Grand River Feasibility Study

Section 404(b)(1) Guidelines Evaluation

September 2019

US Army Corps of Engineers ®
Kansas City District

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Table of Contents

Table of Contents 3
1.0. Introduction 4
2.0. Project Description 4
2.1. Location 4
2.2. General Description of Project Components 4
2.3. General Description of Dredged and Fill Material 11
2.4. Authority 12
3.0. Review of Compliance 13
4.0. Technical Evaluation Factors (Subparts C-F) 14
4.1. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C) 14
4.1.1. Substrate 14
4.1.2. Suspended Particles/Turbidity 14
4.1.3. Water 14
4.1.4. Current Patterns and Water Circulation 14
4.1.5. Normal Water Fluctuation 14
4.1.6. Salinity Gradients 15
4.2. Potential Impacts to the Biological Characteristics of the Aquatic Ecosystem (Subpart D) 15
4.2.1. Threatened and Endangered Species 15
4.2.2. Fish, crustaceans, mollusks, and other aquatic organisms in the food web 15
4.2.3. Other Wildlife 15
4.3. Potential Impacts on Special Aquatic Sites (Subpart E) 15
4.3.1. Sanctuaries and Refuges 15
4.3.2. Wetlands, Mud flats, and Vegetated Shallows 15
4.3.3. Coral Reefs 16
4.3.4. Riffle and pool complexes 16
4.4. Potential Effects on Human Use Characteristics 16
4.4.1. Municipal and private water supplies 16
4.4.2. Recreational and commercial fisheries 16
4.4.3. Water-related Recreation 16
4.4.4. Aesthetics 16
4.4.5. Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves 16
4.5. Evaluation of Dredged or Fill Material (Subpart G) 16
4.5.1. General Evaluation of Dredged or Fill Material 16
4.5.2. Chemical, biological, and physical evaluation and testing 16
4.6. Disposal Site Delineation (§230.11 f) 16
4.7. Actions Taken to Minimize Adverse Effects (Subpart H) 17
4.8. Factual Determinations (§230.11) 17
4.9. Findings (§230.12) 17

1.0. Introduction

This Section 404(b)(1) Evaluation is for the Grand River Feasibility Study Tentatively Selected Plan (TSP), which includes a suite of ecosystem restoration actions proposed for implementation in the Lower Grand River sub-basin. This evaluation meets the requirements found in 40 CFR 230, Section 404(b)(1): Guidelines for Specification of Disposal Sites for Dredged and Fill Material.

The Missouri Department of Conservation (MDC) and the Missouri Department of Natural Resources (MoDNR) are the cost-share sponsors and signatories to the Feasibility Cost Share Agreement. The Environmental Protection Agency (EPA), Missouri Department of Transportation (MoDOT), U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS), and U.S. Geological Survey (USGS) are study partners.

2.0. Project Description

2.1. Location

Components of the tentatively selected plan would be located on and around Pershing State Park, Fountain Grove Conservation Area (Fountain Grove CA), and Swan Lake National Wildlife Refuge (NWR) in Carroll, Chariton, Linn and Livingston counties in north central Missouri (Figure 1). The TSP also includes implementation of approximately 316 bank stabilization projects in the upper portion of the Locust Creek sub-basin. Projects may be implemented in the following HUC-10 watersheds: Watkins Creek-Locust Creek (excluding the portion in Iowa); East Locust Creek; West Locust Creek; and Locust Creek.

2.2. General Description of Project Components

Hundreds of miles of channels within the Grand River watershed were straightened in the early 1900s to facilitate agricultural development, causing progressive instability of the watershed, loss of high value habitat, and continually threatened infrastructure. The watershed historically contained diverse complexes of river/stream channel and oxbow habitats, floodplain forest and woodland, bottomland prairie, and terrace prairie and savanna that supported rich animal communities and provided many important ecological functions. Since the mid-1800s, thousands of acres of tallgrass prairie, wetland, and bottomland hardwood habitat have been lost. Over 300 miles of natural stream corridor were channelized, adversely impacting thousands of linear feet of riparian and aquatic habitat. Sediment deposition, erosion, and habitat degradation have increased in intensity, which are now serious problems.

The TSP is composed of actions within the three focus study areas: Locust Creek, Fountain Grove, and Yellow Creek. The Locust Creek TSP features include a diversion berm across the Locust Creek floodplain and extending into the Locust Creek channel upstream of Pershing State Park. The floodplain portion of the berm would serve to prevent the progression/formation of additional avulsions that might divert water and bypass the sediment detention basin. The in-channel portion of the berm would serve to divert flows into the sediment basin while also allowing water to continue downstream on Locust Creek and Higgins Ditch. Construction of the sediment detention basin would require raising/construction of a perimeter levee around the sediment detention basin (Figure 2). Two spillways were included in the levee raise to allow water to overtop in a controlled manner. A pilot/diversion channel into the sediment detention basin would be excavated to convey sediment and logs away from the diversion berm and reduce the risk of plugging the mouth of the diversion. A portion of the existing levee on the east bank of Locust Creek would be notched to allow flow into the sediment detention basin. In addition, several existing levees within the sediment detention basin would be notched. Log capture features would be incorporated into the sediment detention basin. Water would exit the sediment detention basin through three 6-foot by 6-foot concrete box culverts located on the south side of the sediment detention basin (Figure 2). On-going removal of logs from the basin or log jams in locations adversely impacting the effectiveness of the sediment detention basin would be necessary.

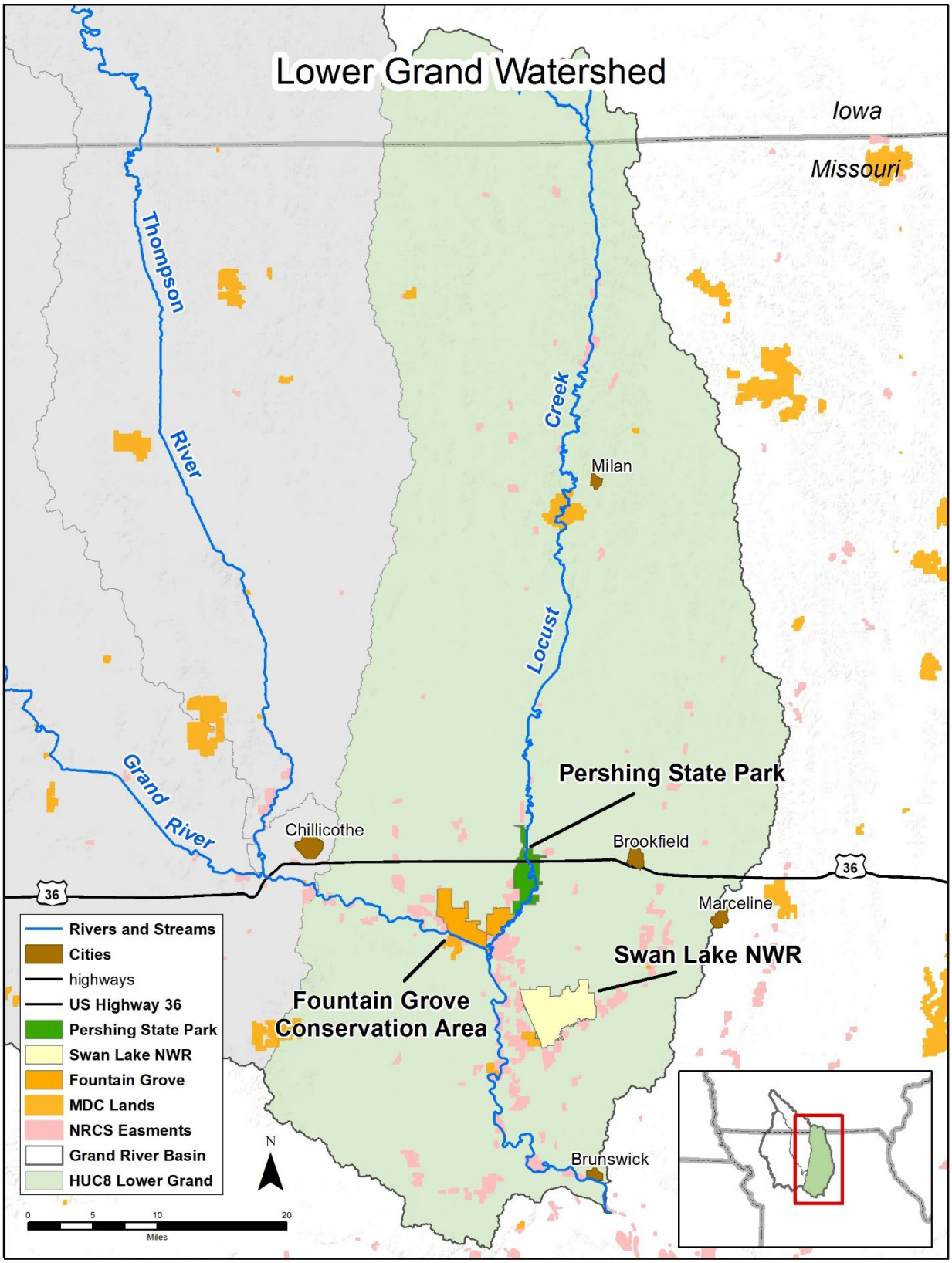

Figure 1. Lower Grand River Sub-basin

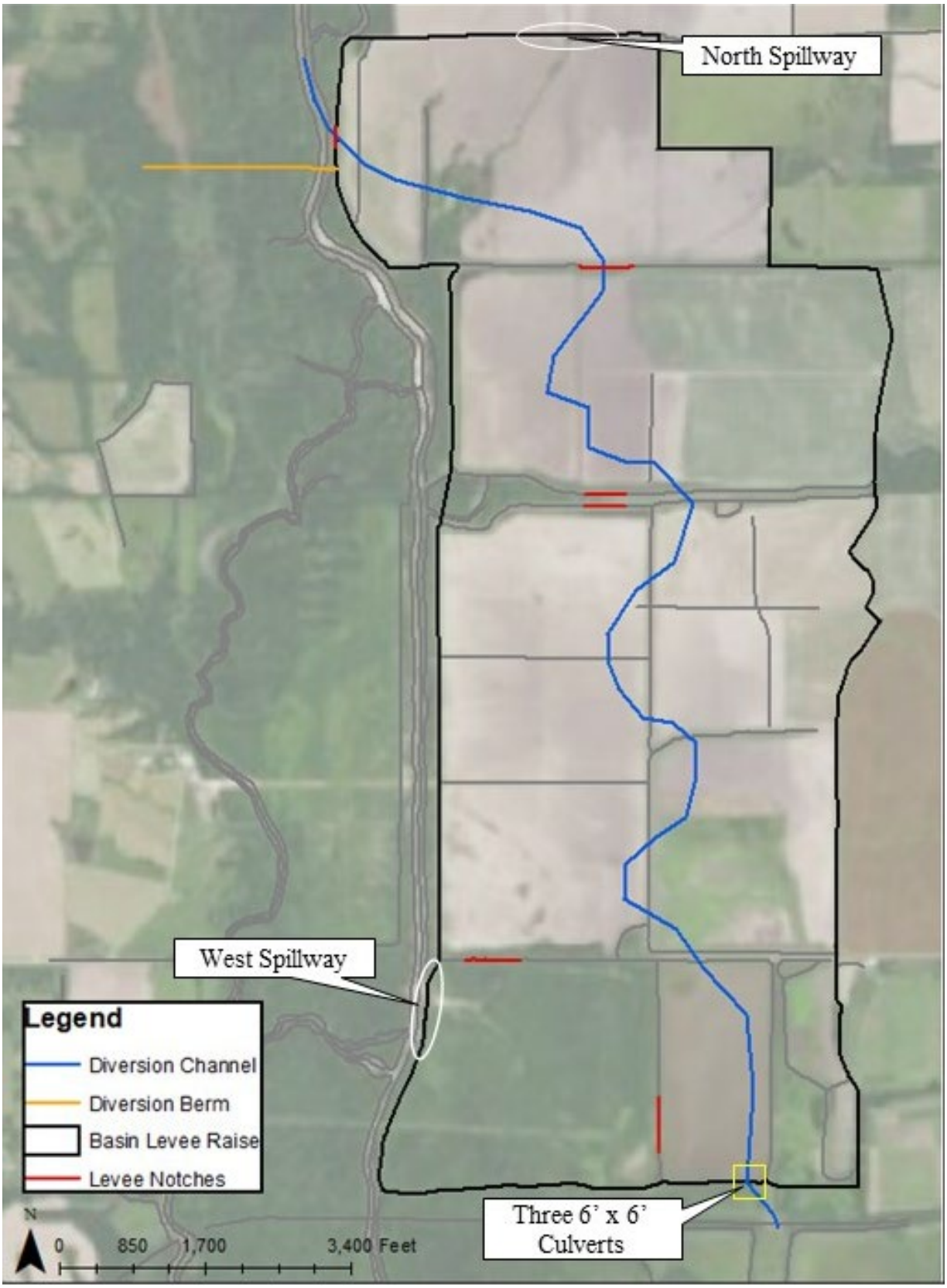

Figure 1. Preliminary Concept of Large Sediment Detention Basin.

The Locust Creek TSP also includes four grade control structures. Two would be located on Locust Creek, one would be constructed along Higgins Ditch, and one on Muddy Creek upstream of its connection with the sediment detention basin to prevent head-cutting. Approximately 23,500 feet of Muddy and Locust creeks would be dredged to provide channel dimensions sufficient to accommodate the historic bankfull flow and provide appropriate slope (Figure 3). Dredge material would be used to perform small levee modifications and habitat enhancements. Dredged material would be spoiled along a portion of Locust Creek (Figure 3) to create an avulsion spoil berm. The partial removal of the levee separating the east and west sides of the Locust Creek floodplain south of HWY36 would help restore floodplain connectivity between Higgins Ditch and the Locust Creek channel.

Bank stabilization measures would be implemented in the Locust Creek watershed upstream of the sediment detention basin. It is estimated that approximately 316 bank stabilization projects would be implemented to achieve a 14% reduction in quantified risk associated with uncertainties in forecasted sediment loading. Projects may be implemented in the following HUC-10 watersheds: Watkins Creek-Locust Creek (excluding the portion in Iowa); East Locust Creek; West Locust Creek; and Locust Creek. Although specific project sites are not known, it is anticipated these project would be relative small in magnitude and plan formulation assumed small bank stabilization sites of approximately 250 feet in length with 12-foot high banks.

The Fountain Grove TSP features a suite of actions to enhance wetlands through increased natural ecosystem form and function, improved habitat development, and improved water management (Figure 4). The bank of the channel downstream of the Pool 3 Levee WCS, referred to as Jackson's Ditch, would be armored to prevent erosion on the neighboring property. This measure allows for opening the gates at Pool 3 Levee WCS to increase the drainage rate from Fountain Grove CA pools. The Pool 1 WCS #1 would be replaced with two 96-inch PVC pipes with two sluice gates. The culverts are used to drain Pool 1 to Pool 2. A new levee would be constructed, running north/south, on the west side of Fountain Grove CA where Parsons Creek flows are entering the area under existing conditions. The levee would prevent flows lower than the 1.2 year recurrence interval from entering Fountain Grove CA and focus Parsons Creek flows towards a controlled overtopping point into a conveyance channel. The Pool 2/3 levee would be moved closer to the pump station and an additional levee would be constructed within Pool 3 to allow for independent water control of all three major pools on Fountain Grove CA. The levee on the east side of Fountain Grove CA would be set back to increase flood resiliency.

A conveyance channel would be excavated through Fountain Grove CA to effectively move Parsons Creek flows through the area during high flow events. Outside of high flow events, the feature serves as a water distribution channel and provides aquatic/edge habitat for wetland species. A portion of the Chillicothe-Brunswick rail berm would be removed.

Micro-topography on the site would be enhanced through the creation of sloughs and habitat mounds. Spoil from drainage channel excavation would be used to form the habitat mounds. Earthwork would be performed to modify the existing pool design on the east side of Fountain Grove CA. The intent would be to provide more naturally shaped wetland pools, which is consistent with modern wetland management practices. The redesign of the pools on the east side would allow for the removal of some water control structures in that area, creating more natural conditions, and allowing for more efficient management.

An additional drainage ditch would be constructed from the proposed Parsons Creek levee to the vicinity of the Fountain Grove CA pump station. This feature would allow for more efficient drainage of Pool 1 when desired. Two electric groundwater pumps would be installed on South Fountain Grove CA to facilitate wetlands development and more reliable hydrology.

The tentatively selected plan for Yellow Creek is alternative YC11. The main feature of the plan is the setback of a levee on Swan Lake NWR (Figure 5). The plan would include levee removal, removing three existing culverts, raising a portion of existing levee, constructing a portion of new setback levee, and addition of two 3-foot diameter concrete culverts with flap gates.

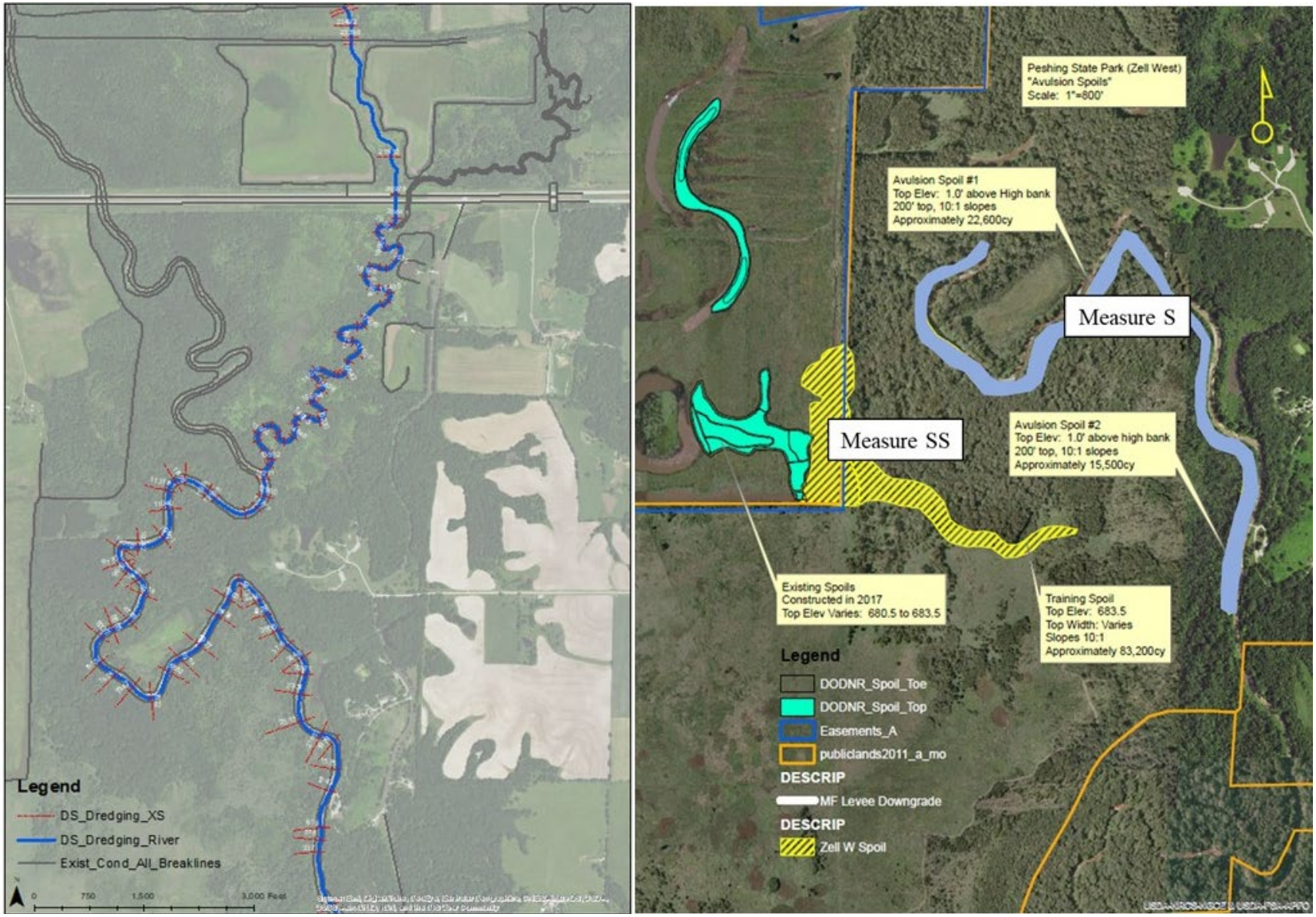

Figure 2. Area of Locust and Muddy Creek dredging (left) and spoil locations (right).

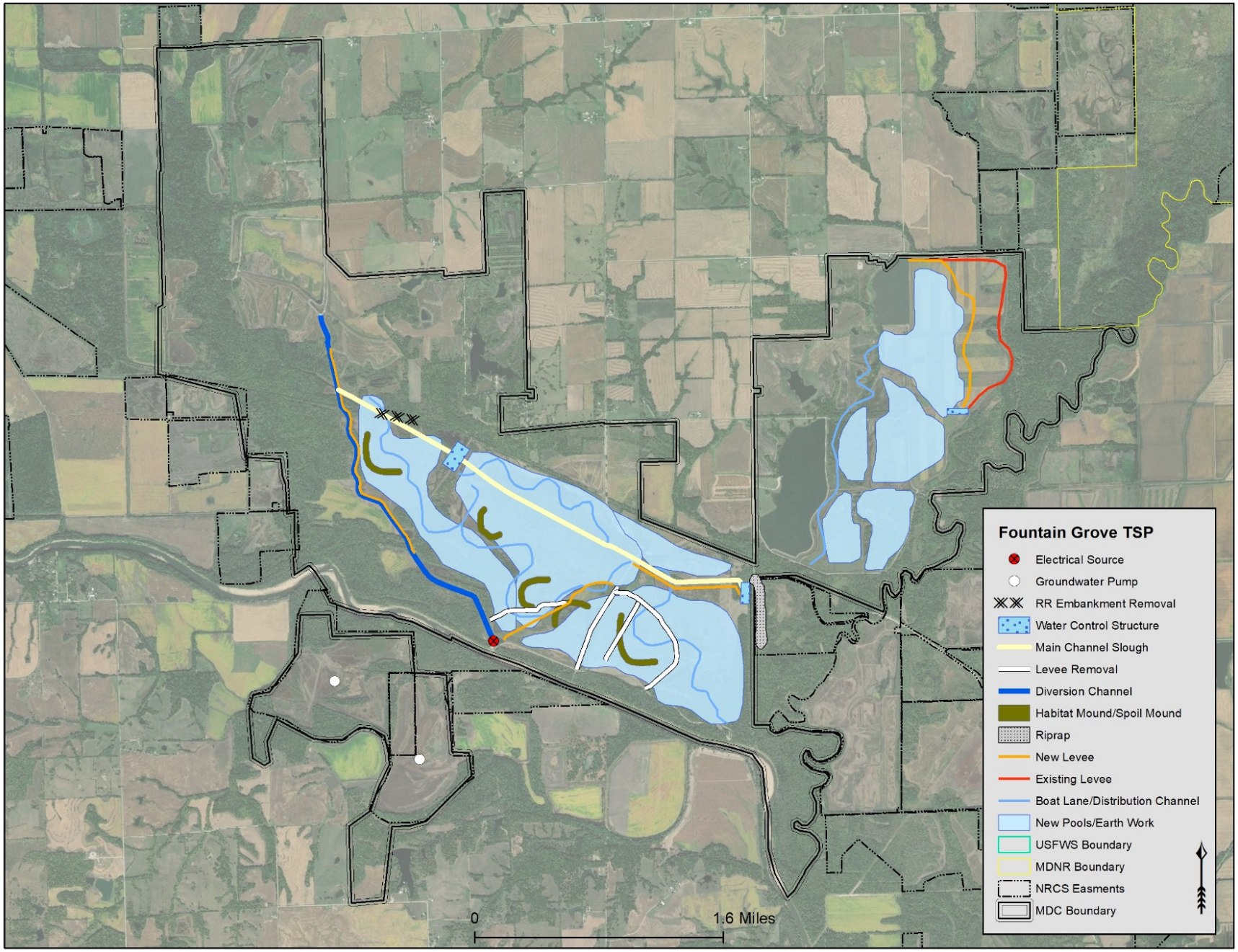

Figure 3. Location of Project Components at Fountain Grove Conservation Area.

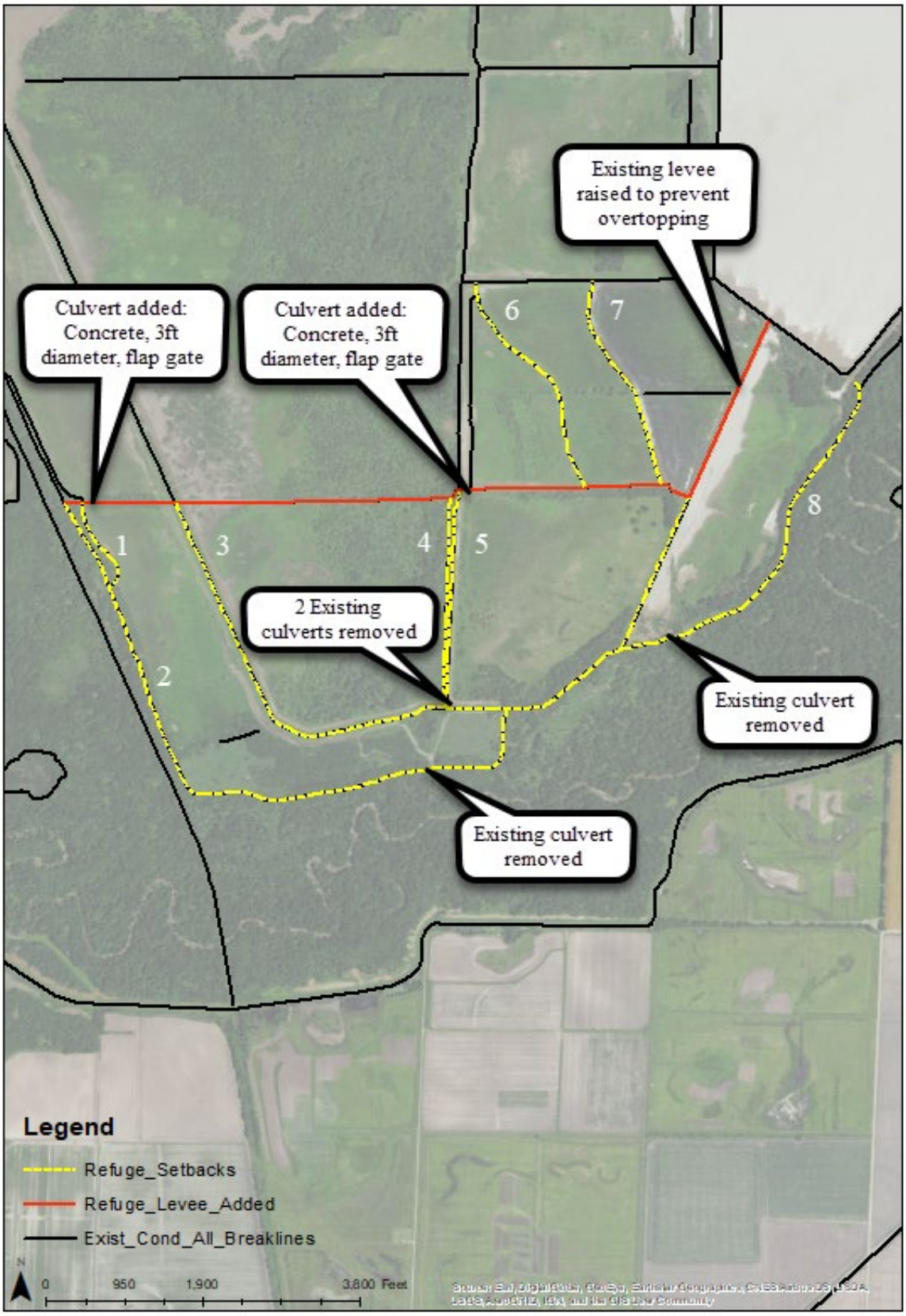

Figure 4. Preliminary Concept of Features Associated with Swan Lake NWR Levee Setback.

2.3. General Description of Dredged and Fill Material

The construction of the tentatively selected plan would require the mechanical excavation of an estimated 1,603,262 cubic yards of material within the study areas; 1,354,200 cubic yards would remain on site (Table 1; Excavation & Earthwork) and be incorporated into constructed management measures (e.g., berms and levees, micro-topography). The remaining 249,062 cubic yards would be permanently hauled off site (Table 1; Excavation & Hauling). Bed sediment samples indicate that the bed of both Locust Creek and Higgins Ditch are predominantly medium and coarse sand. Clean Water Act, Section 401 guidelines do not require elutriate testing or sieve analyses where mechanical excavation is used for sediment removal; therefore, the Corps has not included these in this study.

The tentatively selected plan would also require an estimated total of 64,948 tons of clean riprap to construct management measures. This does not include the amount of riprap that may be incorporated into the upstream bank stabilization projects. The tentatively selected plan would result in approximately 102.25 acres of tree clearing for clearing and grubbing associated with construction. The excavated material from tree clearing would be wasted on-site. Operations and maintenance of the constructed features may require future replacement of rock on grade control or bank stabilization structures, as well as the periodic removal of logs from the sediment detention basin or other locations in the study area. During the feasibility study, the USACE planning team avoided and minimized impacts to wetlands with placement of management measures. This 404(b)(1) evaluation covers the management measures included in the tentatively selected plan.

Table 1. Excavation, Earthwork, Riprap, and Clearing/Grubbing Summary.

Measure	Excavation & Earthwork (cubic yards) – Material kept on-site	Excavation & Hauling (cubic yards) – Material disposed off-site	Riprap Placed (tons)	Clearing & Grubbing* (acres)
Locust Creek				
Levee notch for flow entrance to sediment detention basin	NA	8,705	1,608	1.23 (0.25)
Diversion berm	1,524	NA	3,180	4.0 (4.0)
Pilot/diversion channel	263,000	NA	NA	5.0 (4.0)
Spillways		143,630	6,468	0.5
Dredge of Muddy and Locust creeks	143,081	NA	NA	2.75
Grade control	2,778		22,230	5.0
Avulsion spoil berm		NA	NA	86.0 (86.0)
Habitat enhancements	NA	NA	NA	47.0 (8.0)
Exit culvert	4,231		1,200	4.0
Levee notches	NA	50,948	18,342	2.0
Perimeter levee	11,970	NA	NA	
Log capture	4,231	NA	120	1.0
Sub-total	430,815	203,283	53,148	158.5 (102.25)
Fountain Grove				
Bank Armoring	NA	NA	4,000	
Cut/move existing berms	75,610	NA		10.0
Water control structures	1,519	NA	3,600	

Measure	Excavation & Earthwork (cubic yards) – Material kept on-site	Excavation & Hauling (cubic yards) – Material disposed off-site	Riprap Placed (tons)	Clearing & Grubbing* (acres)
Levee construction/ modifications	15,605	NA	4,200	9.2
Conveyance channel	27,701	NA	NA	
Pool 1 drainage	35,990	NA	NA	11.0
Rail berm removal	23,510	NA	NA	2.0
Boat lanes and islands	220,111	NA	NA	15.4
Levee setback	100,474	NA	NA	
Micro-topography	338,670	NA	NA	
Sub-total	839,190	0.0	11,800	47.6
Yellow Creek				
Levee setback	84,195	45,779	NA	10.0
Sub-total	84,195	45,779	NA	10.0
Total:	1,354,200	249,062	64,948	216.10 (102.25)

Note * Acres presented parenthetically are estimates of tree clearance associated with the clearing and grubbing amounts.

2.4. Authority

The feasibility study was authorized by resolution of the Committee on Environment and Public Works of the United States Senate during the 108th Congress 2nd Session on June 23, 2004. The authorization stated:

> *That the Secretary of the Army is requested to review the report of the Chief of Engineers on the Grand River and Tributaries, Missouri and Iowa, published as House Document 241, 89th Congress, First Session, and other pertinent reports, to determine whether any modifications of the recommendations contained therein are advisable at the present time in the interest of flood damage reduction, municipal and industrial water supply, recreation, fish and wildlife conservation, or environmental restoration in the Grand River Basin, Iowa and Missouri.*

The overall purpose of the study is to identify a plan to achieve ecosystem restoration benefits within the Lower Grand River sub-basin. Specifically, to reverse the trend of degradation of wetland, aquatic, and floodplain habitats within the areas of Pershing State Park, Fountain Grove CA, Swan Lake NWR, Yellow Creek CA, and surrounding public and private lands. The study seeks to identify a plan that contributes to the national ecosystem restoration (NER) objective by increasing the net quantity and/or quality of desired ecosystem resources.

3.0. Review of Compliance

The TSP would result in 5,184 average annual habitat units (AAHUs) of wet prairie, 8,524 AAHUs of wetland, 6,120 AAHUs of forest, and 199 AAHUs of aquatic riverine habitat types. This represents a net increase of 2,453 AAHUs of these habitats within the study area when compared to the expected degradation under the future without project condition. Although construction of TSP components would occur in waters of the U.S. including streams and wetlands, the project would result in substantial benefits to habitat and no other plan provides the same benefits with fewer temporary adverse impacts. Impacts to wetlands and waters of the United States are from construction would be minimized to the extent practicable during design and BMPs will be used during construction to avoid potential impacts to wetlands and other waters of the United States. Additional information on the impacts of various alternatives can be found in Chapter 5 of the Draft Feasibility Report and Environmental Assessment.

The TSP would not be anticipated to violate any applicable state water quality standards, or applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act. The TSP is not likely affect species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or result in the destruction or adverse modification of critical habitat.

The TSP would not cause or contribute to significant degradation of waters of the United States. Contrary to that, the evaluation of the TSP indicates it would substantially benefit waters of the United States and reduce ongoing degradation to waters of the United States occurring in the study area.

Implementation of best management practices (BMPs) during construction activities would minimize potential adverse impacts on the aquatic ecosystem.

4.0. Technical Evaluation Factors (Subparts C-F)

4.1. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

4.1.1. Substrate

Existing substrate at the location of grade control and bank stabilization projects is typically characterized by highly erosive materials such as silts and sands. Grade control would involve burying the existing substrate through the placement of riprap along the toe of the eroding banks and extending across the stream channel. Over time, the spaces in the riprap would be anticipated to fill in with similar material to what existing previously (i.e. silts and sands). However, the substrate at the grade control locations would be primarily characterized by stone over the long-term. Upstream banks stabilization projects would rely primarily on vegetative materials for stabilization such as logs or cedar revetments; however, the use of rock riprap would be possible depending on the project site.

4.1.2. Suspended Particles/Turbidity

The TSP could result in minor, short-term impacts to suspended particulates and slight increases in turbidity within Muddy Creek, Locust Creek, Higgins Ditch, Jacksons Ditch, and upper sub-basin streams during construction. This would result from the placement of riprap and construction of grade control, the diversion berm, or bank stabilization projects. BMPs would be implemented to avoid and minimize any potential construction related impacts to water quality. Implementation of the TSP is forecasted to reduce sediment loading within the study area and as a result would be anticipated to have a long-term beneficial effect on water quality, included suspended particulates and turbidity.

The TSP would not violate any general criteria of the Missouri Water Quality Standards, 10 CSR 20-7.031. No significant adverse impacts to the chemical and physical properties of the water column are expected.

4.1.3. Water

Substantial differences in water chemistry following TSP construction are not expected, and the project is not anticipated to result in violations of applicable state water standards. The rock materials are inert, having little effect on water chemistry. Odor, taste, pH, temperature and dissolved gas changes would not be affected. Turbidity (as measured by total suspended solids) is expected to temporarily increase during construction; however, in the long-term turbidity is expected to improve with constructed measures by reducing bank line inputs of sediments. Best management practices would be implemented during construction. The construction should not impair the aquatic ecosystem's capability to sustain life or reduce the suitability of the Locust Creek, Muddy Creek, or Higgins Ditch for aquatic organisms, human consumption, recreation or aesthetics.

4.1.4. Current Patterns and Water Circulation

Grade control and bank stabilization projects use earthen fill material and clean rock fill to protect streambanks from erosion and redirect the flow of water away from the eroding bank. Any changes to the direction or velocity of water flow and circulation in the localized area of the grade control or bank stabilization projects would be minor. No significant impacts to the location, structure, and dynamics of the aquatic community, or the rate and extent of the mixing of dissolved and suspended components of the water bodies are anticipated. The TSP would intentionally redirect water flow from Higgins Ditch back to Locust Creek to restore lower Locust Creek, which is listed on the National Rivers Inventory.

4.1.5. Normal Water Fluctuation

The TSP is anticipated to change water surface elevations for the 100-year event within the study area. By design, water surface elevations would increase in the area of the sediment detention basin. The

forecasted changes to water fluctuations are anticipated to be beneficial to wetlands and aquatic ecosystems within the study area.

4.1.6. Salinity Gradients

The TSP would not impact salinity gradients. These are freshwater systems and this would not change as a result of the TSP.

4.2. Potential Impacts to the Biological Characteristics of the Aquatic Ecosystem (Subpart D)

4.2.1. Threatened and Endangered Species

Presence of, or use by, endangered and threatened species is discussed in the Feasibility Report with Integrated Environmental Assessment. No adverse impacts are expected to result from the tentatively selected plan. Refer to Chapter 5-Environmental Consequences of the Feasibility Report with Integrated Environmental Assessment. A Biological Assessment has been prepared and submitted to the USFWS. In accordance with Section 7 Endangered Species Act (ESA) guidelines, USACE concluded a determination of “May Affect, Not Likely to Adversely Affect” for the following species: gray bat (*Myotis grisescens*), Indiana bat (*M. sodalis*), northern long-eared bat (*M. septentrionalis*) and a determination of "No Effect" for the pallid sturgeon (*Schaphirhynchus albus*). Potential for conservation measures is anticipated and is currently being coordinated between USFWS and the USACE. Full compliance with ESA would occur prior to construction.

4.2.2. Fish, crustaceans, mollusks, and other aquatic organisms in the food web

The TSP would not result in significant adverse impacts to aquatic organisms. Minor, short-term impacts to the aquatic community may result from the smothering of immobile organisms, direct displacement of organisms, and an increase in turbidity, during construction. The impact may affect a small number of individuals in a small stretch of waterbodies but would be unlikely to have a significant impact on the overall population of any particular species. It is anticipated that following construction there would be a long-term beneficial impact by reducing the amount of sediment entering the study area streams and providing a substrate for benthic organisms.

4.2.3. Other Wildlife

The TSP would result in beneficial long-term impacts to fish and wildlife resulting from an increase in the quantity and quality of habitat. Net increase in AAHUs modeled for habitat evaluation and quantification is considered representative for the effects of alternatives on fish and wildlife populations. The TSP includes construction of features that would result in ground disturbance and/or tree clearing. Fish and wildlife within proximity to project features would experience short-term direct adverse impacts from construction activities and/or short-term indirect adverse impacts from construction-related noise or disturbance. These impacts are anticipated to be negligible to minor.

4.3. Potential Impacts on Special Aquatic Sites (Subpart E)

4.3.1. Sanctuaries and Refuges

The study area and features of the tentatively selected plan include levee setback actions on Swan Lake National Wildlife Refuge. The actions were formulated in coordination with the USFWS and are intended to benefit ecological resources on Swan Lake NWR. Any effects to Swan Lake NWR are anticipated to be beneficial.

4.3.2. Wetlands, Mud flats, and Vegetated Shallows

It is anticipated that these habitats within the study area would benefit over the long-term through a reduction in sedimentation and habitat degradation.

4.3.3. Coral Reefs

There are no coral reefs in the study area.

4.3.4. Riffle and pool complexes

The study area has experienced a drastic reduction in riffle-pool complexes from the long-term impacts of sedimentation in the sub-basin. Grade control structures and other bank stabilization projects would be designed to the extent possible to restore riffle-pool features within the study area.

4.4. Potential Effects on Human Use Characteristics

4.4.1. Municipal and private water supplies

The TSP is not anticipated to have any effect on municipal and private water supplies.

4.4.2. Recreational and commercial fisheries

Long-term beneficial impacts to fisheries would be expected from improved aquatic riverine habitat quality.

4.4.3. Water-related Recreation

Recreation would be temporarily restricted in the study area during construction activities. Over the long-term, the TSP is anticipated to benefit recreation within the study area.

4.4.4. Aesthetics

There may be short-term minor impacts to aesthetics during construction activities. However, over the long-term aesthetics would remain consistent with a rural, natural area setting.

4.4.5. Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves

Beneficial impacts are expected to parks and conservation areas within the study area.

4.5. Evaluation of Dredged or Fill Material (Subpart G)

4.5.1. General Evaluation of Dredged or Fill Material

Fill materials placed below the ordinary high water mark typically consist of earthen fill materials from the existing stream bank, logs, and/or clean rock fill with minimal fines obtained from a commercial source. Prior experience indicates that commercially available rock fill would be free from chemical biological, or other pollutants.

4.5.2. Chemical, biological, and physical evaluation and testing

The fill material would meet the testing exclusions based on the fact that it consists of local earthen materials and clean rock fill from a commercial source. No contaminants would be excavated exceeding the USEPA standards in identified substrates. Possible introduction by equipment or construction-related contaminants would be controlled by adherence to runoff monitoring plans during construction activity. No additional toxic material would be introduced to the area over ambient conditions as a result of construction activities. Rock riprap would be clean, uncontaminated stone from an approved source in compliance with the Clean Water Act, Section 404 Missouri Regional Condition #4 and Section 401 Water Quality Certification Condition #5.

4.6. Disposal Site Delineation (§230.11 f)

The fill locations would consist of the streambank and channel of the proposed project areas. Typically local earthen materials and clean rock fill with minimal fines would be used to stabilize the stream banks.

The minimum amount of fill necessary would be determined. The depth of water, current velocity, direction, and variability, the degree of turbulence, and rate of discharge at the disposal site would be considered in determining the acceptability of the mixing zone. Spoil from project activities would be placed as identified in Figure 3.

4.7. Actions Taken to Minimize Adverse Effects (Subpart H)

The construction contractor would be required to obtain a Section 402 NPDES storm water permit from the state. As part of the NPDES permit, the Best Management Practices would be required to minimize the incidental fallback of material into the waterway and to minimize the fuel, petroleum products, or other deleterious material from the waterway. Such measures could include the use of erosion control fences; storing equipment, solid waste, and petroleum products above the ordinary high water mark and away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. To prevent fill from reaching the water by wind or runoff; fill would be covered, stabilized, or mulched, and silt fences would be used as required. Additional measures to minimize adverse effects would include using clean rock fill with minimal fines, stabilizing the earthen material with rock, using appropriate construction equipment, minimizing the amount of time that construction equipment would be in the river channel, and not placing fill in the river during unusual high water events.

4.8. Factual Determinations (§230.11)

A review of the items 4 through 7 of this report indicates that there is minimal potential for long-term adverse environmental effects of the potential discharge. Additionally, there are not expected to be any cumulative or long-term secondary impacts as a result of the TSP.

4.9. Findings (§230.12)

The TSP has been evaluated and determined to be in compliance with the Clean Water Act Section 404(b)(1) guidelines.