UNITED STATES ARMY CORPS OF ENGINEERS

Record of Decision
for
Authorization of
Commercial Sand and Gravel Dredging
on the
Lower Missouri River

MARCH 2011

Prepared by
U.S. Army Corps of Engineers
Kansas City and St. Louis Districts

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SECTION 1

Introduction

1.1 RECORD OF DECISION

This document constitutes a Record of Decision (ROD) for permit applications under Section 10 of the Rivers and Harbors Act of 1899 (33 United States Code (U.S.C.) § 403, hereafter the RHA)) and Section 404 of the Clean Water Act (33 U.S.C. § 1344, hereafter the CWA)) and for a Final Environmental Impact Statement (Final EIS) for proposed commercial dredging in the Missouri River in the states of Kansas and Missouri. In compliance with the National Environmental Policy Act (NEPA), a Final Environmental Impact Statement for Missouri River Commercial Dredging (USACE, 2011) was completed and a Notice of Availability was published in the Federal Register (76 Fed. Reg. 10583 (Feb. 25, 2011)). This ROD addresses the requirements contained in Section 10 of the RHA, Section 404 of the CWA, and NEPA and was prepared in accordance with the procedures described at 33 Code of Federal Regulations (C.F.R.) Part 320-332, including Appendices B and C.

1.2 PERMIT DECISION.

I have reviewed and evaluated the permit applications in light of the overall public interest, the environmental, social, engineering and economic considerations, and in accordance with applicable laws, regulations, and policy cited above. It is my decision based on all available information, including the Final EIS, that issuance of permits under authority of Section 10 of the RHA and Section 404 of the CWA to authorize the alternative identified by the U.S. Army Corps of Engineers (USACE) as the Least Environmentally Damaging Practicable Alternative (LEDPA) is in compliance with Section 404(b)(1) Guidelines and is not contrary to the public interest. The authorization will contain special conditions and mitigation requirements to avoid, minimize and mitigate project-related impacts. Therefore, permits will be granted to Holliday Sand & Gravel Company, LLC; Capital Sand Company, Inc.; Hermann Sand and Gravel, Inc.; Con-Agg of MO, LLC; J.T.R., Inc.; and Limited Leasing Company and authorization for Master's Dredging Company, Inc. and Edward N. Rau Contractor Company will be denied, based on the following information contained in this document. Authorization will also be denied for Capital Sand Company, Inc. to expand their operation between river miles 40 and 50 within the USACE St. Louis District.

SECTION 2

Project Information

2.1 PROPOSED ACTION

The USACE Kansas City and St. Louis Districts have received 11 permit applications from eight companies (Dredgers) to extract 11,615,000 tons of sand and gravel annually from specifically identified reaches of the lower Missouri River (LOMR) totaling approximately 390 miles of the river between St. Louis, Missouri and Rulo, Nebraska (see Table 2-1). The applicants include companies who would:

- Own and operate dredging equipment, tug boats, and barges and who would dredge sand and gravel from within their requested dredging reaches and deliver it to their own onshore sand plants;
- Own onshore sand plants and contract with other companies to dredge sand and gravel from within their requested dredging reaches and deliver it to onshore sand plants; and
- Own dredging equipment and contract to deliver sand and gravel dredged from their requested dredging reaches to onshore plants owned by other companies.

All but two of the applicants – The Master's Dredging Company, Inc. and Edward N. Rau Contractor Company – are currently authorized to dredge on the LOMR.

Dredging activities to be conducted under permits issued by the USACE would include dredging of river sediments from the navigable waters of the LOMR, extraction of suitable sand and gravel, and return (discharge) of some of the dredged material into the river. Dredging for sand and gravel on the LOMR is conducted by using hydraulic suction-head or cutter-head dredges mounted on movable barges. The dredge consists of mechanical equipment mounted on a barge that can be moved into position and anchored during dredging operations. The dredge barge is held in a fixed position during dredging by deploying large, fortress-style anchors from the forward corners of the barge on the end of 1,000- to 2,000-foot-long cables. By selectively manipulating the length of each anchor cable, the dredge can be moved forward, backward, and from side to side during the dredging operation. From a single anchoring position, a dredge can operate in an area approximately 1,000–2,000 feet in length and approximately 400–500 feet in width before moving the anchors. Some dredges include piles (called

"spuds") that can be raised and lowered to the river bottom, to assist with maintaining the dredge position.

Table 2-1 Summary of Permit Applications for Commercial Dredging in the Lower Missouri River

Permit Applicant	Amount Requested (tons/yr)	Segment of Operation [a]	General Reaches Requested [b] (river mile)	Activity [c]
J.T.R., Inc. (three St. Louis District permits for three operations)	1,550,000	St. Charles	0–35	Suction dredging / distribution
Limited Leasing Company (St. Louis District permit)	1,200,000	St. Charles	0–47	Suction dredging
Capital Sand Company, Inc. (St. Louis District permit)	500,000	St. Charles	40–50	Cutter-head dredging/ distribution
Edward N. Rau Contractor Company (Kansas City District Permit)	100,000	St. Charles	62–75	Distribution
Capital Sand Company, Inc. (Kansas City District permit)	2,255,000	St. Charles, Jefferson City, and Waverly.	62–354	Cutter-head dredging / distribution
Hermann Sand & Gravel, Inc. (Kansas City District Permit)	1,000,000	St. Charles, Jefferson City	56–164	Cutter-head dredging / distribution
Con-Agg of MO, L.L.C. (Kansas City District Permit	250,000	Jefferson City	177–202	Distribution
Holliday Sand & Gravel Company, L.L.C. (Kansas City District Permit)	3,760,000	Waverly, Kansas City, and St. Joseph	320–459	Cutter-head dredging / distribution
The Master's Dredging Company, Inc. (Kansas City District Permit	1,000,000	St. Joseph	383–390	Cutter-head pipeline dredging / distribution
Total	11,615,000		0–390	

[a] For analysis, the lower Missouri River has been divided into five segments: St. Charles (river mile [RM] 0 – RM 130; Mississippi River to Osage River); Jefferson City (RM 130 – RM 250; Osage River to Grand River); Waverly (RM 250 – RM 357; Grand River to Blue River); Kansas City (RM 357 – RM 391; Blue River to Platte River); and St. Joseph (RM 391 – RM 498; Platte River to Rulo, Nebraska). See Section 3.3 of the Final EIS for further discussion.

[b] Indicates total range of the river within which individual reaches have been requested.

[c] Distribution indicates operation of an onshore sand plant for offloading, processing, storage, and distribution of sand and gravel. Those operations that are distribution only would contract another company to dredge for them.

All permit applicants use one of two types of hydraulic suction dredges. In the upper and middle segments, the currently authorized operations use dredges with cutter heads and onboard processing equipment. A new applicant, The Master's Dredging Company, Inc., proposes to use a pipeline dredge that conveys the dredged material as slurry in a pipeline to an onshore processing plant. Dredges with

suction heads and simple onboard screens are used in the lower segments of the LOMR. During dredging, the dredging head (with or without a cutter head) and a suction line are mounted on a boom (called a ladder) that is lowered to the river bed. Sediment is removed from the river bottom until the suction head comes into contact with hard materials (such as bedrock, large rock substrates, or consolidated sediment layers)—at which time the suction head does not advance further into the river bottom, and the amount of bottom sediments sucked into the suction head is greatly reduced. The dredge boom is then raised, the dredge is relocated, and excavation recommences.

The characteristics of bottom sediments in the LOMR vary with location. Dredging in the LOMR produces material of highly variable grain size, including small stones, coarse and fine gravels, sands of various sizes, fine material, and some lignite particles. Sand and gravel suitable for commercial use in building materials must meet material specifications defined by grain size distribution and proportion of each grain size that may be included in the product. The dredged material is passed though screens and settling-sorting equipment to achieve a desired grain size distribution that meets material specifications for various commercial uses. The material ranging from 0.1 to 4.0 millimeters (mm) is typically retained, and the unwanted material is discharged into the river. Most applicants load marketable material onto barges that are tied alongside the dredge barge. The barges, typically ranging from 120 to 200 feet long and from 30 to 45 feet wide, are pushed upstream and downstream by towboats. During loading and transport, river water drains from the loaded sand and is discharged back to the river via scuppers on the barge. For dredging operations in the lower segments of the LOMR, where discharge screens are used to sort the dredged material, this runoff is a considerable volume. No specific testing of overboard discharge of dredge slurry water or undesirable size fractions of sediment is conducted, as the discharged material is not exposed to any processing other than sorting.

Once loaded, barges are moved upstream or downstream to a sand plant, where they are tied next to an unloading barge with conveyor transfer equipment. Earth-moving equipment is used to transfer the sand and gravel to a conveyor system that moves it ashore; following offloading at the sand plant, empty barges are returned to the dredge site for reloading. Offloaded material may be washed to remove lignite, resorted into various classifications, and stored for sale and transport. The terminal where the unloading barge is located (the sand plant) typically includes a system of overhead conveyors, stackers, and earth-moving equipment for moving and stacking bulk materials; truck loading facilities; scales; and equipment maintenance facilities.

The Master's Dredging Company's operation would convey the dredged material in a pipeline as slurry to an onshore plant where the material is processed much as described above but the water is discharged into a settling pond before it is eventually discharged back into the river.

Sand plant facilities typically have direct access to local, state, and interstate highway systems for product transport. The onshore terminal may also include moorage for dredge barges, transport barges, and towboats. To the extent practicable, vessel maintenance is performed at the onshore facility. Existing and proposed plant facilities are subject to separate permitting and review and are considered in this decision only to the extent that secondary and cumulative impacts of these facilities, resulting from dredging, has been identified.

Table 2-2 identifies the dredging equipment, barges, and towboats that will be used by the applicants. The location, approximate size and storage capacity, length of water frontage, and adjacent land use of each sand plant facility currently operated or proposed by the dredging applicants is shown in Table 2-3.

Table 2-2 Dredging Production Equipment to Be Used by the Applicants

Permit Applicant	Dredge Barges	Towboats	Barges
J.T.R., Inc.	3	3	7
Limited Leasing Company	3	3	29
Capital Sand Company, Inc.	3	3	12
Hermann Sand & Gravel, Inc.	1	3	4
Con-Agg of MO, L.L.C.	0	0	0
Holliday Sand & Gravel Company, L.L.C.	3	5	13

Dredging typically occurs from March through December. During the coldest periods, when ice formation may hinder operations and demand for aggregate and sand is lowest, the Dredgers typically perform annual maintenance on their equipment. Dredging operations are typically performed only during daylight hours but are capable of operating around the clock.

Seasonal flows, the configuration of river training structures and bends, and sediment transport in the river generate a pattern of sediment deposition that dredge operators can reasonably predict in some locations. Based on previous experience, dredge operators frequently return to known locations of sediment deposits that meet sand and gravel market criteria. Being able to return to specific locations minimizes the time for dredge movement, produces more consistent dredge material, maximizes yield for a given period of dredging, and reduces the cost of operation. Experience gained over time helps

the dredge operators identify these prime locations. Moving to a new reach requires the dredger to search for new or other prime locations, increasing costs and reducing the certainty of supply.

Since 2008, each permitted dredge operator has been required to continuously report its dredge location using global positioning system (GPS) coordinates and its operating status. This reporting has provided a better understanding of where dredging is occurring. The applicants prefer to dredge at locations upstream of the sand plant. This allows loaded barges to travel downstream with the current and empty barges to travel back upstream. River currents in the LOMR are swift, and pushing loaded barges upstream is more costly in terms of fuel consumption. Dredging typically occurs no more than 7–10 miles upstream of a company's sand plant and typically no more than 3–9 miles downstream. This range is dictated by the travel times to move loaded barges to the plant, offload, and return to the dredging site, and by the associated fuel costs. Extending the range of dredging upstream from a sand plant would require using additional barges and tugs to maintain full-time operation of the dredge. Some companies contract for dredging and delivery of dredged sand and gravel, causing some dredging equipment to be relocated to different reaches or segments of the LOMR.

For more detail about the Proposed Action see Section 2.2.1 through 2.2.4 of the Final EIS.

2.2 JURISDICTION

The proposed dredging would take place in the Missouri River. One of the congressionally authorized purposes of the LOMR is navigation, and the LOMR is in fact navigated for various commercial purposes. Under Section 10 of the RHA, the USACE has authority over dredging activities in navigable waters of the United States. The LOMR is clearly a navigable waterway and thus is regulated under Section 10.

The LOMR commercial dredging operations extract sand and gravel from the river bed using hydraulic suction dredges. The dredges operated by Holliday Sand & Gravel Company have onboard equipment to sort the dredged material, press the water out of the desired material, and discard unwanted excessively fine or coarse material and water back into the river in a process that takes several minutes. The desired material is discharged onto a barge and the unwanted material is discharged into the river at a point 40 feet or more from the suction dredge head. The other dredges on the LOMR do not have onboard sorting and drying equipment, and discharge the pumped material and water directly through screens onto a barge with slots or drain holes to allow the water to drain out. Dredged material is discharged back into the river in the form of cobbles and debris separated by the screens, and a

Table 2-3 Sand Plants in the Lower Missouri River

Company	Plant Name	Location (river mile)	Size (acres)	Storage Capacity	Adjacent Land Use
Holliday Sand & Gravel Company, L.L.C.	St. Joseph	447.7	11	100,000	Industrial
	Riverside	371.8	28	200,000	Industrial
	Randolph	359.9	17	100,000	Industrial
Total			56	400,000	
Capital Sand Company, Inc.	Lexington	317.2	30	135,000	Agricultural
	Carrollton	287.0	12	10,000	Agricultural
	Glasgow	226.2	3.5	38,000	Industrial
	Boonville	196.6	4	50,000	Agricultural
	Rocheport	186.3	10	68,000	Agricultural
	Washington	65.4	21	150,000	Agricultural
	Jefferson City	143.5	9	202,000	Agricultural/ Industrial
Total			89.5	653,000	
Hermann Sand & Gravel, Inc.	Jefferson City	146.6	12 [a]	150,000	Agricultural
	Hermann	96.9	17 [a]	150,000	Agricultural/ Industrial
Total			29[a]	400,000	
J.T.R., Inc.	St. Charles	16.7	2[a]	60,000	Industrial
	Riverview	31.2	2	40,000	Industrial
Total			4	100,000	
Limited Leasing	Bridgeton[b]	44.0	30	90,000	Industrial
	Chesterfield[b]	28.0	86	190,000	Industrial
	F. Belle[c]	8.2	10	50,000	Industrial
	Alton[d]	203.9	3	N/A	Industrial/ Commercial
Total			N/A	230,000	

Notes:

N/A = Not applicable.

[a] Numbers are approximate.

[b] Owned by LaFarge.

[c] Owned by Central Stone.

[d] The Alton facility is located on the Mississippi River and is served by Lower Missouri River river miles 0–12 in the St. Charles segment.

draining off the barges because the dredged material was not mechanically dewatered. The USACE has determined that the undesired silt, cobbles, and debris that is separated and intentionally discharged back into the river and the suspended silt and sand washed out of the barges with the draining water are discharged back into the river at a point and time that are substantially different from the point and time of extraction and are therefore regulated under Section 404 of the CWA. This review was conducted in accordance with the procedures described at 33 C.F.R. Part 320-332, including Appendices B and C and this decision is issued under Section 10 of the RHA (33 U.S.C. § 403) and Section 404 of the CWA (33 U.S.C. § 1344).

2.3 PROJECT PURPOSE

Under NEPA guidelines and implementing regulations in 36 C.F.R. 1502.13 and 33 C.F.R. 320.4, the lead federal agency must state the purpose and need for the agency's proposed action when preparing an EIS. CWA guidelines (40 C.F.R. 230) distinguish between the basic purpose and overall project purpose, and specify that the basic purpose determines whether the proposed action is water dependent. This distinction ensures that the scope of the EIS and the range of alternatives analyzed are sufficiently broad to fully inform the agency decision maker.

2.3.1 Overall Project Purpose

The overall Project purpose is to profitably extract sand and gravel from the Missouri River that meet certain specifications in order to supply the region's construction and manufacturing needs.

2.3.2 Basic Project Purpose

For purposes of the CWA, the basic (fundamental, essential, or irreducible) purpose of the Proposed Action is to supply the aggregate required to support the region's construction and manufacturing needs.

2.3.3 Water Dependency Determination

No discharges of dredged or fill material into special aquatic sites are proposed or are authorized in this decision. As such, a water dependency determination is not required.

2.4 PROJECT NEED

Sand and gravel are essential components of concrete, asphalt, brick mortar, tile grout, and landscape materials. These materials are used to construct local, regional, and interstate roads and highways;

public and commercial infrastructure; public, commercial, and industrial buildings and facilities; and residential housing developments. The use of sand and gravel as a constituent of construction materials is pervasive in the economy of the region that encompasses St. Joseph, Missouri; the greater Kansas City metropolitan area; central Missouri; and the St. Louis, Missouri metropolitan area.

The largest use of sand and gravel in the region is for concrete and asphalt, which require material that meets specific requirements related to aggregate size, shape, parent material, hardness, and sorting. Dredging from the LOMR represents one of the most cost-effective methods for supplying sand and gravel because the river provides sorted sand and gravel and does not require the removal of overlying soil called overburden. Sand from the LOMR also meets the specific requirements needed for high-quality concrete and asphalt with relatively minimal additional processing.

Historically, demand for sand and gravel within the region has been almost exclusively supplied by dredging from the Missouri, Kansas, and Mississippi Rivers and supply has met or exceeded local demand. However, in 1990, USACE review of Kansas River dredging permits and preparation of an EIS resulted in a significant reduction in the amount of sand and gravel resources authorized for extraction from the Kansas River. As extraction from the Kansas River was restricted and demand for sand in the region increased with economic growth, annual extraction from the Missouri River increased from 4,240,000 tons in 1990 to a peak of 8,752,714 tons in 2002. With the recent economic downturn, annual extraction decreased to 4,634,311 tons in 2009.

Dredging permit applicants are commercial enterprises engaged in or planning to engage in extraction and supply of sand and gravel to meet regional construction and manufacturing needs. The existing, currently authorized Dredgers have invested in and developed land and land-based facilities (sand plants) and the capacity to dredge, barge, offload, process, and stockpile sand and gravel at specific locations along the LOMR. Each sand plant services a geographic area or market. The potential dredging area for each operation is determined largely by the distance that the operator can effectively transport the extracted material by barge from the dredge to the sand plant without significant down time on the dredge. This distance is governed by the size and number of barges and push boats available to the operator. The market area is determined largely by the shipping costs for the finished sand and gravel, which is primarily the cost of hauling by truck.

2.5 ALTERNATIVES CONSIDERED

In accordance with 33 C.F.R. 325, Appendix B and 40 C.F.R. 1500–1508, the Final EIS (USACE 2011) evaluates the environmental consequences of the applicants' Proposed Action, the No Action

Alternative, and a range of practicable alternatives to meet the basic and overall purpose of the Proposed Action. To better evaluate and regulate the potential environmental consequences of dredging on a long and highly diverse river system, the has been divided into five separate and distinct river segments: St. Charles (river mile [RM] 0 – RM 130; Mississippi River to Osage River); Jefferson City (RM 130 – RM 250; Osage River to Grand River); Waverly (RM 250 – RM 357; Grand River to Blue River); Kansas City (RM 357 – RM 391; Blue River to Platte River); and St. Joseph (RM 391 – RM 498; Platte River to Rulo, Nebraska). The basis for defining the river segments is given in Section 3.3 of the Final EIS (USACE 2011). The Environmentally Preferred Alternative will be a composite of the best alternative for each segment. The alternative actions considered are described below.

2.5.1 Proposed Action

Eight companies have requested approval of 11 Department of the Army (DA) Permits (DA permits) for dredging a total of 11,615,000 tons of sand and gravel per year from designated reaches of the LOMR, generally with the existing permit conditions (e.g., exclusion zones and operating protocols). Table 2-1 contains the names of each of the applicants, the annual tonnage amount requested, and the locations by river segment and general reaches for proposed dredging activities.

2.5.2 No Action Alternative

NEPA requires that one of the alternatives evaluated in detail in an EIS is the No Action Alternative. The No Action Alternative for this EIS is defined as not approving any of the pending permit applications for commercial sand and gravel dredging on the LOMR. Commercial sand and gravel dredging on the LOMR would cease upon expiration of the current commercial dredging permits.

Currently available alternate local sources of commercial sand and gravel, or commercial sand and gravel imported from outside the local market would supply sand and gravel needs in the market and region currently served by existing commercial dredging permits. Denial of permit requests could result in the disruption of business operations dependent on sand and gravel operations in the LOMR or within certain market areas along the LOMR where there are no locally available alternate sources of aggregate. After stockpiles of sand and gravel were exhausted, the applicants would be unable to satisfy (using sand and gravel from the LOMR) the needs and contracts of customers who have routinely purchased sand and gravel materials from the applicants. This may allow certain applicants with concrete or asphalt production capabilities to produce products from their own supply of sand and gravel, possibly at lower levels of production or higher costs.

The No Action Alternative also would result in short term and long term, and direct and indirect effects associated with obtaining sand and gravel from land-based operations within the region, importing sand and gravel from other locations, and recycling materials. Implicit in this alternative are the practicality of relying on sources other than commercial dredging in the LOMR and the assumption that other sources can satisfy the demand for sand and gravel. It should be noted that Alternatives A and B (described below) would partially rely on alternate sources of sand and gravel to meet regional demand. The same alternate sources described for the No Action Alternative would be relied on under Alternatives A and B.

2.5.2.1 Alternate Sources

Four general types of sand and gravel mining operations represent an alternate source to material dredged from the LOMR. The most comparable alternate source of sand and gravel is material dredged from the Kansas and Mississippi Rivers, which potentially could serve demand centers in the western and eastern sides of Missouri, respectively. Sand produced from these sources is generally considered to be Class A (natural) sand and meets material specifications for road and other construction projects. Other alternate sources include floodplain open-pit mines and quarries, instream mining, and manufactured sand. However, the suitability, availability, and cost of production of these sources vary widely. See Section 2.3.2.1 of the Final EIS (USACE 2011) for more detailed information about alternate sources of sand and gravel.

Available Capacity of Existing Alternate Sources

The short term responses to reductions in sand and gravel dredging from the LOMR would be increased production from the alternate sources identified above. Short-term replacement supplies from existing sources likely would be needed over the next several years until new mines were permitted and constructed in response to market pressures. The primary factors affecting which alternate sources of supply would be utilized are the distances to markets, quality of sand and gravel resources, and ability of existing sources to increase production beyond what is required to meet their existing demands. The available (or unused) capacity of alternate sources of construction sand and gravel is difficult to estimate because production data and operating parameters of individual mining operations are not known and often are considered proprietary information. Therefore, estimates of available capacity have been developed using the best available data and a set of analytical assumptions that are presented here.

As indicated above, the quality of alternative sources of sand and gravel has a direct bearing on their ability to offset reductions in supplies from the LOMR. For the EIS, it was assumed that sand and gravel from all alternate sources would meet specifications for general construction, such as residential and commercial building. Currently, most of the sand and gravel from the LOMR is used for general construction purposes based on its availability and proximity to markets. However, the quality of sand and gravel from the LOMR also meets specifications for Class A fine aggregate, which is required for road construction projects undertaken by the Missouri Department of Transportation (MoDOT) and the Kansas Department of Transportation (KDOT). Only those alternate sources that meet state specifications can be used as replacement supplies for sand and gravel from the LOMR.

Table 2-4 presents the available capacity of alternate sand and gravel sources considered in the Final EIS (USACE 2011). As shown, the estimated production of existing sand and gravel operations is approximately 11.0 million tons annually.

When looking at alternate sources across all segments of the river in total, in order to offset displaced supplies from the LOMR, existing production levels at alternate sources would need to increase by approximately 63 percent under the No Action Alternative, 43 percent under Alternative A, and 17 percent under Alternative B (Table 2-5). Under the Proposed Action and Alternative C, permitted dredging from the LOMR would meet current and recent levels of demand for commercial sand and gravel; therefore, no increase in the use of alternate supplies likely would be needed. With an available capacity of approximately 7.9 million tons, the alternate sources would be able to produce the required amount of replacement sand and gravel supplies under all of the alternatives, including the No Action Alternative (where dredging of the LOMR would cease entirely).

The location of demand within the primary market area dictates where the alternate supply sources will come from. Based on shipping and production costs, it is likely that alternate suppliers closest to each demand center would be utilized first, all else equal. A transportation-cost model was developed to estimate the pattern of commodity movement from alternate supply sources to demand centers and the resulting effect on the delivered price of construction sand and gravel in the region. For more information on the transport cost analysis, refer to Section 3.13 of the Final EIS (USACE 2011).

It is acknowledged that an increase in production by these alternate mining operations would affect the overall rate of resource utilization at these sources. Because most alternate sources are bound by a finite set of sand and gravel reserves, it is plausible that these alternate sources would deplete their reserves at a faster rate if required to offset the displaced demand for sand and gravel from the LOMR.

Accordingly, this likely would result in the need for new mining operations to restore long term equilibrium in the sand and gravel market in Missouri. For more detailed information on the capacity of existing alternate sources of sand and gravel see Section 2.3.2.4 of the Final EIS (USACE 2011).

Table 2-4 Estimated Production and Available Capacities of Alternate Sand and Gravel Sources (tons/year)

Alternate Source	Estimated Production	Available Capacity
Other River Sources		
Mississippi River	1,124,902	1,224,308
Kansas River	1,154,529	756,765
Subtotal	*2,279,431*	*1,981,073*
Open-Pit Mines and Quarries		
Open pit mines (Missouri)[a]	4,899,964	4,424,881
Open pit mines < 5,000 tons (Missouri)	18,005	16,995
Floodplain open-pit mines (Kansas)	2,244,253	38,091
Open-pit mines (Illinois)	610,682	531,970
Subtotal	*7,772,904*	*5,011,937*
Instream Mining		
< 5,000 tons (Missouri)	578,732	546,268
> 5,000 tons (Missouri)	411,840	388,738
Subtotal	*990,572*	*935,006*
Total	11,042,907	7,928,016

Note: N/A = Not applicable.

[a] Includes open-pit mines with no production limit and combined open-pit and instream mining operations.

Development of New Alternate Sources

Development of new alternate sources of sand and gravel in the region will depend on the initiative of business owners to acquire property with available resources and to permit and develop new projects.

As moderate to large-scale extractive industrial activities, these types of projects must resolve a number of issues, including:

- Acquisition of land with reserves of suitable grades of sand and gravel that are accessible for extraction;
- Acquisition of permits and approvals from federal, state, and local government agencies;

Table 2-5 Dredging Amounts for the Proposed Action and Alternatives by River Segment (tons/year)

Segment	Annual Average (2004–2008)	Proposed Action	No Action Alternative	Alternative A	Alternative B	Alternative C
St. Joseph (RM 391 – RM 498)	326,928	1,150,000	0	350,000	860,000	330,000
Kansas City (RM 357 – RM 391)	2,520,107[c]	4,060,000	0	540,000	1,230,000	2,660,000
Waverly (RM 250 – RM 357)	815,505[c]	1,005,600	0	500,000	1,140,000	680,000
Jefferson City (RM 130 – RM 250)	1,633,852[c]	2,750,000	0	430,000	980,000	1,630,000[c]
St. Charles (RM 0 – RM 130)	1,706,895[c]	4,384,400	0	370,000	840,000	1,710,000[c]
Total dredging[a]	7,003,287	13,350,000	0	2,190,000	5,050,000	7,010,000[c]
Alternate sources[b]		*N/A*	*7,003,287*[c]	*4,813,287*[c]	*1,953,287*[c]	*0*

Note: N/A = Not applicable.

[a] Sum of Dredgers request by segment – the total amount authorized would be limited to approximately 11.6 million tons per year.

[b] Calculation of alternate sources was based on 2004–2008 average annual total dredging.

[c] Following completion of the Draft EIS, corrections to the dredging records initially submitted by the individual Dredgers occurred. These corrections increased the average annual dredging amounts in the Waverly, Jefferson City, and St. Charles segments, and reduced the annual average dredging amounts in the St. Joseph and Kansas City segments. Comparison of the average annual amounts given in Tables 2.4-1 and 2.7-1 of the Final EIS (USACE 2011) show the differences. Review of the results of the geomorphic analysis determined that the changes were not substantial and would not affect the findings of the impact assessment reported in Chapter 4 or Appendix A. Therefore, the updated dredging amounts have been given in Table 2.7-1 and used by the USACE in identification of the Environmentally Preferred Alternative in Section 2.7 of the Final EIS (USACE 2011) and here in this table of the ROD but have not been revised in any other sections of the Final EIS (USACE 2011).

- Local landowner resistance to project development during the permitting process; and
- Feasible site reclamation following closure.

Several open-pit floodplain mine projects have been developed or proposed in the region. Anecdotal evidence indicates that a period of up to 5 years, or more, is typically required for project permitting and development. See Section 2.3.2.5 of the Final EIS (USACE 2011) for more detailed information about the development of new alternate sources of sand and gravel.

2.5.3 Alternative A

Allowable commercial dredging tonnages would be set at levels at the lower end of the range that are reasonably expected to reduce the contribution of sand and gravel dredging to continued river bed degradation in the LOMR (2,190,000 tons per year). Each segment would be limited to the annual amount shown in the column for Alternative A in Table 2-5, with the limitation that total dredging in all segments combined will not exceed 2,190,000 tons per year. It was assumed that dredging locations

would be limited to those river reaches shown for each applicant in Table 2-1 subject to the existing permit conditions (e.g., exclusion zones and operating protocols).

2.5.4 Alternative B

Allowable commercial dredging tonnages would be set at levels at the upper end of the range that are reasonably expected to reduce the contribution of sand and gravel dredging to river bed degradation (5,050,000 tons per year). Each segment would be limited to the annual amount shown in the column for Alternative B in Table 2-5, with the limitation that total dredging in all segments combined will not exceed 5,050,000 tons per year. It was assumed that dredging locations would be limited to those river reaches shown for each applicant in Table 2-1 subject to the existing permit conditions (e.g., exclusion zones and operating protocols).

2.5.5 Alternative C

Allowable commercial dredging tonnages would be set at levels that approximate recent dredging amounts (7,010,000 tons per year). Each segment would be limited to the annual amount shown in the column for Alternative C in Table 2-5, with the limitation that total dredging in all segments combined will not exceed 7,010,000 tons per year. It was assumed that dredging locations would be limited to those river reaches shown for each applicant in Table 2-1 subject to the existing permit conditions (e.g., exclusion zones and operating protocols).

2.5.6 Environmentally Preferred Alternative

The Environmentally Preferred Alternative was identified for each river segment which the USACE believes would best protect the biological and physical environment, and would meet the intent of NEPA Section 101. This composite Environmentally Preferred Alternative is Alternatives B, A, B, C, and C for the St. Joseph, Kansas City, Waverly, Jefferson City, and St. Charles segments respectively. Development of the Environmentally Preferred Alternative included the following conditions that would result in a target of no more than slight degradation in both the short and long term in each segment:1) dredging would be distributed more broadly throughout the segment than has occurred under past dredging practices, 2) degradation would be monitored through water surface profiles and bed elevation surveys, and 3) in five years the degradation rates and trends throughout the LOMR will be reevaluated and permit limits and conditions will be adjusted if warranted. Table 2-6 shows the total annual allowable amount of dredging per segment as part of the Environmentally Preferred Alternative. Table 2-6 also shows the percent increase or decrease in the proposed annual tonnage limitation by segment

from the average annual amount of sand and gravel extracted from that segment for the 5-year period from 2004 to 2008.

Table 2-6 Selected Alternatives by River Segment for the Environmentally Preferred Alternative

Segment	Alternative	Total Annual Allowable Dredging (tons/year)	Average Annual Dredging 2004–2008 (tons/year)	Percent Change
St. Joseph	B	860,000	326,928	+163
Kansas City	A	540,000	2,520,107[a]	-79
Waverly	B	1,140,000	815,505[a]	+40
Jefferson City	C	1,630,000[a]	1,633,852[a]	-
St. Charles	C	1,710,000[a]	1,706,895[a]	-
Total		5,880,000[a]	7,003,287[a]	-16

[a] Following completion of the Draft EIS, corrections to the dredging records initially submitted by the individual Dredgers occurred. These corrections increased the average annual dredging amounts in the Waverly, Jefferson City, and St. Charles segments, and reduced the annual average dredging amounts in the St. Joseph and Kansas City segments. Comparison of the average annual amounts given in Tables 2.4-1 and 2.7-1 of the Final EIS (USACE 2011) show the differences. Review of the results of the geomorphic analysis determined that the changes were not substantial and would not affect the findings of the impact assessment reported in Chapter 4 or Appendix A. Therefore, the updated dredging amounts have been given in Table 2.7-1 and used by the USACE in identification of the Environmentally Preferred Alternative in Section 2.7 of the Final EIS (USACE 2011) and here in this table of the ROD but have not been revised in any other sections of the Final EIS (USACE 2011).

2.6 RATIONALE FOR SETTING ALTERNATIVE DREDGING AMOUNTS

Available evidence suggests that commercial dredging has exacerbated river bed degradation on the Missouri River (West Consultants 1999, Stark et al. 2000, USACE 2009b). As described in Section 3.4.6.3 of the Final EIS (USACE 2011) and reported in the Reconnaissance Study (USACE 2009b), analyses to date show a strong correlation between the locations, time frames, and quantities of dredging in the LOMR and degradation of the river bed. Dredging contributes to degradation by removing considerable amounts of sediment from the river bed relative to the available annual bed material load. While dredging is likely not the only cause of bed degradation, data collected over the last 15 years suggest that increased dredging, combined with the Missouri River Bank Stabilization and Navigation Project (BSNP) and changes in flow regime, are likely the dominant causes of degradation (USACE 2009b).

During early EIS scoping and discussions, development of alternative actions focused on evaluating different levels of dredging that would allow continued commercial dredging without unacceptable levels of further bed degradation or that would reduce or stop the contribution of commercial dredging to bed degradation. As described in Section 3.4 of the Final EIS (USACE 2011), the annual amount of sediment (bed material load) moved by the Missouri River annually was estimated for three locations along the LOMR (St. Joseph, Kansas City, and Hermann). These bed material load estimates were

reviewed and compared to estimates in the published literature and other relevant data, and were determined to be the best available estimate of sediment loads of the same size as the material removed by commercial dredging. Estimates of bed material load were found to be greater during periods of higher river flow and lower during periods of lower river flows. Because the estimates of bed material load were found to vary with the flow conditions in the LOMR, estimates were made for two time periods, 2000–2009 (representing below-average flow conditions) and 1994–2009 (representing average flow conditions). See Appendix A and Sections 4.3 and 4.4.5.5 of the Final EIS (USACE 2011) for details on estimation of bed material loads and below-average and average flow conditions.

The Missouri River bed material load estimates for each segment were compared to the average annual amount of material dredged during the 2000–2009 time period for average and below-average flows. In the river segments where river bed degradation is acute in areas of concentrated dredging, Kansas City and St. Charles, dredging removed approximately 46–53 percent of the estimated bed material load. In segments that are stable or only slightly degraded, St. Joseph and Waverly, dredging removed approximately 10 percent of the bed material load. These results are shown in Table 2-7.

Using this information as guidance, dredging levels for Alternatives A and B were developed. Alternative A would allow 10 percent of the estimated bed material load under below-average flow conditions (represented by the period from 2000–2009, Table 2-7) to be extracted. Alternative B would allow for a somewhat higher level, 15 percent of the estimated bed material load under average flow conditions (represented by the period from 1994–2009, Table 2-7). Alternative C dredging limits would be based on average annual dredging levels by river segment from 2004 to 2008. Together with the Proposed Action and the No Action Alternative, these three alternatives bound the range of practicable alternatives.

Table 2-7 Comparison of Dredging Amounts to Bed Material Loads on the Lower Missouri River (2000–2009)

Segment	St. Joseph	Kansas City	Waverly	Jefferson City	St. Charles
Nearest gage	St. Joseph (RM 448)	Kansas City (RM 366)	Waverly (RM 293)	Hermann (RM 98)	Hermann (RM 98)
River bed status at gage	Stable	Substantially degraded	Stable	Locally degraded	Degraded
Average annual amount dredged (2000–2009) (tons/year)	343,231	2,855,073	500,143	1,479,733	1,716,518

Table 2-7 Comparison of Dredging Amounts to Bed Material Loads on the Lower Missouri River (2000–2009)

Segment	St. Joseph	Kansas City	Waverly	Jefferson City	St. Charles
Average annual bed material load (2000–2009) (tons/year)	3,508,000	5,352,000	4,956,000[a]	4,261,000[a]	3,699,000
Dredged percent of bed material load	9.8%	53.3%	10.1%	34.7%	46.4%

[a] The bed material loads for the Waverly and Jefferson City segments were estimated by interpolating the values between the Kansas City gage and the Hermann gage.

2.7 ALTERNATIVES CONSIDERED BUT NOT INCLUDED IN DETAILED ANALYSIS

During the scoping process and preparation of the EIS, the applicants, public, agencies, and organizations were provided the opportunity to submit formal and informal ideas and suggestions about alternative means for achieving the Project purpose. A number of comments and ideas about alternatives and alternative methods and strategies were received and considered. Each alternative was considered with regard to the Project purpose and need, current laws and regulations, practicability, and other criteria. This section describes the reasons why some alternatives were not carried forward for further analysis in the EIS. These reasons include, but are not limited to, an alternative not meeting the scope of the Project purpose and need; being sufficiently similar to, or included in, other alternatives so that individual consideration was not required; not being technically feasible; or resulting in unacceptable environmental impacts.

2.7.1 No Cap Mine-and-Relax Strategy

The Dredgers proposed an alternative they call the No Cap Mine-and-Relax Strategy. The strategy consists of the following elements: (1) no limit on the amount dredged by segment or by Dredger; (2) expanding the permitted areas available for dredging; (3) limiting dredging activity in any given mile to 1 week; and (4) restricting dredging in the same mile for 4 weeks to allow the reach to “recover.”

This alternative was not analyzed separately for several reasons. First, with no cap on the amount of material that could be dredged, some assumption would be needed concerning how much dredging would actually occur under this strategy. The No Cap Mine-and-Relax Strategy could result in higher or lower yields than the Proposed Action or any of the other alternatives. Limiting the total dredging amount to levels similar to any of the five alternatives already considered in this EIS would not

differentiate it sufficiently from the other alternatives and would not meet the first element of the proposed strategy.

Second, the proposed strategy would spread the potential effects of dredging from localized reaches to 5-mile reaches. A dredge operation could operate year-round on one 5-mile reach by dredging each mile for a week and then moving on to the next mile and allowing the remaining 4 miles to recover. While this would limit dredge operations from dredging the same mile indefinitely, it would provide little if any difference in the overall amount dredged from the 5-mile reach. Given the degree and lateral extent of degradation in heavily dredged reaches of the LOMR, spreading dredging operations out over a 5-mile reach would not make a sufficient a difference to warrant analysis under an additional alternative.

Third, allowing a dredged reach to “recover” does not mean that river bed degradation would not occur in that reach or adjoining ones. There is evidence that the river bed in recently dredged areas fills in over a period from several days to over a week (USACE 2007). However, the sediment that fills in that dredged reach does not get moved downriver or the increased transport capacity of the river below the dredged area results in degradation below the dredged reach. With time, river bed degradation from dredging a particular reach spreads out above the dredge location by head-cutting and below the dredge location by sediment-poor water picking up sediment from the bed. The response of the river to localized dredging is eventually to spread out the degradation from local areas to broader segments of the river.

Finally, the river transports only a certain amount of sediment each year, and a 4-week recovery period does not change the total amount dredged relative to the total amount of sediment transported by the river. River bed degradation in a reach occurs when more sediment leaves the reach than enters the reach; dredging represents a long term cumulative loss to the reach even when it is being dredged only 1 of every 5 weeks.

The Environmentally Preferred Alternative does include the concept of spreading out dredging by limiting annual extraction in each segment and in smaller reaches. By limiting concentration limits to the reaches with the most significant degradation (hotspots), it also allows the dredgers flexibility outside the hotspots to implement a mine and relax strategy that will be evaluated through monitoring the water surface profiles and bed elevations. This will demonstrate whether the dredged reaches “recover” from dredging throughout the permit period.

2.7.2 Sand Supplied from Distant Sources

Several commenters suggested that sand not available from dredging of the LOMR that was needed to meet the demand for sand and gravel could be replaced from sources outside the existing sand and gravel market areas. Specifically, suggestions included providing sand and gravel by railroad, trucking sand from the Wichita, Kansas area, and bringing sand from the East on empty coal train return trips.

Relying on sand and gravel supplied from distant sources is included in the No Action Alternative, and in Alternatives A and B. In each of these alternatives, some portion of the demand for sand and gravel would not be met from dredging of the LOMR. Together, these alternatives fully evaluate the benefits and environmental impacts of using alternate sources to the LOMR in order to meet regional needs for sand and gravel.

2.7.3 Sand from Locally Available Alternate Sources

Several commenters suggested that sand not available from dredging of the LOMR that was needed to meet the demand for sand and gravel could be replaced from various local sources within the existing sand and gravel market areas. Specific suggested sources included manufactured sand from quarry operations (limestone, quartz, and flint), sand from recycling or concrete and highway demolition, floodplain mining with or without direct water connection to the river, and concrete using alternate materials for strength (such as fiberglass fibers).

Relying on locally available sources of sand and gravel is included in the No Action Alternative, and in Alternatives A and B. In each of these alternatives, some portion of the sand and gravel demand would not be met from dredging of the LOMR. Together, these alternatives fully evaluate the benefits and environmental impacts of using alternate sources to the LOMR in order to meet regional needs for sand and gravel.

2.7.4 Increasing Sediment Supply in the Lower Missouri River

Several commenters suggested various means for increasing the sediment supply in the LOMR. Specific suggestions included reconstructing channel chutes to reintroduce trapped sediments, and piping sand and gravel from upstream mainstem Missouri River dams via sediment slurry pipelines to move sediment accumulated in the reservoir back into the LOMR channel.

This alternative does not meet the Project purpose and need because it does not supply the sand and gravel to support the regional construction and manufacturing needs. This alternative could be part of a

long term river management strategy that may ultimately increase the bed load of the river or reduce river bed degradation, and thus potentially allow greater levels of dredging. However, it could not be practicably implemented in sufficient time to meet the current need, and whether these actions would result in the desired or predicted effect is not certain.

This alternative is evaluated indirectly in Chapter 5, “Cumulative Impacts.”

SECTION 3

Public Involvement

3.1 SCOPING

A Notice of Intent to prepare a Draft EIS was published in the Federal Register on December 5, 2008. Public Scoping Meetings were held on January 6, 2009 in Jefferson City, Missouri; January 7, 2009 in Cottleville, Missouri (St. Louis area); and January 8, 2009 in Kansas City, Missouri and an Agency Scoping Meeting was held on January 9, 2009, to identify significant issues related to the proposed action and to determine the scope of issues to be addressed in the EIS. The comments received were addressed in the Draft EIS.

3.2 DRAFT EIS

The Draft EIS was released to the public for review and comment on July 15, 2010. A Notice of Availability of the Draft document was published in the Federal Register on July 23, 2010, which initiated a formal 45-day public comment period beginning on that date and ending on September 7, 2010. One public meeting was held on August 26, 2010, in Jefferson City, Missouri. A court reporter was provided at the meeting to allow meeting attendees to submit oral comments. In addition, agencies, organizations, and interested parties could provide written comments at that meeting or by mail or email.

3.3 PUBLIC NOTICE

A Joint Public Notice was issued by the USACE, the Kansas Department of Health and Environment, and the Missouri Department of Natural Resources on July 15, 2010 (concurrent with the release of the Draft EIS) to initiate a public interest review for the dredging permit applications. The Joint Public Notice comment period remained open beyond 30 days and closed on September 6, 2010. Comments received in response to the Joint Public Notice were combined with comments regarding the potential environmental consequences described in the Draft EIS and are addressed in the Final EIS. Those comments concerning the practicability of the alternative actions and what should or should not be authorized rather than the environmental consequences are addressed in this ROD.

3.4 FINAL EIS

A Final EIS was released to the Public for review on February 18, 2011. A Notice of Availability for the final document was published in the Federal Register on February 25, 2011, which initiated a formal 30-day public review period beginning on that date and ending on March 28, 2011. Any new substantive issues identified in comments received during the Final EIS review period are addressed in this ROD.

3.5 PUBLIC HEARING REQUEST

No requests that USACE hold a public hearing were received. We did hold public scoping meetings, a public information meeting regarding the Draft EIS, and various meetings with permit applicants, state and federal agencies, and congressional representatives to discuss study findings, alternatives, and potential impacts of our permit decision. We do not believe that a public hearing or additional meetings would provide additional information helpful in our evaluation.

3.6 AGENCY AND PUBLIC COMMENTS

At the close of the comment period on the Draft EIS, 84 individual letters had been received from governmental agencies, organizations, and the general public during the Draft EIS comment period. A copy of each letter with the individual comments highlighted is included in Appendix F to the Final EIS (USACE 2011). Table 3-1 identifies the organizations, groups, and individuals who commented on the Draft EIS. An additional 15 individual letters were received after the Draft EIS comment period or in response to the Final EIS and are included in Appendix A of this ROD. Table 3-1 identifies the organizations, groups, and individuals who commented after the Draft EIS comment period or on the Final EIS.

Table 3-1 List of Commenters on the Draft EIS

Letter ID	Date	Name	Organization	Location
1	9/2/2010	Hon. Blaine Luetkemeyer, Hon. Roy Blunt, Hon. Russ Carnahan, Hon. Todd Akin, Hon. Sam Graves, Hon. Jo Ann Emerson, Hon. Lynn Jenkins	U.S. Congress	Washington, DC
2	9/2/2010	Hon. Kurt Schaefer	Missouri Senate	Jefferson City, MO
3	9/7/2010	Karl Brooks	U.S. Environmental Protection Agency, Region VII	Kansas City, KS
4	9/2/2010	Robert F. Stewart	U.S. Department of the Interior	Denver, CO
5	9/3/2010	Kevin Keith	Missouri Department of Transportation	Jefferson City, MO

Table 3-1 List of Commenters on the Draft EIS

Letter ID	Date	Name	Organization	Location
6	9/3/2010	Kip A. Stetzler	Missouri Department of Natural Resources	---
7	9/7/2010	Doyle Brown	Missouri Department of Conservation	Jefferson City, MO
8	9/7/2010	David Bender	Kansas Department of Wildlife and Parks	Pratt, KS
9	9/7/2010	Tracy Streeter	Kansas Water Office	Topeka, KS
10	8/4/2010	Patrick Zollner	Kansas State Historic Preservation Office	Topeka, KS
11	9/2/2010	Charles W. Korman, Rich Danniels, John Noltensmeyer	Montgomery County Commission	Montgomery City, MO
12	9/1/2010	Larry Miskel	Mayor of Hermann, Missouri	Hermann, MO
13	9/7/2010	Curtis B. Skouby	City of St. Louis, Department of Public Utilities – Water Division	Saint Louis, MO
14	8/12/2010	Sandy Lucy	Mayor of Washington, Missouri	Washington, MO
15	9/3/2010	Karen Kelley	City of Independence, Missouri Water Department	Independence, MO
16	9/2/2010	Charles Kruse	Missouri Farm Bureau Federation	Jefferson City, MO
17	9/3/2010	Randy Asbury	Coalition to Protect the Missouri River	Higbee, MO
19	9/28/2010	Douglas Baker	Missouri Sand Company	Lawrence, KS
20	9/3/2010	William G. McCaffree	McCaffree & Landoll	Nevada, MO
21	8/31/2010	David Yates	Missouri Asphalt Pavement Association	Jefferson City, MO
22	9/3/2010	Jay Schultehenrich	SITE Improvement Association	St. Louis, MO
23	8/30/2010	Dara Page Genny	Cedar Knoll Farm	Berger, MO
24	9/3/2010	Allan Hasenjaeger	Hasenjaeger Trucking, Inc.	Marthasville, MO
25	9/1/2010	Lulu Hasenjaeger	Hasenjaeger Trucking, Inc.	Marthasville, MO
26	9/3/2010	Darrell Hasenjaeger	Hasenjaeger Trucking, Inc.	Marthasville, MO
27	9/2/2010	David J. Peters	David J. Peters Trucking, Inc.	Marthasville, MO
28	9/7/2010 (rec'd)	Ren Potterfield	Ren Potterfield Trucking, Inc.	Monroe City, MO
29	9/7/2010 (rec'd)	Ronald J. Rowland	Utility Trailer Sales of Kansas City, Inc.	Kansas City, KS
30	8/30/2010	Michael Armstrong	Water District No. 1 of Johnson County, Kansas (WaterOne)	Lenexa, KS
31	8/31/2010	Steve J. Schleicher	U.S. Water Company	Lexington, MO
32	9/7/2010	Tom Schrempp	Missouri River Public Water Supplies Association	Johnson County, KS

Table 3-1 List of Commenters on the Draft EIS

Letter ID	Date	Name	Organization	Location
33	9/6/2010	Tom Waters	Missouri Levee and Drainage District Association	Orrick, MO
34	8/28/2010	Frank Kartmann	Missouri American Water Company	St. Louis, MO
35	9/6/2010	Bart Korman	Lewis-Bade, Inc.	Warrenton, MO
36	9/2/2010	Rodger Kaminska	International Union of Operating Engineers Local No. 101	Kansas City, MO
37	8/31/2010	Vickie Muldoon	Home Builders Association of Central Missouri	---
38	9/3/2010	Joe Hoette	Hoette Concrete Construction	Hazelwood, MO
39	9/1/2010	Steven W. Engemann	Hermann Sand & Gravel, Inc.	---
40	8/30/2010	Douglas L. Smith	Associated General Contractors of Missouri, Inc.	Jefferson City, MO
41	8/31/2010	Glen Robertson	Emery Sapp & Sons, Inc.	Kansas City, MO
42		Brian Osborne	Knapheide Equipment Company	Quincy, IL
43	9/7/2010	David Shorr	Lathrop & Gage	Jefferson City, MO
44	9/6/2010	Michael R. Odell	Holliday Sand and Gravel Company	Lenexa, KS
45	9/2/2010	Randy Scherr	Missouri Concrete Association, Inc.	Jefferson City, MO
46	9/7/2010	F. Ray Bohlken	Capital Sand Company, Inc.	Jefferson City, MO
47	9/3/2010	Mike and Christine Novak	---	---
48	9/3/2010	Jean Held	---	Hermann, MO
49	9/7/2010 (rec'd)	Dale A. Gloe	---	---
50	9/1/2010	Robb Jacobson	U.S. Geological Survey (unofficial comments)	---
51	9/1/2010	Lisa E. Redfern	---	Hermann, MO
52	9/3/2010 (rec'd)	Kate Engemann	---	---
53	9/7/2010	Geralyn Gloe	---	Hermann, MO
54		Eugene and Wanda Casarotto	---	---
55	9/7/2010 (rec'd)	Marie Colabello et al.	Residents of Hermann Form Letter	Hermann, MO
56	9/7/2010	Diane Pope	---	---
57	9/7/2010	Laura Feldman	---	---
58	9/7/2010	Cathi Utley	---	---
59	9/7/2010	Debra Brethorst	---	---
60	9/7/2010	Jeremy Overkamp	---	---

Table 3-1 List of Commenters on the Draft EIS

Letter ID	Date	Name	Organization	Location
61	9/7/2010	Glenn Brethorst	---	---
62	9/7/2010	Christine Coup	---	---
63	9/7/2010	Kim M. Crowe	---	---
64	9/7/2010	Klye Crowe	---	---
65	9/7/2010	Manty Coup	---	---
66	9/7/2010	Dan Kemma	---	---
67	9/7/2010	Wendy Fisher	---	---
68	9/7/2010	Dearrell Reinhardt	---	---
69	9/7/2010	Marty and Dana Bruckerhoff	---	---
70	9/7/2010	Lisa Winkelman	---	---
71	9/7/2010	William and Marie Colabello	---	---
72	9/7/2010	Christi Overkamp	---	---
73	9/7/2010	Rodger and Brenda Kempker	---	---
74	9/7/2010	Gary and Kathy Rohlfing	---	---
75	9/7/2010	Diane Spechn	---	---
76	9/7/2010	Lindsay M. Flint	---	---
77	9/7/2010	Jim Clay	---	---
78	9/3/2010	Barbara Flint	---	---
79	9/7/2010	Daniel Burns	---	---
80	9/7/2010	J. Scott Rood	---	---
81	9/7/2010	Ray Rood	---	---
82	9/7/2010	Mr. and Mrs. Brian Larkin	---	---
83	9/7/2010	Michael Rood	---	---
84	9/7/2010	Jen Mikiska	SPF Landscaping, Inc.	---
85	8/26/2010	Brian Viehmann	Limited Leasing Company	Old Monroe, MO
86	8/26/2010	Larry Moore	ConAgg of Missouri	---
87	8/26/2010	Joseph Gibbs	Missouri Levee and Drainage District Association, Upper Mississippi, Illinois and Missouri River Association	Columbia, MO
88	8/26/2010	Steve Schulte	Jotori Dredging Company	St. Louis, MO
89	8/26/2010	John Bremser	Kansas City, Missouri Water Treatment Plant	Kansas City, MO
90	8/26/2010	Tom Schrempp	WaterOne	Johnson County, KS

Table 3-1 List of Commenters on the Draft EIS

Letter ID	Date	Name	Organization	Location
91	8/26/2010	Randy Asbury	Coalition to Protect the Missouri River	Higbee, MO
92	8/25/2010	Steve Engemann	Hermann Sand & Gravel, Inc.	---
93	8/26/2010	Mike Odell	Holliday Sand and Gravel Company	Lenexa, KS
94	8/26/2010	Ray Bohlken	Capital Sand Company, Inc.	Jefferson City, MO
95	8/26/2010	Dan Engemann	District Director for Congressman Blaine Luetkemeyer	---
96	8/26/2010	Danny Kuenzel	---	Washington, MO
97	8/26/2010	Tim Buddemeyer	Councilman	Washington, MO
98	8/26/2010	Jeremy Hecktor	---	Marthasville, MO
99	8/26/2010	Scott Jacob	---	---
100	8/26/2010	Robert Struckhoff	Doris Bottom Levee District	Defiance, MO

Table 3-2 List of Commenters after the Draft EIS Comment Period or on the Final EIS

Letter ID	Date	Name	Organization	Location
101	2/2/2011	Patrick Zollner	Kansas State Historic Preservation Office	Topeka, KS
102	11/16/2010	Christopher M. Parrish, PE	Missouri American Water	Creve Coeur, MO
103	9/29/2010	Mike Odell	Holliday Sand and Gravel Company	Lenexa, KS
104	9/30/2010	Mike Odell	Holliday Sand and Gravel Company	Lenexa, KS
105	10/25/2010	Douglas L. Baker, Attorney at Law	Missouri Sand Company, LLC	Lawrence KS
106	11/9/2010	Mike Odell	Holliday Sand and Gravel Company	Lenexa, KS
107	12/24/2010	Mike Odell	Holliday Sand and Gravel Company	Lenexa, KS
108	12/28/10	Mike Odell	Holliday Sand and Gravel Company	Lenexa, KS
109	1/25/2011	David Penny	The Master's Dredging Company, Inc.	Lawrence, KS
110	2/11/2011	Claude Attebury	Missouri Sand Company, LLC	Independence, MO
111	3/8/2011	Mike Odell	Holliday Sand and Gravel Company	Lenexa, KS
112	3/24/2011	Karl Brooks	Environmental Protection Agency	Kansas City, KS
113	3/24/2011	David Shorr	Lathrop & Gage LLP	Jefferson City, MO
114	3/25/2011	Mike Odell	Holliday Sand & Gravel Company	Lenexa, KS
115	3/25/2011	Laura Calwell	Friends of the Kaw, Inc.	Lawrence, KS

3.7 SUBSTANTIVE ISSUES, APPLICANT REPLY AND CORPS RESOLUTION

A total of 515 substantive individual comments were identified from the letters received regarding the Draft EIS, and 16 people provided verbal comments during the public meeting. Comments received

during the Draft EIS comment process were considered in the preparation of the Final EIS. In some cases, the Draft EIS was amended with updated or corrected information, and in some limited cases, additional analyses were required to adequately address the issue raised. The topics that received the greatest number of comments on the Draft EIS were Geology and Geomorphology, Economics and Demography, Infrastructure, and a set of comments grouped under the category General. Comments received that concerned the potential environmental consequences of the Proposed and Alternative Actions were addressed in Chapter 10 of the Final EIS (USACE 2011).

Various comments included suggestions about what should or should not be authorized in the pending permit decision. The NEPA process is one of evaluation and disclosure of potential environmental impacts and does not make the permit determination. The Final EIS describes the anticipated consequences of the Proposed Action and alternatives and identifies an Environmentally Preferred Alternative that balances the various public interests, including the need for aggregate and the need for a stable river system providing other services including water supply. The Final EIS does not, however, state what will or will not be permitted. That decision is informed by the Environmentally Preferred Alternative but also includes the permit evaluation required by Section 404(b)(1) of the CWA. This ROD is the vehicle for disclosing the permit decision.

Various public comments received during the Draft EIS public comment period included suggestions about what should or should not be authorized in the pending permit decision and may not have been fully addressed in Chapter 10 of the Final EIS because they were not NEPA issues. These comments are addressed in Table 3-3. Similar issues dealing with permitting were subsequently raised in various meetings with and correspondence from the applicants, agencies, and other interested parties. Those substantive comments concerning the CWA, practicability of the alternative actions, and opinions about what should or should not be authorized are addressed in Table 3-4.

Four comment letters listed in Table 3-2 were received after the Final EIS (USACE 2011) was published. Three of the commenters had also submitted comment letters regarding the Draft EIS (USACE, 2010). Many of the issues raised in these letters repeated those already addressed in the Final EIS. Substantive issues already answered in the Final EIS (USACE 2011) are not addressed here and may not be listed in Table 3-3 or Table 3-4.

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Table 3-3 Comment-Response Matrix for Comments Received During the Draft EIS Comment Period

Comment ID[a]	Comment	Response
Comment Category: Recommended Decision		
01-002, 22-001, 44-56, 44-58, 87-001	Several commenters recommended that the dredging permits be extended without any changes for various reasons.	The USACE has determined that, based on the environmental consequences identified in the Final EIS (USACE 2011), continuing commercial dredging without any changes would not comply with the Section 404(b)(1) Guidelines. It would not be the LEDPA and would be likely to result in moderate to substantial bed degradation. This level of bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest.
11-001, 12-001, 13-001, 14-001, 17-001, 21-007, 23-001, 24-001, 25-001, 26-001, 27-001, 28-001, 29-001, 36-001, 45-006, 46-001, 48-001, 49-001, 53-001, 54-001, 55-001, 56-001, 57-001, 58-001, 59-001, 60-001, 61-001, 62-001, 63-001, 64-001, 65-001, 66-001, 67-001, 68-001, 69-001, 70-001, 71-001, 72-001, 73-001, 74-001, 75-001, 76-001, 77-001, 78-001, 79-001, 80-001, 81-001, 82-001, 83-001, 84-001	We support our local commercial sand dredging operations and encourage you to continue commercial sand dredging on the Missouri River at levels no less than current production.	

Comment ID[a]	Comment	Response
Comment Category: Infrastructure		
15-001	One of the City of Independence wells is a horizontal collector well whose arms collect water from beneath the Missouri River at approximately River Mile 353.5. This well produces 6,940 gallons per minute which accounts for a significant percentage of the water we provide to our customers. We would respectfully request that a no-dredge zone be created 2,000 feet upstream and 2,000 feet downstream from our well at River Mile 353.5 to reduce possible impact to this well.	The USACE has determined that the existing permit conditions provide dredging exclusion zones that adequately protect existing horizontal collector wells from direct contact and indirect impacts to water quality and quantity. The City of Independence's horizontal well at RM 353.5 will be added to the USACE GIS system so that they are protected in the new dredging permits and updated authorized dredging area charts.
18-001, 18-005, 18-006, 18-007, 18-008, 30-002, 30-003, 89-004	Several commenters' recommend increasing the No-Dredge Zone to protect water supply and infrastructure.	
30-009	Pg 4.3-11 Kansas City segment from RM 391 to RM 357 clearly includes the WaterOne Horizontal Collector Well and narrowly misses the Independence Wellfield. Dredging restrictions should apply to these locations as well as the ones listed.…Page 4.3-40 - Alternate C, Impacts to Water Supply Wells, Sl. Joseph and Kansas City Segments	
30-004	WaterOne believes the proposed extraction rate for The Master's Dredging Company, Inc. is far too high for the 7 mile reach from Mile 383 to 390. WaterOne's new Horizontal Collector Well is located in the reach and WaterOne has plans for 3 more of these wells in its Master Plan.	The USACE has determined that there is no available and unused capacity in the Kansas City and St. Joseph segments to support the dredging proposed by The Master's Dredging Company so their permit will be denied. The USACE has also determined that the existing permit conditions provide dredging exclusion zones that adequately protect existing horizontal collector wells from direct contact and indirect impacts to water quality and quantity. However, we do not believe that a future well should automatically receive protection from dredging operations previously authorized to operate where the well is proposed. WaterOne's planned wells will require authorization by the USACE under Section 10 of the River and Harbors Act because they extend under the Missouri River, a navigable river. The USACE will conduct a public interest review at that time to determine if the wells should be authorized and if they should be protected from dredging. The USACE has determined that Holliday Sand & Gravel Company will be permitted to extract 860,000 tons from the St. Joseph segment. Its annual extraction in the Kansas City segment will be reduced to an amount expected to result in no more than slight degradation. Holliday Sand & Gravel Company's overall authorized extraction amount will be 25% less than under their previous permit.

Comment ID[a]	Comment	Response
43-081, 43-108, 43-163, 44-46	Several commenters' suggest that requiring the Dredgers to fund the cost to repair infrastructure on the river is inappropriate unless there is a direct effect from the dredging.	The EIS concluded that dredging is one of several factors causing river bed degradation in the LOMR but did not determine how much of the degradation was caused by each of the contributing factors. Analysis of available information indicated that the LEDPA should result in no more than slight degradation and potentially could equate to no added degradation. Dredging and public water supply are only two of the various uses of that public resource known as the Missouri River. As indicated by Section 6.1.2.1, USACE permits do not relieve the permittee from any potential liability for damage arising from dredging. The USACE has determined that it cannot require the Dredgers to pay for economic losses or expenses experienced by LOMR water users due to general river bed degradation or, on the other hand, require the water users to compensate the Dredgers for economic losses associated with dredging restrictions needed to protect water supplies.
18-002, 32-001, 34-001	Several comments suggested that any modifications to water intake structures necessitated by bed degradation should be paid for by the companies that dredge material from the river.	
89-001	Kansas City, Missouri, has seen river levels decrease over 82 years and have seen significant decreases over the past ten years. Kansas City, Missouri, Water Services Department has made five modifications to its intake facilities in order to compensate for low water in the river at a price of over $6 million. In section 4.3.3.2, impact to water intake facilities, it states that major investments to making modifications to existing facilities or new construction can be passed on to the taxpayers. Kansas City, Missouri, rate payers will be seeing significant rate increases to fund the $2.5 billion combined sanitary sewer system overflow control project program. Additional modifications to waste water treatment plants are being undertaken in response to new disinfection regulations, which will be paid through increased rates. Thirdly, Kansas City's rate payers are also being asked with upgrading its aging infrastructure. Expecting tax payers to allow rates to increase because the dredging industry wishes to take more products from the river for profit will not be easily received by the public.	The USACE has identified and will authorize the LEDPA that would allow a level of dredging with associated restrictions that are anticipated to result in no more than slight river bed degradation in the near term and long term and minimize future impacts on existing water intake structures from dredging.
Comment Category: Water Resources		
03-003, 03-007, 03-008, 30-006, 32-007	Several comments were received suggesting that the dredging activity may not comply with Section 404 of the Clean Water Act (CWA) and that a compensatory mitigation and monitoring plan be developed prior to issuance of the CWA Section 404 permit. Other monitoring recommendations from commenters included a Blue River dredging exclusion area and water quality monitoring at discharge sites.	The USACE has identified the LEDPA which we believe will comply with the Section 404(b)(1) Guidelines. The LEDPA includes permit conditions that mitigate and monitor impacts (see Section 4.2.3.1 and Section 6). SECTION 5 of this document contains the evaluation of the LEDPA required by the Section 404(b)(1)Guidelines. The USACE evaluated the suggestion of excluding dredging near the confluence of the Blue River and monitoring water quality at discharge sites and determined it was not necessary or practicable after careful consideration of the overall factors outlined in the 404(b)(1) evaluation.

Comment ID[a]	Comment	Response
Comment Category: Economics and Demographics		
43-058, 43-111, 43-159, 43-099	Several comments indicated that although division of the LOMR into five different segments may be useful for characterizing environmental effects, it is not an appropriate structure for analysis of changes in truck transportation. Comments also indicated that the Dredgers object to and will oppose any use of the segmentation structure for allocation of dredging amounts in the permits because it does not take into account market demands or the differences in dredging, marketing, and transporting sand by the various applicants and does not meet or follow the most recent permitting structure because the segments do not correlate with the property rights vested in recent permits nor correlate with business operations amongst the applicants.	The commenter suggests that the analytic structure of the EIS and the permit decision should be based on the structure of the sand and gravel industry not the natural resource. However, the LOMR is not homogenous throughout its length. The bed load, and therefore the dredging capacity, varies with the geomorphology of the river, the geology of the floodplain, and sediment and water input from tributaries. To be able to evaluate and regulate the potential effects of dredging on river geomorphology, the spatial variation in bed load needed to be taken into account. Dividing the LOMR into segments based on the major sediment input from tributaries was the method that was determined to appropriately do this. The Dredgers may not prefer the segment limits because they do not fully accommodate the differences among the Dredgers in dredging, marketing, and transporting sand. However, the Final EIS (USACE 2011) analyzes the environmental consequences using this segment approach and the USACE must make a permit decision consistent with the Final EIS (USACE 2011). The USACE has also determined that the segment approach is practicable for the dredgers. In all segments outside the Kansas City segment, the authorized extraction limits will be approximately equal to or greater than the average amount dredged by each Dredger between 2004 and 2008 in those segments. Further, it is not expected that the dredgers in these segments will need to relocate their sand plants to obtain the authorized amounts. Although it was necessary to reduce authorized extraction in the Kansas City segment, the USACE has increased the authorized amounts in the upstream and downstream segments. The USACE believes this is a practicable alternative for Holliday Sand & Gravel Company. Section 404 permits do not create vested or unalterable legal rights. They are subject to reevaluation and modification based on available information. In addition, the previous permits in question have reached the end of their established authorization period. The USACE can provide no assurance of renewal of a permit as it is required to assess the public interest in such an activity. Although dredging has been permitted in the past, the federal action and associated public interest review in question is the proposed dredging for the applications to dredge in the future.
Comment Category: Air Quality and Climate Change		

Comment ID[a]	Comment	Response
06-026	10. Section 4.14 – Air Quality and Climate Change. The Department recommends, to the extent practicable, that the use of heavy construction equipment and commercial towboats and dredge boats should be limited on days with orange or red Air Quality Indices (AQI). High AQI represent potentially poor air quality days in the St. Louis area. This action would ensure that these diesel engines do not contribute to future ozone and particulate matter ($PM_{2.5}$) exceedances. Additionally, if practical, the use of diesel engines and equipment that have been retrofitted with a diesel oxidation catalyst or other air pollution control device would further reduce the mobile source emissions related to the project.	The comment suggests that the USACE permits limit the operation of heavy construction equipment on days with orange or red air quality indices and require that equipment be retrofitted with diesel oxidation catalysts or other air pollution control devices. The comment asserts that such mitigation would ensure that diesel engines do not contribute to future ozone and PM2.5 national ambient air quality standards (NAAQS) exceedances. The USACE agrees that limiting equipment usage on poor air quality days might benefit local air quality. Diesel oxidation catalysts also represent another potential mitigation measure (in addition to those specified in Section 6.4.6 of the Final EIS (USACE 2011)) that may be used by dredging companies. While these additional mitigation measures might contribute to meaningful reductions in emissions, without concentration-based modeling and specific information on which strategies will be implemented by which companies, it cannot be determined with certainty that exceedances of the NAAQS will be avoided (as suggested by the commenter). USACE does not expect, nor was it expressed as opinion from any external source, that the rather limited contribution from dredging associated diesel engines would actually materially contribute to any NAAQS exceedances. The USACE has determined that the proposed requirements are not practicable or necessary to comply with the Section 404(b)(1) Guidelines or NEPA and will not be included in the permit conditions.
Comment Category: General Comments		
01-001, 01-002, 05-004, 18-002, 43-002, 43-064, 43-065, 43-A003, 44-31, 89-005, 91-001, 93-002, 95-002,18-002, 01-002	Various comments cited the conclusions of the recently completed Missouri River Bed Degradation Reconnaissance Study and indicated that the dredging permit decision should be deferred until the pending Feasibility Study is complete. Some comments indicated that in some cases dredging should be stopped or reduced until the Feasibility study is complete while other comments indicated that dredging should not be further reduced until the Feasibility Study is complete and problems with Corps of Engineers structures are addressed.	NEPA requires preparation of an EIS for federal government-funded or authorized actions that could result in significant environmental impacts. The applications for permits to mine sand from the Missouri River triggered the need for the USACE to evaluate impacts from the proposed activity, before it made a permit decision potentially authorizing sand dredging (the major federal action). The USACE identified river bed degradation of the LOMR as a significant concern and found that levels of bed degradation were highly correlated with levels of commercial dredging. Therefore, the USACE determined that an EIS was required to comply with NEPA before any dredging could be reauthorized or new permits issued. Preparation of the EIS began in December 2008. The Final EIS (USACE 2011) evaluates the effects of continued dredging on river bed degradation, the environmental impacts of current and proposed dredging practices, and the alternate methods of obtaining sand. It also analyzes the economic impacts of the proposed dredging, alternative dredging strategies, and other methods of obtaining sand. Because the permit action pertains to commercial dredging, the Final EIS (USACE 2011) was focused on commercial dredging activities and their relationship with degradation. Although it utilizes available information to assess other potential causes of river bed degradation, it does not extensively study other causes. It also assesses available information on impacts of bed degradation to public infrastructure but does not engage in extensive new study on such infrastructure or potential remedies that may be required to address impacts to infrastructure in the future.

Comment ID[a]	Comment	Response
		In a separate action, because of concern about potential impacts to public infrastructure from river bed degradation, Congress authorized and appropriated general investigation funds through the Energy and Water Development Appropriations Act of 2008 for the Missouri River Bed Degradation Reconnaissance Study (Reconnaissance Study) to be conducted under authority of Section 216 of the Flood Control Act of 1970. The Reconnaissance Study, completed in 2009, evaluated effects of degradation on federal and non-federal infrastructure along the LOMR. The study looked broadly at the causes of and potential solutions to river bed degradation of the Missouri River between Rulo, Nebraska and St. Louis, Missouri. The findings demonstrated that river bed degradation in the lower 498 miles of the Missouri River is the result of a combination of causes. The study concluded that data collected over the previous 15 years suggest that the increased dredging take, working in concert with the BSNP, has become the dominant cause of river bed degradation. The Reconnaissance Study also demonstrated sufficient evidence of potentially feasible federal actions that could provide economic benefit such that it would be in the federal interest to participate in a cost-shared Missouri River Bed Degradation Feasibility Study (Feasibility Study). Subsequent to this determination, an agreement has been signed with Mid-America Regional Council for a cost-shared Feasibility Study. The agreement was signed in November 2010. The Feasibility Study is now underway. The Reconnaissance Study was an initial look at potential alternatives based on available information. It is not a definitive alternatives analysis, as its intent is to establish the federal interest. The more definitive study and full examination of alternatives will be done during the Feasibility Study. The Feasibility Study will address river bed degradation and its effects on the short term and long term stability of federal flood risk management systems. The purpose of the Feasibility Study is to ensure continued flood protection for areas currently protected by federal flood risk management systems. In addition, the Feasibility Study would address the effects of river bed degradation on the long term stability and sustainability of the navigation system by determining whether structural or operating changes to the navigation system might minimize or eliminate the impacts of degradation on the system. The Feasibility Study would consider approaches to help maintain or enhance the viability of federally constructed ecosystem projects such as constructed wetlands and shallow-water habitat, and the potential for ecosystem benefits as a result of implementation of measures to address river bed degradation. In addition, the Feasibility Study would address the potential for protection of local infrastructure. The Feasibility Study has been initiated. NEPA requires impact analysis and disclosure using the best available information. The Final EIS (USACE 2011) describes the anticipated consequences of the dredging activities proposed by the applicants as well as the anticipated consequences of alternative actions. Its findings agree with the Reconnaissance Study findings that river bed degradation in the lower 498 miles of the Missouri River is the result of a combination

Comment ID[a]	Comment	Response
		of causes, including commercial dredging. The recent study completed by the National Academy of Sciences, *Missouri River Planning: Recognizing and Incorporating Sediment Management* also recognized that river bed degradation is occurring on the Missouri River and that a relationship exists between commercial sand dredging and degradation. The Final EIS (USACE 2011) determined that bed degradation that would likely result from the Proposed Action and alternative actions, and estimated how much degradation would result. The Final EIS (USACE 2011) identifies an Environmentally Preferred Alternative based on the best available information. The existing dredging permits expire on March 31, 2011 and dredging can continue only if the permits are renewed/ extended or new permits issued. The USACE cannot ignore the findings of the Final EIS (USACE 2011) when issuing new or renewing/extending the dredging permits just because the Feasibility Study may eventually provide additional information about the various causes of bed degradation. The USACE has determined that that alternative which is the LEDPA and complies with the Section 404(b)(1) Guidelines is the Environmentally Preferred Alternative with some adaptation to address issues of practicability. This is the action that the USACE can legally authorize.

Note:

[a] The Comment ID is the letter ID from Table 3-1 followed by the comment number identified within the letter.

Table 3-4 Comment Response Matrix for Comments Raised in Meetings with and Correspondence from the Applicants, Agencies, and Other Interest Parties after the Draft EIS Comment Period

Concerned Party	Comment	USACE Response
Concern Category: Dredging Concentration Limits		
Holliday Sand & Gravel Company, Capital Sand Company, Hermann Sand and Gravel, J.T.R., Limited Leasing Company	Applying dredging concentration limits to the entire river is impracticable, burdensome, and unnecessary. Focus five-mile limits to "hot spots" that have degraded the most and are at greatest risk.	The Draft EIS recognized that dredging has historically been concentrated within a couple of miles of the existing sand plants. The Draft EIS also concludes that spreading dredging throughout the segments rather than continuing to concentrate it around the existing sand plants would reduce the likely level of degradation in all the segments. In some circumstances it indicated that it could be the difference between an alternative resulting in slight degradation versus moderate to severe. Section 3.4.6.3 of the Final EIS (USACE 2011) includes additional analysis of the effects of concentrated dredging on bed degradation. Although not expected to be precise, that analysis of the best available information suggests that 60,000 tons per mile per year may be the upper limit of local dredging intensity that is reasonably unlikely to result in local bed degradation. The

Concerned Party	Comment	USACE Response
Hermann Sand and Gravel , David Shorr	The designation of the ten mile reach at Hermann, Missouri had not been discussed before and took Hermann Sand and Gravel by surprise. How can it be considered a "hot spot" and how can dredging be causing any bed degradation when only an average of 120,000 tons has been dredged there each year?	Environmentally Preferred Alternative identified for each segment in the Final EIS (USACE 2011) was conditioned on applying this target level of dredging intensity in conjunction with segment limits. When the Dredgers learned of this condition of the Environmentally Preferred Alternative, they acknowledged it may be necessary in some areas including Kansas City and Jefferson City but they thought it was impracticable, burdensome, and unnecessary outside the most degraded reaches. The Dredgers suggested applying a five-mile dredging intensity limit to the most degraded "hot spots." The USACE agreed that applying the 60,000-tons per mile per year dredging target to each individual river mile throughout the entire river presents difficulties to both the Dredgers and the USACE. Limiting the most heavily dredged and degraded five-mile reaches of the river to no more than 300,000 tons would allow better management by the USACE, would provide more flexibility to the Dredgers in reaches that are not degraded and at risk, and effectively protect those areas at risk from more than slight additional degradation. The USACE has identified 17 specific five-mile reaches with water surface profiles more than two feet lower in 2005 than in 1990 and with a five-mile moving average bed elevation averaged over 2007, 2008, and 2009 that was more than a foot lower than in 1998. These degraded reaches occur between river miles 15 to 20, 25 to 35, 90 to 100, 140 to 150, 355 to 395, and 445 to 455. Several commenters questioned the designation of the reaches between river miles 15 to 20 (St. Charles, Missouri) and 90 to 100 (Hermann, Missouri) as "hot spots" because the average annual extraction in each reach is less than 300,000 tons and they didn't think dredging could possibly be causing any bed degradation there. As described above, these two reaches have degraded two feet or more since 1990 and one foot since 1998. The USACE has concluded that more than slight future degradation, particularly in these most degraded reaches is contrary to the public interest regardless of the cause. Moderate to substantial bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest and conflicts with the 404(b)(1) Guidelines. Therefore dredging would be contrary to the public interest when it is expected contribute to degradation in any area where other factors may be expected to cause more than slight degradation in the short term. All the Dredgers gave several reasons why it would be too costly and difficult to expand their dredging operations outside the 17 identified five-mile "hot spots". The USACE evaluated the average annual extraction in the five-mile "hot spots" in the Jefferson City and St. Charles segments and determined that J.T.R., Limited Leasing Company, Capital Sand Company, and Hermann Sand and Gravel should be able to extract their authorized amounts from their existing sand plants with their existing equipment. They can do so by dredging more in reaches they already use to a small extent that are immediately adjacent to the "hot spots", by shifting some production from their most heavily used plants to their nearest less heavily used plants, and transporting sand by truck when
J.T.R.	Why is the reach between river miles 15 and 20 considered a "hot spot" where annual extraction should be limited to no more than 300,000 tons? It does not dredge much there and any degradation occurring there is not its fault.	
Holliday Sand & Gravel Company	It requests that dredging in the non-degrading reaches adjacent to the Kansas City segment not have a 5 or 10-mile dredge concentration limit.	
J.T.R. , Limited Leasing Company, Capital Sand Company	Dredging farther away from their sand plants in the Jefferson City and St. Charles segments will require additional barges, push boats, and time, which will cost more and could bankrupt the companies.	
J.T.R.	The equipment needed to expand their dredging above the "hot spot" that the USACE has identified between river miles 25 to 35 will cost approximately $4,000,000 which is more than their current dredging and barging fleet is worth.	
Limited Leasing Company	Expanding their dredging operation in the St. Charles segment is problematic because the river is fast and there is less sand downstream of their main plants. During high water the flow is too fast to effectively push barges upstream. During low flows it is too shallow to navigate. Even when possible, pushing barges outside the restricted reaches will add three hours to the upstream leg and two hours to the downstream leg of each trip. This will increase the cost of their sand by 30 to 40%.	
Hermann Sand and Gravel	It is a small company competing against Capital Sand Company in the Jefferson City "hot spot". It will have to dredge aggressively to get their allotted tonnage before Capital Sand Company gets the entire 300,000 tons allowed in the five-mile reach around their sand plant. This is unfair and Hermann Sand and Gravel should be exempt from this restriction.	

Concerned Party	Comment	USACE Response
		needed. Of these companies, Capital Sand Company will have the most difficulty under the condition mainly because it has historically dredged more than 1,000,000 tons per year in the ten miles around their Jefferson City plant. It can increase its extraction below river mile 140 and above 150 and shift some extraction to their Rocheport, Boonville, and Glasgow sand plants. However, USACE has determined that the mileage differences for dredging sand away from the "hot spots" for each of these companies would be much less than for Holliday Sand Company and the permitted volumes and locations for these companies is very close to their average annual take unlike those permitted for Holliday Sand Company. Because of the unique impacts to Holliday Sand Company, the LEDPA will include a three year transition period in the Kansas City segment. The USACE has also determined that the concentration limitations are practicable for the dredgers. It is not expected that the dredgers in these segments outside the Kansas City segment will need to relocate their sand plants to obtain the authorized amounts. The USACE has increased the authorized amounts in the upstream and downstream segments of the Kansas City segment. The USACE believes this is a practicable alternative for Holliday Sand & Gravel Company. Further, the Final EIS and recent comments from The Master's Dredging Company and Missouri Sand Company (see letters in Appendix A) indicate that sand is transported fairly long distances by trucks when necessary. Some of the Dredgers even acknowledge that they truck sand to southern Missouri at times. The Final EIS (USACE 2011) also concluded that existing alternate sources of sand have the capacity to meet any demand not met by LOMR Dredgers. Although shifting some production from one sand plant to another, transporting more sand by truck, and/or letting other alternate sources meet some of the demand for sand does not maximize the profit of the Dredgers and may increase the price of sand to some extent. As a supplemental element, it is a practicable alternative that meets the basic project purpose of supplying the aggregate required to support the region's construction and manufacturing needs. The USACE has determined that based on the available information, limiting dredging to no more than 300,000 tons per year in each of these 17 five-mile reaches is a practicable and necessary part of the LEDPA and will comply with the Section 404(b)(1) Guidelines. Without this dredging concentration limit in these reaches, the selected alternative would not comply with the Section 404(b)(1) Guidelines. Available information indicates that it would likely result in moderate to substantial bed degradation. This level of bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest. USACE recognizes that as we assess additional information in the form of future survey data, as well as other information made available in the future, concentration limits may be adjusted within the overall framework of the EIS and this ROD. However, the best currently available information indicates that the concentration limitations described above are appropriate

Concerned Party	Comment	USACE Response
		and necessary.
Holliday Sand & Gravel Company	*"Because of the location of an extensive no-dredge zone near BPU wells and WaterOne's intake, we are forced to move more than 10 miles when we reach 500K tons. Instead of moving up to RM 378, we have to move all the way to 383.4 or 15 miles. To provide mitigation for this we request that we be allowed to dredge an additional 100K tons in the 10 mile reach behind the dikes. This does not increase our requested limit of 600K tons above KC (rm 366.1) or the total 1.2MM tons in the KC reach. It provides another method of reducing local impacts without having to move up 15 miles."*	The comment refers to a requirement in the December 2009 extension of the dredging permits through 2010, for Holliday Sand & Gravel Company to confine their dredging to the authorized area between the ends of the dikes that are part of the Bank Stabilization and Navigation Project when the river was above 17 feet at the Kansas City gage. These "dike fields" contain sediment that has accreted over the years. Because the EIS was not completed yet, the requirement was implemented as a practicable way to minimize the potential impacts to the point that the USACE could make a Finding of No Significant Impact regarding the permit extension. However, the practice was not being evaluated in the Draft EIS which was well underway at the time and is not evaluated in the Final EIS (USACE 2011). Additionally, it is uncertain that allowing Holliday Sand & Gravel Company to dredge 100,000 tons from the "dike fields" in each 10-mile reach in the Kansas City segment would mitigate the negative effect of increasing the dredging concentration limit by 50,000 tons per five-mile reach, as well as the overall increase in tonnage in the Kansas City segment. The USACE has determined that it would not be consistent with the Final EIS (USACE 2011) or in compliance with the Section 404(b)(1) Guidelines to grant this request. USACE has determined that any dredging in the floodplain overbank area, (that area landward of the bank line), would not be considered part of a dredgers authorized volume of material under the LEDPA. This would not be considered part of river channel's bed load material, but rather, accreted material deposited and stored in the floodplain. Therefore, any approved dredging of material in the overbank area, such as for a habitat restoration project, would not count against a dredgers total authorized volume.
Concern Category: Kansas City Segment		
Holliday Sand & Gravel Company	It requests 1,200,000 tons per year in the Kansas City segment over a five-year transition period rather than a two-year transition period. • It dredged 1,600,000 tons in the Kansas City segment in 2010 in the worst economy since the Great Depression (1,500,000 tons in 2009) • A base of 600,000 tons is absolutely necessary for Riverside. • Randolph needs 600,000 tons in the Kansas City segment	Holliday Sand & Gravel Company argues that the Environmentally Preferred Alternative is not practicable because it does not have the equipment and pilots needed to dredge more sand farther away from their sand plants at Riverside and Randolph and because there are not sufficient alternate sources in the Kansas City metropolitan area to supply the sand previously dredged from the Kansas City segment. We acknowledge that Holliday Sand & Gravel Company may not have the additional equipment needed to immediately transfer the extraction of 1,060,000 tons per year from the Kansas City to the St. Joseph or Waverly segments. However, this may have been avoidable. In 2007 and 2008 when the USACE proposed to cap dredging at 2006 levels and decrease it each year in the

Concerned Party	Comment	USACE Response
	and another 800,000 tons in the Waverly segment. • There are not sufficient alternate sources of sand in the Kansas City segment. • It does not have the equipment and pilots for long towing. • Environmentally Preferred Alternative will cost Holliday Sand & Gravel Company Sand and the KC Metro area $123,100,000 • Holliday Sand & Gravel Company's requested modification would cost $67,900,000	Kansas City area, Holliday Sand & Gravel Company asked that it be allowed to extract the full amount for the duration of the permit to give them time to acquire property and equipment needed to adjust. USACE recognizes the difficult decision associated with investment during a period of uncertainty but made efforts to express to Holliday Sand & Gravel Company that the degradation issue in Kansas City area was severe and would require less concentrated dredging. The USACE also disagrees with the assertion that the Kansas City economy would suffer because there are not sufficient alternate sources to make up for any decrease in dredging from the LOMR. The USACE has received letters from The Master's Dredging Company and Missouri Sand Company LLC (see letters in Appendix A) rebutting this assertion and providing credible information about existing and planned sand mining operations with ample reserves of sand that meets the requirements and can fulfill the market needs now and in the future. Some of the planned sand mining operations mentioned above have not yet received all the required permits and Holliday Sand & Gravel Company has expressed that it needs 600,000 tons for each of the Riverside and Randolph plants to keep them operating. Therefore the USACE has determined that the LEDPA will include a three year transition period to the Environmentally Preferred Alternative. Annual extraction in the segment would be limited to 1,200,000 tons (approximately Alternative B) in 2011; 900,000 tons in 2012; 850,000 tons in 2013; and 540,000 tons per year in 2014 and 2015. We believe these levels of extraction during this transition period are practicable from the perspectives of both Holliday Sand & Gravel Company and the regional economy. The Final EIS (USACE 2011) concluded that Alternative B would result in slight degradation in the short term and moderate degradation in the long term so transitioning through these amounts (although Alternative A is the ultimately selected alternative) should not result in more than slight degradation over the transition period. There are several other legitimate reasons supporting the transition period. First, the tonnage will be at or below the level extracted annually from 2007 to 2009 and comparison of the bed elevation surveys of the Kansas City segment in those years show that some short term aggradation may have occurred. The tonnage extracted annually from 2007 to 2009 was already slightly less than several years earlier when dredging had peaked in the segment. Second, the Missouri River basin experienced an extended drought from 2000 through 2007 and reservoirs and flow in the LOMR were extremely low until runoff, reservoir levels and releases returned to normal in 2009 and 2010. During the period of lower than average flows the LOMR had a corresponding lower than average bed load. Based on the current snowpack throughout the Missouri River basin, the 2010-2011 Annual Operating Plan for the Missouri River Mainstem System (USACE 2010f) projects river flows to be at or above normal in 2011 so the bed material load should be at or above normal and able to accommodate the higher transition dredging level, which is likely a substantial part of the reason for the observed short term recovery. Third, the transition period is only three years. The final but important reason is that that the water surface profile will be
Holliday Sand & Gravel Company	Really need more tonnage for the Riverside plant. An alternative to the proposal above would be to move 500,000 tons from the St. Joseph limit and add it to the Kansas City segment limit but require it be extracted below river mile 379 which is the most degraded point.	
Holliday Sand & Gravel Company	It asked for the 1,200,000 tons per year over a five-year transition period rather than a two-year transition period. • Two years would be adequate to obtain additional barges and modify existing towboats and unloading dock necessary to dredge 19 miles upstream from the River side plant. • An alternate source would be preferable to 19-mile tows if it can be accomplished. It will have to litigate with opposition to their proposed floodplain dredging site near the Nearman Creek Power Plant in Kansas City, Kansas. • Five years should be enough time to acquire the necessary financial resources, litigate, and to obtain required permits.	
Holliday Sand & Gravel Company	Next to the request above, it prefers that 310,000 tons be permanently be reallocated from the St. Joseph segment to the Kansas City segment. • St. Joseph would then have 550,000 tons allotted: 250,000 for the St. Joseph plant and 300,000 to be dredged by the Riverside dredge in the lowest five miles of the St. Joseph segment. • The Kansas City segment would have 850,000 tons.	
Holliday Sand & Gravel	The Riverside operation won't be able to stay in business if annual extraction is limited to no more than 300,000 per year in	

Concerned Party	Comment	USACE Response
Company	each five-mile reach between river miles 355 and 395. A hundred union jobs would be lost as a result. • Operating the Riverside dredge more than 19 miles upstream of the Riverside sand plant will cost $3 per ton. • Operating the Riverside dredge more than 25 miles is cost prohibitive.	monitored during the transition period and, as with any permit, permits for dredging in the segment could be suspended, modified, or revoked if warranted. When combined with the time elapsed since the previous permit decision and dredging reductions in 2007, this three year transition period should give Holliday Sand & Gravel Company enough time to adjust their operation and it provides some time for permits to be obtained for development of alternative sources. The USACE has determined that giving Holliday Sand & Gravel Company this three year transition period to Alternative A of the EIS is the LEDPA and complies with the Section 404(b)(1) Guidelines.
Holliday Sand & Gravel Company, J.T.R., Limited Leasing Company	Dredging and barging sand farther away from the sand plants may be problematic outside the navigation season or during droughts and low water periods.	The Dredgers already periodically deal with this issue at some locations by planning their operations around the foreseeable seasonal fluctuation of the river and buy spontaneously adjusting their operations to unforeseen events. They can plan to dredge farther away from their sand plants during the navigation season and dredge the areas immediately adjacent to the sand plants during the non-navigation months. The USACE has determined that limiting dredging to no more than 300,000 tons per five-mile reach in 17 five-mile reaches is a practicable and necessary part of the LEDPA.
Concern Category: Segment Limits		
Capital Sand Company	Capital is a project based demand company. Its Jefferson City sand plant is the only one with constant production levels because it is located near Highways 50 and 64 and supplies much of the state with sand. The segment limits do not provide the flexibility it needs.	See the response to Comment 43-058 in Table 3-3.
David Shorr	Segments should be adjusted because they are not practicable. The Kansas City segment needs more miles.	The USACE believes that a real but unstated concern of the commenter is that Capital Sand Company has several sand plants in the Waverly segment from Lexington, Missouri on down river and Holliday Sand & Gravel Company has historically dredged a limited amount in the upper end of the segment from their Randolph sand plant. Because of the distance between the operations, the two companies did not directly compete with each other. However, with the segmentation of the river, each of these two companies may now see the other as potential competition because each has been allocated part of the Waverly segment annual extraction limit. The USACE has also determined that the segment approach is practicable for the dredgers. In all segments outside the Kansas City segment, the authorized extraction limits will be approximately equal to or greater than the average amount dredged by each Dredger between 2004 and 2008 in those segments. Further, it is not expected that the dredgers in these segments will need to relocate their sand plants to obtain the authorized amounts. Although it was necessary to reduce authorized extraction in the Kansas City segment, the USACE has increased the authorized amounts in the upstream and downstream segments. The USACE believes this is a practicable alternative for Holliday
David Shorr	Segments or reaches that are currently aggrading should have higher dredging limits.	

Concerned Party	Comment	USACE Response
		Sand & Gravel Company. Further, the Final EIS and recent comments from The Master's Dredging Company and Missouri Sand Company (see letters in Appendix A) indicate that sand is transported fairly long distances by trucks when necessary. Some of the Dredgers even acknowledge that they truck sand to southern Missouri at times. The Final EIS (USACE 2011) also concluded that existing alternate sources of sand have the capacity to meet any demand not met by LOMR Dredgers. Although shifting some production from one sand plant to another, transporting more sand by truck, and/or letting other alternate sources meet some of the demand for sand does not maximize the profit of the Dredgers and may increase the price of sand to some extent. As a supplemental element, it is a practicable alternative that meets the basic project purpose of supplying the aggregate required to support the region's construction and manufacturing needs. As more fully discussed in the response to Comment 43-058 in Table 3-3, the Final EIS (USACE 2011) separates the LOMR into five segments and ends the Kansas City segment at the confluence of the Blue River with the Missouri because it was determined to be the most appropriate method. The USACE cannot modify the segments boundaries or increase the segment extraction limits beyond any of the Alternatives considered for each segment because it would not be consistent with the Final EIS (USACE 2011).
All	The ability to add or carry over tonnage not used in a segment during one year to the segment extraction limit for the next year would provide flexibility to the Dredgers to conserve sand and plan for larger anticipated future demand in a segment.	The USACE agrees that it would generally be good for the river if Dredgers leave sand that they could dredge but don't need in the river. Leaving this quantity would help degraded reaches recover. However, carrying over a large amount of sand in one or more years could result in the extraction of an amount that is larger than the bed load can accommodate and cause more than slight degradation. The LEDPA for the St. Charles segment will authorize extraction of the highest percentage of any segment. If 10% of the segment limit could be carried over, that would equate to 4.5% of the bed load in the St. Charles segment and less for all others. If more was carried over in all of the segments, the analysis behind the selected alternatives would no longer support permitting the overall allotted amounts. Carrying over more than this would be likely to result in moderate to substantial bed degradation. This level of bed degradation could cause potentially increased significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest. The USACE has determined that up to 10% of each Dredger's authorized annual tonnage may be carried over each year as a *de minimis* amount to be extracted the following year but the annual tonnage extracted with carryover may never exceed 110% of annual authorized tonnage.
J.T.R.	Why can't it carry over more than 10% of our segment allocation from one year to the next if it was not extracted?	
Concern Category: Allocation of Segment Limits Among Dredgers		

Concerned Party	Comment	USACE Response
Holliday Sand & Gravel Company	Capital Sand Company should be given additional tonnage in the Waverly segment in addition to our requested 800,000 tons there.	The USACE recognizes that the current state of knowledge of the dynamics of the Missouri River system, its geomorphic processes, and river bed degradation dynamics is incomplete. Evaluation of alternatives and selection of the Environmentally Preferred Alternative include the use of the best available information and interpretation of sediment transport equations and underlying data, the results of which include some level of uncertainty. While the results and the interpretation of the effects of bed degradation are based on the best currently available scientific data, sediment transport and estimates of previous bed degradation are indicators rather than precise predictors of future degradation. The Final EIS (USACE 2011) evaluated the Proposed Action, the No Action Alternative, and three alternatives with extraction limits covering the range between the two extreme Alternatives. Alternative A was the percentage of the bed load (10%) that had been extracted from segments of the river that had remained stable or degraded only slightly during a period of below-average flow (and bed load) conditions. Alternative B would allow for a somewhat higher level, 15 percent of the estimated bed material load under average flow conditions. Alternative C dredging limits was based on average annual dredging levels by river segment from 2004 to 2008. The applicants were given the opportunity to review and comment on these alternatives and no objections were expressed about the alternatives for the Waverly segment. The USACE has determined that Alternative B, with the highest level of dredging of all the alternatives considered for the Waverly segment, is the LEDPA and is not contrary to the public interest or in violation of the Section 404(b)(1) Guidelines. The USACE cannot increase the annual limit in the Waverly segment because the Final EIS (USACE 2011) did not consider an alternative with a higher annual extraction limit. However, in the next permit cycle the USACE may be able to increase the annual extraction limit in the Waverly segment if the segment continues to be stable or aggrading under Alternative B during the next five years.
Holliday Sand & Gravel Company	It asked for at least 800,000 tons in the Waverly segment and request that if the Kansas City segment is restricted more in the future, it should be compensated with more tonnage in the Waverly segment. "*If we could dredge the same percentage of bed load in Waverly, an aggrading segment, as has been proposed by the Corps with Alternative 'C' in St. Charles, a degrading segment, Waverly's Alternative 'C' would b*n with Capital Sand Company.	
Capital Sand Company	Capital Sand Company has dredged more at Washington in 2009 and 2010 to 189,000 and 320,000 tons respectively. This is more than the average amount at that location from 2004 to 2008. The Environmentally Preferred Alternative will not allow enough dredging at Washington.	The Final EIS (USACE 2011) determined that the Environmentally Preferred Alternative for the Jefferson City and St. Charles segments is Alternative C with dredging concentration limits and a monitoring and adaptive management framework. This should result in no more than slight degradation in the short term and long term at the sand plants or elsewhere within the segments. The USACE has determined that these conditions are the LEDPA and comply with the Section 404(b)(1) Guidelines. However, dredging more than the segment limit of Alternative C in the Jefferson City and St. Charles segments, even with the dredging concentration limit, would not comply with the Section 404(b)(1) Guidelines and is not the LEDPA. It would be likely to result in moderate to substantial bed degradation. This level of bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be

Concerned Party	Comment	USACE Response
		contrary to the public interest. The USACE has also determined that the segment approach is practicable for Capital Sand Company. Its overall authorized extraction will be approximately equal to or greater than the average amount it dredged between 2004 and 2008.
Capital Sand Company	Over the past several years Capital Sand Company has modified its dredging practices at their Washington sand plant to prove its "No-Cap Mine and Relax Strategy". As a result the reach has aggraded but their average production is down in the St. Charles segment and it will be penalized and receive a smaller allocation in that segment. It believes we should increase its allocation in aggrading segments or reaches.	The response above explains why the USACE cannot increase the annual extraction limit for the St. Charles segment above the amount identified in Alternative C. Various Dredgers have given various reasons explaining why they have dredged different amounts at different locations at different times and why they should be allocated more of a segment annual extraction limit. The USACE has determined that it will allocate the annual extraction limit for the St. Charles segment among the various applicants by giving each applicant the percentage of the segment limit that is equal to the percentage of the total average amount extracted from that segment between 2004 and 2008 that was dredged by each applicant. There are several reasons for this approach. First, the USACE is unable to discern or judge the reasons that motivated the Dredgers to dredge the levels they have in the past. Second, the period between 2004 and 2008 includes years of high, average, and low sand production so is representative of both the market demand and the ability of each of the Dredgers to meet that demand. Third, it is equitable.
J.T.R.	In recent years, J.T.R. has dredged less and let Limited Leasing Company dredge for them at times. This will unfairly reward Limited Leasing Company and penalize J.T.R.	
Capital Sand Company	Capital Sand Company always complied with their extraction limits even before 2007 and was capped at that level in 2007. Holliday Sand & Gravel Company often exceeded their authorized extraction limit before 2007and was capped at their higher level in 2007 and is getting more tonnage in the Waverly segment while Capital Sand Company is not.	Prior to 2007, the USACE did not enforce the annual extraction amounts in the dredging permits as potentially significant issues were not recognized. In the 2007 permit decision, the USACE identified bed degradation as a significant potential impact of dredging and notified the Dredgers that the dredging limits in the permits would be strictly enforced from that point on. Segment limits throughout the LOMR will be distributed among the Dredgers as discussed in the response above. Holliday Sand & Gravel Company is the only currently operating Dredger in the Kansas City segment so will get the entire allotment for the segment. Holliday Sand & Gravel Company was authorized to extract 3,400,000 tons in 2006 but will be cut back to 1,200,000 tons in 2011 and 540,000 tons by 2014. The USACE has determined that it is most equitable to permit Holliday Sand & Gravel Company the additional 530,000 tons in the St. Joseph segment and an additional 770,000 tons in the Waverly segment. It's total authorized annual extraction will still be approximately 75% of what it was authorized in 2007. Capital Sand Company will be authorized a total of 1,720,000 tons in all segments. That is approximately 76% of what it was authorized to dredge in 2007 and includes the full amount of the Capital's average extracted tonnage in Waverly segment in the five year period between 2004 and 2008. The USACE does not believe that Capital Sand Company is being restricted disproportionally or unfairly.

Concerned Party	Comment	USACE Response
Hermann Sand and Gravel, Limited Leasing Company, J.T.R.	Suggest creating a Washington segment separate from the St. Charles and Jefferson City segments to prevent overlap and competition. They believe that the proposed segment should be allotted its own tonnage in addition to and not subtracting from the St. Charles and Jefferson City segment limits.	The Dredgers understandably want to limit direct competition among their companies by creating more segments. However, they do not want any of the divided segments to lose any of their allotted tonnage. The two preceding responses explain why the USACE cannot increase the annual extraction limits for the St. Charles and Jefferson City segments above the amount identified in Alternative C. Without any increase in annual extraction, dividing a segment wouldn't accomplish anything besides creating a regulatory border between the Dredgers. The USACE cannot regulate competition between the Dredgers. The response to Comment 43-058 in Table 3-3 explains that the Final EIS (USACE 2011) separates the LOMR into five segments and ends the Kansas City segment at the confluence of the Blue River with the Missouri because it was necessary and logical. The USACE cannot adjust the segments because it would not be consistent with the Final EIS (USACE 2011).
Concern Category: Existence and Cause of Degradation		
Hermann Sand and Gravel	Analysis by Henry Hauk and John Doyle does not show any degradation at Hermann, MO. If degradation is occurring there, how can it be caused by the small amount extracted by Hermann Sand and Gravel.	The extent and causes of degradation are fully evaluated in Sections 3.4 and 4.2 of the Final EIS. Similar comments regarding the causes of degradation are addressed in Chapter 10 of the Final EIS. The Final EIS concluded that significant degradation has occurred in reaches in St. Joseph, Kansas City, Jefferson City, and St. Charles where dredging has been concentrated in the past. Dredging is one of several causes of degradation.
J.T.R.	Our dredges without cutterheads only vacuum alluvial material and do not change the overall bed elevation.	
Holliday Sand & Gravel Company	Dredging is not the only cause of degradation but dredging bears the brunt of the blame and burden.	
Concern Category: Adaptive Management		
Holliday Sand & Gravel Company	"*Not allowing any degradation unfairly places the expectation of zero degradation in the Kansas City segment solely on Holliday Sand & Gravel Company. We dredge in certain reaches because that is where we can find concrete sand and also because there are extensive no-dredge zones. If we lose any five mile reaches because the one survey in five years determines there is "any" degradation we could effectively lose our ability to find coarse sand to dredge near the plant during non-navigation months. This could put us out of business in Riverside and possibly Randolph too. Degradation of the riverbed at the Kansas City gage is not new. The bed elevation began dropping in 1940 with completion of the majority of the BSNP structures and has averaged about 0.16 feet per year*	The Final EIS concluded that significant degradation has occurred in reaches in St. Joseph, Kansas City, Jefferson City, and St. Charles where dredging has been concentrated in the past and that dredging is one of several causes of degradation. Kansas City is the most severely degraded segment; has experienced the most impacts to revetments, bridges on tributaries, and intake structures; and has the greatest investment protected by levees in close proximity to the river and vulnerable to bed degradation. The USACE has concluded that more than slight future degradation, particularly in these most degraded reaches is contrary to the public interest regardless of the cause. Moderate to substantial bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest and conflicts with the 404(b)(1) Guidelines. Therefore dredging would be contrary to the public interest when it is expected contribute to degradation in any area with trends of

Concerned Party	Comment	USACE Response
	(refer to Draft EIS page 3.4-75). For that reason we ask that the 0.16 feet/year average rate of degradation be considered an annual baseline, or 0.8 feet per 5 year interval."	more than slight degradation even where a portion of that degradation is caused by other means. The LEDPA identified by the USACE includes a monitoring and adaptive management framework (see Section 4.2.3.1.3). The framework calls for degradation to be identified by comparing future water surface profiles and bed elevation surveys against the 2009 baseline data. Moderate to severe degradation instead of the slight degradation anticipated by the EIS for the Environmentally Preferred Alternatives for the St. Joseph, Waverly, Jefferson City, and St. Charles segments or any additional degradation in the Kansas City segment would require a review of the permit provisions and could result in reductions in authorized dredging reaches or quantities, or implementation of other mitigation measures in the new permit decision. Likewise, aggradation trends could allow for consideration of increased quantities.
All	How can you base adaptive management on changes in the bed elevation when the dredging does not cause the degradation?	
David Shorr	Why is slight degradation (two feet) the maximum tolerable amount rather than moderate degradation (two to four feet)? Slight degradation could be the goal but should not be a mandatory or absolute limit.	
David Shorr	What exactly is the baseline against which future water surface profiles and bed elevation surveys will be compared to identify and quantify bed degradation?	Future water surface profiles will be compared against a composite water surface profile derived from the 2007, 2008, and 2009 water surface profiles. Future bed elevation surveys will be compared against the composite bed elevation profile derived from the 2007, 2008, and 2009 bed elevation surveys.
David Shorr, Capital Sand Company	Segment limits should be adjusted up or down according to the projections of the USACE Missouri River Basin Water Management Division and actual high flow periods and flood events.	Alternative B, the LEDPA for the St. Joseph and Waverly segments, is the level of dredging that, under average-flow conditions (represented by the period from 1994–2009), is expected to reduce or stop the contribution of commercial dredging to bed degradation in those segments. The period from 1994 to 2009 was selected because it included years of high and low flows. We don't know enough about the difference in bed load between high and low flow years to be able to precisely adjust dredging levels up or down based on projections of future flows or the occurrence of actual high or low flow periods or events. The USACE has determined that increasing dredging higher than Alternative B in the St. Joseph segment is contrary to the public interest because it would likely decrease the bed load reaching the Kansas City segment and exacerbate degradation. Alternative B is the highest level of dredging evaluated in the Final EIS (USACE 2011) for the Waverly segment. The USACE cannot adjust the Waverly segment extraction limit because it would not be consistent with the Final EIS (USACE 2011). Underlying the choice of the alternative is that average flow balances out low and high years. We don't know enough about the difference in degradation levels from varying dredging quantities, as they relate to different flows, to be able to accurately adjust extraction amounts by flow on a yearly basis. Alternative C, the LEDPA for the Jefferson City and St. Charles segments is higher than Alternative B for those segments and is only made possible by limiting annual extraction to no more than 300,000 tons in each of the most degraded five-mile reaches. The USACE has determined that dredging more than the segment limit of Alternative C in the Jefferson City and St. Charles segments, even with the dredging concentration limit, would not comply with the Section 404(b)(1) Guidelines because it would be likely to result in moderate to substantial bed

Concerned Party	Comment	USACE Response
		degradation. This level of bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest. The USACE has determined that giving Holliday Sand & Gravel Company a three year transition period from an amount similar to Alternative B to the Environmentally Preferred Alternative is the LEDPA and complies with the Section 404(b)(1) Guidelines.
Concern Category: Endangered Species		
Capital Sand Company	Previous permit restrictions protecting pallid sturgeon habitat were negotiated with the USFWS in good faith back in 2004. There is no reason that the issue needs to be reopened.	The last Biological Assessment (BA) of potential impacts of commercial dredging in the LOMR was completed in 1994. In 2003 the USFWS completed the *Amendment to the 2000 Biological Opinion on the Operation of the Missouri River Mainstem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River*. During informal consultation in 2004 and 2005, the USACE, USFWS, and Dredgers negotiated a set of pallid sturgeon protection zones that were key conditions of the USFWS concurrence that dredging was not likely to adversely affect the endangered pallid sturgeon. Substantial research has been conducted and knowledge gained about the endangered pallid sturgeon since that time so the USFWS and USACE agreed that a new BA would need to be developed to incorporate recent research in order to support an effects analysis and identify appropriate mitigation measures.
Concern Category: General Comments Regarding the Final EIS		
EPA	The Final EIS does not assess the impacts to the entire lower river system, but instead focuses on the impacts of each alternative on each segment. A comprehensive system-wide assessment of the impacts associated with dredging almost 6 million tons of sand and gravel per year from the entire 500 mile reach was not conducted. Lacking a comprehensive sediment budget for the lower river, dredging of sand and gravel volumes significantly greater than 10% of the estimated bed load in segments the Corps believes are largely stable should be carefully evaluated. Absent that evaluation, permitted dredging could merely shift bed degradation from one segment to another. Provisions within the Corps Alternative which would implement limits on dredging intensity within each segment should be applied throughout each segment and not limited to reaches near existing sand plants to prevent creation of new 'hot spots' of bed loss elsewhere.	The USACE looked at the potential of dredging in upstream segments having an impact on downstream segments. We concluded that selecting an alternative that would result in no more than slight degradation in a given segment would not have an additive effect on downstream segments that would be greater than slight. The USACE recognizes that additional information such as a sediment budget would allow for more specific impact analysis. However, limiting dredging to amounts expected to result in no more than slight degradation in each segment creates a safeguard against additive impacts from one segment to the next. During the permit cycle, the USACE will be gathering more information by monitoring water surface profiles and bed elevations. This and other information that may become available will allow us to further assess segment to segment impacts. The USACE agrees that a comprehensive sediment budget for the LOMR would be helpful for evaluation of dredging, degradation, and other USACE programs. However, the LOMR is not homogenous throughout its length. The bed load, and therefore the dredging capacity, varies with the geomorphology of the river, the geology of the floodplain, and sediment and water input from tributaries. To be able to evaluate and

Concerned Party	Comment	USACE Response
EPA	EPA continues to advocate for a conservative amount of dredging, particularly within those reaches with significant bed loss, while implementing a proper monitoring and assessment plan which would provide the basis for permitting more or less dredging for the next permit cycle. The proposed 163 % increase in dredging quantity within the St. Joseph segment should be evaluated with respect to maintaining current segment bed stability and potential downstream effects, with particular emphasis on the Kansas City segment.	regulate the potential effects of dredging on river geomorphology, the spatial variation in bed load needed to be taken into account. Dividing the LOMR into segments based on the major sediment input from tributaries was the method that was determined to appropriately do this. The USACE recognizes that the current state of knowledge of the dynamics of the Missouri River system, its geomorphic processes, and river bed degradation dynamics is incomplete. Evaluation of alternatives and selection of the Environmentally Preferred Alternative include the use and interpretation of sediment transport equations and underlying data, the results of which include some level of uncertainty. While the results and the interpretation of the effects of bed degradation are based on the best currently available scientific data, sediment transport and estimates of previous bed degradation are indicators rather than accurate predictors of future degradation. For this reason, the monitoring and adaptive management framework is a vital part of the LEDPA. The Final EIS concluded that the Environmentally Preferred Alternative (which is also the LEDPA in the St. Joseph segment) should result in no more than slight short and long term degradation.
EPA	It recommends the elimination of cutterheads in all three upstream segments which could compromise the integrity of consolidated sediment.	Removing the cutter heads from these six dredges or replacing the dredges with non-cutter-head dredges would cost the Dredgers a substantial amount. The combination of segment limits, limits on localized dredging intensity, and a monitoring and reevaluation process should limit degradation in each segment to no more than slight degradation in the short and long term. Also, because of the reduced segment limit in the Kansas City segment, the Dredger there may not need to dredge as deeply to obtain sufficient sand that meets the required material specifications. The localized dredging intensity limits would have the same effect on dredging operations in the other segments. Because prohibiting the use of cutter-head dredges would be a costly and unnecessary restriction, this condition is not included as part of the Environmentally Preferred Alternative.
EPA	EPA recommends limiting dredging to less than 300,000 tons per five mile reach per year throughout the segment, but particularly within River Miles 340 to 400.	Following the publication of the Draft EIS, EPA provided comments recommending that dredging be less concentrated in “hot spots” of degradation. The USACE concurred with this recommendation and assessed potential concentration limits in areas identified as “hot spots”. The USACE also considered river-wide dredging concentration limits but determined it was impracticable, burdensome, and unnecessary outside the most degraded reaches. Limiting the most heavily dredged and degraded five-mile reaches of the river to no more than 300,000 tons would allow better management by the USACE, would provide more flexibility to the Dredgers in reaches that are not degraded and at risk, and effectively protect those areas with the higher degradation trends. The USACE has identified 17 specific five-mile reaches with water surface profiles more than two feet lower in 2005 than in 1990 and with a five-mile moving average bed elevation averaged over 2007, 2008, and 2009 that was more than a foot lower than in 1998. These degraded reaches occur between river miles 15 to 20, 25 to 35, 90 to 100, 140 to 150,

Concerned Party	Comment	USACE Response
		355 to 395, and 445 to 455.
Friends of the Kaw	It opposes in-river dredging on the Kansas River and encourages dredgers to move to appropriately located pit locations in the Kansas River Valley and believes this is a viable alternative to Missouri River dredging.	The Final EIS (USACE 2011) recognizes that mining sand from the floodplain of the LOMR is a viable long term alternative to dredging the LOMR. It also recognized that these projects take time to develop because of the various legal, technical, and logistical challenges that they face.
Friends of the Kaw	It believes that commercial in-river mining of sand and gravel is harmful to any river's ecosystem. River hydraulics, river bed degradation, river bank stability, threatened and endangered species, infrastructure, local and regional economics, and cumulative impacts are all important aspects to consider.	The Final EIS (USACE 2011) fully evaluates the impacts of the Proposed Action and alternatives on the resource areas identified by the commenter. The USACE has identified the LEDPA that is not contrary to the public interest and complies with the Section 404(b)(1) Guidelines.
Friends of the Kaw	It is opposes the conclusion of the Final EIS that the Kansas River represents a clear option to offset changes in Missouri River supplies of sand.	The Final EIS (USACE 2011) did not suggest that the permitted dredging limits on the Kansas River should be increased to offset reductions in supplies from the LOMR. It only considered the currently authorized but not utilized tonnage and recognized that dredging the full authorized amount from the Kansas River may not be sustainable so would be only a short term source.
David Shorr	Mr. Shorr believes that the Final EIS (USACE 2011) failed to address the majority of his comments submitted in response to the Draft EIS. Therefore he resubmitted those comments along with new comments from an economist and a geomorphologist he conracteded to review the Final EIS.	The USACE believes the Final EIS (USACE 2011) did assess and respond to the numerous comments regarding the Draft EIS. Those comments were taken into account as the USACE determined what could be allowed in permit amounts, conditions and allocations. The USACE interacted frequently with the Dredgers and Mr. Shorr in an effort to fully understand concerns, impacts and opinions of the Dredgers related to economic and other impacts. Elements such as concentration restrictions being applied in hot spots only, the extrapolation of those concentrations to 5-mile reaches, the 10% carryover allowance, transition period for Holliday Sand & Gravel Company, determination to not restrict cutterheads, and several other permit provisions and conditions were reached after these substantial discussions. Several aspects of the EIS were modified in response to those comments. Regarding the third party reports submitted by Mr. Shorr in this most recent correspondence, the USACE reviewed the documents and believes that the substance of the reports was reflective of the comments and opinions expressed in response to the Draft EIS. One aspect that was not addressed related to concentration limitations. Section 3.4.6.3 of the Final EIS (USACE 2011) includes additional analysis of the effects of concentrated dredging on bed degradation. Although not expected to be precise, that analysis of the best available information suggests that 60,000 tons per mile

Concerned Party	Comment	USACE Response
		per year may be the upper limit of local dredging intensity that is reasonably unlikely to result in local bed degradation. In the short period of time the USACE had to review Mr. Shorr's recent comments, we were not able to engage in in-depth review of the method his consultant used to assess concentration limitations or some of the other opinions, but the USACE believes that the methodology we used to determine concentration limits provides a reasoned guide for those limitations. The USACE intends to use the continued monitoring information to assess whether changes in the long term are warranted.
Holliday Sand & Gravel Company	It is disappointed that its extensive comments regarding the Draft EIS were dismissed and had no impact on the Preferred Alternatives. It goes on to identify numerous parts of the Final EIS (USACE 2011) that it believes is wrong or biased.	Comment duly noted. The USACE believes the Final EIS (USACE 2011) did respond to the numerous comments regarding the Draft EIS. The USACE reviewed the new comments regarding the Final EIS (USACE 2011) and has concluded that they are addressed in either the Final EIS (USACE 2011) or in other responses in this table.

SECTION 4

Alternatives Analysis

Analysis of the environmental consequences of the Proposed Action and other alternatives is required by the CEQ NEPA regulations (40 C.F.R. 1502.14); the Section 404(b)(1) Guidelines (40 C.F.R. 230.1(a)); USACE regulations (33 C.F.R. 320.4(a)(2)); Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. §470); and Section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C §1531-1543). The type of alternatives to include, the impacts that should be analyzed, and the scope of analysis is defined differently and can vary somewhat under each authority.

4.1 SCOPE OF ANALYSIS

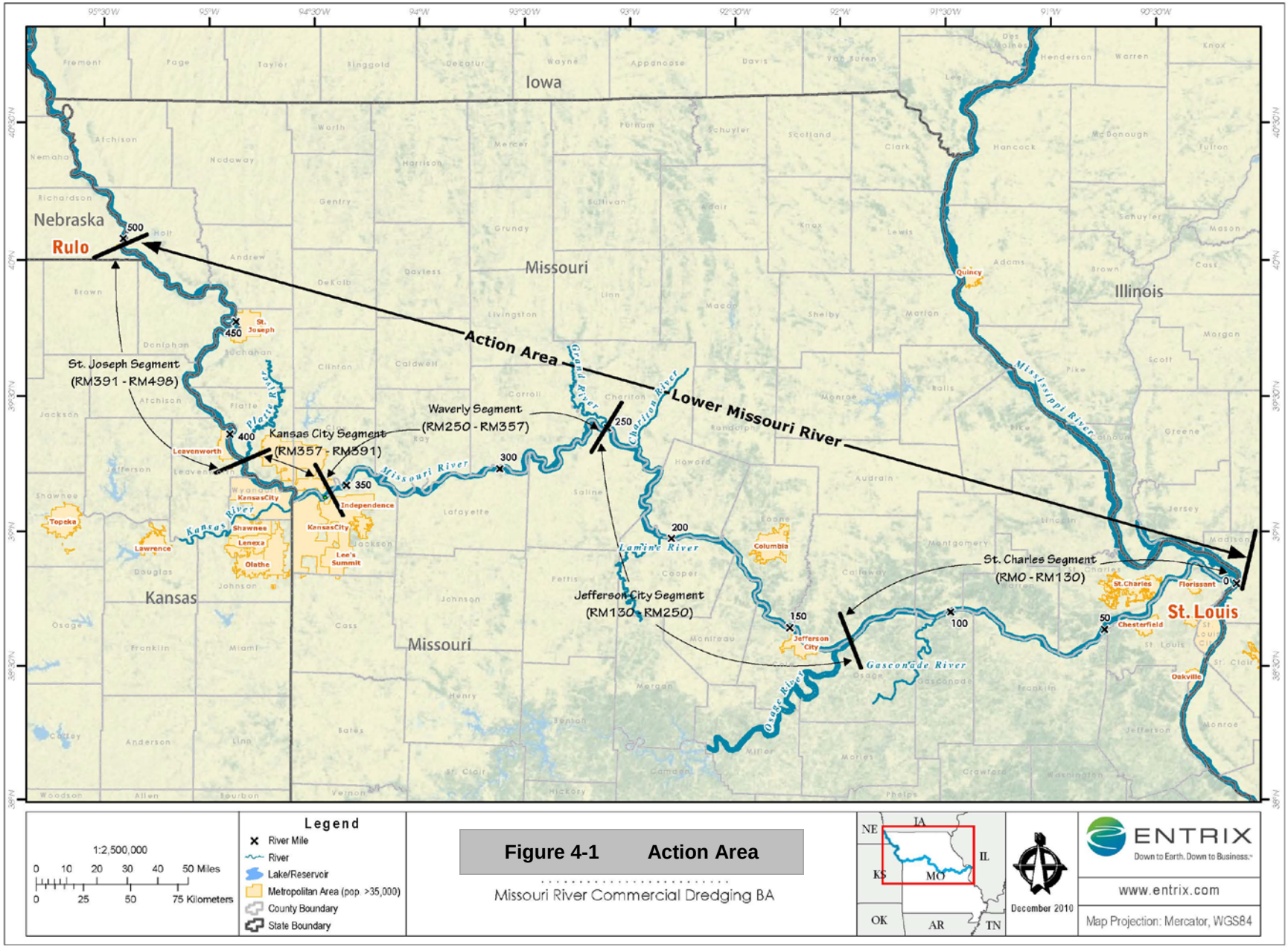
4.1.1 NEPA

The purpose of the Final EIS is to inform USACE decision makers of the environmental effects of decisions regarding authorization of dredging to commercially extract sand and gravel from the LOMR. The scope of the Final EIS includes:

- Project scope – The Final EIS directly considers those activities within the jurisdiction of the USACE under Section 10 of the RHA and Section 404 of the CWA. This includes extraction of sand and gravel resources from the river bed using hydraulic dredging equipment. Changes to operations of vessels and barges on the river; moored off-loading barges; and land-based materials handling, stacking, and processing at sand plants are not proposed and therefore are not within the purview of this Section 10 and Section 404 permit decision. Proposed changes to these activities would be evaluated by the relevant state or federal permitting authorities. Dredging operations are evaluated in the Final EIS to the extent that indirect impacts may be associated with these activities.
- Proposed Action and alternatives – The Final EIS scope includes environmental analysis of the Proposed Action, No Action Alternative, and other action alternatives that would allow continuation of some commercial sand and gravel dredging in the LOMR. Imbedded in the No Action Alternative and each of the action alternatives is the fact that alternate sources of commercial sand and gravel

would be needed to supplement sand and gravel dredged from the Missouri River in order to meet some or all of the regional demand.

- Geographic scope – The geographic scope of the Final EIS includes that portion of the LOMR subject to commercial sand and gravel dredging that extends from its confluence with the Mississippi River at river mile (RM) 0 to RM 498 near Rulo, Nebraska. It also includes the portions of tributaries to the Missouri from RM 0 to RM 498 that are immediately adjacent to the main channel of the LOMR. Figure 4-1 shows the project Action Area.


Iowa
Nebraska
Missouri
Illinois
Kansas
Missouri
Rulo
Action Area
Lower Missouri River
St. Joseph Segment
(RM391 - RM498)
Kansas City Segment
(RM357 - RM391)
Waverly Segment
(RM250 - RM357)
Jefferson City Segment
(RM130 - RM250)
St. Charles Segment
(RM0 - RM130)
St. Louis
500
450
400
350
300
250
200
150
100
50
0
Legend
River Mile
River
Lake/Reservoir
Metropolitan Area (pop. >35,000)
County Boundary
State Boundary
1:2,500,000
0 10 20 30 40 50 Miles
0 25 50 75 Kilometers
Figure 4-1 Action Area
Missouri River Commercial Dredging BA
December 2010
ENTRIX
Down to Earth. Down to Business.
www.entrix.com
Map Projection: Mercator, WGS84

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The geographic scope of the Final EIS includes the main channel and floodplain of the LOMR from RM 0 to RM 498, the most downstream portions of tributaries to the Missouri River to the extent that they may be indirectly affected by river bed degradation, and the region surrounding the Project area portion of the river to the extent that specific resources may be affected by dredging or use of alternate sources of sand and gravel. For example, the broader sand and gravel market areas are included when evaluating alternate sources of sand and gravel, and some entire counties are considered when evaluating potential air quality impacts.

- Temporal scope – Dredging activities have occurred on the LOMR for approximately the past 100 years, and previous dredging permits have been authorized for 5-year periods. To the extent that a specific resource analysis considers future trends, trends up to a 20-year time frame were evaluated. For the cumulative analysis, projects and programs reasonably likely to occur within a 20-year time frame were evaluated. Sufficient information on future foreseeable actions was not available to reasonably analyze future trends beyond an approximately 20-year time frame.

4.1.2 National Historic Preservation Act

Projects involving federal land, funds, review, or permitting are subject to compliance with Section 106 of the NHPA. Section 106 requires federal agencies such as the USACE to take into account the effects of their undertakings on historic properties. An “historic property” is any district, archeological site, structure, sacred site, or object that is included on or eligible for inclusion in the National Register of Historic Places (NRHP). As the lead federal agency with jurisdiction over the permitting of commercial dredging along the LOMR, the USACE is responsible for ensuring compliance with Section 106 of the NHPA and other pertinent cultural resource laws and regulations. Section 106 also requires that the USACE consult with SHPOs, federally recognized Native American tribes, local governments, and other interested parties regarding the proposed undertaking. In addition, the Advisory Council on Historic Preservation (ACHP) would be consulted for projects adversely impacting historic properties.

Part of the USACE’s responsibility under the NHPA is to determine scope of analysis, or the Area of Potential Effect (APE) in the NHPA, which should include those areas that may be affected by the undertaking. Project-related activities with the potential to directly affect historic properties include excavation and removal of sand and gravel from the main channel of the LOMR. Potential indirect effects that may result from increased river bed degradation related to dredging include erosion, induced instability, headcutting, and related channel effects from dredging activities. Areas affected by erosion induced by headcutting could include banks of the LOMR and localized areas of tributaries. Because of the above known and potential impacts, the APE for this Project was determined to include

the main channel of the LOMR from the confluence of the Missouri and Mississippi Rivers in St. Louis, Missouri (RM 0) to Rulo, Nebraska at RM 498 and extending from the top of bank to approximately 50 feet below the river bottom (i.e., the greatest potential depth of dredging activities). The APE also includes perennial tributaries joining the LOMR for a distance of 0.25 mile upstream or to the first upstream control point. A "control point" includes any natural streambed feature or human-made structure that provides grade control and controls or impedes the upstream progress of a headcut. Because degradation of the tributaries is not likely to extend more than 20 feet beyond the current banks of the LOMR and its tributaries, the APE extends 20 feet landward of each bank.

Sand plants owned and operated by the dredging permit applicants are not included in the APE as they were previously permitted by the USACE, if authorization was required. It is reasonably foreseeable that some alternatives may result in extraction of sand or gravel from new upland mining sources. These upland mining sources are not included in the APE for this Project because actions related to the upland mining sources would not be subject to any of the USACE permits that would be issued under this Project. Construction and operation of proposed sand plants and alternate mining sources were considered in the indirect effects analysis in Section 4.13 of the Final EIS (USACE 2011).

4.1.3 Endangered Species Act

The ESA is the primary federal law protecting threatened and endangered species. The ESA and its subsequent amendments provide for the protection and conservation of federally listed species and the habitats upon which they depend. Under Section 7 of the ESA, federal agencies (such as the USACE) are required to consult with the USFWS to ensure that any federal undertaking, funding, permitting, or authorizing actions would not likely jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. "Critical habitat" refers to a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species, and that may require special management and protection (a more complete definition can be found in the ESA).

The scope of analysis, or Action Area, considered under ESA is defined as the geographic area within which the direct or indirect effects (physical, chemical, and/or biotic) of the proposed federal action will occur, and conforms closely to the geographic scope of the Final EIS. It includes the main channel and floodplain of the LOMR from the confluence of the Missouri and Mississippi Rivers in St. Louis, Missouri (RM 0) to Rulo, Nebraska at RM 500 (Figure 4-1). The Action Area also includes perennial tributaries joining the LOMR for a distance of 0.25 mile upstream or to the first upstream control point. A "control point" includes any natural streambed feature or human-made structure that provides grade control and controls or impedes the upstream progress of a headcut.

Six Recovery Priority Management Areas were defined and identified in the Pallid Sturgeon Recovery Plan (USFWS 1993) for implementation of recovery tasks. These were based on population and geographic considerations, and based on the potential of these areas for recovery of the species. The Action Area described in the biological assessment corresponds closely with the Lower Missouri River portion of RPMA 4, which is defined as the Missouri River downstream of Gavins Point Dam, South Dakota to the Missouri River/Mississippi River confluence, including major tributaries such as the Platte River.

4.2 ALTERNATIVES EVALUATION CRITERIA

4.2.1 NEPA Analysis

Issues to be evaluated in the EIS were developed through a NEPA scoping process that included a public notice and opportunity for public and agency comment. Three public scoping meetings and a cooperating agency scoping meeting were conducted in the Project area. A total of 149 scoping comments were received and evaluated to form the scope of analysis for the EIS. The following issues were raised during the scoping process.

- Geomorphology of the river, including bed degradation and changes in water surface levels
- Effects of geomorphology on infrastructure and water supplies
- Economic effects of changing costs for commercial sand and gravel
- Impacts on the ecosystem and protected species
- Existing environmental programs
- The NEPA process
- Recreation
- Cumulative effects.

Based on those issues raised during scoping and on the requirements of NEPA, the Final EIS described the potential environmental consequences of the Proposed and Alternative Actions for the following resource areas and topics.

- Geology and Geomorphology
- Infrastructure
- Land Use and Recreation
- Economics and Demographics

- Navigation and Transportation
- Water Resources
- Aquatic Resources
- Wetlands, Floodplains, and Terrestrial Resources
- Federally Listed Species
- Noise
- Visual and Aesthetic Resources
- Cultural Resources
- Air Quality and Climate Change
- Cumulative Impacts

The Council on Environmental Quality (CEQ) Guidelines for implementing NEPA require the lead federal agency to identify the Environmentally Preferred Alternative (40 C.F.R. Section 1505.2[b]). The Environmentally Preferred Alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources.

To identify the Environmentally Preferred Alternative, the results of the environmental consequences analysis were reviewed. In particular, the variability of impacts to environmental resources within and among the segments was considered for each alternative. This review found that, for most resource areas, impacts either did not vary substantially or they varied in direct relationship to geomorphic impacts (primarily changes in surface water levels and river bed degradation). This result is reasonable given that impacts to most resource areas are indirect impacts that arise from the direct effects of dredging on geomorphology. Resource areas with impacts that varied in direct relationship to geomorphic impacts include infrastructure, federally listed species, and cultural resources. One resource area where the results did not vary in direct relationship to geomorphic impacts was economics. Economic impacts were primarily driven by volume of authorized material and increased use of alternate sand and gravel resources to offset reduced dredging. The key resource areas that identified the Environmentally Preferred Alternative including infrastructure, federally listed species, cultural resources, and economics are discussed below.

4.2.1.1 Infrastructure

Generally, the potential physical effect of dredging on infrastructure is directly related to the changes in surface water levels and river bed degradation, but the amounts and values of infrastructure vary between segments. Consequently, the actual physical and economic effect of dredging on infrastructure varied among segments. Those segments with the greatest amount and value of

infrastructure that could be affected by degradation would be more adversely affected by a given amount of degradation than would those segments with a lower amount and value of infrastructure at risk. Also, infrastructure in already degraded segments would be more adversely affected by a given amount of degradation than would those segments that are not yet degraded. The Kansas City, Jefferson City, and St. Charles segments have experienced the greatest amount of degradation where dredging has been concentrated around sand plants. Those sand plants are also located in cities with more levees, revetments, drinking water and industrial water intakes, bridges, and pipeline crossings located on the LOMR than occur in rural reaches of those segments or in the Waverly and St. Joseph segments. The Kansas City segment has degraded approximately 12 feet since 1940 and as a result has experienced failed revetments and dikes, collapsed river banks, damaged or disabled water intakes, damaged bridges on tributaries, damaged levee toes, and failed outfalls. Based on the impacts to infrastructure already observed in the most degraded Kansas City segment, it appears likely that other segments, particularly the Jefferson City and St. Charles, would experience adverse impacts with the occurrence of moderate to substantial degradation in the long-term future. Adverse impacts that could be expected include compromised performance of water intakes that provide drinking, cooling, and industrial process water thus requiring expensive modifications to intake structures, premature pump wear, and damage that threaten the reliability of electric generation and public drinking water supply; scouring of existing bridge foundations (particularly on tributaries near the LOMR); exposure of and/or damage to petrochemical, sewer, or water pipelines (and associated accidental releases) under the river; and bank and revetment failure that could impair navigation and threaten the integrity of nearby levees.

4.2.1.2 Federally Listed Species

The *2003 Amendment to the 2000 Biological Opinion on the Operation of the Missouri River Mainstem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System* (USFWS, 2003) indicated that the portion of the LOMR between the Platte River, Nebraska and the LOMR confluence with the Mississippi River is lacking sediment transport and sediment availability, which is adversely affecting pallid sturgeon habitat development and maintenance (USFWS, 2003). Further, the USFWS has stated that larval and juvenile pallid sturgeon are limited by the quantity of SWH that provides rearing and refugia habitat (USFWS, 2003). River bed degradation, in conjunction with the local (reach-scale) removal of sand and gravel, could affect the quantity and distribution of natural or created shallow water habitat (SWH) in the LOMR. Potential effects on naturally occurring SWH could result from changes in elevation, configuration, or connectivity of the

SWH to the main river channel, or could affect the performance of SWH projects relative to design specifications. The Missouri River Commercial Dredging Final Biological Assessment (USACE, 2011b) concluded and the USFWS concurred after informal consultation that slight short and long term degradation is not likely to result in any substantial impacts on the abundance of SWH over and above natural year-to-year variations in the abundance of SWH. Changes on the order of moderate to substantial would likely be required for this to occur.

4.2.1.3 Cultural Resources

Because of the extensive history of dredging in the main channel of the LOMR, direct adverse effects of dredging on shipwrecks, Lewis and Clark sites, and bridges are not anticipated provided that dredging activities continue to occur in their historical locations and dredging exclusion zones are maintained around known shipwrecks, structures built or authorized by the U.S. Government, normal bank lines, islands, and bridges. Expansion of dredging activities to new areas would require assessment of potential cultural resource impacts as required by existing USACE permit conditions. Discovery of unidentified sites located in the main channel are also addressed through USACE permit conditions.

The principal indirect effects of dredging on cultural resources stem from tributary headcutting and erosion and scouring of the river bed near bridge abutments. These processes may (1) destroy or damage all or part of the property; or (2) expose archaeological resources, thereby, making an entire site or part of a site vulnerable to human disturbance such as looting or vandalism. Because tributary degradation has not been well quantified on the LOMR and each tributary is different with regard to size, degree of modification, length between the main channel and control points, degradation, and other factors, impacts on the geomorphology of each tributary were not analyzed individually. Instead, the geomorphic impact assessment characterizes the likelihood that tributary degradation would increase under an alternative based on the change in low-flow water surface elevations on the mainstem LOMR occurring near the tributary. In general, low-flow water surface elevations on the LOMR would need to decrease a moderate or substantial amount before tributaries would likely be affected (see Section 4.2.3.4 of the Final EIS (USACE 2011)).

4.2.1.4 Geology and Geomorphology

The Draft EIS (USACE, 2010) evaluated four potential impacts on the geology and geomorphology of the LOMR system that may arise from dredging. These include changes in sediment loads and river bed composition, changes in river bed elevation, changes in channel geometry and water surface elevation, and tributary degradation. Changes to both low-flow and high-flow water surface elevations

may result from changes in channel geometry. Channel geometry refers to the shape of a channel, which is altered when the river bed degrades or aggrades in a reach, or when bank erosion or deposition occurs in the active channel. At low flows, water depths are shallow and more closely track changes in the river bed. Therefore, river bed degradation is likely to cause water surface elevations to decrease during periods of low flows. Reduced low-flow water surface elevations also allow vegetation to become established along the river banks and on sand bars, especially if periods of low flows become prolonged. The increased amount of vegetation traps sediment, building up land in the channel and reducing the amount of area in the channel to convey high flows. The smaller area in the channel cross section reduces conveyance capacity, resulting in increased water surface elevations at high flows. Due to the complex relationship between channel geometry and water surface elevations, the uncertainty related to estimating changes in water surface elevation is greater than that for other parameters. Degradation on tributaries to the LOMR occurs when the mainstem LOMR channel bed at the confluence of a tributary degrades or when the low-flow water surface elevation on the mainstem drops below typical levels.

Changes in sediment loads and river bed composition are relatively local, tend to accumulate in areas with the most dredging, and therefore are considered dredging-related impacts that occur in the vicinity of the dredging operation. Tributary degradation and changes in channel geometry and water surface elevation are all tied to and a result of changes in river bed elevation. Based on these reasons, this ROD will focus on bed degradation as an indicator of the potential effects of dredging.

In the Draft EIS it was assumed that dredging would continue to be concentrated around the existing sand plants as it has been over the past decade. Maintaining dredging in the Jefferson City segment at current levels of the 5-year average, and in the same areas, would cause slight degradation in the short term and moderate to substantial degradation in the long term *in the area around the Jefferson City sand plants*. Areas outside of the Jefferson City reach would experience slight degradation or aggradation in the short term and the long term. Results in the St. Charles segment would be similar to the Jefferson City segment. If dredging continues to be concentrated in the St. Charles area, it would cause slight degradation in the short term and moderate to substantial degradation in the long term *around the main sand plants*.

However, an important finding from the Final EIS (USACE 2011) is that if dredging was evenly distributed through each segment and not concentrated at the sand plants in the St. Joseph, Jefferson City, and St. Charles segments rather than concentrated near the sand plants, the direct impacts from removal of sediment from the river bed would be spread throughout the segments and degradation

would be greatly reduced. The result in the Jefferson City and St. Charles segments with that added factor is that dredging at the levels of the 5-year average would be a slight degradation or aggradation in the short term and slight degradation in the long term.

To estimate potential dredging intensity effects on river bed degradation, historical dredging data were used to determine where dredging occurred (dredging reach) and at what intensity (annual average dredging amount in tons/mile). This information was then compared with observed patterns of local bed degradation by analyzing changes in local bed elevations in relation to dredging intensities using linear regression. The results suggest that 60,000 tons/mile/year may be the upward limit of local dredging intensity that is reasonably unlikely to result in local bed degradation. This figure is not expected to be precise but provides a guide in establishing limits within areas experiencing the most degradation.

4.2.1.5 Economics and Demographics

Overall, the sand and gravel resources in the region appear to be sufficient as a substitute for displaced supplies from the LOMR in the short term, including resources that would meet material specification requirements for road construction maintained by the Missouri Department of Transportation (MoDOT) and the Kansas Department of Transportation (KDOT). However, the proximity of these alternate sources to demand centers varies substantially across market areas and directly affects the short-term cost of sand and gravel to consumers based on changes in transportation costs. Generally, for alternatives that decrease dredging in the LOMR, the delivered costs of construction sand and gravel would increase in response to higher transportation costs. Conversely, increased dredging in certain market areas would increase available supplies and provide more flexibility in meeting regional demands, thereby reducing costs. In the long term, development of new mining operations in response to displaced supplies from the LOMR would minimize potential increases in the cost of construction sand and gravel in the region.

From a regional perspective, increases in sand and gravel production levels, whether from dredging in the LOMR or from alternate sources, would benefit local economic conditions, including increased output, income, and employment. Conversely, decreases in sand and gravel production would adversely affect the local economy. Regional economic effects associated with changes in sand and gravel production need to be considered in conjunction with the benefits and impacts associated with changes in transportation activity and household income levels. In the long term, regional economic impacts would depend on the location, size, and production levels of new mining operations developed in the region.

Tax revenue impacts, specifically impacts on sand royalties, are location specific; increases in dredging from the LOMR and other production in Kansas would result in increased royalties.

Potential economic impacts associated with river bed degradation are difficult to quantify but would be proportional to the amount of degradation expected to occur under the selected alternative. Continued degradation in the LOMR could result in additional expenditures for infrastructure repair, maintenance, and replacement. In addition, additional degradation, particularly in the Kansas City segment, would increase the potential for levee failure and jeopardize billions of dollars in investment protected by regional levee systems.

4.2.1.6 Identification of the Environmentally Preferred Alternative

As discussed in Section 4.2.1.1, 4.2.1.2, and 4.2.1.3 of this ROD, the effects of dredging on infrastructure, federally listed species, and cultural resources are directly related to the amount of degradation that is expected to occur. If degradation is limited to no more than slight in the short and long term, then the effects on these three resource areas are expected to be minimal. On the other hand, more than slight degradation could adversely affect shallow water habitat for the endangered pallid sturgeon and cultural resources which would require additional impact assessment, consultation, and mitigation with the USFWS regarding endangered species and the Missouri and/or Kansas State Historic Preservation Offices and National Advisory Council regarding cultural resources. Also, more than slight degradation could result in additional expenditures for infrastructure repair, maintenance, and replacement and increase the potential for levee failure, particularly in the Kansas City segment, and jeopardize billions of dollars in investment protected by regional levee systems. In the Kansas City segment, with the proximity of levees to the river, moderate or severe degradation could also threaten lives, inundate hazardous waste sites, and result in other unacceptable impacts. For these reasons each river segment was evaluated separately, and the alternative that would allow the largest amount of dredging while resulting in no more than slight degradation was selected. In the Draft EIS (USACE, 2010), dredging was evaluated as if it would continue to be concentrated around the existing sand plants as it has been over the past decade. However the Draft EIS (USACE, 2010) also recognized that the localized impacts of dredging would be reduced, as would be the risk for increased river bed degradation and associated environmental impacts, by more widely distributing dredging activity in each segment. The Final EIS (USACE 2011) includes additional analysis of the effects of concentrated dredging on bed degradation. Although not expected to be precise, that analysis of the best available information suggests that 60,000 tons per mile per year may be the upper limit of local dredging intensity that is reasonably unlikely to result in local bed degradation. Based on this dredging intensity

target, the Final EIS (USACE 2011) determined that Alternatives B, A, B, C, and C would be the Environmentally Preferred Alternative for the St. Joseph, Kansas City, Waverly, Jefferson City, and St. Charles segments respectively because they would allow the largest amount of dredging while resulting in no more than slight degradation (Table 2-6). The USACE looked at the potential of dredging in upstream segments having an impact on downstream segments. We concluded that selecting an alternative that would result in no more than slight degradation in a given segment would not have an additive effect on downstream segments that would be greater than slight. The USACE recognizes that additional information such as a sediment budget would allow for more specific impact analysis. However, limiting dredging to amounts expected to result in no more than slight degradation in each segment creates a safeguard against additive impacts from one segment to the next. During the permit cycle, the USACE will be gathering more information by monitoring water surface profiles and bed elevations. This and other information that may become available will allow us to further assess segment to segment impacts.

The USACE recognizes that the current state of knowledge of the dynamics of the Missouri River system, its geomorphic processes, and river bed degradation dynamics is incomplete. Evaluation of alternatives and selection of the Environmentally Preferred Alternative included the use and interpretation of the best currently available information, which includes use of sediment transport equations and underlying data, the results of which include some level of uncertainty. While the results and the interpretation of the effects of bed degradation are based on the best currently available scientific data, sediment transport and estimates of previous bed degradation are indicators rather than accurate predictors of future degradation.

A process to monitor key variables in the LOMR system throughout the 5-year permit cycle would provide information needed to determine whether dredging levels or permit restrictions should be adjusted. Such a monitoring and reevaluation process would allow the uncertainty inherent in the modeling and analysis of bed degradation to be addressed. It also would reduce the risk of potentially significant impacts, increasing the confidence that adjustments could be made to address impacts while they are relatively small.

As discussed in Section 6.3.1 of the Final EIS (USACE 2011), low-flow water surface elevation and hydroacoustic bed elevation data (HBED) are two types of data that could be gathered to show river bed aggradation or degradation. Both have their advantages and disadvantages.

Advantages of low-flow water surface elevation data are the period of record that is available, the ability to collect data on the water surface and use it to estimate gross changes in bed elevation, the consistency of the data collected over a short period of time, and the low cost and effort for data collection. Its main disadvantage is the level of error and uncertainty resulting from the low number of physical measurements, the level of accuracy of the USGS stage and flow estimates, the interpolation of surface elevations and flow estimates between USGS gage stations, and normalization of the flows at the time of the survey to the CRP flow.

The advantages of using HBED for monitoring purposes are that it measures river bed elevations directly rather than using estimates from water surface elevations or models, surface water elevations are collected simultaneously, data exist for the whole Project area, and high-resolution data exist for 1998 (using a different protocol), 2007, 2008 (partial), and 2009. Disadvantages include high collection and data processing costs, the fact that water surface elevation data collected during HBED surveys would need to be normalized to a standard flow, the fact that the surface of the river bed varies with the flow, and the fact that a rigorous statistical analysis has not yet been done to determine what spatial density of sampling points and number of transects is sufficient to accurately show actual degradation or aggradation.

Based on the issues previously stated, the USACE has determined that, as part of the Environmentally Preferred Alternative, low-flow water surface elevation data should be collected every year and HBED surveys should be conducted every 5 years for the lower 498 miles of the LOMR. These data would be used to identify reaches that degraded or aggraded over the previous 5 years and to guide the adjustment of dredging in those reaches for the next 5-year permit cycle.

Prohibiting the use of cutter-head dredges is discussed in Section 6.2.2 of the Final EIS (USACE 2011) as a potential permit restriction. Two of the currently authorized Dredgers (Holliday Sand & Gravel Company, L.L.C. and Capital Sand Company, Inc.) use six dredges with cutter heads. Removing the cutter heads from these six dredges or replacing the dredges with non-cutter-head dredges would cost the Dredgers a substantial amount. The combination of segment limits, limits on localized dredging intensity, and a monitoring and reevaluation process should limit degradation in each segment to no more than slight degradation in the short and long term. (The Final EIS (USACE 2011), page 2-85 misidentified the effects of the long term degradation in this sentence. The correct effect is as written here.) Also, because of the reduced segment limit in the Kansas City segment, the Dredger there may not need to dredge as deeply to obtain sufficient sand that meets the required material specifications. The localized dredging intensity limits would have the same effect on dredging operations in the other

segments. Because prohibiting the use of cutter-head dredges would be a costly and unnecessary restriction, this condition is not included as part of the Environmentally Preferred Alternative.

4.2.2 Cumulative Impacts Assessment

"Cumulative impacts" are defined as the impact on the environment that results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes the actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CCFR Section1508C.F.R Part 1508.7). The cumulative impact analysis section is intended to provide a broader, more expansive assessment of potential impacts associated with implementing the Proposed Action and alternatives considering the wide array of other activities, new and ongoing projects, and programs in the Project area and vicinity. In this way, the potential interactions between commercial dredging of sand and gravel and reasonably foreseeable projects and programs can be explored, and any significant adverse or beneficial cumulative impacts can be identified and considered. Cumulative and secondary effects of the Environmentally Preferred Alternative are more fully discussed in Chapter 5 of the Final EIS (USACE 2011).

The Environmentally Preferred Alternative identified in the Final EIS (USACE 2011) has been selected as the LEDPA with some modifications. The resource areas most affected by dredging were discussed In Section 4.2.1 of this ROD. Impacts on infrastructure, federally listed species, and cultural resources either did not vary substantially or they varied in direct relationship to geomorphic impacts (primarily changes in surface water levels and river bed degradation) Economic impacts were primarily driven by volume of authorized material and increased use of alternate sand and gravel resources to offset reduced dredging.

The USACE has determined that the LEDPA for the Kansas City segment will include a three year transition period to the Environmentally Preferred Alternative. Annual extraction in the segment would be limited to 1,200,000 tons (approximately Alternative B) in 2011; 900,000 tons in 2012; 850,000 tons in 2013; and 540,000 tons per year in 2014 and 2015. We believe these levels of extraction during this transition period will not have significant cumulative impacts on the regional economy because existing and planned sand mining operations have ample reserves of sand that meets the requirements and can fulfill the market needs now and in the future. The Final EIS (USACE 2011) concluded that Alternative B would result in slight degradation in the short term, and moderate degradation only in the long term, so transitioning through these amounts (although Alternative A is the ultimately selected alternative) should not result in more than slight degradation over the transition period. There are several other

factors limiting cumulative and indirect effects associated with the transition period. First, the tonnage will be at or below the level extracted annually from 2007 to 2009 and comparison of the bed elevation surveys of the Kansas City segment in those years indicated that there may be some short term aggradation. The tonnage extracted annually from 2007 to 2009 was already slightly less than several years earlier when dredging had peaked in the segment. Second, the Missouri River basin experienced an extended drought from 2000 through 2007 and reservoirs and flow in the LOMR were extremely low until runoff, reservoir levels, and releases returned to normal in 2009 and 2010. During the period of lower than average flows the LOMR had a corresponding lower than average bed load. Based on the current snowpack throughout the Missouri River basin, the 2010-2011 Annual Operating Plan for the Missouri River Mainstem System (USACE, 2010c) projects river flows to be at or above normal in 2011 so the bed material load should be at or above normal and able to accommodate the higher transition dredging level, which is likely a substantial part of the reason for the observed short term recovery. Third, the transition period is only three years. The final but important reason is that the water surface profile will be monitored during the transition period and, as with any permit, permits for dredging in the segment could be suspended, modified, or revoked if warranted. In light of these factors and permit conditions described above, the USACE has determined that the three year transition period for the Kansas City segment should not result in any new significant cumulative and indirect impacts to geomorphology, infrastructure, cultural resources, or endangered species.

The Final EIS (USACE 2011) determined that 60,000 tons per mile per year may be the upper limit of local dredging intensity that is reasonably unlikely to result in local bed degradation. The Environmentally Preferred Alternative identified for each segment in the Final EIS (USACE 2011) was conditioned on applying a target level of dredging intensity in conjunction with segment limits. The USACE has determined limiting the most heavily dredged and degraded five-mile reaches of the river to no more than 300,000 tons would effectively protect those areas at risk from more than slight additional degradation in the future. The USACE has identified 17 specific five-mile reaches with water surface profiles more than two feet lower in 2005 than in 1990 and with a five-mile moving average bed elevation averaged over 2007, 2008, and 2009 that was more than a foot lower than in 1998. These degraded reaches occur between river miles 15 to 20, 25 to 35, 90 to 100, 140 to 150, 355 to 395, and 445 to 455. The LEDPA will limit annual extraction in each five-mile portion of these reaches to no more than 300,000 tons. The USACE has determined that this restriction, with the segment limits and a monitoring and adaptive management framework, are expected to result in no more than slight degradation in the most heavily degraded and at risk reaches and throughout each segment and should

not result in cumulative and indirect impacts to geomorphology, infrastructure, cultural resources, or endangered species not already assessed in the Final EIS.

The restriction should not result in any significant cumulative and indirect impacts on the regional economy not already assessed in the Final EIS because most of the dredgers should be able to extract their authorized amounts from their existing sand plants with their existing equipment. They can do so by dredging more in reaches they already use to a small extent that are immediately adjacent to the "hot spots", by shifting some production from their most heavily used plants to their nearest less heavily used plants, and transporting sand by truck when needed. The Final EIS (USACE 2011) also concluded that existing alternate sources of sand have the capacity to meet any demand not met by LOMR Dredgers.

Cumulative and secondary impacts are more fully discussed in Chapter 5 of the Final EIS (USACE 2011).

4.2.3 Clean Water Act (CWA) Analysis

The USACE responsibility under our Regulatory Program covers three primary areas of responsibility: 1.) NEPA evaluation, 2.) Public Interest Review and 3.) Section 404(b)(1) Guidelines. The NEPA evaluation comprises the information from the Final EIS (USACE 2011). The Public Interest Review comprises the overall desires of the public as reflected in the comments of state and local agencies and the general public, which is contained and evaluated throughout this document. The Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material prohibits the authorization of a discharge of dredged or fill material if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem (Least Environmentally Damaging Practicable Alternative or LEDPA), so long as the alternative does not have other significant adverse environmental consequences. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant, which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered. The Section 404(b)(1) Guidelines also prohibits authorizing a discharge of dredged or fill material that will cause or contribute to significant degradation of the waters of the United States or jeopardize the continued existence of species listed as endangered or threatened under the ESA . The potential of the Proposed and Alternative Actions to adversely affect waters of the United States and endangered or threatened species were considered in identifying the Environmentally Preferred Alternative. Practicability was the key consideration in identifying the

LEDPA and is discussed in this section. A factual determination of the effect of the LEDPA on waters of the United States and on endangered and threatened species is included SECTION 5 of this ROD.

4.2.3.1 Identification of the LEDPA

4.2.3.1.1 Segment Limits

The Final EIS (USACE 2011) divided the LOMR into five segments for analysis and the identified Environmentally Preferred Alternative was a composite of the best alternative for each segment. Several of the Dredgers said that dividing the LOMR into segments with annual extraction limits for each segment did not provide the flexibility they need to bid large projects throughout Missouri. They suggest that the analytic structure of the EIS analysis and the permit decision should be based on the structure of the sand and gravel industry not the natural resource. However, the LOMR is not homogenous throughout its length. The bed load, and therefore the dredging capacity, varies with the geomorphology of the river, the geology of the floodplain, and sediment and water input from tributaries. To be able to evaluate and regulate the potential effects of dredging on river geomorphology, the spatial variation in bed load needed to be taken into account. Dividing the LOMR into segments based on the major sediment input from tributaries was the method that was determined to appropriately do this. The USACE has also determined that the segment approach is practicable for the dredgers. In all segments outside the Kansas City segment, the authorized extraction limits will be approximately equal to or greater than the average amount dredged by each Dredger between 2004 and 2008 in those segments. Further, it is not expected that the dredgers in these segments will need to relocate their sand plants to obtain the authorized amounts. Although it was necessary to reduce authorized extraction in the Kansas City segment, the USACE has increased the authorized amounts in the upstream and downstream segments. The USACE believes this is a practicable alternative for Holliday Sand & Gravel Company. The Dredgers may not prefer the segment limits because they do not fully accommodate the differences among the Dredgers in dredging, marketing, and transporting sand, but the Final EIS (USACE 2011) and recent comments from The Master's Dredging Company and Missouri Sand Company indicate that sand is transported fairly long distances by trucks when necessary. Some of the Dredgers even acknowledge that they truck sand to southern Missouri at times. The Final EIS (USACE 2011) also concluded that existing alternate sources of sand have the capacity to meet any demand not met by LOMR Dredgers. Although shifting some production from one sand plant to another, transporting more sand by truck, and/or letting other alternate sources meet some of the demand for sand does not maximize the profit of the Dredgers and may increase the price of sand to some extent. As a supplemental element, it is a practicable alternative that meets the basic

project purpose of supplying the aggregate required to support the region's construction and manufacturing needs.

Holliday Sand & Gravel Company argues that the Environmentally Preferred Alternative is not practicable because it does not have the equipment and pilots needed to dredge more sand farther away from their sand plants at Riverside and Randolph and because there are not sufficient alternate sources in the Kansas City metropolitan area to supply the sand previously dredged from the Kansas City segment. We acknowledge that Holliday Sand & Gravel Company may not have the additional equipment needed to immediately transfer the extraction of 1,060,000 tons per year from the Kansas City to the St. Joseph or Waverly segments. However, this may have been avoidable. In 2007 and 2008 when the USACE proposed to cap dredging at 2006 levels and decrease it each year in the Kansas City area, Holliday Sand & Gravel Company asked that it be allowed to extract the full amount for the duration of the permit to give them time to acquire property and equipment needed to adjust. USACE recognizes the difficult decision associated with investment during a period of uncertainty but made efforts to express to Holliday Sand & Gravel Company that the degradation issue in Kansas City area was severe and would require less concentrated dredging. The USACE also disagrees with the assertion that the Kansas City economy would suffer because there are not sufficient alternate sources to make up for any decrease in dredging from the LOMR. The USACE has received letters from The Master's Dredging Company and Missouri Sand Company LLC (see the letters in Appendix A) rebutting this assertion and providing credible information about existing and planned sand mining operations with ample reserves of sand that meets the requirements and can fulfill the market needs now and in the future.

Holliday Sand & Gravel Company is making efforts to obtain permits for some floodplain mining as an alternate source for some of its needed sand production. That permit and those for some of the planned sand mining operations mentioned above have not yet been obtained, and Holliday Sand & Gravel Company has expressed that it needs 600,000 tons for each of the Riverside and Randolph plants to keep them operating. Therefore, the USACE has determined that the LEDPA will include a three year transition period to the Environmentally Preferred Alternative in the Kansas City segment. Annual extraction in the segment would be limited to 1,200,000 tons (approximately Alternative B) in 2011; 900,000 tons in 2012; 850,000 tons in 2013; and 540,000 tons per year in 2014 and 2015. We believe these levels of extraction during this transition period are practicable from the perspectives of both Holliday Sand & Gravel Company and the regional economy. The Final EIS (USACE 2011) concluded that Alternative B would result in slight degradation in the short term, and moderate degradation only in the long term, so transitioning through these amounts (although Alternative A is the

ultimately selected alternative) should not result in more than slight degradation over the transition period. There are several other legitimate reasons supporting the transition period. First, as Holliday Sand & Gravel Company pointed out, the tonnage will be at or below the level extracted annually from 2007 to 2009 and comparison of the bed elevation surveys of the Kansas City segment in those years actually showed some short term recovery. The tonnage extracted annually from 2007 to 2009 was already slightly less than several years earlier when dredging had peaked in the segment. Second, the Missouri River basin experienced an extended drought from 2000 through 2007 and reservoirs and flow in the LOMR were extremely low until runoff, reservoir levels and releases returned to normal in 2009 and 2010. During the period of lower than average flows the LOMR had a corresponding lower than average bed load. Based on the current snowpack throughout the Missouri River basin, the 2010-2011 Annual Operating Plan for the Missouri River Mainstem System (USACE, 2010c) projects river flows to be at or above normal in 2011 so the bed material load should be at or above normal and able to accommodate the higher transition dredging level, which is likely a substantial part of the reason for the observed short term recovery. Third, the transition period is only three years. The final but important reason is that that the water surface profile will be monitored during the transition period and, as with any permit, permits for dredging in the segment could be suspended, modified, or revoked if warranted. The USACE has concluded that more than slight future degradation, particularly in the most degraded reaches is contrary to the public interest, could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest and conflicts with the 404(b)(1) Guidelines. Based on the factors described above, the USACE has determined that the three year transition period for the Kansas City segment should result in no more than slight degradation over the permit period and would not be contrary to the public interest.

When combined with the time elapsed since the previous permit decision and dredging reductions in 2007, this three year transition period should give Holliday Sand & Gravel Company enough time to adjust their operation and it provides some time for permits to be obtained for development of alternative sources. The USACE has determined that giving Holliday Sand & Gravel Company this three year transition period to Alternative A of the EIS is the LEDPA and complies with the Section 404(b)(1) Guidelines.

The Dredgers on the other segments of the LOMR all indicated that the annual extraction limits of the Environmentally Preferred Alternative did not provide enough sand to meet demand or for their dredging operations to remain profitable. The USACE has also determined that the segment approach is practicable for the dredgers. In all segments outside the Kansas City segment, the authorized

extraction limits will be approximately equal to or greater than the average amount dredged by each Dredger between 2004 and 2008 in those segments. Further, it is not expected that the dredgers in these segments will need to relocate their sand plants to obtain the authorized amounts. Although it was necessary to reduce authorized extraction in the Kansas City segment, the USACE has increased the authorized amounts in the upstream and downstream segments. The USACE believes this is a practicable alternative for Holliday Sand & Gravel Company. The Final EIS (USACE 2011) determined that the segment limits of the Environmentally Preferred Alternative combined with dredging concentration limits and a monitoring and adaptive management framework should result in no more than slight degradation in the short term and long term at the sand plants or elsewhere within the segments. The USACE has determined that these conditions are the LEDPA and comply with the Section 404(b)(1) Guidelines. However, dredging more than the segment limit of Alternative C in the Jefferson City and St. Charles segments, even with the dredging concentration limit, would not comply with the Section 404(b)(1) Guidelines and is not the LEDPA. Higher segment limits would be likely to result in moderate to substantial bed degradation. This level of bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest.

In summary, Table 4-2 shows the companies, amounts, and locations, that the USACE intends to authorize. The USACE has determined that the Environmentally Preferred Alternative for the St. Joseph, Waverly, Jefferson City, and St. Charles segments is practicable and therefore the LEDPA. However, the Environmentally Preferred Alternative for the Kansas City segment would reduce annual extraction by 1,980,000 tons from the average amount extracted annually between 2004 and 2008. Holliday Sand and Gravel Company has demonstrated that it cannot practicably increase extraction levels in the St. Joseph segment or develop alternate sources on the floodplain of the LOMR in less than three years and it needs at least 850,000 tons in the Kansas City segment to remain viable during this three-year period. The USACE has determined that the LEDPA is to allow a three year transition period to the 540,000-ton Environmentally Preferred Alternative. Annual extraction will be limited to 1,200,000 tons in 2011; 900,000 tons in 2012; and 850,000 tons in 2013. This will to allow Holliday Sand to prepare to implement the Environmentally Preferred Alternative A (540K tons per year) in the Kansas City segment in 2014 and 2015 while balancing the substantial potential impacts of higher amounts on other resources.

In the St. Charles and Jefferson City segments, the previously authorized Dredgers will be authorized to annually extract the average annual amount each company dredged from that segment from 2004 to 2008. In the Waverly segment Capital Sand will also be authorized to annually extract the average

amount that company dredged annually from 2004 to 2008. Because Holliday Sand and Gravel Company will be authorized to dredge significantly less material from the Kansas City segment than their average from 2004 to 2008, it will be authorized to annually extract the remaining 770,000 tons of the annual extraction limit for the Waverly segment and the entire 860,000 tons in the St. Joseph segment. Because the annual extraction limit of the LEDPA is less than the average annual extraction between 2004 and 2008 and further reductions to the previously authorized dredgers would likely cause extreme hardship on them to remain economically viable, the new annual extraction limit will be fully allocated among the previously authorized Dredgers and none will be available to authorize new permits or additional tonnage requested by previously authorized Dredgers. The currently authorized dredgers have existing infrastructure and ongoing operations which rely on sand and gravel extraction from the river. To force them to close in order to allow new applicants to receive a portion of the limited amounts in the LEDPA would not be equitable. Therefore The Master's Dredging Company and Edward N. Rau Contractor Company will be denied authorization to dredge and Capital Sand Company will be denied authorization to dredge in the St. Louis District.

Table 4-2 Proposed March 2011 Dredging Permit Action

Application Number	Applicant Name and Address	River Miles Authorized for Dredging by This Permit	Annual Tons of Material Authorized by This Permit
NWK 2001-01429	**Capital Sand Company, Inc. (Capital Sand)** Post Office Box 104990 Jefferson City, MO 65110-4990	**(St. Charles Segment)** 62.00-75.00, 109.00-115.20, 115.95-118.40, 119.15-119.35, 119.85-124.35, 124.95-126.05, 126.90-127.50,	140,000
		(Jefferson City Segment) 130.20-157.00, 158.45-164.00, 172.00-176.40, 178.35-180.15, 180.65-184.75, 185.65-186.90, 188.20-192.00, 193.00-193.40, 195.75-202.10, 202.75-210.00, 220.00-226.95, 227.55-230.00, 245.00-249.65	1,350,000
		(Waverly Segment) 250.30-265.00, 283.00-297.90, 301.05-303.00, 314.00-328.00.	370,000
MVS 2008-00193	**Capital Sand**	**(St. Charles Segment)** None	0
NWK 2001-01430	**Hermann Sand and Gravel, Inc. (Hermann Sand)** Route 3, Box 261 Hermann, Missouri 65041	**(St. Charles Segment)** 56.00-56.85, 61.25-66.00, 70.00-80.00, 80.50-89.75, 93.55-101.70, 109.00-115.20, 115.95-118.40	120,000
		(Jefferson City Segment) 146.00-157.00, 158.45-164.00	120,000

Application Number	Applicant Name and Address	River Miles Authorized for Dredging by This Permit	Annual Tons of Material Authorized by This Permit
NWK 2001-01431	**Holliday Sand and Gravel Company (Holliday Sand)** 6811 West 63rd Street Overland Park, Kansas 66202	**(Waverly Segment)** 320.00-330.90, 331.65-336.00, 338.00-339.15, 350.00-356.30, 356.50-356.90	770,000
		(Kansas City Segment) 356.90-358.16, 358.36-359.24, 359.44-360.17, 360.37-361.20, 361.44-362.15, 362.35-364.25, 364.45-364.64, 364.84-365.43, 365.79-366.02, 366.30-367.00, 367.90-373.30, 374.20-375.10, 375.30-377.81, 378.90-379.70, 380.70-386.00	**2011** - 1,200,000 **2012** - 900,000 **2013** – 850,000 **2014** - 540,000 **2015** – 540,000
		(St. Joseph Segment) 445.00-447.75, 448.25-456.75, 457.25-458.75	860,000
NWK 2001-01434	**Con-Agg of MO, L.L.C. (Con-Agg)** 2604 North Stadium Blvd. Columbia, Missouri 65202	**(Jefferson City Segment)** 178.35-184.75, 185.65-186.90, 188.20-192.00, 193.00-193.40, 195.75-196.50, 196.70-197.00, 198.50-199.15, 199.40-201.95	160,000
MVS P-2339	**J.T.R. Inc. (Jotori Dredging)** 2320 Creve Coeur Mill Road Maryland Heights, MO 63043	**(St. Charles Segment)** 1.00-4.00, 6.00 -12.00, 14.00-24.00, 30.00-35.00	460,000
MVS P-2342	**Limited Leasing Company** 1777 Highway 79 South Old Monroe, MO 63369	**(St. Charles Segment)** 0.00-12.00, 20.00-35.00, 40.00-47.00	990,000
NWK 2008-1765	**The Master's Dredging Co.** P.O. Box 9 Lawrence, KS 66044	**(St. Joseph Segment)**	0
NWK 2001-1435	**Edward N. Edward N. Rau Contractor Company** 2809 State Road A, Suite A Washington, MO 63090-6442	**(St. Charles Segment)**	0
TOTAL	2011 2012 2013 2014, 2015		6,540,000 6,240,000 6,190,000 5,880,000

4.2.3.1.2 Limits on Localized Dredging Intensity

The Final EIS (USACE 2011) determined that 60,000 tons per mile per year may be the upper limit of local dredging intensity that is reasonably unlikely to result in local bed degradation. The Environmentally Preferred Alternative identified for each segment in the Final EIS (USACE 2011) was conditioned on applying a target level of dredging intensity in conjunction with segment limits. It is

recognized that this amount is not a precise measurement and evaluation of monitoring data during the upcoming permit cycle may indicate that modifications are warranted within the framework of the EIS and this ROD. When the Dredgers learned of this condition of the Environmentally Preferred Alternative, they acknowledged it may be necessary in some areas including Kansas City and Jefferson City but they thought it was impracticable, burdensome, and unnecessary outside the most degraded reaches. The Dredgers suggested applying a five-mile dredging intensity limit to the most degraded "hot spots." The USACE agreed that applying the 60,000-tons per mile per year dredging target to each individual river mile throughout the entire river presents practicality difficulties to both the Dredgers and the USACE. The USACE considered applying this limit on a one-mile basis, but in evaluation of the available river bed elevation models, there was too much variability and uncertainty at the one mile level. Choosing to use a longer reach, i.e., five miles, allowed for better identification and delineation of the "hot spots". Limiting the most heavily dredged and degraded five-mile reaches of the river to no more than 300,000 tons would allow better management by the USACE, would provide more flexibility to the Dredgers in reaches that are not degraded and at risk, and effectively protect those areas with the higher degradation trends. The USACE has identified 17 specific five-mile reaches with water surface profiles more than two feet lower in 2005 than in 1990 and with a five-mile moving average bed elevation averaged over 2007, 2008, and 2009 that was more than a foot lower than in 1998. These degraded reaches occur between river miles 15 to 20, 25 to 35, 90 to 100, 140 to 150, 355 to 395, and 445 to 455.

Several commenters questioned the designation of the reaches between river miles 15 to 20 (St. Charles, Missouri) and 90 to 100 (Hermann, Missouri) as "hot spots" because the average annual extraction in each reach is less than 300,000 tons and they didn't think dredging could possibly be causing any bed degradation there. As described above, these two reaches have degraded two feet or more since 1990 and one foot since 1998. The USACE has concluded that more than slight future degradation, particularly in these most degraded reaches is contrary to the public interest regardless of the cause. Moderate to substantial bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest and conflicts with the 404(b)(1) Guidelines. Therefore dredging would be contrary to the public interest when it is expected contribute to degradation in any area where other factors may be expected to cause more than slight degradation in the short term.

All the Dredgers gave several reasons why it would be too costly and difficult to expand their dredging operations outside the 17 identified five-mile "hot spots". The USACE evaluated the average annual

extraction in the five-mile "hot spots" in the Jefferson City and St. Charles segments and determined that the condition is practicable. J.T.R., Limited Leasing Company, Capital Sand Company, and Hermann Sand and Gravel should be able to extract their authorized amounts from their existing sand plants with their existing equipment. They can do so by dredging more in reaches they already use to a small extent that are immediately adjacent to the "hot spots", by shifting some production from their most heavily used plants to their nearest less heavily used plants, and transporting sand by truck when needed. Of these companies, Capital Sand Company may have the most difficulty under the condition mainly because it has historically dredged more than 1,000,000 tons per year in the ten miles around their Jefferson City plant. It can increase its extraction below river mile 140 and above 150 and shift some extraction to their Rocheport, Boonville, and Glasgow sand plants. However, USACE has determined that the mileage differences for dredging sand away from the "hotspots" for each of these companies would be much less than for Holliday Sand Company, and the permitted volumes and locations for these companies is very close to their average annual take (unlike those permitted for Holliday Sand Company.).. Because of the unique impacts to Holliday Sand Company, the LEDPA will include a three year transition period in the Kansas City segment.

The Final EIS (USACE 2011) and recent comments from The Master's Dredging Company and Missouri Sand Company indicate that sand is transported fairly long distances by trucks when necessary. Some of the Dredgers even acknowledge that they truck sand to southern Missouri at times. The Final EIS (USACE 2011) also concluded that existing alternate sources of sand have the capacity to meet any demand not met by LOMR Dredgers. Although shifting some production from one sand plant to another, transporting more sand by truck, and/or letting other alternate sources meet some of the demand for sand does not maximize the profit of the Dredgers and may increase the price of sand to some extent. As a supplemental element, it is a practicable alternative that meets the basic project purpose of supplying the aggregate required to support the region's construction and manufacturing needs.

The USACE has determined that based on the available information, limiting dredging to no more than 300,000 tons per year in each of these 17 five-mile reaches is a practicable and necessary part of the LEDPA and will comply with the Section 404(b)(1) Guidelines. Without this dredging concentration limit in these reaches, the selected alternative would not comply with the Section 404(b)(1) Guidelines. Available information indicates that it would likely result in moderate to substantial bed degradation. This level of bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest.

4.2.3.1.3 Monitoring and Adaptive Management Framework

The Final EIS (USACE 2011) determined that a monitoring and adaptive management framework was an integral part of the Environmentally Preferred Alternative. The Dredgers recognize the need for monitoring and are willing to pay for periodic bed elevation surveys even though they are opposed to the idea of reevaluating and adjusting permit conditions based on the results of that monitoring. They have expressed the opinions that degradation is not actually occurring or is as severe as the Final EIS (USACE 2011) concluded, and that dredging is not a cause of degradation. The Final EIS concluded that significant degradation has occurred in reaches in St. Joseph, Kansas City, Jefferson City, and St. Charles where dredging has been concentrated in the past and that dredging is one of several causes of degradation. Kansas City is the most severely degraded segment; has experienced the most impacts to revetments, bridges on tributaries, and intake structures; and has the greatest investment protected by levees in close proximity to the river and vulnerable to bed degradation. The USACE has concluded that more than slight future degradation, particularly in the most degraded reaches is contrary to the public interest regardless of the cause. Moderate to severe bed degradation could cause potentially significant impacts on resources including but not limited to water intakes, navigation, flood control, endangered species, and cultural resources and would be contrary to the public interest and conflicts with the 404(b)(1) Guidelines. Therefore dredging would be contrary to the public interest when it is expected contribute to degradation in any area with trends of more than slight degradation even where a portion of that degradation is caused by other means.

The USACE has determined that monitoring is a practicable and necessary part of the LEDPA. The USACE evaluated existing models for identifying degradation from water surface profiles and hydroacoustic bed elevation surveys and concluded that the state of these models are not advanced sufficiently to accurately identify changes within one year. Accordingly, USACE concluded, based on available information, that the only practicable way to identify degradation trends and to make adaptive changes is to use multiple years of data. Water surface profiles are prepared annually by the USACE and a hydroacoustic bed elevation survey will be provided by the Dredgers in the fourth year of each permit cycle, unless the USACE provides one through another study or river program. The USACE will evaluate the data and meet with the Dredgers and state and federal agencies in the fall of each year to discuss the condition and trend of the river as shown by the most recent water surface profiles or surveys. Permits would be issued for five-year periods. During the five-year permit cycle, if the USACE determines from new data or analysis that additional measures should be taken to protect critical resources, it may modify, suspend, or revoke the permit at any time. Renewal of the dredging permits after five years would be a new Federal action requiring assessment of the prior NEPA

documentation and assessment of any new information. In 2015, the data from the previous four years will be compared with the 2009 water surface profile and bed elevation baselines to evaluate if the permit limits and special conditions adequately limited the impact of dredging to no more than slight degradation across the river as projected by the EIS. Trends of moderate to severe degradation instead of the slight degradation anticipated by the EIS for the Environmentally Preferred Alternatives for the St. Joseph, Waverly, Jefferson City, and St. Charles segments or any additional degradation in the Kansas City segment would require a thorough review of the permit provisions and could result in reductions in authorized dredging reaches or quantities, or implementation of other mitigation measures in the new permit decision. Likewise, aggradation trends could allow for consideration of increased quantities.

SECTION 5

Evaluation of the Section 404(b)(1) Guidelines

The LEDPA has been evaluated in accordance with guidelines developed by the Administrator of the Environmental Protection Agency in conjunction with the Secretary of the Army, and published at 40 C.F.R. 230. The following discussion addresses adverse impacts, individually and cumulatively, for all evaluation factors identified in Subparts C through H of the subject regulation.

5.1 PHYSICAL AND CHEMICAL CHARACTERISTICS (SUBPART C)

5.1.1 Substrate

The substrate of the areas to be dredged consist primarily of fine grained quartz sand, silt, and some gravel deposited during periods of high flow. Missouri River substrates also have some organic material including lignite. The velocity in the main channel is high enough that silt and clay are primarily kept in suspension. The total sediment load of the Missouri River increases to some degree as it progresses downstream through the St. Joseph, Kansas City, and Waverly segments because of the sediment added by tributaries. The concentration of the suspended sediment is reduced to some degree in the Jefferson City and St. Charles segments because of dilution caused by inflow of water from clearer Ozark streams.

The hydraulic cutter-head suction dredges have rotating cutters on the suction heads that allow them to loosen and suck up compacted material. The water and material are discharged from the suction pipe onto vibrating screens, removing the desired material and discharging the water and unwanted material back into the river. The course discharged material, such as rocks, coarse gravel, clay balls, or coarse sand will immediately settle to the bottom of the disposal area and usually accumulate directly beneath the discharge point. The vast majority of the fine-grained material also descends rapidly to the bottom where it forms a low gradient circular or elliptical fluid mud mound. A small percentage of the discharged material is stripped away from the outside of the slurry as it hits the water surface and

descends through the water column and remains suspended in the water column as a turbidity plume. If the discharge is moved as the dredge advances, a series of mounds will develop. The majority of the mounded material is usually high-density, non-flowing fluid mud. The short and long term dispersion characteristics of the discharged slurry depend on many factors including the nature and rate of slurry discharge, the discharge configuration, and the hydrodynamic regime and bottom topography in the disposal area. Because of the relatively high river velocity, no long term or permanent changes in bottom geometry would occur.

Localized changes in sediment loads and river bed composition occur in the vicinity of the dredging operation and are proportional to the amount of dredging occurring. The proposed dredging would result in the following effects in all segments:

- Short-term impacts in all segments would include a local decrease in sediment availability as the dredged area captures sediment transported by the river, and erosion occurs downriver as the river replaces the captured sediment. The amount of fine sediment in the water column would increase below the active dredge location as the dredging operation discharges unusable material back into the river.
- Long-term impacts in all segments would include an increase in the concentration of coarse gravel and cobbles on or near the surface of the river bed as material is dredged from the river bed and the material that is too coarse to retain is deposited back onto the surface of the river bed.

Because dredging constantly extracts the same gradation of sand, in order for it to not contribute to bed degradation it is necessary that sufficient bed material load be available to replace the material removed by the Dredgers. To not change the substrate composition, the available bed material load must be composed of the gradations removed by the Dredgers. The bed material load is correlated to the river flow volume so less material is available for extraction during low flow years than is normally available. In general, the bed material in the St. Joseph, Kansas City, and Waverly segments tends to be finer than the specifications for concrete sand, requiring additional material to be dredged from the river bed (see Figures 3.4-14 and 3.4-15 of the Final EIS [USACE 2011] for the size distribution of bed material relative to the specifications). Because of the additional amount of dredging required to obtain material that meets specifications, the effects of dredging on sediment availability and coarse sediment would be greater for the St. Joseph, Kansas City, and Waverly segments than for the Jefferson City and St. Charles segments under the LEDPA. The LEDPA includes annual extraction limits for each segment based on the estimated sediment load of each segment and/or recent average extraction limits, limits on localized dredging intensity for the most degraded and heavily dredged five-mile

reaches, and a monitoring and adaptive management framework that will minimize changes in substrate composition and is expected to result in no more than a slight amount of degradation or aggradation in the short and long term. See Section 4.2 and 4.5 of the Final EIS (USACE 2011) for additional information.

5.1.2 Water

Dredging operations result in suspended sediment at and downstream of the dredge site. The size of the elevated suspended sediment plume downstream of the dredge depends on a variety of factors, including the hydrodynamic conditions of the dredging site, the type of dredge used, operational methods, and sediment type. Because coarser-grained sediment particles have a greater fall velocity, they settle out more quickly than silt and fine-grained sand particles, which typically comprise the suspended sediment plume downstream of the dredge. USACE sampling of in situ suspended solids below a cutter-head dredge in the LOMR near the confluence of the Kansas and Missouri Rivers indicated that suspended solid concentrations returned to background concentrations within approximately 1,300 feet (see Section 4.5.3.1 of Final EIS, USACE 2011). Because natural suspended sediment variations in the LOMR have been documented as exceeding the average predicted suspended sediment levels at 100 and 400 feet from the dredge head, it is likely that dredging operations would not likely result in a significant change in suspended sediment concentrations, compared to natural variation. While dredging would result in elevated suspended sediment concentrations along the suspended sediment plume during periods of low background suspended sediment levels, the levels of suspended sediments from dredging would not likely exceed levels that occur naturally during high runoff events.

As discussed in Section 3.7 of the Final EIS (USACE 2011), state water quality standards for turbidity and suspended sediment in the LOMR are largely qualitative, and it is important to note that sediment levels in the LOMR have decreased substantially from historical levels due to the installation of dams and the associated flow modifications, bank stabilization, and the design of the navigation channel. Any suspended sediment from the hydraulic dredge head would be limited to the bottom of the water column. Large-particle sediments from the dredge discharges would quickly settle to the bottom of the LOMR; and the fine sediments discharged, depending upon background levels at the time of discharge, may contrast with receiving waters. But fine sediment discharge would likely not be of sufficient quantity to differ substantially from the maximum natural suspended sediment levels in receiving waters.

See Section 4.5 of the Final EIS (USACE 2011) for additional information.

5.1.3 Current Patterns and Water Circulation

Under the LEDPA, neither dredging nor the discharge of dredged material will cause permanent changes in circulation patterns or shoaling areas. The stockpiling of material on shore will not affect groundwater recharge, wetland areas, or other areas of nutrient and mineral cycling, or natural areas of contaminant detoxification and fixation. River bed hydraulic conductivity would continue to be slightly altered for a short period in those locations subject to dredging. Change in the composition or depth of the substrate over existing horizontal municipal drinking water collector wells along the river could negatively affect the existing permeable aquifer material and reduce the quality and quantity of this municipal drinking water source. However, by excluding dredging near horizontal collector wells under the river, the hydraulic conductivity of the river bed in those areas should not be altered. Tributary degradation is linked to low-flow water surface elevations in the main channel. In general, a moderate to substantial decrease in LOMR low-flow water surface elevations would need to occur before tributaries are likely to be affected. Because the LEDPA is expected to result in no more than a slight long term decline in low-flow water surface levels, tributary degradation is not expected to result.

See Section 4.2 and 4.5 of the Final EIS (USACE 2011) for additional information.

5.1.4 Normal Water Fluctuations

Under the LEDPA, all segments of the LOMR are expected to experience no more than slight short and long term bed degradation, no more than a slight long term rise in high-flow surface water levels, and no more than a slight long term decline in low-flow surface water levels which would likely have a slight effect on alluvial aquifer levels near the LOMR and no effect on aquifer levels farther from the river channel. Because the LEDPA includes limits on concentrated dredging, the effects of dredging on low-flow and high-flow water surface elevations would not be distinguishable from other factors affecting water surface elevations.

See Section 4.2 and 4.5 of the Final EIS (USACE 2011) for additional information.

5.1.5 Salinity Gradients

The Missouri River contains fresh water. The dredging operation will not introduce salt bearing material or additional water so should neither increase nor decrease the normal salinity level of the river.

5.2 BIOLOGICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM (SUBPART D)

5.2.1 Threatened and Endangered Species

All of the proposed dredging areas are within the known range of the threatened piping plover, endangered least tern, endangered pallid sturgeon, endangered Indiana bat, and threatened decurrent false aster. In compliance with the ESA, the USACE has completed a Biological Assessment which concluded that the LEDPA would have no effect on the Indiana bat and the decurrent false aster and is not likely to adversely affect the pallid sturgeon, least tern, and piping plover or their designated critical habitat.

When combined with the past and present effects, along with those anticipated as a result of future non-federal actions within the Action Area, the LEDPA may affect, but is not likely to adversely affect pallid sturgeon. Based on the best available information reported in the literature and the specific factors on the LOMR, the potential for entrainment of pallid sturgeon due to dredging and towboat propellers and related mortality would be extremely low and improbable and thus judged to be minor and discountable(USACE, 2011b). The other potential adverse effect of dredging on pallid sturgeon is through indirect effects on natural or created shallow water habitat (SWH), which is thought to be an important habitat to larval and young juvenile pallid sturgeon. However, the effects on SWH are estimated to be minor and discountable. This is because under the LEDPA, dredging would be kept to levels that would result in bed degradation and associated changes in low-flow and high-flow water surface elevations that would be expected to be only slight in the short term (5 years). Changes of this magnitude are not expected to result in any substantial impacts on the abundance of SWH over and above natural year-to-year variations in the abundance of SWH. All other potential effects of the LEDPA were judged to be minor and discountable.

Commercial dredging on the LOMR under the LEDPA is also not likely to adversely affect interior least tern or piping plover due to the lack of suitable nesting habitat within the Action Area, the rare occurrence and lack of breeding within the Action Area, and the absence of critical habitat in the Action Area.

The LEDPA would have no effect on Indiana bats and decurrent false aster. Terrestrial habitats for both species would not be affected by commercial dredging under the LEDPA and would not authorize the construction of any new sand plants. Therefore the LEDPA would have no effect on these species.

After informal consultation, the USFWS has concurred with this determination based on the permit conditions described in Sections 4.2.3.1 and 6-1 of this document.

5.2.2 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms

5.2.2.1 Aquatic Habitat

As discussed in Section 3.4 of the Final EIS (USACE 2011), the main channel benthic habitat of the LOMR is a dynamic system in which the bed load and associated benthic habitats often are changing. Benthic fish use habitats in and adjacent to main channels, where dredging is primarily concentrated, with environmental conditions that can include bed load sediment transport and high near-bed flow velocities. Macroinvertebrate density and diversity increase with sediment stability, decreased water velocities, and increasing silt and organic matter; therefore, macroinvertebrate diversity and density are likely to be reduced in the channelized LOMR main channel, compared to unchannelized and shallow-water habitats. Further, these species are typically found on hard substrates, opposed to shifting sand substrates (such as in those areas where dredging occurs).

The magnitude and duration of direct impacts on aquatic habitat at the dredge site would be determined by the time required for recovery and repopulation of the benthic areas. Typically, the more naturally variable an aquatic habitat, the less the direct effect of dredging on that habitat. Aquatic organisms common to these naturally variable areas are adapted to unstable sediment conditions and can better withstand the stresses imposed by dredging. Thus, due to the high level of variability in the benthic habitats in the LOMR, aquatic species present in these habitats are likely to be better able to withstand and recover from the localized alteration of benthic habitat due to dredging. Many areas of coarse aggregate sediments (e.g., cobble and bedrock) that substrate-spawning species (e.g., sturgeon and sauger) are known to use are found on outside bends that are constantly flushed free of fine sediment (DeLonay et al. 2009). Dredging under the LEDPA will be excluded from shallow-water habitat, in side channel areas, at many tributary junctions, and near dikes and revetments. These exclusion zones will cover most of the potential aggregate spawning habitat in the action area. The maintenance and establishment of these chutes and side channel areas that mimic historical depth and velocity patterns in the LOMR will assist in the restoration and maintenance of native fish communities. Under the LEDPA, the location and frequency of dredging in the St. Joseph and Waverly segments would substantially increase. This increase in dredging would result in a corresponding increase in the locations and frequencies that benthic habitats would be subject to direct disruption, even though temporary, and would affect habitat quality and availability. However, dredging would decrease in the

Kansas City segment compared to recent dredging, with a corresponding reduction in the frequency of direct benthic habitat disturbance. In the St. Charles and Jefferson City segments the quantity of dredging activity would not change substantially; therefore, the rate of temporary benthic habitat disruption would be similar to recent levels of benthic habitat disturbance.

Riverine habitat loss or alteration in the LOMR has been implicated in the loss of several native Missouri River fishes. As discussed in Section 3.8 of the Final EIS (USACE 2011), shallow-water habitat (SWH) is an important riverine habitat in the LOMR that provides for primary and secondary productivity, forage fish production, and early life stage development for native Missouri river fishes. SWH is recognized as a highly underrepresented aquatic habitat type that was characteristic of the historic Missouri River. Historical changes, such as flow alterations and channelization of the LOMR, likely have substantially decreased the availability of shallow, slow-moving water. Further, the LOMR has been and still is affected by reduced sediment inputs; these are important to creating and maintaining the diversity of habitats used by native fish such as the pallid sturgeon for reproduction and survival. River bed degradation also can alter the quantity of SWH in the LOMR (USACE 2009). River bed degradation can worsen the adverse biologic impacts of channelization by reducing the amount of shallow-water habitat available for primary production of plankton and invertebrates, and fish spawning and nursery areas (USACE 2009). Continued riverbed degradation could affect the long term stability and functioning of SWH restored by the MRRP (USACE 2009). The low-flow water surface elevations caused by river bed degradation could expose some SWH, while SWH in other areas could be created. Although this response of SWH to alterations of surface water flow may be occurring, it is important to note that these effects cannot be quantified at this time, and that additional studies are needed to fully determine and quantify the impacts of river bed degradation on SWH (USACE 2009). For the purposes of the effects analysis in the Final EIS (USACE 2011), it was assumed that river bed degradation, in conjunction with the local (reach-scale) removal of sand and gravel, could affect the quantity and distribution of natural or created SWH in the LOMR. Because the linkage between river bed degradation, sediment availability, and the quantity of SWH has not been quantified, levels of potential river bed degradation were used in the Section 4.6.5 of the Final EIS (USACE 2011) as a proxy for the potential for changes in the quantities of shallow-water habitat.

The LEDPA includes annual extraction limits for each segment based on the estimated sediment load of each segment and/or recent average extraction limits, limits on localized dredging intensity for the most degraded and heavily dredged five-mile reaches, and a monitoring and adaptive management framework that are expected to result in no more than a slight amount of degradation or aggradation in the short and long term in all segments of the river. Low-flow water surface elevations are not

anticipated to change significantly and may not have a potential to alter the abundance of shallow-water habitat in these segments.

Under the LEDPA, alternate sources of aggregate would need to supply a million tons of sand per year or more if the economy recovers and demand increases. Open-pit upland and floodplain mining could result in destruction of riparian or wetland habitat and introduction of contaminants and sediment via storm water, which would decrease habitat quality. Further, additional aquatic habitat alteration from floodplain open-pit mining would occur if the excavation pit was captured by the active stream channel during flooding, which would cause an abrupt relocation of the channel and extensive channel instability. However, the capture of a floodplain pit mine would be a very rare occurrence. Impacts related to instream mining operations would be similar to those discussed for upland mining impacts, such as potential spills of diesel fuel or other contaminants. Further, instream mining activities could destabilize the stream bed and banks, which causes simplification of aquatic habitats. Channel widening could result in shallowing of the stream bed, which could produce braided flow or subsurface intergravel flow in riffle areas; these conditions could hinder fish movement between pools or increase stream water temperature.

See Section 4.6 of the Final EIS (USACE 2011) for additional information.

5.2.2.2 Aquatic Organisms

Potential direct impacts on individual aquatic species include dredge entrainment, propeller entrainment, alterations of habitat from increased turbidity, and behavioral changes due to increased noise.

Benthic organisms (fish and macroinvertebrates) living near the river bottom or in the substrate in the main channel areas could be subject to entrainment during dredging. Intake water velocity and the organism's susceptibility to entrainment in the intake water flow are the primary determinant for entrainment; but secondary variables affecting swimming behavior and performance also could influence and determine species' entrainment rates. Site-specific physical factors, such as a constricted river area, biological factors, such as habitat near the dredge, and dredge operation and type would also determine the rate of entrainment. No definitive mortality estimates are available for the potential quantity or rate of fishes or their larvae that could be subject to entrainment from dredging in the LOMR. In general, studies show that dredging would not likely be a substantial problem for many fish or shellfish species in water bodies experiencing periodic dredging; however, dredging may pose a more substantial risk to some sensitive aquatic resources.

Dredge barges and transport barges (barges used for transporting excavated material to sand plants or other terminal locations) are anticipated to be positioned or moved using towboats. Ship propellers cause abrupt changes in hydraulic patterns due to increased turbulence and water velocities, pressure changes, and shear forces that can injure fish and larvae. Ship propellers also can injure or kill fish if fish come in contact with the blades. Studies have concluded that shear stress caused by towboat traffic is probably a primary force contributing to the mortality of icthyoplankton entrained during vessel passage, but the magnitude of mortality is dependent on the individual size of icthyoplankton. The extent of mortality would be a function of the amount of tow traffic on a given river system, towboat speed, and traffic volumes during the period when larvae are most susceptible to shear stress.

Fishes produce and use sounds in a wide variety of behaviors. Fish detect and respond to sound, utilizing its cues to hunt for prey, to avoid predators, and for social interaction. Underwater human-caused noise has been documented to influence fish behavior in general. Exposure to sound includes a measure of both the received level and the duration of the signal. Most noise impacts to fishes have been observed in situations of intense energy flux, such as construction-related pile driving or explosions, or propeller and engine noise from high-speed boats. Dredging operations generally produce lower levels of sound energy over prolonged periods. It is expected that noise from the operation of dredges—while not as intense as pile driving or explosions—may result in avoidance of the dredging area by fish species sensitive to noise over the duration of the activity.

The individual's response to elevated suspended sediment would be determined by the size, shape, and duration of the elevated suspended sediment plume, the tolerance of the fish, and the location of the dredge areas. Native organisms that evolved and are naturally associated with turbid environments typically are highly tolerant of elevated suspended sediment. The highest suspended sediment loads in the downstream channelized section of the LOMR are only 0.2 to 17 percent of pre-dam values. The combination of channelization and flow modifications in the LOMR has collectively resulted in a reduction of habitat and caused a substantial change in river species composition. Species that have become more abundant as turbidity has decreased include sight-feeding carnivores and pelagic planktivores, while some native big-river fishes with morphological adaptations to use high-turbidity and high-velocity main-channel habitats have declined. Native aquatic species evolved in the LOMR under historically turbid conditions, and turbid conditions that mimic the historical environment have largely been eliminated in the LOMR (see Section 3.7 of the Final EIS [USACE 2011]). Because of the historical context and role of suspended sediment in the LOMR system and the general reduction in suspended sediment in recent history, the introduction of suspended sediment, while localized to a

short distance downstream of the dredge (see Section 4.5 of the Final EIS [USACE 2011]), would likely result in a temporary improvement in habitat conditions for native aquatic species.

Under the LEDPA, alternate sources of aggregate would need to supply a million tons of sand per year or more if the economy recovers and demand increases. The potential introduction of contaminants in water bodies from upland and floodplain open-pit mining may result in changes in holding, feeding, or migratory behavior of fish and reproductive success of fish and macroinvertebrates. These changes may result in reduced species abundance and changes in species composition. Instream mining also may result in impacts to aquatic species similar to those described for open-pit mines, which could result in reduction or elimination of populations of aquatic species. Alterations of pool and riffle habitat characteristics and frequency due to sedimentation and channel widening can change the aquatic biotic community composition through changes to food production or retention, distance between patches, refuge security, and refuge distribution.

See Section 4.6 of the Final EIS (USACE 2011) for additional information.

5.2.3 Other Wildlife

Dredging can result in indirect effects on riparian and emergent wetlands within and adjacent to dredged areas because lower water surface levels affect groundwater-dependent wetlands. Indirect effects of dredging on terrestrial resources would be limited to alteration of vegetation resources in riparian and emergent wetland habitats and potential conversion of these habitats to upland habitat types. This effect would result in loss or degradation of wetland habitat and consequently would affect wetland-dependent wildlife, including dabbling ducks, songbirds, mammals, reptiles, and amphibians. As discussed in Section 4.2 of the Final EIS (USACE 2011), river bed degradation could result in localized erosion of sand bar habitat features that may be located near the dredge sites. Sand bar habitats are important to shore birds, including the piping plover and interior least tern (see Section 4.8 of the Final EIS) [USACE 2011]). Erosion of these habitats would result in a decrease in available sand bar habitat for species that use sand bars for one or more of their life stages. Terrestrial habitat and wildlife that use it can also be affected in the development of on-shore sand plants or sand pits in the floodplains. The primary impact on vegetative cover types from sand plant construction would be clearing and removal of vegetation on the sand plant parcels. The severity of impact would depend on the type of vegetation impacted and the size of the area cleared. Forested wetland habitats would be more dramatically altered by construction of sand plants than any other habitat. Because trees would be cleared from the sand plant area, species that depend on trees for food, refuge, or nesting would be displaced to nearby forested habitat. Some nesting species and tree-cavity nesting species would

suffer mortality during clearing. For adult birds that are able to disperse from the construction area, nesting success may be denied or diminished for one annual breeding cycle. During construction and operation of the sand plants, mobile species present in all habitats would disperse to adjacent habitats, while small, non-mobile species could suffer mortality.

Dredging in the LOMR would not result in direct effects on wetlands because dredging activities would be limited to the areas within the channel of the LOMR. The LEDPA includes annual extraction limits for each segment based on the estimated sediment load of each segment and/or recent average extraction limits, limits on localized dredging intensity for the most degraded and heavily dredged five-mile reaches, and a monitoring and adaptive management framework that are expected to result in no more than a slight amount (less than 2 feet) of degradation or aggradation in the short and long term, no more than a slight long term rise in high-flow surface water levels, and no more than a slight long term decline in low-flow surface water levels which would likely have a slight effect on alluvial aquifer levels near the LOMR and no effect on aquifer levels farther from the river channel. This effect in turn could lead to minor localized indirect effects on floodplain wetlands as a result of changes in groundwater levels that support floodplain wetlands. Those wetlands closest to the LOMR would be most likely to be affected, particularly during prolonged dry periods. Emergent, scrub-shrub, and forested wetlands provide habitat for several state-listed species, migratory birds, and numerous common wildlife species. Loss or degradation of wetland habitats would result in displacement of the wetland-dependent species, but could provide additional upland habitat for other non-wetland-dependent species. Because the LEDPA includes limits on concentrated dredging, the effects of dredging on low-flow and high-flow water surface elevations would not be distinguishable from other factors affecting water surface elevations.

Under the LEDPA, alternate sources of aggregate would need to supply a million tons of sand per year or more if the economy recovers and demand increases. In-channel dredging on the Kansas River or Mississippi River would not result in direct effects on wetland habitat because dredging activities would be limited to the area within the river channels. Any river bed degradation associated with alternate sources of dredging would lead to localized indirect effects on floodplain wetland habitats as a result of changes in surface water and groundwater surface levels on the Kansas and Mississippi Rivers. Potential indirect effects to wetland-dependent species, such as displacement and loss of habitat, would be similar to those described for the LOMR. Expansion of existing or new land-based mining could result in conversion of wetland or upland wildlife habitat and vegetative land cover to industrial land covers. The degree of impacts to wildlife species, such as species displacement and habitat

modification, would depend on the location of the alternate source, land covers, and the level of extraction.

Some terrestrial vegetation was cleared during the initial construction of the unloading and stockpiling facilities years ago. Consequently, a minor loss of some wildlife habitat did occur. However, no new off-loading facilities would be authorized under the LEDPA; therefore, no direct or indirect effects on wetland, vegetation, or terrestrial resources are anticipated to occur with reauthorization of the currently authorized dredging operations.

See Sections 3.9 and 4.7 of the Final EIS (USACE 2011) for additional information.

5.3 SPECIAL AQUATIC SITES (SUBPART E)

5.3.1 Sanctuaries and Refuges

Numerous local, state, and federal wildlife refuges occur along the LOMR within areas proposed for dredging. Special conditions and dredge exclusion zones developed in informal consultation between the USACE, the USFWS, MDNR, MDC, KDWP, KDHE, and the applicants, will exclude dredging, discharging unwanted material and water, docking, unloading, and stockpiling operations from primary fish and wildlife habitat within wildlife sanctuaries and refuges. The proposed dredging operations, when in compliance with these special conditions, would have minor adverse effects on fish or wildlife habitat within wildlife sanctuaries and refuges.

5.3.2 Wetlands

Special conditions and dredge exclusion zones developed in informal consultation between the USACE, the USFWS, MDNR, MDC, KDWP, KDHE, and the applicants, will exclude dredging, discharging unwanted material and water, docking, unloading, and stockpiling operations within wetlands.

5.3.3 Mud Flats

Special conditions and dredge exclusion zones developed in informal consultation between the USACE, the USFWS, MDNR, MDC, KDWP, KDHE, and the applicants, will exclude dredging, discharging unwanted material and water, docking, unloading, and stockpiling operations within mudflats.

5.3.4 Vegetated Shallows

Special conditions and dredge exclusion zones developed in informal consultation between the USACE, the USFWS, MDNR, MDC, KDWP, KDHE, and the applicants, will exclude dredging, discharging unwanted material and water, docking, unloading, and stockpiling operations within vegetated shallows.

5.3.5 Coral Reefs

Corals reefs do not occur in the LOMR.

5.3.6 Riffle and Pool Complexes

The LOMR is a deep, fast flowing navigable river without any riffle and pool complexes.

5.4 HUMAN USE CHARACTERISTICS (SUBPART F)

5.4.1 Municipal and Private Water Supplies

During 1990, elutriate testing data from the LOMR was reviewed by the USACE to identify, under the water quality and drinking water standards current at that time, possible dredging contamination problems. The data also was utilized in calculating a mixing zone for dilution of dissolved contaminants. The available elutriate testing was done in 1985 on the bed materials between miles 370 and 375 for the Missouri River Levee System (MRLS) Unit L-385 project originally to evaluate the potential for contaminants to be released in open water if a dredging operation was used to make the random fill for this MRLS Unit. Additionally, data on dredge-suspended solids was utilized for determination of a mixing zone for settling of these suspended materials and in determination of dredge exclusion zones around municipal drinking water intakes.

Analysis following the elutriate testing in 1985 revealed that ten contaminants exceeded ambient (receiving) water concentrations in at least one sample each, but none exceeded drinking water standards in effect at that time. During L-385 project coordination, the Kansas City, Missouri Water & Pollution Control Department and the District agreed that cyanide and five metal contaminants (arsenic, antimony, cadmium, nickel, and zinc) were only slightly greater than the ambient concentrations. Di-n-butylphthalate and methylene chloride were considered by the District to be contaminants introduced at the lab during analysis although the Water Department felt the former may have been dredging contamination. The Water Department also felt that elevated chloroform and toluene, in addition to taste and odor problems resulting from synergy between dredging and discharges from the

contaminated Line Creek area, may make additional water treatment necessary. Experts on dredging from the WES reviewed the 1985 data in 1988 and agreed there would be practically no release of contaminants from dredging the sand bed sediments. The WES expressed the belief that mixing would "quickly reduce any elevated concentrations to ambient levels".

There is no significant reduction in the water quantity by commercial dredging operations. The materials removed are continually being drained with only a small percent of water retained. Material that has been stockpiled for one day has been shown to have a moisture content equal to three to four percent of the weight of oven dried material.

Degradation of the Missouri River bed in the Kansas City reach has negatively impacted the intake structures of municipal drinking water providers and energy providers. This has required them to shut down or bring in temporary pumping facilities while they retrofit their water intake structures. The recommended alternative includes conditions that will seek to control and mitigate bed degradation.

Because of bed degradation and water intake issues, several municipal drinking water providers in the Kansas City area have installed horizontal collector wells along the LOMR. Dredging can remove the permeable aquifer materials that provide the natural filtration capacity. Additionally, the depressions left by dredging are filled by the discarded finer-grained deposits of silt and clay that the dredger doesn't want. This disruption can reduce the permeability of the river bed and aquifer and reduce the quantity and quality of water being pumped from the wells. The LEDPA includes conditions negotiated with the municipal drinking water providers that exclude dredging from within 1000 feet of their collector wells.

5.4.2 Recreational and Commercial Fisheries

Potential direct impacts on individual aquatic species important to recreational and commercial fisheries include dredge entrainment, propeller entrainment, alterations of habitat from increased turbidity, and behavioral changes due to increased noise. No definitive mortality estimates are available for the potential quantity or rate of fishes or their larvae that could be subject to entrainment from dredging in the LOMR. In general, studies show that dredging would not likely be a substantial problem for many fish or shellfish species in water bodies experiencing periodic dredging; however, dredging may pose a more substantial risk to some sensitive aquatic resources. Studies have concluded that shear stress caused by towboat propellers is probably a primary force contributing to the mortality of icthyoplankton entrained during vessel passage, but the magnitude of mortality is dependent on the individual size of icthyoplankton. The extent of mortality would be a function of the amount of tow traffic on a given river system, towboat speed, and traffic volumes during the period when larvae are most susceptible to

shear stress. Towboat traffic associated with dredging on the LOMR is relatively low and unlikely to significantly affect game fish and commercially fished non-game species on the LOMR. Most noise impacts to fishes have been observed in situations of intense energy flux, such as construction-related pile driving or explosions, or propeller and engine noise from high-speed boats. Dredging operations generally produce lower levels of sound energy over prolonged periods. It is expected that noise from the operation of dredges—while not as intense as pile driving or explosions—may result in avoidance of the dredging area by fish species sensitive to noise over the duration of the activity but is not expected to significantly impact those species important to recreational and commercial fishing. Because of the historical context and role of suspended sediment in the LOMR system and the general reduction in suspended sediment in recent history, the introduction of suspended sediment, while localized to a short distance downstream of the dredge, would likely result in a temporary improvement in habitat conditions for native aquatic species.

See Section 4.6 of the Final EIS (USACE 2011) for additional information.

5.4.3 Water-related Recreation

The LOMR is utilized by recreational motor boaters, canoeists, kayakers, and water skiing to some extent. Water skiing is limited mostly by debris so they wait for steady flow or falling flow when the river carries less debris. Because of the fast current, it is not used for swimming. The LEDPA includes special permit conditions requiring the Dredgers to comply with all U.S. Coast guard, State of Missouri, State of Kansas (RM 367 to 490), and USACE regulations concerning the prevention of navigation obstructions in navigable waters of the United States. And to conduct operations in the LOMR such that there will be no unreasonable interference with navigation. The dredges and associated barges are well marked night and day. The dredges are anchored to the river bottom so the anchor cables are mostly under water and don’t pose a significant hazard to the recreation boats or their occupants. Even when they are loading a barge to the side, there is plenty of space in the navigation channel for other recreation boats to pass.

5.4.4 Aesthetics

The LEDPA would cause a plume of increased suspended sediment and turbidity below an operating dredge that can be discerned through a laboratory analysis. However, because of the normally turbid nature of the Missouri River, the discharge turbidity plume is indiscernible to the human eye.

Scenic vistas are present throughout the action area from bridge crossings, from roadways along the river, and from vantages with expansive views across agricultural fields or similar conditions. Under the LEDPA, dredging and the number of barges visible on the water would increase in the St. Joseph and Waverly segments, decrease in the Kansas City segment, and remain the same in the Jefferson City and St. Charles segments. Increasing the number of barges on the river would mean that more dredging operations would become visible along the river. Dredging operations create noise and movement that would draw viewers' attention to these areas, making them more noticeable and taking away from the feeling of "wildness" and solitude of the river important to some recreationists and residents nearby. Conversely, decreasing the number of barges would add to this feeling of "wildness' and solitude. However, dredging and barge traffic has a long history on the Missouri River and is part of the local flavor and "mystic" that appeal to many other recreationists and residents. In the short term, slight river bed degradation or aggradation would occur under the LEDPA. In the long term, slight river bed degradation and a slight decrease in low-flow water surface elevations would occur. These slight changes likely would not result in substantial changes in accessing views from boat ramps. In the short term and the long term, under the LEDPA expanded mining and dredging at locations of alternate sources of sand and gravel could convert areas that typically would be vegetated to large, unvegetated swaths of land with piles of sand and gravel and associated mining infrastructure. These features would contrast with the more natural areas that were present prior to construction of new facilities and would detract from existing views. In addition, dredging operations create noise and movement that would draw viewers' attention to these areas, making them more noticeable.

Under the LEDPA, barge trips would increase by 163 percent and 68 percent in the St. Joseph and Waverly segments respectively. The increased number of barges on the river would increase glare produced by equipment on the river. Due to the reflective nature of the river's surface and because equipment would be moving and not stationary, the incremental increase in glare related to the additional barges would not substantially increase total glare in the segment. Under the LEDPA, barge trips would decrease by 54 percent in the Kansas City segment, resulting in improved views in the area due to less glare. Sand and gravel stockpiles located onshore would continue to produce light and glare similar to existing conditions. Barge trips would increase slightly in the Jefferson City and St. Charles segments under the LEDPA, resulting in no adverse glare-related visual change in the Project area. Views would remain similar to existing conditions. Views may change in the future, consistent with future trends and continuing changes to river bed elevations and water surface elevations. Sand and gravel stockpiles, which produce glare, would remain onshore.

Under the LEDPA, new facilities could be required for alternate sources of sand and gravel to meet the long term demand, including along the Mississippi and Kansas Rivers. New facilities would convert areas that typically would be vegetated to large, unvegetated swaths of land with piles of sand and gravel and associated infrastructure. These features would increase the amount of glare by removing vegetative ground covering, exposing lighter subsurface material, and by removing trees and shrubs that absorb light and act as buffers to adjacent land uses. In addition, structures and site lighting have the potential to increase light and glare.

5.4.5 Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

The Lewis and Clark National Historic Trail retraces the path the Lewis and Clark Expedition traveled from Illinois to the Pacific Ocean and back between 1804 and 1806. It includes more than 100 sites managed by many diverse groups including the National Park Service and other federal, tribal, state, and local agencies, and public and private organizations. In Missouri and Kansas these managed sites include Arrow Rock State Historic Site, the Jefferson National Expansion Memorial, the National Frontier Trails Center, Fort Osage, The Lewis and Clark Boathouse and Nature Center, the Katy Trail State Park, and the Frontier Army Museum. There are also many marked and unmarked Lewis and Clark campsites, points of interest, and information signs, the Lewis and Clark National Historic Trail Highway, parks, research sites, and preserves. The Dredgers do not directly impact any of these sites through physical contact. The LEDPA should result in no more than slight bed degradation in the LOMR. This would prevent or minimize the direct and indirect effects on the Lewis and Clark National Historic Trail associated with tributary head cutting. USACE permit conditions would include the requirement to notify the USACE and state agencies if unidentified cultural resources are discovered; a description of existing dredging exclusion zones to avoid and/or reduce the potential for adverse effects to historic properties; and the requirement to notify the USACE and state agencies if the Dredgers propose to expand dredging into areas not previously dredged. There are several post Lewis and Clark era State Historic Sites along the river in stretches that are dredged. The historic significance of these sites is related to their role as river towns or landings in river borne exploration, commerce, and transportation. Dredging and transportation of sand and other commodities by barges and river boats has occurred in these areas for more than seventy years and is part of the cultural fabric. No adverse effects to the Lewis and Clark National Historic Trail or other parks, and historic monuments, therefore, are expected from the authorization of the LEDPA.

5.5 CONTAMINANT EVALUATION AND TESTING (SUBPART G)

5.5.1 Evaluation of Dredged or Fill Material

The draft "Total Maximum Daily Loads (TMDLS) for Chlordane and Polychlorinated Biphenyls in the Missouri River" published in public notice by MDNR in August 2006, identified chlordane and PCPs as two contaminants impairing the Missouri River. There are several Superfund Sites on the National Priority List for cleanup in the St. Louis, Kansas City, St. Joseph, Topeka, and Omaha areas that have probably contributed contaminants including PCBs to the Missouri River. PCBs were commonly used in transformers and other electrical equipment such as fluorescent light fixtures as coolants and lubricants and were also used as hydraulic oils. U.S. production of PCBs ended in 1977 but it does persist in the environment and bio-accumulate in fish tissue. Chlordane and other chlorinated hydrocarbon pesticides were commonly used in the past for termite control and pest control at nurseries, golf courses, and general agriculture. Chlordane was banned completely by 1988, but due to its persistence, eroding contaminated soil can provide a continuing source of Chlordane to streams and lakes. Several lakes and ponds in the Kansas City area are known to have high levels of chlordane. According to the MDNR report cited above, data collected to date indicates a general downward trend in PCB and Chlordane levels in the Missouri River.

5.5.2 Dredge and Discharge Site Comparison:

When contaminants introduced into the water column become fixed into the underlying sediments, they generally remain dissolved in the sediment interstitial or pore water, become absorbed to the sediment exchange portion as an ionized constituent, form organic complexes, and/or become involved in complex sediment oxidation-reduction reactions and precipitations. The fraction of a chemical constituent that is potentially available for release to the water column when sediments are disturbed is approximated by the interstitial water concentrations and the loosely bound (easily exchangeable) fraction in the sediment. In order to estimate the impact to the water column, an elutriate test would be used in conjunction with a mixing zone analysis.

Analysis of data from elutriate tests conducted by the Kansas City District, Corps in 1985 revealed that ten contaminants exceeded ambient water concentrations in at least one sample each, but none exceeded drinking water standards in effect at that time. Results of the 1985 elutriate tests did indicated the presence of a pocket of cadmium near Hermann, Missouri, which would elevate the dissolved cadmium concentrations above ambient water concentrations and exceed 1990 standards for drinking water. Based on the test results and the 1990 drinking water standards, a mixing zone was

calculated which would allow the greatest distance, worst case scenario, for the dilution of dissolved cadmium concentrations to become equivalent to the background concentrations. In the analysis, two plume conditions were considered where: (1) the dredging would be confined to the thalweg or deepest part of the river and (2) the dredging would occur over the entire cross-section between the Rectified Channel Lines. Since the mixing is inversely proportional to the velocity and depth of flow, the lower flow regime will generate the longer and wider plume. Under thalweg conditions, assuming a flow return of 50 cfs, the plume mixing length is approximately 1.79 feet. By doubling the return flow to 100 cfs, the plume length is 7.1 feet. The widths of the plumes are 0.9 and 1.8 feet, respectively. If the total cross-section is utilized, the plume lengths for the 40 and 100 cfs return flows are 6.9 and 27.7 feet and the widths are 1.3 and 2.6 feet, respectively. All of these numbers are less than the dimensions of a loading barge indicating that the contaminant concentrations of the dredge and discharge site are not significantly different.

Suspended solids or turbidity plumes data collected below a cutter-head dredge using underwater disposal near the confluence of the Kansas and Missouri rivers and in the Missouri River below Waverly, Missouri, indicated that concentrations return to background concentrations within a quarter mile or 1,300 feet. The same was true at other monitoring sites while collecting data below a baffled prop wash mechanized landing craft.

Unwanted dredged material will be discharged adjacent to the dredged site. The dredge and discharge sites are subject to the same sources of contaminants, and materials and the two sites are substantially similar. Dredging has occurred in the same general reaches of the Missouri River for decades. The river bed is constantly changing and mixing sediments, filling in recently dredged areas with sediment washed in from above. Based on this information and the results of elutriate testing and mixing zone analysis, it can be concluded that re-dredging these same areas to the same depth and immediately discharging unwanted dredged material won't release significant levels of additional contaminants such as PCBs, chlordane, or cadmium.

Under the LEDPA, alternate sources of aggregate would need to supply a million tons of sand per year or more if the economy recovers and demand increases. Increased dredging in the Mississippi and Kansas Rivers could temporarily suspend contaminated sediments and pore water to the water column. Operation of upland, floodplain, and instream mines could result in pit dewatering, which could serve as a pathway for contaminants to be added to nearby surface waters.

See Section 4.5 of the Final EIS (USACE 2011) for additional information.

5.5.3 Chemical, Biological, and Physical Evaluation

Based on the dredge and discharge site comparison it is not necessary to require the commercial dredging industry to perform chemical, biological, or physical testing for contaminants. The 4,000-foot no-dredge mixing zone required above municipal water intake structures eliminates the need for site specific testing. The 4,000-foot dredge exclusion zone is in effect for all municipal water intake structures, unless the municipality/community/owner and the permitted Dredgers agree to a no impact mixing zone or reach distance, other than the minimum distance required to preserve the structural integrity of the banks and manmade structures. When such an exception is agreed to by all parties concerned, a copy of the agreement, signed by both entities, should be submitted to the Kansas City District and an exception may be granted.

5.6 ACTIONS TO MINIMIZE ADVERSE EFFECTS (SUBPART H)

5.6.1 Actions Concerning the Location of the Discharge

The permit special conditions will limit dredging and discharging excess material to the navigation channel between the Rectified Channel Line (RCL) away from shallow water and wetland areas where vertebrate and invertebrate species mainly occur. Dredging and discharging is also excluded near municipal and industrial water intakes and lateral collector wells. The discharge will occur within areas with substrate composed of material essentially the same as that being discharged.

5.6.2 Actions Concerning the Material to be Discharged

Excess material will be discharged in essentially the same place where it was dredged and be essentially the same as the substrate where it is deposited with the exception of the sand or gravel that was retained. The permit special conditions will limit discharge to suitable material that is free from toxic pollutants in other than trace quantities.

5.6.3 Actions Controlling the Material after Discharge

No action will be taken to control the material after discharge.

5.6.4 Actions Affecting the Method of Dispersion

Based on the test results and the 1990 drinking water standards, a mixing zone was calculated which would allow the greatest distance, worst case scenario, for the dilution of dissolved cadmium concentrations to become equivalent to the background concentrations. The size of the estimated

mixing zone is less than the dimensions of a loading barge which indicates that the contaminant concentrations of the dredge and discharge site are not significantly different. No actions affecting the method of dispersion are necessary. However, dredging and discharging material are excluded far enough from municipal and industrial water intake structures to accommodate the estimated mixing zone needed to maintain water quality.

5.6.5 Actions Related to Technology

Special permit conditions would require that if any part of the authorized work is performed by a contractor, before starting work the permittee must discuss the terms and conditions of this permit with the contractor; and must give a copy of this entire permit to the contractor. The dredge operation must store all construction materials, equipment, and/or petroleum products that are part of the on-shore operation, when not in use, above anticipated high water levels. The dredge operation must employ measures to prevent or control spilled fuels or lubricants from entering the waters of the United States. Each dredge must record the dredge plant location (in river mile and GPS derived longitude and latitude coordinates), tons of material removed, and the locations of any gravel (in higher than normal/unusual concentrations) or hard substrates encountered while dredging. In the initial 120 days after the permits are issued the Dredgers could use a hand held GPS unit. However, after 120 days, they would be required to use an automated system that logs the dredge plant position and functional status on a continuous basis. This condition will ensure that material is not dredged or discharged in excluded sensitive areas.

5.6.6 Actions Affecting Plant and Animal Populations

The permit special conditions limit the dredging operations to the main channel within the RCL and exclude dredging within 200 feet of any dike, revetment, or other structure built or authorized by the U.S. Government or within 100 feet of any normal bank line or island where plant and animal habitat primarily occurs. The dredging operations are also excluded within reaches specifically identified by the USFWS as areas critical for endangered species (pallid sturgeon) restoration efforts.

5.6.7 Actions Affecting Human Use

The permit special conditions exclude the dredging operations from the vicinity of municipal and industrial water intakes, horizontal collector wells, levees, pipelines, submerged utility crossings, bridge piers or abutments, dikes, revetments, or other structures built or authorized by the U.S. Government. The dredge operations must comply with all U.S. Coast Guard, State of Missouri, State of Kansas (river mile 367 to 490), and Corps of Engineers regulations concerning the prevention of navigation

obstructions in navigable waters of the United States. They also must conduct operations in the Missouri River such that there will be no unreasonable interference with navigation. The annual extraction of each dredge operation will be limited to prevent future bed degradation and its effects on various manmade structures and human uses.

5.6.8 Other Actions

The Dredgers will be required to conduct a hydrographic survey of the lower 498 miles of the LOMR in 2014 and the USACE will prepare a water surface profile each year. The USACE will meet with the Dredgers each fall to show them the results of the recent water surface profile and bed elevation survey and discuss degradation rates and trends that are shown. The hydrographic survey and water surface profiles will be compared to baseline data from 2009 to identify reaches that degraded or aggraded over the previous 5 years and to guide the adjustment of dredging in those reaches for the next 5-year permit cycle.

5.7 SECTION 404(B)(1) GUIDELINE COMPLIANCE

As required by Section 404(b)(1) of the CWA (33 U.S.C. §1344), the subject activity (LEDPA) has been evaluated in accordance with guidelines developed by the Administrator of the Environmental Protection Agency in conjunction with the Secretary of the Army, and published at 40 C.F.R. § 230. The 404(b)(1) evaluation has resulted in a conclusion that use of the discharge site is not prohibited by 40 C.F.R. § 230. There is no less environmentally damaging practicable alternative available to the applicant that meets the purpose and need for the project. The activity does not appear to (1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of CWA; (2) jeopardize the existence of Federally-listed endangered or threatened species or their habitat; or (3) violate requirements of any Federally designated marine sanctuary. The activity will not cause or contribute to significant degradation of waters of the United States including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, esthetic, and economic values. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

SECTION 6

Required Mitigation

6.1 SPECIAL PERMIT CONDITIONS

The proposed dredging permits will include special permit conditions to ensure avoidance or minimization of impacts on environmental resources. Those special permit conditions are categorized as operational measures, resource protection zones, and compliance and monitoring measures.

6.1.1 Operational Measures

- If future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the USACE, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.
- Up to 10% of the permittee's authorized annual tonnage for each segment may be carried over each year to be extracted within that segment the following year. Annual tonnage with carryover may never exceed 110% of annual authorized tonnage of each segment. At the end of each year the permittee must notify the Regulatory Branch of the Kansas City District, USACE in his annual tonnage report of any unextracted tonnage that he intends to carryover.
- The permittee must discharge only suitable material that is free from toxic pollutants in other than trace quantities.
- The permittee must investigate for water supply intakes or other activities which may be affected by suspended solids and turbidity increases caused by work in the watercourse and give sufficient notice to the owners of affected activities to allow preparation for any changes in water quality.
- The permittee must employ measures to prevent dredged materials stored or disposed of on shore from running off or eroding into wetlands or tributaries to the Missouri River.

- The permittee must employ measures to prevent or control spilled fuels or lubricants from entering the waters of the United States.
- The permittee must store all construction materials, equipment, and/or petroleum products that are part of the on-shore operation, when not in use, above anticipated high water levels.
- The permittee may discharge back into the Missouri River material spilled off the conveyer belts and unusable material separated out in the on-shore sand washing and handling facility. To subtract that tonnage from his annual extraction limit, the permittee must follow a plan approved in writing by the Regulatory Branch of the Kansas City District, USACE. This plan must show where and how the material will be discharged and how the amount of dredged material discharged back into the river will be measured and reported to the Regulatory Branch of the Kansas City District, USACE. The total extraction tonnage will equal the tonnage extracted and barged to shore minus that amount intentionally returned to the Missouri River.
- The permittee may return unwanted dredged material and river water (but not garbage) extracted from the Missouri River back to the Missouri River. The permittee must not dispose of waste materials, water, or garbage below the ordinary high water mark of any other water body, in a wetland area, or at any location where the materials could be introduced into the water body or an adjacent wetland as a result of runoff, flooding, wind, or other natural forces.
- The permittee must comply with all U.S. Coast Guard, State of Missouri, State of Kansas (RM 367 to 490), and USACE regulations concerning the prevention of navigation obstructions in navigable waters of the United States.
- The permittee must conduct operations in the Missouri River such that there will be no unreasonable interference with navigation.

6.1.2 Resource Protection Zones

Dredging can have a direct and immediate negative effect on various natural and manmade resources in the immediate area. To prevent or minimize these negative effects, dredging would generally be excluded in certain environmentally sensitive areas, in areas adjacent to certain infrastructure facilities, and in or near pallid sturgeon habitat. The specific resource protection zones within which dredging is prohibited are listed below. The Regulatory Branch of the Kansas City District, USACE will provide the Dredgers with these resource protection zones in an electronic format that the dredge operator can use in the electronic dredge navigation system. This is for the ease and convenience of the Dredgers but the conditions below describing resource protection zones supersede any paper or electronic maps the

USACE may provide. The dredge operator is responsible for determining that the dredge does not operate within these resource protection zones. The dredge location is documented with GPS, and compliance with the permit conditions will be documented in reports submitted to the USACE.

- In permit conditions that specify a linear distance exclusion zone adjacent to a river feature, “dredging” refers to the operation of hydraulic cutter-head suction dredging. The exclusion zone distances will apply to and be measured from the end of the cutter head, rather than from a general point on the dredge.

- The permittee must confine dredging to between the Rectified Channel Lines (RCL) with the following restrictions. Dredging must be conducted in such a manner to preserve the structural integrity of the landmass landward of the RCL. This must be accomplished by maintaining an adequate "no dredging or discharging" zone riverward of the RCL so that material will stabilize into the dredging area at its natural angle of repose. This slope will vary depending upon river location and the type of material being dredged, but it is your responsibility to ensure that this shallow water interface landward of the RCL be maintained.

6.1.2.1 Levees, Pipeline Crossings, Dikes, and Bridges

Dredging too close to levees, pipelines, submerged utility crossings, bridge piers or abutments, dikes, revetments, water intakes, boat ramps, and natural river banks or islands, even at sustainable levels, can harm these structures either through direct physical contact or by undermining, exposing, destabilizing, or weakening these structures. The following condition is necessary to ensure that adverse impacts of the authorized dredging on navigation, flood control, and water intake structures and endangered species and their habitat are minimized

- The permittee must not dredge within 500 feet of any levee centerline, pipeline or submerged utility crossing, bridge pier or abutment; nor within 200 feet of any dike, revetment, or other structure built or authorized by the U.S. Government; nor within 100 feet of any normal bank line or island, without special authorization. When dredging is performed adjacent to river stabilization structures, the dredging may be conducted only in the present streambed of the river at the authorized locations. This condition represents only the minimum distances needed between dredging and structures and natural features and does not relieve the permittee from liability for damage arising from dredging. The permittee must be satisfied that dredging to these limits will not cause damage to public and private property.

6.1.2.2 Water supply

Dredging too close to water intake structures, even at sustainable levels, can harm these structures through direct physical contact; by undermining, exposing, destabilizing, or weakening these structures; and by negatively affecting water quality at the water intake. Dredging over horizontal collector wells can harm these wells by direct physical contact and by modifying the depth and physical characteristics of the river bed over the wells and negatively affecting the volume and quality of water pumped by the wells. The following conditions are necessary to avoid adverse impacts to existing municipal drinking water intake structures and provide a mixing zone sufficient to reestablish water quality to background conditions on the Missouri River; to preserve the existing permeable aquifer material and avoid adverse impacts to the horizontal collector wells; and to avoid adverse impacts to water intake structures and water quality of water users other than municipal drinking water providers.

- The permittee must not conduct dredging operations in a zone extending 4,000 feet upstream and 500 feet downstream from any municipal drinking water intake structures located along either bank of the river unless he obtains an exemption to this condition in writing from the Regulatory Branch of the Kansas City District, USACE.

- The permittee must not conduct dredging operations in a zone extending 1,000 feet upstream and 1,000 feet downstream from any municipal drinking water horizontal collector wells located along either bank of the river unless he obtains an exemption to this condition in writing from the Regulatory Branch of the Kansas City District, USACE.

- The permittee must not conduct dredging operations in a zone extending 500 feet upstream and 500 feet downstream from any other water intake structures other than those used for municipal drinking water unless he obtains an exemption to this condition in writing from the Regulatory Branch of the Kansas City District, USACE.

6.1.2.3 Pallid Sturgeon Habitat and Cultural Resources

Previous dredging permit evaluations have determined that dredging in the specific locations authorized by those permits would not have any direct adverse effect on any cultural resources or endangered species. The Final EIS (USACE 2011) looked at a larger area of potential effect and identified various potential impacts that dredging could have on the endangered pallid sturgeon and on known and unknown but potential cultural resources throughout the Action Area if dredging caused more than slight bed degradation in the short and long term or if dredging expanded into areas not previously dredged. The first condition is a practicable measure that is necessary to ensure that adverse impacts

of the authorized activity on cultural resources and the pallid sturgeon and its habitat are evaluated and minimized when dredging expands outside currently dredged reaches. The pallid sturgeon habitat protection zones listed on Table 6-1 include specific areas where monitoring has most frequently found pallid sturgeon that could be directly impacted by dredging. The protection areas also include USACE shallow water habitat project sites that could be negatively impacted by dredging through physical disturbance and by removing coarse sediment from the bed load at locations where it is needed to form the sand and gravel bars in chutes that are a vital part of shallow water habitat. Table 6-1 will be reevaluated by the USACE and discussed with the Dredgers and the state and federal agencies each fall along with degradation conditions and trends indicated by the water surface profiles. The USACE and USFWS will also reevaluate the list when Dredgers request new or expanded dredging areas. At these times, habitat protection zones may be added for newly completed shallow water habitat projects or newly identified pallid sturgeon habitat areas; habitat protection zones may also be deleted if shallow water habitat areas have matured and/or no longer need protection from adjacent dredging.

- To avoid impacting endangered species and cultural resources, the permittee must confine dredging to the specified reaches listed in Table 4-2. If the permittee desires to expand or relocate his dredging operation outside the specified reaches, he must submit a request to the Regulatory Branch of the Kansas City District, USACE identifying the proposed new limits, in river miles, and the location of the unloading facility to be employed. Approval of the requests, if granted, will be provided in writing with modified reaches identified on the Missouri River Hydrographic Survey. Copies of the relocation requests must be furnished to the following agencies:

    1. U.S. Fish and Wildlife Service, Columbia Field Office
    2. Missouri Department of Natural Resources, Water Pollution Control Program
    3. Missouri Department of Natural Resources, State Historic Preservation Office
    4. Kansas Department of Health and Environment, Bureau of Water (for operations extending upstream of river mile 367)
    5. Kansas State Historical Society, State Historic Preservation Office (for operations extending upstream of river mile 367)
    6. Corps of Engineers, Kansas City District, Hydrologic Engineering Branch

- Dredging is prohibited within the reaches identified in Table 6-1 as pallid sturgeon habitat features

Table 6-1 Pallid Sturgeon Habitat Areas Protected from Dredging on the Lower Missouri River

Missouri River Miles (including 0.25-mile buffer)		
Downstream Limit	Upstream Limit	Habitat Feature
44.25	44.85	RDB Centaur Chute

Missouri River Miles (including 0.25-mile buffer)		
Downstream Limit	Upstream Limit	Habitat Feature
49.15	50.05	RDB Centaur Chute
56.85	59.05	LDB Chute/Island
58.55	61.25	RDB Chute/Island
89.75	91.10	RDB Island
89.90	91.45	LDB Loutre Slough
91.20	93.55	LDB Lunch Island
103.00	104.95	Both Gasconade Confluence and Dike Field
105.20	106.25	RDB Dike Field
115.20	115.95	RDB Island
118.40	119.15	RDB Dike Field
119.35	119.85	RDB St. Albert Chute
124.35	124.95	RDB St. Albert Chute
126.05	126.90	LDB Dike Field
127.50	130.20	Both Osage River Confluence and Dike Field
157.00	158.45	LDB Island
176.40	178.35	LDB Island/RDB Tadpole Island Chute
180.15	180.65	RDB Tadpole Island Chute
184.75	185.65	RDB Chute
186.90	188.20	RDB Chute and Dike Field
193.40	195.75	RDB Dike Field/Island
202.10	202.75	RDB Lamine River Confluence
210.00	219.65	Lisbon/Jameson Complex
226.95	227.55	LDB Little Chariton Confluence
238.40	239.10	LDB Chariton River Confluence
249.65	250.30	LDB Grand River Confluence
269.85	271.35	RDB Shallow/Island
280.40	282.05	RDB Island
297.90	299.05	RDB Island
300.00	301.05	LDB Island
367.00	367.75	RDB Kansas River Confluence
390.85	391.45	LDB Platte River Confluence
456.75	457.25	LDB Worthwine Chute

Missouri River Miles (including 0.25-mile buffer)		
Downstream Limit	Upstream Limit	Habitat Feature
458.75	459.25	LDB Worthwine Chute
462.65	463.25	LDB Nodaway River Confluence
478.55	479.15	RDB Wolf Creek Confluence
494.55	495.20	RDB Big Nemaha River Confluence

Source: USACE 2010a

Notes:

LDB = Left downstream bank.

RDB = Right downstream bank.

6.1.2.4 Degraded Reaches

As discussed in Section 4-16, if dredging were not distributed more broadly and were allowed to remain concentrated around the existing sand plants, the level of future river bed degradation and associated direct and indirect impacts under these alternatives would be expected to be locally moderate to substantial. There would also likely be some loss of shallow water habitat in these areas of moderate to substantial bed degradation. The following condition is necessary to ensure that dredging results in no more than slight degradation throughout each river segment but particularly in the most severely degraded reaches near some existing sand plants.

- No more than 300,000 tons of material shall be extracted within one year from each five-mile reach of the Missouri River between river miles 15 to 20, 25 to 35, 90 to 100, 140 to 150, 355 to 395, and 445 to 455. When the dredge report database of the Regulatory Branch of the Kansas City District, USACE indicates that extraction in a five-mile reach has reached 300,000 tons, all Dredgers authorized to operate within that reach will be notified that it is closed to further dredging for the remainder of the calendar year unless a waiver is requested and received in writing from the Regulatory Branch of the Kansas City District, USACE.

6.1.3 Compliance and Monitoring Measures

The Final EIS (USACE 2011) identified the Environmentally Preferred Alternative which is that alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources. The USACE has concluded that the LEDPA, which is the Environmentally Preferred Alternative with some adaptation due to practicability considerations, should result in no more than slight degradation throughout the LOMR in

the short and long term. These conclusions were based on the use of the best available information and on interpretation of sediment transport equations and underlying data, the results of which include some level of uncertainty. While the results and the interpretation of the effects of bed degradation are based on the best currently available scientific data, sediment transport and estimates of previous bed degradation are indicators rather than precise predictors of future degradation. The following permit conditions are part of a process to monitor key variables in the LOMR system throughout the 5-year permit cycle and provide information needed to determine whether dredging levels or permit restrictions should be adjusted. Such a monitoring and reevaluation process will allow the uncertainty inherent in the modeling and analysis of bed degradation to be addressed. It also will reduce the risk of potentially significant impacts, increasing the confidence that adjustments could be made to address impacts while they are relatively small. The permit conditions are also necessary to ensure that the Dredgers comply with the conditions restricting where and how much material may be dredged.

- The permittee must implement a Dredge Monitoring Plan (DMP) approved by the Regulatory Branch of the Kansas City District, USACE. If a DMP has not been previously approved by the Regulatory Branch, USACE, Kansas City District, the permittee must provide within 30 days of execution of the permit a DMP for each individual dredge plant to the Regulatory Branch of the USACE, Kansas City District for approval. The DMP must show how the permittee will monitor, record, and report the cutter-head position, cutter-head operating status, extraction tonnage, and the presence of any hard substrates, mussel shells, or unusual concentration of gravel in an impartial, unbiased, reliable, and accurate manner. The DMP must include the specifications of the process and the Dredge Monitoring System (DMS) including sensors, hardware, software, communications devices the permittee will use to: gather data; perform quality control on those data; calibrate, test, and repair sensors when they fail; and transfer the data to the Regulatory Branch of the Kansas City District, USACE. The DMS must include automated differential Global Positioning System (DGPS) equipment (or other comparable system) operating with a minimum accuracy level of 1-3 meters horizontal Circular Error Probable with horizontal positions tied into the UTM Zone 15 NAD 83 (feet) coordinate system recorded to the nearest foot. The DMS must always be on, recording cutter-head position and operating status every 5 minutes, 24-hours a day, 365 days a year, even when the dredge is not operating. The data logged each month must be submitted by email to cody.s.wheeler@usace.army.mil at the Regulatory Branch of the Kansas City District, USACE by the 7th day of the following month. If the permittee does not receive an email confirmation that the report was received, the permittee must contact the Regulatory Branch of the Kansas City District, USACE at 816-389-3990 for revised instructions for filing the monthly report. The extracted material must be measured by one of the methods described in the attached

Standard Operating Procedure for Hydrographic Surveying and Dredge Monitoring. If the tonnage is measured by scale at the off-loading facility, the DMP should also describe how the operation will record the date, time, river mile, coordinates, and approximate tonnage of each barge loaded in one location. If a barge is partially filled at one anchor setting then completed at a new anchor setting, the tonnage should be estimated separately for each location. This information must be provided monthly by email on the attached Missouri River Commercial Dredging Location/Volume Report spreadsheet to cody.s.wheeler@usace.army.mil at the Regulatory Branch of the Kansas City District, USACE by the 7th day of the following month. If the permittee does not receive an email confirmation that the report was received, the permittee must contact the Regulatory Branch of the Kansas City District, USACE at 816-389-3990 for revised instructions for filing the monthly report. Faulty sensors or other components identified in the DMP must be repaired within 96 hours. The DMS must not be inoperable more than 5 percent of the time. The permittee must install an approved DMS and have it inspected by the Regulatory Branch of the Kansas City District, USACE (or St. Louis District) within 120 days of execution of the permit or the permittee must cease dredging operations until it is installed and inspected or the permittee submit a justification of the delay and an installation schedule and get an extension of this deadline in writing from the Regulatory Branch of the Kansas City District, USACE (or St. Louis District).

- The USACE periodically surveys the river as part of the management and operation of the Bank Stabilization and Navigation Project. If, for any reason, the USACE has not surveyed the river in the fourth year (2014) of the five-year permit cycle, the authorized dredging companies must have the lower 498 miles of the LOMR surveyed during the summer months in accordance with the Standard Operating Procedures for Hydrographic Surveying and Dredge Monitoring. The survey shall be completed between June and September of 2014 and submitted to the USACE by November 1, 2014.
- If any part of the authorized work is performed by a contractor, before starting work the permittee must discuss the terms and conditions of this permit with the contractor and must give a copy of this entire permit to the contractor. After the initial 120 days of this permit, any contracted dredges or barges must also be equipped with and operate in accordance with an approved DMP as required in Special Condition “b”. The DMP and system must be approved by the Regulatory Branch of the Kansas City District, USACE prior to starting work.
- Until the dredges and barges are equipped with the DMS required by Special Condition “b”, the permittee must, for each dredge operated, record Global Positioning System (GPS) coordinates, tons of material removed, and the presence of any hard substrates or unusual concentration of

gravel daily. If the dredge moves more than 100 feet in any one day then the amount of material removed from each location must be recorded separately. The operators may use hand-held GPS devices or automatically recording devices, but with which ever system used, must identify the device make/model and recording location. This information must be recorded on the attached Missouri River Commercial Dredging Location/Volume Report in an electronic spreadsheet. The permittee must furnish a copy of the completed monthly report by email to cody.s.wheeler@usace.army.mil at the Regulatory Branch of the Kansas City District, USACE by the 7th day of the following month. If the permittee does not receive an email confirmation that the report was received, he must contact the Regulatory Branch of the Kansas City District, USACE at 816-389-3990 for revised instructions for filing the monthly report.

SECTION 7

Determinations

7.1 SECTION 176(C) OF THE CLEAN AIR ACT GENERAL CONFORMITY RULE REVIEW

Section 4.14.7.2 of the Final EIS (USACE 2011) analyzed the proposed permit action for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined that the activities proposed under this permit will not exceed *de minimis* levels of direct or indirect emissions of a criteria pollutant or its precursors and are exempted by 40 C.F.R. 93.153. Any later indirect emissions are generally not within the Corps' continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons a conformity determination is not required for this permit action.

7.2 ENDANGERED SPECIES ACT

In compliance with the ESA, the USACE has completed a Biological Assessment (Appendix B) which concluded that the LEDPA would have no effect on the Indiana bat and the decurrent false aster and is not likely to adversely affect the pallid sturgeon, least tern, and piping plover or their designated critical habitat. After informal consultation, the USFWS concurred with this determination in an email dated 30 March 2011 (Appendix A). See discussion above in Section 5.2.1 of this ROD.

7.3 HISTORIC PROPERTIES

The LEDPA is expected to result in only slight bed degradation in the LOMR. This would prevent or minimize the direct and indirect effects on cultural resources associated with tributary head cutting. USACE permit conditions will include the requirement to notify the USACE and state agencies if unidentified cultural resources are discovered; a description of existing dredging exclusion zones to avoid and/or reduce the potential for adverse effects to historic properties; and the requirement to notify the USACE and state agencies if the Dredgers propose to expand dredging into areas not previously dredged. No adverse effects to historic properties, therefore, are expected from authorization of the LEDPA. No Programmatic Agreement between the USACE and the National Park Service, State

Historic Preservation Offices of Kansas, Missouri, and Nebraska, tribes, and ACHP would be necessary. The LEDPA complies with the provisions of Section 106 of the NHPA.

7.4 CUMULATIVE AND SECONDARY IMPACTS

Cumulative and secondary impacts are discussed in Chapter 5 of the Final EIS and section 4.2.2 of this document. No significant cumulative, indirect or secondary impacts not already addressed in the Final EIS are expected to result from authorization of the LEDPA in this Record of Decision.

7.5 WATER QUALITY CERTIFICATION

The Missouri Department of Natural Resources and the Kansas Department of Health and Environment certified in accordance with Section 401 of the CWA (33 U.S.C.§1341), that the work would not violate applicable water quality standards (Appendix A). These certifications contain several conditions which address water quality concerns. The applicants will be informed by the proposed permit transmittal letters that the conditions presented in the certifications are incorporated into the special conditions of the Department of the Army permit by reference, as stated in General Condition "5" of the permit document.

7.6 RELEVANT PRESIDENTIAL EXECUTIVE ORDERS

7.6.1 EO 11990, Protection of Wetlands

The decision described in this document is consistent with this executive order.

7.6.2 EO 13175, Consultation with Indian Tribes, Alaska Natives, and Native Hawaiians

The decision described in this document is consistent with this executive order. This action has no substantial direct effect on one or more Indian tribes.

7.6.3 EO 11988, Floodplain Management

The decision described in this document is consistent with this executive order. Alternatives to location within the floodplain, minimization, and compensation of the effects were considered above.

7.6.4 EO 12898, Environmental Justice

The decision described in this document is consistent with this executive order. In accordance with Title III of the Civil Right Act of 1964 and Executive Order 12898, it has been determined that the

project would not directly or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin nor would it have a disproportionate effect on minority or low-income communities.

7.6.5 EO 13112, Invasive Species

The decision described in this document is consistent with this executive order. There are no invasive species issues involved.

7.6.6 EO 13212 and 13302, Energy Supply and Availability

The decision described in this document is consistent with this executive order. The project is not one that will increase the production, transmission, or conservation of energy, or strengthen pipeline safety.

7.6.7 EO 12630, Takings Implication Assessment

In compliance with the requirements of Executive Order 12630 and the Attorney General's Guidelines for the Evaluation of Risk and Avoidance of Unanticipated Takings, I have reviewed and considered the Takings Implication Assessment (TIA) prepared for these permit applications and have concluded that the action contemplated, e.g., denial of three permits does not indicate a takings implication.

7.7 SIGNIFICANT ISSUES OF OVERRIDING NATIONAL IMPORTANCE

None were identified.

7.8 COMPLIANCE WITH SECTION 404(b)(1) GUIDELINES

Having completed the evaluation in Section 5, I have determined that the activities described as the LEDPA comply with the Section 404(b)(1) Guidelines.

7.9 PUBLIC INTEREST DETERMINATION

I find that issuance of the permit actions listed below, as prescribed by regulations published in 33 C.F.R. 320-332, is based on a thorough analysis and evaluation of the various factors enumerated above; that there are no reasonable alternatives available to the applicants that will achieve the purposes for which the work is being constructed; that the proposed work is in accordance with the overall desires of the public as reflected in the comments of state and local agencies and the general public; that the proposed work is deemed to comply with established state and local laws, regulations, and codes; that there have been no identified, significant, adverse, environmental effects related to the

work; that the issuance of these permits is consonant with national policy, statutes, and administrative directives; and that on balance the total public interest should best be served by the approval of the LEDPA.

- Issuance of new DA permits to Capital Sand Company, Inc. (NWK 2011-361); Hermann Sand and Gravel, Inc. (NWK-2011-362); Holliday Sand and Gravel Company, LLC (NWK-2011-363); Con-Agg of MO, LLC (NWK-2011-364); Limited Leasing Company (MVS-2011-177); and J.T.R., Inc. (MVS 2011-178) to extract sand and gravel from the Missouri River subject to the limitations and special conditions described above, and
- Modification of each DA permit numbered 2001-01429 (Capital Sand Company, Inc.), 2001-01430 (Hermann Sand and Gravel, Inc.), 2001-01431 (Holliday Sand and Gravel Company, LLC), 2001-01434 (Con-Agg of MO, LLC), MVS-P-2342 (Limited Leasing Company) and MVS-P-2339, 2340, and 2341 (J.T.R., Inc.) to include all limitations and special conditions that are part of each corresponding new permit and be extended until the Administrative Appeal process is complete for the corresponding new permit, or until the corresponding new permit is accepted and executed.

I also find that denial, as prescribed by regulations published in 33 C.F.R. 320-332, of DA permits requested by Edward N. Rau Contractor Company (NWK-2001-1435), The Master's Dredging Company (NWK-2008-1765), and Capital Sand Company (MVS-2008-193, for dredging in the lower 50 miles of the LOMR) to extract sand and gravel from the Missouri River as proposed, is based on a thorough analysis and evaluation of the various factors enumerated above; that there are reasonable alternatives available to these applicants that will achieve the purposes for which the work is being conducted; that there are significant, adverse environmental effects related to the work; that the issuance of these permits is contrary to national policy, statutes, and administrative directives; and that on balance the total public interest should best be served by the denial of Department of the Army permits to these applicants.

APPROVED BY:

Date: 31 March 2011

ANTHONY J. HOFMANN
Colonel, EN
Commanding

S E C T I O N 8

Literature Cited

USACE. (2010). *Draft EIS for Missouri River Commercial Dredging.*
USACE. (2010c). *Final 2010-2011 Annual Operating Plan, Missouri River Mainstem System.* Retrieved March 7, 2011, from http://www.nwd-mr.usace.army/cc/aop.html
USACE. (2011). *Final Environmental Impact Statement for Missouri River Commercial Dredging.*
USACE. (2011b). *Missouri River Commercial Dredging Final Biological Assessment.*
USEPA. (1999). *Consideration of Cumulative Impacts in EPA Review of NEPA Documents.* EPA Office of Federal Activities.
USFWS. (2003). *2003 Ammendment to the 2000 Biological Opinion on the Operation of the Missouri River Mainstem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System.*