

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

MARCH 2008



**US Army Corps
of Engineers**®
Rock Island District

CEMVR-PM-A

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS
POOL 18, MISSISSIPPI RIVER
RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

March 2008

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

CONTENTS

I.	Purpose and Need For Action	EA-1
II.	Alternatives Including the Proposed Action	EA-5
III.	Affected Environment	EA-14
IV.	Environmental Consequences.....	EA-18
V.	Coordination and Public Involvement.....	EA-30
VI.	List of Preparers	EA-31
VII.	References	EA-31

Draft Finding of No Significant Impact

FIGURES

EA-1	Project Location.....	EA-2
EA-2	Typical Chevron Design	EA-9
EA-3	Selected Chevron Elevation – 3.5 Feet Above Flat Pool.....	EA-10

PHOTOGRAPHS

EA-1	Loaded Tow and Barge Near Oquawka, Illinois	EA-4
EA-2	A Typical Chevron Dike Field	EA-10
EA-3	Collected Mussels from RM 416 Mussel Dive 1	EA-15
EA-4	Cottonwood Island Chevrons	EA-19
EA-5	A Series of Chevron Dikes	EA-20

TABLES

EA-1	Historic Dredging Records for Pool 18 RM 415.5-415.8 Mississippi River.....	EA-6
EA-2	Estimated Chevron Dike Construction Dimensions.....	EA-11
EA-3	Comparison of Achievement of Project Objectives of the Project Alternatives	EA-13
EA-4	Federally-listed Species for Des Moines County and Henderson County.....	EA-16
EA-5	Potential Causes for Impaired Water Quality, Henderson County, Illinois	EA-16
EA-6	Environmental Protection Statutes and Other Environmental Requirements.....	EA-29

PLATES

- 1 Location Plan, Vicinity Map
- 2 Chevron Typical Section
- 3 Alternative B, Scenario 1
- 4 Alternative B, Scenario 2
- 5 Alternative B, Scenario 3

APPENDICES

- A Pertinent Correspondence
- B Section 404(b)(1) Evaluation
- C Mussel Survey
- D Distribution List

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

SECTION I. PURPOSE OF AND NEED FOR ACTION

The U.S. Army Corps of Engineers, Rock Island District (District) proposes to reduce Mississippi River navigation channel dredging by constructing four chevron dikes (chevrons). The District proposes to construct these structures between River Miles (RM) 415.0 and 516.2 in Pool 18 of the Mississippi River, near Oquawka, Illinois, but located in Des Moines County, Iowa, (figure EA-1 and plate EA-1). If the District builds these structures, they would be the first of their kind built in the District.

A. Project Objectives

The Corps of Engineers' goal for navigation is, "to provide an unrestricted state of art, environmentally sustainable and cost effective navigation system." To meet this goal, the District's objectives for this project are:

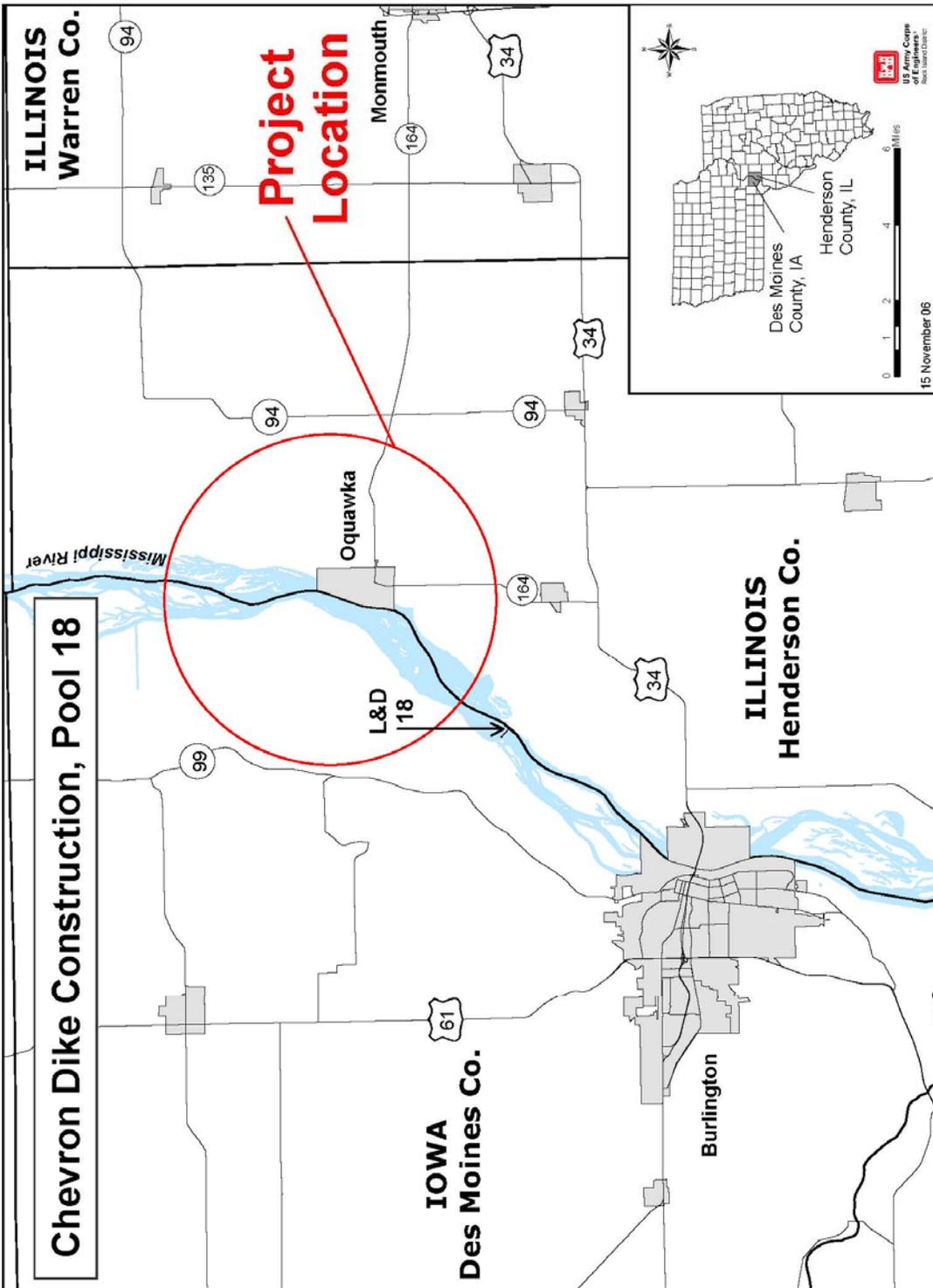
- Provide for commercial navigation on the Mississippi River whereby the District maintains the 9-foot navigation channel in a cost efficient manner. Reduced dredging would result in the District's reducing their channel maintenance and operating cost;
- Reduce the environmental impact of dredging and placing dredged material in sensitive backwater, bottomland, or upland habitats;
- Create habitat diversity in the main channel border;
- Create potential fish over wintering areas, and fish rearing areas;
- Potentially create island habitat at historic island locations;
- Protect existing shorelines and islands from ongoing erosion.

B. Related National Environmental Policy Act (NEPA) Documentation

The Environmental Impact Statement (EIS) entitled *Operations and Maintenance, Upper Mississippi River, 9-Foot Navigation Channel, Final Environmental Impact Statement Pools 11 thru 22, 1974*, describes regulating structures contributions to channel maintenance and repairs of the structures. The EIS did not address site specific new construction. Because this project includes new construction, the District has prepared this National Environmental Policy Act (NEPA) documentation to address any impacts potentially resulting from this activity. This EA is a stand alone document and does not rely on any other NEPA document for cross reference or programmatic impact assessment.

*Chevron Dike Construction
Near Oquawka, Illinois
Pool 18, Mississippi River
Des Moines County, Iowa*

Environmental Assessment



G:\DMM\pmiss\pool_18\Oquawka_Reach\ArcMap_Projects\Chevron Dike Construction, Pool 18

Figure EA-1. Project Location

C. Decision

The District must consider and decide upon viable alternatives to keep the navigation channel open to commercial barge traffic. While dredging is a standard channel maintenance activity, rock structures like wingdams and chevrons are more economical and considered to have a lower environmental impact than dredging. The natural resource agencies who manage Mississippi River resources have requested the District to consider chevron style structures. The agencies recognize the chevron's value to creating habitat diversity, while at the same time redirecting flow towards the navigation channel, thus reducing the amount of shoaling in the channel, and thereby reducing need for dredging.

Ultimately the District must decide to implement one of the following alternatives:

- Construct four chevrons for the benefit of navigation channel maintenance
- Construct training works (i.e. wingdams) in other locations or configurations.
- Continue channel maintenance without training structure improvements.

D. Scoping and Significant Issues

The project team used its experience and expertise, input from other state and federal agency professionals, and tribal nations to compile data to help decide on a preferred alternative. The District weighed many issues for this project. These issues include:

- Contributing impacts of wingdams, channel maintenance dredging, and other channel maintenance activities to maintaining a reliable infrastructure for the navigation industry.
- Impacts of channel maintenance activities to natural resources (negative and positive)

The District has discussed the possibility of constructing chevrons or wingdams with the resource agencies via the Committee to Assess Regulatory Structures (CARS). The District also invited comments on this decision-making process from several state and Federal agencies, and the local community of Oquawka, Illinois. Appendix A, *Pertinent Correspondence*, contains these entities' comments. Several agencies had concerns with possible impacts of construction on existing mussel beds and threatened and endangered species. The Illinois Department of Natural Resources (ILDNR), U.S. Fish and Wildlife Service (USFWS), and the District conducted mussel surveys in the area to assess possible impacts. Section IV, *Environmental Consequences*, contains further discussion of natural resource impacts.



Photograph EA-1. Loaded Tow and Barge Near Oquawka, Illinois

E. Authority and Environmental Compliance

The formal authorization for the U.S. Army Corps of Engineers to perform operation and maintenance activities on the UMR was given in the Rivers and Harbors Act of 1927; as modified by the Rivers and Harbors Acts of 1930, 1932, and 1935; 1950, and a Resolution of the House Committee on Flood Control of September 19, 1944. These Acts and Resolution authorize the construction, operation, and maintenance of the 9-foot navigation channel on the Mississippi River between the mouth of the Missouri River and St. Paul, Minnesota.

If the District determines channel maintenance would become more efficient with wingdam modification, wingdam construction, or chevron construction, the District would have to comply with several Federal environmental statutes and obtain any required permits. For the following legal requirements, the District is the responsible party who must comply with all legal compliance and meet the requirements to obtain any permits or certifications from other governing bodies. If the District decides to implement this project, it will comply or obtain all the necessary requirements listed below prior to initiating any aspect of the project:

- NEPA documentation in the form of this EA ultimately concluding with a signed Finding of No Significant Impact (draft version attached) or the initiation of an Environmental Impact Statement. This EA also serves as a means to fulfill environmental compliance coordination for several statutes such as the Endangered Species Act and National Historic Preservation Act. (Section IV, *Environmental Consequences*);

- Clean Water Act Section 404 Public Notice;
- Clean Water Act Section 404(b)(1) Evaluation (Appendix B);
- Clean Water Act Section 401 Iowa State Water Quality Certification;
- State of Iowa Floodplain Construction Permit (or waiver); and
- Corps of Engineers engineering regulations and standards such as ER 1105-2-100, Planning Guidance Notebook which states, with regard to site-specific studies, the District should make every effort to assure both economic and environmental value is added to watershed resources.

SECTION II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section describes the reasonable alternatives (potential actions) and summarizes the environmental consequences of the alternatives. There were three primary alternatives evaluated in detail. This section also defines the differences between the alternatives, especially how their environmental impacts may differ. The District only considered feasible and reasonable alternatives.

A. No Federal Action

Under the No Federal Action alternative, the District would continue its present channel maintenance activities in Pool 18. The District must abide by congressional mandate to maintain a commercial navigation channel on the Mississippi River. The Oquawka Reach is and will continue to be a chronic dredging area and therefore, offering challenging dredged material placement location(s) and mitigation options. Current placement of dredged material would continue at various bankline, island, and inland stockpile areas which are nearing their capacity. Continued long-term placement at the historically used placement sites at the historic rate may result in unacceptable terrestrial and aquatic habitat loss.

The main channel in this reach is attempting to shift from its left descending bank to the right side of the river valley. As water volumes diminish in the main channel, river bed load material (mostly shifting sand) is settling out in the navigation channel. The District anticipates average-to-above-average dredging in this area in the future. There are three primary dredge cuts located between RM 411-415.2. Table EA-1 summarizes historical dredging events in this reach of Pool 18.

Under the present conditions, the threat of sudden sand bars closing the navigation channel exists. An immediate closure requires costly emergency dredging. If the dredged material placement site would be full, the District would have to select an emergency placement site with little environmental analysis.

Navigation channel maintenance includes periodic repair of existing training works or regulating structures, e.g., wingdams and closing dams, modification of existing structures, and construction of new structures. Construction of these structures is required for routine maintenance and to reduce the expected future demand for maintenance dredging in the 9-foot navigation channel along this stretch of river.

*Chevron Dike Construction
Near Oquawka, Illinois
Pool 18, Mississippi River
Des Moines County, Iowa*

Environmental Assessment

Table EA-1. Historic Dredging Records for Pool 18 RM 415.5-415.8, Pool 18, Mississippi River

Dredge Cut	Year Dredged	Dredging Amount (yd³)	Dredging Site	Placement Site	Placement Type
Oquawka RM 414.7-415.2	1961	66,470	414.7-415.2	414.8-415.2R	
	1998	45,000	414.5-415.0	414.6-414.8L	Behind Levee
	2002	10,034	414.5-415.0	417.5-418.0R	Behind Levee
	2003	11,547	414.8-415.1	417.8R - mechanical	Behind Levee
	2006	12,048	414.5-414.8	418.2T - mechanical	Thalweg
	2007	15,917	414.7-415.0	419.4-419.7L - Mechanical	Bankline
		Total: 161,016			
		Avg: 26,836			
Furnald Island RM 413.0-414.5	2001	17,862	413.6-413.9	418.6T (Benton Is. Thalweg)	Thalweg
	2002	35,500	413.5-414.8	417.5-418.0R	Behind Levee
	2003	3,338	413.5-413.7	417.8R	Behind Levee
	2004	27,659	413.5-413.8	417.8R	Thalweg Mechanical
	2007	6,380	413.5-413.6	419.4-419.7L Mechanical	Bankline
		Total: 90,739			
		Avg: 18,148			
Lock 18 Upper RM 411.0-412.4	1941	192,971	411.7-412.4	411.9L, 412.0-412.1L, 412.3L, 412.4L	
	1970	48,473	411.2-411.4	411.3-411.5L	
	1973	50,445	411.1-411.5	411.1-411.3L	
	1980	39,411	411.0-411.3	411.1-411.3L	
	1983	29,293	411.1-411.3	411.1-411.3L	
		Total: 360,593			
		Avg: 72,119			

There are approximately 18 wingdams, closing dams, and rock bankline protection areas in the Oquawka Reach of Pool 18. The District inspects and evaluates these structures for their effectiveness of directing river flows to the navigation channel. If the wingdams have lost their effectiveness, the District has rebuilt the structures to their original grade. The District anticipates this ongoing maintenance would continue in the future with or without this project.

There are other ongoing District, state, and Federal actions in the project area. Under the No Action Alternative, these actions are likely to continue. These programs include, but are not limited to, navigation and navigation channel maintenance, the Navigation and Ecosystem Sustainability Program, and Environmental Management Program.

See Section III, *Affected Environment*, for a more detailed profile of the current environmental situation in the Oquawka Reach of the Mississippi River. If the District selects the No Federal Action Alternative, environmental consequences would still occur because the existing environment is not static. Dredging and dredging impacts would continue to occur. The District considers the No Federal Action alternative as the baseline for the rest of the analysis herein.

B. Construct Training Works in Other Locations or Configurations

The District investigated the need to repair and/or improve existing wingdams, and construct new wingdams and chevrons in the Oquawka Reach of Pool 18. There are 18 existing rock structures in the project area. The District has surveyed each of these structures and determined they could modify two wingdams (RM 413.8) to improve their effectiveness at reducing the shoaling in the navigation channel. The District is analyzing the need to modify these wingdams in a separate environmental assessment titled, *Environmental Assessment Oquawka Wingdams 15 & 16, Pool 18, Mississippi River, River Miles 413-414, Henderson County, Iowa*.

The remaining wingdams are either at their maximum efficiency, or have become obsolete since the construction of the 9-foot navigation project in the 1930s. Once this project raised river levels, many of these rock structures became obsolete due to their now diminished height.

River flows are spreading to the western edge of the river, away from the navigation channel. This indicates the present configuration of wingdams is not effective in reducing shoaling in the navigation channel. The District performed hydraulic modeling to determine the best configuration of new rock structures to reduce shoaling in the navigation channel, thus reducing dredging. The river resource agencies and CARS suggested the District investigate the use of chevrons based upon research indicating their environmental friendly design. The District modeled three chevron configurations in this area:

1. Install three emergent chevrons near the entrance to the right channel between RM 415.4 to 416.0 (Plate EA-3).
2. Install two emergent chevrons in the channel between Oquawka Island and Long Island near RM 414.7 (Plate EA-4).
3. Install three emergent chevrons near the entrance to the channel between Oquawka Island and Long Island between RM 414.7 to 415.2 (Plate EA-5).

The modeling results concluded wingdam improvements at RM 413.8 and construction of the three chevrons at RM 415.4-416.0 (1 above) have similar channel improvements in the Furnald Island vicinity. The District is concurrently analyzing the need to rebuild these degraded wingdams in the Oquawka Wingdams Environmental Assessment cited in paragraph two, above.

For the second and third chevron scenarios above, the modeling indicated if the District were to built the structures, the channel depths in the problem dredging reach would not increase or increased only slightly. These modeling results would not meet the District's of improved channel maintenance.

The modeling results were qualitative in nature. Any hydraulic model, whether physical or numerical, is subject to biases introduced as a result of the inherent complexities existing in the model. Anomalies in actual hydrographic events, such as prolonged periods of high or low flows, are not reflected in these results, nor are complex physical phenomena, such as the existence of underlying rock formations or other nonerodible variables.

C. Chevron Construction

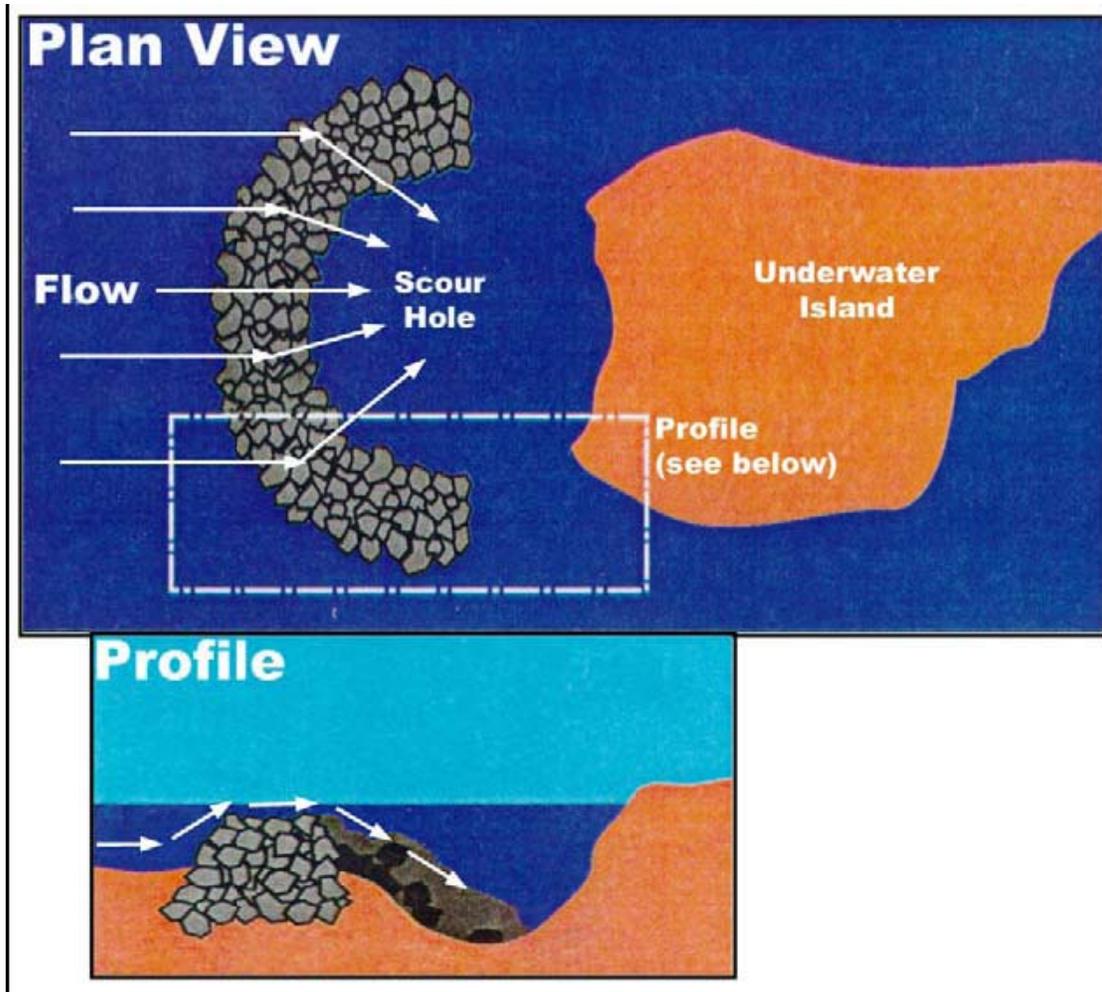
A hydraulic solution at this location is necessary to capture and maintain a flow in the Mississippi River main channel capable of maintaining the 9-foot navigation channel. The resource agencies which oversee the Mississippi River resources have expressed an interest in chevron design and their habitat diversity potential. Therefore, the District did not select a conventional wingdam design.

New construction would include four chevrons built to an elevation of 531.5 mean sea level (msl), 3.5 feet above flat pool elevation of 528 msl. This means if the District constructs the chevrons, the structures would be 3.5 feet above the water surface at normal river stage. Each structure would be an average linear length of approximately 1,325 feet (plate EA-1). Unlike the typical wingdam, chevrons do not connect to the shoreline. Figure EA-2 depicts a typical chevron design. The chevron is a V- or U-shaped rock structure pointing upstream. Not only do chevrons divert river flow toward the main channel—similar to a wingdam—they also create several different types of river habitat, with variable depth and flow velocities. River flows overtopping the structures during high water periods create a large scour hole just downstream of the structure's apex. Downstream of this area the scoured material would settle out in a shallow bar.

The District selected a chevron elevation 3.5 feet above flat pool for two reasons: 1) 3.5 feet is the 2-year flood height [(overtopping height) (figure EA-3)], which means this height is low enough to develop and maintain a scour hole behind the structure on a routine basis; and 2) 3.5 feet is at a height above the normal flat pool elevation in which the chevrons are visible to recreation boaters most of the time

Photograph EA-2 shows a series of chevrons located near Slim Island at RM 266. They are pointed upstream. This photo should give the reader an idea of the size and presence of the chevrons.

After the flows drop below the crest of the structure, the scour hole formed at high flow becomes an area of deep slack water. This environment is conducive to the needs of overwintering fish, and provides the ideal conditions for a juvenile and larval fish nursery. The potential plant life established along the wetted edges and uneven rock structure would provide good escape cover and foraging habitat for young fish.



US Army Corps of Engineers, 2006

Figure EA-2. Typical Chevron Design

*Chevron Dike Construction
Near Oquawka, Illinois
Pool 18, Mississippi River
Des Moines County, Iowa*

Environmental Assessment

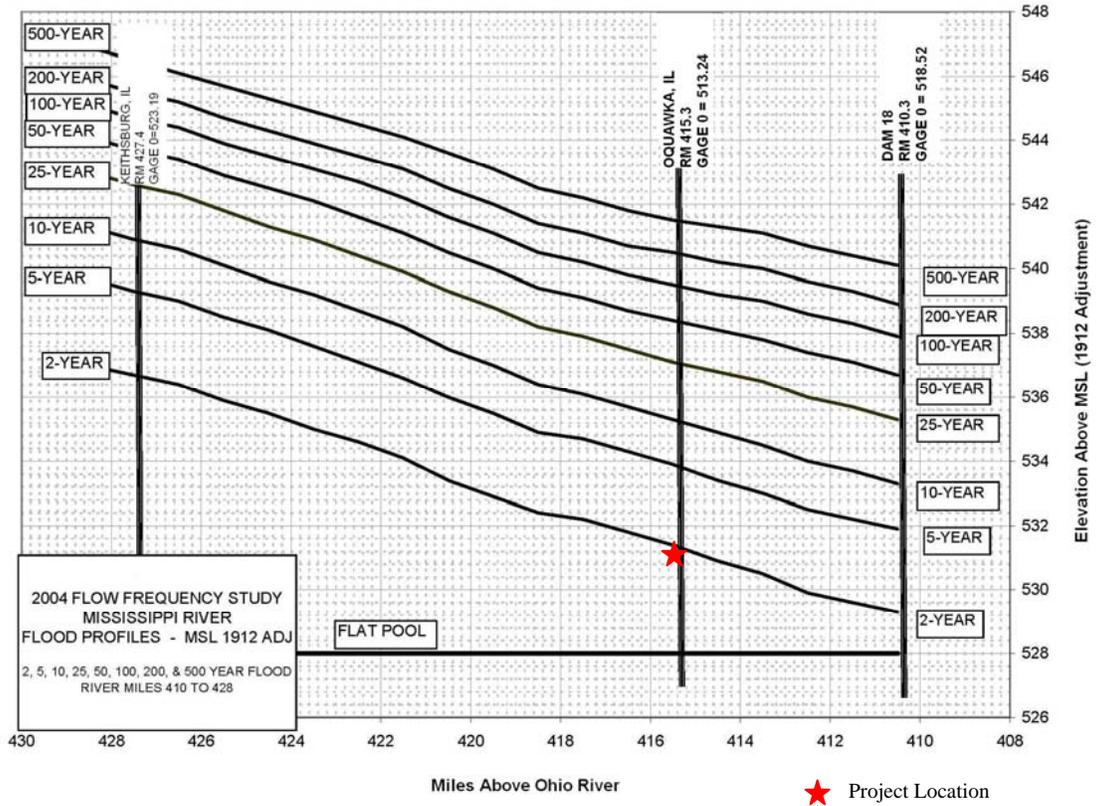


Figure EA-3. Selected Chevron Elevation – 3.5 Feet Above Flat Pool



Photograph EA-2. A Typical Chevron Dike Field

The physical data collected in and around the chevrons show extensive depth, velocity, and substrate diversity, which translates into habitat diversity. The structures create several different types of river habitat, with variable depth and flow velocities, and with multiple wetted edges or wetted perimeters where plant life can flourish. The plant life established along the wetted edges provides good cover and habitat for young fish (US Army Corps of Engineers, 2006).

The rock dike substrate also provide habitat for epilithic (rock dwelling or attached to rock) macroinvertebrates capable of colonizing in very high densities and providing an important food source for fish. Chevrons create habitat heterogeneity and appear to increase invertebrate abundance and diversity (Ecological Specialists, Inc. 1997) and provide useful and valuable habitat for a large variety of riverine fishes (Atwood 1997).

While chevrons produce habitat diversity, the primary goal of chevron construction is to reduce shoaling in the 9-foot navigation channel along this stretch of the river, thus decreasing the impacts of dredging and dredge material placement, and the cost of operation and maintenance of the navigation channel.

The chevron locations on Plate EA-1 were not part of the hydraulic model mentioned above. The District selected the proposed chevron locations based on four assumptions:

- the proximity to the chronic dredge cut;
- the District hydraulic engineers, channel maintenance experts, and river biologists' professional opinion determining optimal location for optimal effectiveness;
- the attempt to protect existing islands; and
- the possibility of rebuilding islands lost to the 9-foot channel project implementation.

Plate 1 displays the chevron sites, and plate 2 shows the typical cross section (grade and height). Table EA-2 collectively displays the proposed lengths, elevations, and rock quantity estimates. Construction would take place in 2008 and/or 2009.

Table EA-2. Estimated Chevron Dike Construction Dimensions

Chevron Location (RM; Upstream to Downstream)	Length (ft)	Proposed Elevation (ft. above mean sea level)	Quantities (tons)	Foot Print Area (ft²)
416.2	1098.13	531.5	13,200	72,476.58
415.7	1140.21	531.5	35,300	75,253.86
415.5	1661.04	531.5	25,400	109,628.60
415.0	1399.73	531.5	29,900	92,382.18

If the Corps would construct chevrons at these locations, the need for dredging would probably not stop, yet the District anticipates the frequency, duration, and quantity of dredging would decrease in this reach of the river.

D. Description of Alternatives Considered but Eliminated from Detailed Study

The interdisciplinary team examined various alternatives to meet the goal of reducing dredging in the Oquawka Reach of Pool 18. Based on their collective experiences on how to reduce dredging given today's technology, the above alternatives of wingdam or chevron construction in the project area are the most engineering viable and may provide the best environmental benefit. The following alternatives were discussed, but the District did not evaluate them in detail:

- **Cease Channel Maintenance.** This alternative is counter to the congressionally mandated mission of the Corps of Engineers. The mission mandates the District to maintain a 9-foot deep navigation channel. The natural river movements of water and sediment would quickly shut the river down if the District were to stop channel maintenance.
- **Relocate the Navigation Channel to a New Configuration.** The increased cost for dredging, wingdams, cost to private barge terminal maintenance and the resulting environmental impacts would not be practical, or prudent.

E. Comparison of Environmental Consequences

The two action alternatives (2B and 2C) would provide similar benefits to channel maintenance and would create similar habitat diversity benefits. In addition, Alternative 2C would protect islands from erosion and perhaps build historic islands lost to the 9-foot navigation channel project and erosion.

F. Comparison of Alternatives

Implementing either alternative would have specific environmental implications on the ability of this project to meet the project objectives outlined in Section I.A. Table EA-3 provides a key part of the information needed by the District and the public to make an informed, reasoned decision regarding the implementation of the proposed project. The table compares each alternative's potential in meeting the project objectives.

Table EA-3. Comparison of Project Alternatives

Project Objective	Indicators	Alternative 2A No Action	Alternative 2B Construct Training Works in Other Locations or Configurations	Alternative 2C Chevron Construction
#1 Provide for commercial navigation on the Mississippi River in a cost effective manner	Maintain the 9-foot navigation channel	Current channel maintenance practices would continue. Average annual dredging would be about 9,300 yds ³ of dredge material placed at historic placement sites	Channel maintenance would continue but with less dredging and therefore at a reduced O&M cost.	Channel maintenance would continue but with less dredging and therefore at a reduced O&M cost.
#2 Reduce the environmental impact of placing dredged material in sensitive backwater, bottomland, or upland habitats.	Reduction of dredging and dredge material placement at historic placement sites and new sites in the river floodplain.	Historic placement site use would continue at the current rate until they reach capacity. New sites would be required, thus impacting previously unimpacted river habitats	Historic placement site would continue, but reduced dredging would extend the life of these sites. New placement sites may not be needed as quickly, if at all.	Historic placement site would continue, but reduced dredging would extend the life of these sites. New placement sites may not be needed as quickly, if at all.
#3 Create habitat diversity in the main channel border.	Variable depths, velocity, increased submerged aquatic plant growth	The main channel border would remain rather consistent with shifting sand near the main channel with silty clay further away from the main channel. No additional habitat diversity would be created.	Chevron construction would create a variety of localized flows and would cause a change in river bottom contour, most notable, a plunge pool directly behind each structure. In addition, high flows over the chevrons would create an accretion of sediment downstream of the plunge pool creating a site for vegetation to colonize. This would create habitat diversity.	Chevron construction would create a variety of localized flows and would cause a change in river bottom contour, most notable, a plunge pool directly behind each structure. In addition, high flows over the chevrons would create an accretion of sediment downstream of the plunge pool creating a site for vegetation to colonize. This would create habitat diversity.
#4 Create potential fish over wintering areas, and fish rearing areas.	Deep water areas with reduced water velocity	No additional overwintering habitat would be developed with out a change in current conditions.	Chevrons are built to above flat pool, the deep water areas have a reduced flow, making them excellent overwintering habitat for fish.	Chevrons are built to above flat pool, the deep water areas have a reduced flow, making them excellent overwintering habitat for fish.
#5 Potentially create island habitat at historic island locations.	Increase island land mass area	No additional island formation would occur.	High water events should create exposed bars or shoals of sediment downstream of each chevron. Under normal flows, the chevron would protect the shoal from eroding, and promoting vegetative growth, further protecting the new island from erosion. Additional island formation may occur but not at historic locations.	High water events should create exposed bars or shoals of sediment downstream of each chevron. Under normal flows, the chevron would protect the shoal from eroding, and promoting vegetative growth, further protecting the island from erosion. The locations of two of the proposed chevrons are near the head end of historic islands lost to the 9-foot navigation channel. These locations are landscape features with known aesthetics, and permanence. Their establishment would divert flows toward the navigation channel.
#6 Protect existing islands from ongoing erosion.	Reduction of island erosion	Island erosion control is not part of the current channel maintenance program since there are no channel benefits from island protection.	Based upon their proposed locations, new chevrons would not protect existing island from future erosion.	An exposed chevron located just upstream of an existing island would divert river flows toward the main channel and away from the island.

SECTION III. AFFECTED ENVIRONMENT

Section III describes the baseline environmental conditions potentially affected by the project. The District considered all possible environmental factors potentially influenced by the proposed project prior to writing this EA. From this analysis, the District was able to focus its environmental review on specific resources and eliminate others from further evaluation.

A. Resources Not Evaluated In Detail

The EA does not contain detailed discussions on resources not found in the planning area, or would not be impacted by any of the alternatives. These include:

- Prime and Unique Farmlands
- Soils
- Air Quality
- Coastal and Estuaries Areas
- Wild and Scenic Rivers
- Migratory Birds
- Mineral and Energy Resources
- Climate
- State- and federally-listed endangered and threatened species inhabiting terrestrial habitats

B. Relevant Resources Found in the Planning Area

The District focused their evaluation to those resources potentially affected by any of the alternatives. These resources include:

- Fisheries
- Mussels
- Threatened and endangered species inhabiting aquatic habitats
- Water quality and wetlands
- Substrate and benthic communities
- Socioeconomic resources
- Cultural resources
- Manmade resources

Fisheries The aquatic habitat in Pool 18 supports a productive sport and commercial fishery. The Illinois Department of Natural Resources, Iowa Department of Natural Resources, and Western Illinois University, among others, have conducted fish surveys in Pool 18. Various surveys indicate as many as 67 species inhabit Pool 18 (Upper Mississippi River Conservation Committee, 1979). Species such as common carp, buffalo fishes, catfishes, and freshwater drum provide a basis for commercial fishing. Walleye, sauger, and largemouth bass, are the top sport fishing species. Fishes will inhabit all areas of the river and its spectrum of river velocities, water clarity, substrate, etc.

The project area is comprised of main channel border habitat which usually does not offer desirable overwintering habitat for many fish species or larval fish habitat. Species such as freshwater drum prefer main channel border habitats (Ragland, 1974) and use this habitat year around.

Mussels. By letters dated August 30, 2006 and September 11, 2006 respectively, the Iowa Department of Natural Resources (IADNR) and Illinois Department of Natural Resources (IL DNR) requested the District to conduct a mussel survey for the project. Appendix C contains results of a mussel dive survey for this project. The survey was primarily cursory in nature. The survey collected nine species and a total of 155 individuals. One of the six samples is shown in Photograph EA-3. In another study near the project area, divers collected 12 species with a density average of 10.7 mussels/m² (Ecological Specialists, Inc, 2007). This study team also had the task of relocating mussels at Wingdam 15 (RM 413.8). The team relocated 2000 mussels representing 21 species. These studies indicate the Oquawka reach of Pool 18 has a diverse assemblage of mussels in a variety of habitats. Future impacts to mussels include water quality fluctuations and periodic dredging.



Photograph EA-3. Collected Mussels from RM 416.2 Mussel Dive 1

Threatened and Endangered Species. Table EA-4 lists the federally-listed, threatened, and endangered species for the project location. The project resides completely in Des Moines County, Iowa, but due to its proximity to Henderson County, Illinois, the District considered the Henderson County species in its analysis. The lists for both counties are the same.

The District did not include the other listed species in their analysis since these species utilize terrestrial habitats. No terrestrial habitats are located in the project planning area.

There are a few historic records of Higgins' eye pearly mussels (*Lampsilis higginsii*) occurring in Pool 18. Higgins' eyes prefer sand/gravel substrates with a swift current and often in the main channel border or an open, flowing side channel. The Sheepnose mussel (*Plethobasus cyphus*) inhabits medium to large rivers in gravel or mixed sand and gravel. The Spectaclecase (*Cumberlandia*

monodonta) inhabits large rivers with swiftly flowing water, among boulders in patches of sand, cobble, or gravel in areas of reduced current.

By letter, dated August 30, 2006, the IADNR requested the District conduct a mussel survey since there were historic records of *L. higginsii* (Appendix C). The survey did not collect any *L. higginsii*. The mussel survey did find two Illinois state threatened Butterfly mussels (*Ellipsaria lineolata*) along the upstream side of Wingdam 15, located at RM 413.8. Prior to increasing the size of Wingdam 15, the District conducted a mussel relocation effort yielded 57 *E. lineolatas* and moved them to similar habitat outside the wingdam project area. Wingdam 15 is outside the project area.

Table EA-4. Federally-Listed, Threatened, and Endangered Species for
Des Moines County, Iowa and Henderson County, Illinois

Location	Species	Scientific Name	Status	Habitat
Des Moines, County, Iowa and Henderson County, Illinois	Western prairie fringed orchid	<i>Platanthera praeclara</i>	Threatened	Wet prairies and sedge meadows
	Prairie bush clover	<i>Lespedeza leptostachya</i>	Threatened	Dry to mesic prairies with gravelly soil
	Indiana bat	<i>Myotis sodalis</i>	Endangered	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)
	Higgins eye pearly mussel	<i>Lampsilis higginsii</i>	Endangered	Mississippi River
	Sheepnose mussel	<i>Plethobasus cyphyus</i>	Candidate	Rivers
	Spectaclecase mussel	<i>Cumberlandia monodonta</i>	Candidate	Rivers

US Fish and Wildlife Service, 2007

Water Quality and Wetlands. Typical Mississippi River current and water chemistry influence water quality in the project area. Baseline water quality data is described and discussed in Appendix B, Clean Water Act Section 404(b)(1) Evaluation.

Section 303(d) of the Clean Water Act, requires Iowa and Illinois from "time to time" to submit a list of waters for which effluent limits will not be sufficient to meet all state water quality standards. Each lake and stretch of stream or river is designated for a specific use, including contact recreation such as swimming or fishing; for drinking water; or for maintaining a healthy population of fish and other aquatic life. If the water quality in the lake, stream or river does not allow it to meet its designated use, it does not meet Iowa's water quality standards and is considered "impaired." The 303(d) listing process includes waters impaired by point sources and nonpoint sources of pollutants. Table EA-5 lists the causes of the 2006 Illinois 303(d) waters which include the Mississippi River in Henderson County, Illinois and Des Moines County, Iowa.

The project area is completely in the waters of the Mississippi River. The classification for this type of habitat is *riverine* (Cowardin et al, 1979). General characteristics of this habitat type are flowing water and upland islands are usually but not always present. There are no regulated wetlands in the project area.

Table EA-5. Potential Causes for Impaired Water Quality, Mississippi River, Henderson County, Illinois, and Des Moines County, Iowa

State	Potential Cause	Designated Use Impaired
Illinois	Polychlorinated biphenyls	Fish Consumption
Illinois	Fecal Coliform	Primary Contact Recreation
Illinois	Sulfates	Public Water Supplies
Illinois	Manganese	Public Water Supplies
Iowa	Aluminum	Aquatic Life
Iowa	Arsenic	Drinking Water
Iowa	Indicator Bacteria	Primary Contact

Illinois EPA, 2006, Iowa Department of Natural Resources, 2007

Substrate and Benthic Communities. The project area is located in the main channel border with a river bottom composed primarily of shifting sand. From the navigation channel westerly toward the Iowa shoreline, reduced river flows increasingly influence the substrate. Near the existing islands, the river becomes shallow; logs and stumps are prevalent and the predominant substrate is composed of fine sandy/silty-clay material.

In addition to native mussels, some of the common benthic organisms inhabiting the main channel border are: Chironimidae (midges) Diptera (true flies), Oligochaeta (aquatic worms), Ephemeroptera (mayflies), Sphaeriidae (fingernail clams), *Corbicula fluminea* (asian clams), *Dreissena polymorpha* (zebra mussels), Odonata (Dragonflies and damselflies), and Gastropoda (snails).

Socioeconomic Resources. The Oquawka chevron construction area is situated in Iowa, but near the city of Oquawka, in Henderson County, Illinois. Most of the area surrounding Oquawka is rural in nature with low population densities. The area has exhibited relatively minor population growth over the past three decades, and future growth is projected to be similar. Approximately 6 percent of the civilian labor force is unemployed, which is well above the county and state averages. Median household and per capita income for the area are less than county and state averages. Employment in the Oquawka area is mainly in construction, educational services, manufacturing, and retail trade industries. Agriculture is the largest single land use in this reach of the river.

Cultural Resources. The District reviewed two sources for their initial review of this project. The first source, the report *An Investigation of Submerged Historic Properties in the Upper Mississippi River and Illinois Waterway* (October 1997) prepared by American Resources Group, Ltd. for the Corps (Contract No. DACW25-93-D-0012, Delivery Order No. 37), indicated no underwater historic properties are documented within the proposed chevron construction locations (Custer and Custer, 1997). The second source, the Districts' geographic information systems archeological site file and landform sediment assemblage (LSA) data bases for the Mississippi River for the construction locations and adjacent shoreline area, determined there were no previously recorded historic properties in the project area and the project footprint was confined to the active river bed and Late Holocene Channelbelt assemblages (Bettis, et al., 1996). The Historic Properties Management Plan (HPMPS) for the Mississippi River Pools 11 through 22 identified Late Holocene Channelbelt and Island LSAs within leveed areas in Pool 18 as being thickly covered in Post Settlement Alluvium (PSI) and recommended no further archeological evaluations within the top 50 centimeters of these areas (Benn and Vogel., 1995). The State Historic Preservation Officers (SHPO) of Wisconsin and Iowa

concurring with the recommendation while SHPOs from Illinois and Missouri did not respond thereby concurrence is assumed.

Manmade Resources. There are a total of 126 wingdams, closing structures, and bankline protection structures in Pool 18. All but two rock structures were constructed between 1889 and 1929. The most recent rock construction in Pool 18 includes two short wingdams (225' and 450') at RM 420L in 1996 and replacing and notching Wingdam 20 (RM 413.5L) in 2002. The District is proposing to raise two existing wingdams between at RM 413.9 and 414. The EA, titled *Environmental Assessment Oquawka Wingdams 15 & 16, Pool 18, Mississippi River, River Miles 413-414, Henderson County, Iowa* (January 2008) details this project.

Since the Corps of Engineers has modified the Mississippi River main channel beginning in the 1800s to the present day, the District considers the navigation channel a manmade resource. Other manmade resources in the vicinity of the wingdams include the Village of Oquawka, Illinois. Facilities affecting the river include two boat ramps/harbor, a grain terminal, three marinas, and adjacent property owners.

SECTION IV. ENVIRONMENTAL CONSEQUENCES

This section analyzes how the action alternatives (2B and 2C) may affect the project's environmental resources identified in Section III. The impacts associated with the No Action Alternative (2A) include the current baseline environment and the without project future impacts, as described in Section III.

The benefits to channel maintenance and the environmental impacts from both Alternatives 2B and 2C would be the same except Alternative 2B does not protect islands from future erosion or create shoaling on historic island sites. While Section IV describes the environmental consequences of both Alternative 2B and 2C, it mainly describes 2C and only 2B when discussing island protection and island creation.

A. Effects on Resources

1. Effects on Fisheries. The first three experimental chevrons in the Mississippi River were constructed in Pool 24 near RM 290 in 1993 solely for the purpose of protecting dredged material. The St. Louis District conducted fisheries surveys at chevrons near Cottonwood Island at River Mile 289.5 (photograph EA-4). Initial monitoring of the chevrons showed the chevrons had immense environmental benefits by creating an abundance and variety of aquatic habitat. Fish assemblages observed along the outside of the structures are similar to those in a nearby side channel. Forty-five fish species (4 exotics) have been collected inside, while 32 fish species (1 exotic) species have been collected outside. (US Army Corps of Engineers, 2006).

The St. Louis District also conducted research on three additional chevrons near RM 266. Fifty-one fish species and a highly diverse group of macro invertebrates have been collected in and around the structures. The 8 years of data also show a high presence of young of the year and juvenile fishes inside of the structures, which suggest the structures are being used as nursery habitat. The data also shows the outside edges of the chevrons are providing excellent habitat for quality-sized catfish. Catch rates inside the chevron have been more than double the catch rates outside of the structures.

Vegetation colonization, and very favorable water quality conditions, has also been documented (US Army Corps of Engineers, 2006).



Photograph EA-4. Cottonwood Island Chevrons (RM 289.5, St. Louis District)

2. Effects on Mussels. The District expects some loss of individual mussels during construction, but it does not expect a loss of a mussel bed or large assemblage of mussels. The project mussel survey indicated mussels in the project area, but not at high densities.

The structures would attract mussel host fish species, and therefore the areas around each chevron should become populated with a diverse mussel population post construction. A study by Miller and Whiting (1988) found wingdams enabled development of a dense and rich mussel assemblage compared to unprotected offshore areas. Wingdams and other regulating structures such as chevrons may encourage mussel colonization because they attract fish hosts; these hosts are necessary for most mussel species. Reduction in future dredging requirements is expected to reduce the disruption to benthic animal communities found at the dredge cut and at placement sites, reducing the impacts to mussels in the main channel.

3. Effects on Threatened and Endangered Species Resources. The Higgins' eye pearly mussel (*Lampsilis higginsii*) is the only federally listed endangered species for the project vicinity. No native mussel populations are expected to be adversely affected by the proposed action, and consequently no impacts to the Higgins' eye are anticipated. None of the State-listed endangered or threatened species mentioned in Section III and no rare natural communities are expected to be adversely affected by the proposed chevron construction.

The exposed sand bar or shoals created by the chevrons may improve endangered species habitat. The least tern is an endangered species, but it is not a federally- or state-listed species for Henderson County, Illinois, or Des Moines County, Iowa. However, any future construction of chevrons could likely benefit least terns by (1) increasing the abundance of bare sandbar nesting habitat; (2) improving

aquatic habitat diversity, thereby, increasing foraging habitat; and (3) increasing the abundance of forage food.

4. Effects on Water Quality and Wetlands. Minor, temporary increases in turbidity and levels of suspended sediments would occur during construction activity. These impacts should be minimal compared to the normal turbidity of the Mississippi River and the substrate composition at the construction sites. Disturbed material should quickly resettle near each site. The construction materials would be clean quarry stone and therefore would not introduce additional suspended material, toxic material, or biological material in the water column contributing to significant increases in turbidity or water quality degradation. The District anticipates no long-term adverse effects to water quality resulting from this action. Appendix B contains a Section 404(b)(1) Evaluation. This evaluation details the possible impacts to water quality. The District has requested Section 401 water quality certification from Iowa. Prior to any construction, the District will obtain this certification.

The chevrons would redirect some, but not all, downstream flows into the main channel and to a lesser degree into off-channel habitats. In general, the chevrons should increase velocities in the adjacent main channel preventing a build up of material in the main channel. Some distance downstream of the chevrons, the flow distribution should remain relatively unchanged. Photograph EA-5 shows a typical series of chevrons in the main channel border.

Any shoaling immediately downstream of each chevron has the potential to form wetlands along the edge of the shoal. These wetlands should have aquatic vegetation and offer escape cover for fish and also serve as foraging areas for migratory birds and predatory animals.



US Army Corps of Engineers, 2006

Photograph EA-5. Series of Chevrons near Slim Island, RM 266 - Looking Upstream

5. Effects on Substrate and Benthic Communities. Chevron construction would have direct impacts in the footprint of each structure. The structure's rocky composition would contribute to altering the local substrate and benthic community from a relatively monotypic shifting sand substrate to an increased diverse habitat. Pockets and crevasses between the rocks would offer foraging and escape cover to invertebrates and small fish currently not present in high densities in the main channel border.

The chevrons would alter river current patterns in their local vicinity, and flow diversity may be reduced in the area immediately downstream of each structure. Individual chevrons generally develop a scour hole directly downstream, creating a bowl of hardpan or compacted sand. The scoured material would settle downstream as part of the newly formed area of redeposited material, or enter the river's normal bedload. The redeposition of material would cover any substrate and/or benthic organisms downstream of each structure. This area would successional change from a shifting sand substrate, to exposed sand bars, and eventually to island habitat and wetlands.

The main channel border benthic organism community would change to shallow water vegetative and upland as sediment from the scour hole is deposited in a bar downstream and below each dike. This is expected to have minimal overall effect on the aquatic system and could result in small habitat gains by increasing substrate diversity in the immediate area of the structures. If the District constructs the proposed chevrons, the aquatic community found near each structure should become relatively diverse, owing to the range of available habitat types within a comparatively small area. The St. Louis District constructed chevrons in 1993 near Mississippi RM 289.5, Pool 24 for channel maintenance and habitat improvement. The St. Louis District contracted a study which analyzed invertebrate populations on the chevrons and in the surrounding riverbed to determine if the chevrons were providing macroinvertebrate habitat. The macroinvertebrate assemblages were compared between the interior dike rock, exterior dike rock, interior soft substrate, and the surrounding soft substrate in 1994, 1995, and 1996. No unionids (mussels) were found due to previous open water dredge disposal in the area. However, the chevrons and protected areas behind chevrons are providing habitat for invertebrates and fish. Diversity and taxonomic richness was higher on chevrons than in the surrounding soft substrates in all three years (Ecological Specialists, Inc. 1997).

Based upon the amount of shifting sand substrate and the contribution of material to the river's overall bedload, the District's construction of four chevrons would not cause a significant impact to the project area substrate or the benthic community.

6. Effects on Socioeconomic Resources

Community and Regional Growth. No significant impacts to community or regional growth would result from the proposed project.

Community Cohesion. There would be no impacts to community cohesion. No public opposition has been expressed, nor is any expected.

Displacement of People. The proposed project would not result in any residential displacements.

Property Values and Tax Revenues. Chevron construction would not impact property values or tax revenues in the project vicinity.

Public Facilities and Services. Overall, the project would not adversely impact public facilities or services. The primary goal of chevron construction is to reduce maintenance dredging of the navigation channel and keep the channel open to commercial barge traffic, thus positively impacting this public facility. Three chevrons would be located within one-half mile of the entrance to the Oquawka Marina, however no impacts affecting the use of this public facility are anticipated. The chevrons would provide areas conducive to improved aquatic habitat which, in turn, could enhance recreational and commercial fishing opportunities in this part of the river.

Life, Health, and Safety. Chevrons would be constructed approximately 3.5 feet above the water surface and thus would be easily visible by recreational boaters navigating this area of the river. They should present much less of a safety challenge than the existing submerged wing dams in this portion of the river.

During the construction phase, hauling of rock to the staging area at the grain elevator could increase truck traffic through town by an estimated 67 trucks per day during the approximate 100 working days needed to complete this project. The transportation route that would be used is State Highway 164 which is the main east-west road thru town. Highway 164 is also the road used to haul grain to the river terminal during the fall of the year at harvest time, so residents are somewhat accustomed to seeing a large number of trucks traveling through the area. The extra vehicles per day should not represent a significant change from traffic patterns already present on this heavily-used route, and should not cause significant traffic issues or safety concerns.

Employment and Labor Force. There would be no long-term impacts to employment or labor force in Henderson County resulting from project construction.

Business and Industrial Growth. Changes in business and industrial activity would be minimal. No business relocations are required.

Farm Displacement. No farm or farmsteads would be affected by the project.

Noise. Heavy construction equipment would generate a temporary increase in noise levels during construction. The surrounding area is basically rural in nature and includes the small town of Oquawka. The immediate project area includes a barge loading facility which is a relatively noisy operation. No sensitive receptors (schools, hospitals, etc.) are located near the project area. Once the project is completed, noise levels would return to existing conditions and no significant long-term noise impacts are anticipated.

Aesthetics. Impacts to the aesthetic resources of the area would be minimal. The proposed plan would construct the chevrons to be approximately 3.5 feet above the water surface and possibly create a negative visual impact from the shoreline. Given that the view across the river is a rock bankline, the proposed project would not significantly alter the overall existing viewscape.

7. Effects on Cultural Resources. The proposed project would not impact cultural resources. No known historic properties are recorded in this project area, which is located within the active river bed and adjacent to Island LSAs, having low potential for archeological resources. Based on the nature of the work, as proposed, the opinion of the District is this project has no potential to affect historic properties listed on, or eligible for listing on, the National Register of Historic Places. All of the work would be confined to the active river bed and low potential landforms previously disturbed by both alluvial cutting and filling associated with recent inundation and water level management. The District provided this determination to the Iowa SHPO by letter dated May 29, 2007. After reviewing this information, the SHPO concurred with the Corps determination by letter dated June 18, 2007 (R&C#: 070629010) (Appendix A).

8. Effects on Manmade Resources. The proposed project should not impact land-based activities or near-shore activities near Oquawka, Illinois. The chevrons should reduce shoaling in the 9-foot navigation channel and therefore, reduce dredging. The project should not impact flood reduction levees in Iowa or Illinois. The project would not result in any significant change in floodplain storage, and no significant loss of wetlands is expected to result from project implementation. No mining activity is located in the project area and no mineral resources would be affected by the proposed action.

B. Probable Adverse Effects Which Cannot Be Avoided

The loss of some benthic organisms currently inhabiting the project area is an unavoidable adverse effect of the proposed action. Following construction, benthic organisms should rapidly recolonize the chevrons.

C. Relationship Between Short-Term Use and Long-Term Productivity

Construction activities would temporarily disrupt wildlife and human use of the project area. Negative long-term impacts are expected to be minimal on all ecosystems associated with this project. Benefits from the project would be derived by reduced shoaling in the navigation channel thus a reduced need for channel maintenance dredging, development of habitat diversity in the main channel border, and

D. Irreversible or Irrecoverable Commitment of Resources if the Project is Implemented

The purchase of materials and the commitment of man-hours, fuel, and machinery to perform the project are irretrievable. Other than the aforementioned, none of the proposed actions are considered irreversible.

E. Relationship of the Proposed Project to Land-Use Plans

The proposed project would not change the use of any land (non-aquatic) resources. If implemented, the District does not expect the proposed action to alter or conflict with other authorized Corps projects.

F. Cumulative Impacts

1. Introduction. The Council on Environmental Quality (CEQ) regulations require the District to consider the cumulative effects of a program when evaluating potential environmental impacts for an EA or EIS. The CEQ defines cumulative effects as:

The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other action (40 CFR § 1508.7).

Cumulative effects most likely arise when a relationship exists between a proposed action and other actions expected to occur in a similar location during a similar time period. The geographic boundaries considered in the cumulative effects analysis will be limited to the Oquawka reach of Pool 18 on the Mississippi River. Since the chevrons would be made of large stone, their presence is long term. Typical Corps planning looks out up to 50 years for their economic benefit analysis. Therefore the District considers 50 years for this cumulative effects analysis.

2. Past, Present, and Reasonably Foreseeable Actions. Actions overlapping with, or in proximity to the proposed action are most likely to have the potential to result in cumulative effects. In addition, programs similar to channel maintenance are also likely to have a cumulative effect, albeit not a significant impact. There are several channel maintenance and non-channel maintenance actions the District took into account in its cumulative effects analysis.

a. Past Actions Past actions play a large role of how the river is managed and used today. Human manipulation is a relatively new endeavor for the Mississippi River, yet its influence is integral to possible chevron construction and many other studies and proposed actions in the project planning area. The following paragraphs describe, in general terms, manmade physical features changing the natural river. These features include Pool 18; wingdams and other rock structures; pollution; and the introduction of exotic species.

Pool 18. In all the regulated sections of the Mississippi River, including Pool 18, the construction and maintenance of locks and dams have altered physical habitat for fish, invertebrates, and plants by changing stream flow from free-flowing to impounded, and altering the natural hydrology and the physical structure of the channel. As a result, the river has changed from a meandering, flowing system, which periodically overran its banks and flood plain, to a series of impoundments connected by dredged channels where the stream flow and water levels are controlled. The impoundments changed the physical structure of the river, the diversity of aquatic habitats, and water quality. Impoundments reduce the velocity and warm the water in the pools. Reduced velocity causes sediment to settle, changing the composition of the substrate on the bottom of impoundments to fine-grained material (sand and silt). Nutrients and contaminants associated with sediment particles are concentrated in the bottom sediments of the pools (Stark, et al., 2000).

Habitats created by impoundment have shown significant changes exemplified by the loss of islands in the lower pool, and filling of backwaters created by dams. Many backwaters created by dams remain, but they have been degraded by sedimentation creating homogenous, shallow backwaters and impounded areas.

The LD 18 restricts fish movement throughout the river. High water events eliminates this barrier during high water periods when the dam is opened up for essentially open river situation. The time between when dams are open and when fish are migrating may not correspond, and usually only the strongest-swimming species can pass

through the navigation dams. The consequences of restricted upriver fish passage include disruption of migration behavior, reproduction activity, access to foraging and wintering areas, and may combine to limit growth, recruitment, overwinter survival, and population size if access to essential habitat is denied.

The chevrons should provide habitat for the fish residing in Pool 18 adding to the overall habitat diversity, especially in the lower portion of the pool.

Wingdams and Other Rock Structures. Impacts of channel training structures are most evident downstream of Pool 18, yet are very prevalent in the pool. They tend to cut off flow and increase sedimentation in side channels and speed terrestrial encroachment into channel areas. Bank revetments prevent erosion and maintain a stable channel; the revetments have largely arrested new habitat creation. Wing dams also provide flow refugia and may support large concentrations of fish adapted to moderate flow. The rock revetment provides structure for dense aggregation of macroinvertebrates. Wingdams are popular fishing locations, particularly for catfish and walleye.

Pollution. Point source discharges have largely been controlled by regulations initiated in the 1970s. In the past, municipal discharges contributed to the loss of aquatic fauna downstream of large cities, but most of those impacts have been eliminated and the pollution assimilated. Industrial pollution is better controlled now than in the past, but past contamination is still stored in sediment, affecting aquatic fauna.

Non-point source pollutants are a major problem throughout the Upper Mississippi River System (UMRS). High loads of sediment, fertilizers, and pesticides are washed in from agricultural areas. Urban runoff supplies a variety of household fertilizers, pesticides, vehicle wastes, and sediment from construction activities. Some urban areas are upgrading storm sewage treatment capabilities, and agricultural runoff has been reduced in the last two decades.

Exotic Species. Human activities, intentional or unintentional, have introduced exotic and nuisance species to the UMRS, and some have caused significant changes. Common carp were introduced in the late 1880s and have become one of the most abundant fish species in the river. Zebra mussels were introduced from Europe via the Great Lakes and the Illinois River in the early 1990s and have become widespread. In some locations where populations get large, they colonize native mussels and degrade water quality. Other species whose overall impact to the river is still unknown include several Asian carp species and the round goby. The District anticipates other species entering the system in the future. This is always a concern and should remain such throughout the project life of the proposed chevrons.

b. Ongoing River Projects Ongoing District projects and programs may contribute to cumulative effects primarily for their geographic location and not necessarily on combined impacts to the environment. These projects are navigation channel maintenance in nature and include short- and long-term dredging and wingdam maintenance and new construction.

Dredging. The District's goal for chevron construction is to reduce the amount of short- and long-term dredging. The District anticipates the chevrons would be effective; however dredging and dredged material placement would continue after the chevron construction. Table EA-1 outlines the average annual dredging currently taking place in the Lower Pool 18 area. The environmental impact from dredging takes place during the removal of material from the channel on macroinvertebrates and then again when the dredged material is placed on land or shoreline potentially covering up fish and wildlife habitat.

While impacts for fauna within dredge cuts occur, the effects do not appear to be long lasting for macroinvertebrates or fish. Frequently-dredged sites cannot support mussels due to the time interval between dredging events and the time required to substantially recolonize the shifting sand river bottom. Like most dredging cuts in the Rock Island District, the volume and frequency of dredging in the Oquawka Reach has declined markedly over the last two decades. The District's dredging program is closely coordinated with state and Federal natural resources management agencies, the impacts of dredging continue to decline from historic levels.

Dredging material placement has been a major resource problem in the past, but changes through time have reduced the impact. The District has implemented a long term dredge material management program to address future dredging impacts and identify opportunities to reduce the environmental impact of dredge material placement.

The District is currently evaluating long term, environmentally sensitive solutions for the Oquawka Reach in Pool 18. Implementation of the final plan should help reduce the overall impacts riverine placement sites. Cumulatively the long term planning, long term dredge material management solutions, and chevron construction should contribute to any reduced environmental impacts each of these action may produce individually or collectively.

Wingdam Maintenance and New Construction Early river managers began to build river training works beginning in the late 1800s. Up until the 1920s, wingdams were built for the open river and 3-, 4.5- and 6-foot navigation channels, and not the 9-foot channel. While these wingdams are still functional to some degree, they need maintenance and at times the District upgrades them to increase their efficiency for maintaining the 9-foot channel. The District identifies those wingdams in need of repair to original grade, and in some cases, recommends rebuilding the wingdams larger (either higher and/or wider), or shorter by removing portions of the wingdam.

The District recently completed an environmental assessment titled, *Environmental Assessment Oquawka Wingdams 15 & 16, Pool 18, Mississippi River, River Miles 413-414, Henderson County, Iowa*, which outlines the District's plan to increase the size of wingdams 15 and 16. At this time the District does not have additional wingdam repairs beyond Wingdams 15 and 16 in this area.

The habitat adjacent to any repair or upgrade location is disturbed for a short period of time during and after construction. These minor disruptions are localized and do not significantly contribute to the overall cumulative effects of other District projects. Recently, the District has begun to design repairs or upgrades with a notch in the structure. The wingdam effectiveness is not significantly reduced, while the diversity of flows over the structure may contribute to a diversity of habitat of the structure and downstream of the wingdam.

c. Future River Projects. The District has begun the planning phase for foreseeable projects in the Pool 18 area. The Navigation and Ecosystem Sustainability Program and the Environmental Management Program - Huron Island Habitat Restoration Project (RM 421.8-425.3) are described below. Because planning for these projects is funded at a different time than funding for their construction, it is difficult to determine when funds would become available for construction. For this reason, construction dates are uncertain.

Navigation and Ecosystem Sustainability Program (NESP). The NESP program is a long-term program of navigation improvements and ecological restoration for the Upper Mississippi River System (UMRS). Over a 50-year period the District would implement elements of the program in increments through integrated, adaptive management.

The primary opportunities are to reduce or eliminate commercial traffic delays and improve the national and regional economic conditions while restoring, protecting, and enhancing the environment. The primary goal of the program is implementation of an integrated, dual-purpose plan to ensure the economic and environmental sustainability of the UMRS.

Specific Pool 18 NESP proposed projects include a navigation restoration project and two environmental restoration projects. The NESP program identified Lock and Dam 18 needing a lock wall extension for more efficient barge lockage times. The current NESP studies indicated if the District implemented the lockwall extension, a percent of increased navigation traffic, would result. The District would mitigate any negative impacts associated with the increase in navigation traffic. The District's current schedule for the proposed lockwall extension construction is approximately 2020.

In association with the proposed navigation improvements, the District plans to implement two ecosystem restoration projects in Pool 18. They are a seasonal 2-foot pool drawdown and island creation in the lower end of the pool.

The pool drawdown would try to mimic the natural summer low-water period. This may expose mudflats, promoting consolidation of the mudflats so vegetation can take root. Once the pool returns to normal levels, the vegetated mudflats hold sediment for better water quality, provide escape cover and foraging cover for juvenile fish, and provide an important food source for migratory waterfowl.

The drawdown would affect recreation and commercial boating somewhat, with less water in harbors, ramps and in the navigation channel. To off-set boating obstacles, the

District proposes to dredge the Oquawka Boat Harbor and Oquawka Marina to continue their operation and over-dredge the navigation channel to ensure a minimum 9-foot deep navigation channel. The District anticipates a drawdown to occur about once every 5 years when river conditions allow.

Since one of the purposes of the proposed chevrons is to reduce dredging, the drawdown dredging may lessen the navigation benefits of the chevrons. However, without the chevrons, the pre drawdown dredging may have a larger impact and cost. The drawdowns should promote and enhance the other intended purposes of the chevrons; island erosion protection and island restoration. The drawdowns should help consolidate any material deposited downstream of the chevrons, thereby promoting vegetation and improved habitat diversity.

The District anticipates the dredged material from the drawdowns is likely to go two places, capping existing dredge material placement sites for better a better native grass and tree growth, and placed as small islands in the lower area of Pool 18. This portion of the pool has seen the greatest loss of natural islands, and the benefits derived from island habitat. These benefits include bird nesting and river side channel diversity- a benefit to fish. Island creation benefits should cumulatively benefit island habitat benefits with the island protection and restoration goals of chevron construction.

Environmental Management Program (EMP) - Huron Island Habitat Restoration Project (RM 421.8-425.3). The primary goal of the EMP and its site specific projects, such as Huron Island, is to rehabilitate river habitat from silted-in backwaters and loss of island habitat diversity. The Huron Island project would provide deep, overwintering habitat for fish and contribute to island habitat diversity with elevated berms for tree plantings. The elevated berms would be made from the backwater dredged material, and provide elevations conducive to oak, hickory and walnut production. The berms would also divert silt laden high river flows away from the backwater areas for prolonged benefit.

The District estimates if the Huron Island project is built, construction would begin sometime after 2012. Upon completion the Huron Island project and chevrons would have net cumulative environmental benefits for the entire Pool 18 area.

d. Compliance With Environmental Quality Statutes

Table EA-6 summarizes compliance with environmental quality statutes.

Table EA-6. Compliance with Environmental Protection Statutes and Other Environmental Requirements

Federal Policies	Compliance ¹
Archaeological and Historic Preservation Act, 16 U.S.C. 469, et seq.	Full compliance
Clean Air Act, as amended, 42 U.S.C. 1857h-7, et seq.	Full compliance
Clean Water Act, 33 U.S.C. 1857h-7, et seq.	Full compliance
Endangered Species Act, 16 U.S.C. 1531, et seq.	Full compliance
Federal Water Project Recreation Act, 16 U.S.C. 460-1(12), et seq.	Full compliance
Fish and Wildlife Coordination Act, 16 U.S.C. 601, et seq.	Full compliance
Land and Water Conservation Fund Act, 16 U.S.C. 460/-460/-11, et seq.	Not applicable
National Environmental Policy Act, 42 U.S.C. 4321, et seq.	Full compliance
National Historic Preservation Act, 16 U.S.C. 470a, et seq.	Full compliance
River and Harbors Act, 33 U.S.C. 403, et seq.	Full compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	Not applicable
Wild and Scenic Rivers Act, 16 U.S.C. 1271, et seq.	Full compliance
Flood Plain Management (Executive Order 11988)	Full compliance
Protection of Wetlands (Executive Order 11990)	Full compliance
Farmland Protection Act	Full compliance
Analysis of Impacts on Prime and Unique Farmland (CEQ Memorandum, 11 Aug 80)	Full compliance
<u>Corps of Engineers Planning Guidance Handbook (ER 1105-2-100)</u>	Full compliance

¹ Full compliance - Having met all requirements of the statute for the current stage of planning.
Not applicable - No requirements for the statute required.

SECTION V. COORDINATION AND PUBLIC INVOLVEMENT

The District has coordinated the proposed construction of chevrons in Pool 18 throughout the planning and design process with the following local, state and Federal agencies:

Village of Oquawka, Illinois
Iowa Department of Natural Resources (IADNR)
Iowa Historic Preservation Agency
State Historical Society of Iowa (SHSI)
Illinois Department of Natural Resources (ILDNR)
U.S. Environmental Protection Agency (USEPA)
U.S. Coast Guard
U.S. Fish and Wildlife Service (USFWS)

The District received comments from the various agencies and subsequently incorporated them into this EA, as Appendix EA-A, *Pertinent Correspondence*.

The State of Iowa requested the District to conduct a mussel survey of the project area since historic records indicated the state- and federally-endangered species Higgin's-eye pearly mussel, *Lampsilis higginsii* may be found near RM 416. The District, the USFWS, and the ILDNR conducted the mussel survey on September 30, 2006 (Appendix C). The survey did not find any *L. higginsii* mussels.

In a letter dated June 18, 2007, the SHSI provided to the District concurrence with the Corps determination that this undertaking will have No Effect on historic properties.

The ILDNR responded by a September 11, 2006 letter to the District's proposal of construction chevrons. The ILDNR supported the idea of chevrons, but still wanted the District to survey the project for mussel resources so significant resources would not be impacted. Appendix C documents the subsequent mussel survey. The survey results found 10 species in relatively low to moderate densities.

Construction of navigation regulating structures and bank stabilization are coordinated through an interagency team called the Committee to Assess Regulating Structures (CARS). The CARS consists of interdisciplinary personnel from the Corps of Engineers and the USFWS. The USFWS ensures the input of appropriate state natural resource staff to the planning process. The CARS activities also are discussed in other forums such as the Fish and Wildlife Interagency Committee and the River Resources Coordinating Team.

The public has the opportunity to comment during the 30-day review period beginning on the date posted on the cover letter to this EA. This District is not holding a public meeting for this action.

Appendix EA-D lists the agencies, groups, libraries, media outlets, and individuals receiving copies of this EA. They may write or email any substantive comments concerning the addition or deletion of alternatives, or the analysis of new resource issues to the District within the 30-day comment period. The District will evaluate all the comments received and dutifully integrate them in the decision making process. If additional analysis is warranted, the District will conduct sufficient study to determine the significance of any action they propose.

SECTION VI. LIST OF PREPARERS

Personnel USACE, Rock Island District	Area of Expertise
Kenny Brenner	Navigation Channel Maintenance
Sue Brown	Computer-Aided Drafting
Verna Coyle	Correspondence
Wayne Hannel	Clean Water Act Compliance
Sharryn Jackson	Social and Economic Resources
Joe Jordan	NEPA Documentation, Natural Resources
Tom Kirkeeng	Hydraulics, Hydraulic Modeling
Mark Pratt	Engineering, Design
Mary Rodkey	Report Editor
Jim Ross	Cultural Resources

SECTION VII. REFERENCES

- Atwood, B. 1997. Cottonwood Island chevron dike fisheries evaluation update. In: Melvin Price Locks and Dam, Progress Report 1997 for Design Memorandum No. 24, Avoid and Minimize Measures. U.S. Army Corps of Engineers, St. Louis District, St. Louis, Missouri.
- Benn, David W. and Robert C. Vogel. 1995 *The Historic Properties Management Plan for the Mississippi River, Pools 11 through 22, Rock Island District, Corps of Engineers*. Report to the U.S. Army Corps of Engineers, Rock Island District in fulfillment of Contract No. DACW25-92-D-0008, W.O. 0005. Submitted as report BCA #271, by Bear Creek Archaeology, Inc., Cresco, Iowa.
- Bettis, E. Arthur III, Jeffrey D. Anderson, and James S. Oliver. 1996 *Landform Sediment Assemblage (LSA) Units In The Upper Mississippi River Valley, USACE, Rock Island District* (2 volumes). Report to U.S. Army Corps of Engineers, Rock Island District in fulfillment of Contract No DACW25-92-C-0008 W.O. 0012 & DACW25-93-D-0014, W.O. 0011. Submitted as Technical Report No. 95-1004-11b by the Illinois State Museum, Springfield, Illinois, and Bear Creek Archaeology, Inc., Cresco, Iowa.
- Cowardin, L.M., Carter, V., Golet, F.C., LaRoe, E.T., 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. Report No FWS/OBS-79/31. US Fish and Wildlife Service, Washington, DC, p. 103

- Custer, Jack E. and Sandra M. Custer. 1997. *An Investigation of Submerged Historic Properties in the Upper Mississippi River and the Illinois Waterway*. Report to the U.S. Army Corps of Engineers, Rock Island District in fulfillment of Contract No. DACW25-93-D-0012, W.O. 0037. Submitted as Cultural Resources Management Report No. 306 by Steamboat Masters & Associates, Louisville, Kentucky and American Resources Group, Ltd., Carbondale, Illinois.
- Ecological Specialists, Inc. 1997. *Macroinvertebrates Associated With Habitats of Chevrons in Pool 24 of the Mississippi River*. Prepared for Parson Engineering Science, Inc., under contract to U.S. Army Corps of Engineers, St. Louis, Missouri. 44pp. with appendix. 96-034.
2007. *Draft Report: Oquawka Island and Thalweg Freshwater Mussels, Pool 18 Upper Mississippi River, 2007*. Under Contract to the U.S. Army Corps of Engineers, Rock Island District, Rock Island Illinois. 11pp.
- Illinois Environmental Protection Agency. 2006. *Illinois Integrated Water Quality Report and Section 303(D) List – 2006 Clean Water Act Sections 303(D), 305(B) and 314 Water Resource Assessment Information and Listing of Impaired Waters*. Report No. IEPA/BOW/06-002. Springfield, IL. 196 pp.
- Miller, A. C., and R. Whiting. 1988. *The Value of Wingdams for Freshwater Mussels*. Environmental Effects of Dredging Technical Notes. U.S. Army Engineer Waterways Experiment Station, Environmental Laboratory. Vicksburg, Mississippi.
- Ragland, Daniel. 1974. *Evaluation of Three Side Channels and the Main Channel Border of the Middle Mississippi River as Fish Habitat*. Defense Technical Information Service. 70pp.
- Stark, J.R., Hanson, P.E., Goldstein, R.M., Fallon, J.D., Fong, K.E., Lee, A.L., Kroening, S.E., and Andrews, W.J. 2000. *Water Quality in the Upper Mississippi River Basin, Minnesota, Wisconsin, South Dakota, Iowa, and North Dakota*. 1995–98: U.S. Geological Survey Circular 1211, 35 p., on-line at <http://pubs.water.usgs.gov/circ1211/>
- US Army Corps of Engineers. 2006. *Upper Mississippi River System Environmental Design Handbook*. Chapter 5 River Training Structures and Secondary Channel Modifications. Rock Island, IL.
- US Fish and Wildlife Service, Region 3. 2007. *Threatened and Endangered Species for Des Moines County Iowa and Henderson County, Illinois*.
http://www.fws.gov/midwest/Endangered/lists/iowa_cty.html
- Upper Mississippi River Conservation Committee. 1979. *A Compendium of Fishery Information on the Upper Mississippi River*. Jerry Rasmussen, Editor. Rock Island, IL. 259pp.

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

DRAFT FINDING OF NO SIGNIFICANT IMPACT

The U.S. Army Corps of Engineers, Rock Island District (District) proposes to construct four chevrons in the Mississippi River, Pool 18, near Oquawka, Illinois. These exposed rock structures will divert river flows toward the main channel, thus reduce shoaling in the navigation channel and subsequent channel maintenance dredging. Additionally, these curved structures will create diverse aquatic habitat and provide island protection. The District has detailed the information concerning this proposal in the accompanying environmental assessment. The District determined this alternative meets the objectives of the local channel maintenance needs as well as providing environmental benefits at no additional cost. The other alternatives did not meet the channel maintenance requirements and/or do not provide diverse environmental benefit.

I have reviewed the information provided in the accompanying environmental assessment, along with data obtained from cooperating Federal, state, and local agencies and from the interested public. Based on this review, I find the proposed construction of four chevrons will not significantly affect the quality of the human environment. Therefore, it is my determination an Environmental Impact Statement is not required. The District will reevaluate this determination if warranted by later developments.

Alternatives considered along with the preferred action were:

- No Federal action
- Construction of training works in other locations or configurations

Factors considered in determining that an EIS is not required are:

- The action should reduce the future need for channel maintenance dredging and placement activities in this section of the river.
- Initial loss of and disturbance to aquatic habitat during construction will be offset by increased habitat diversity and protection following project completion.
- The Corps does not anticipate any significant social, economic, environmental, or cultural impacts as a result of this action.

Date

Robert A. Sinkler
Colonel, U.S. Army
District Engineer

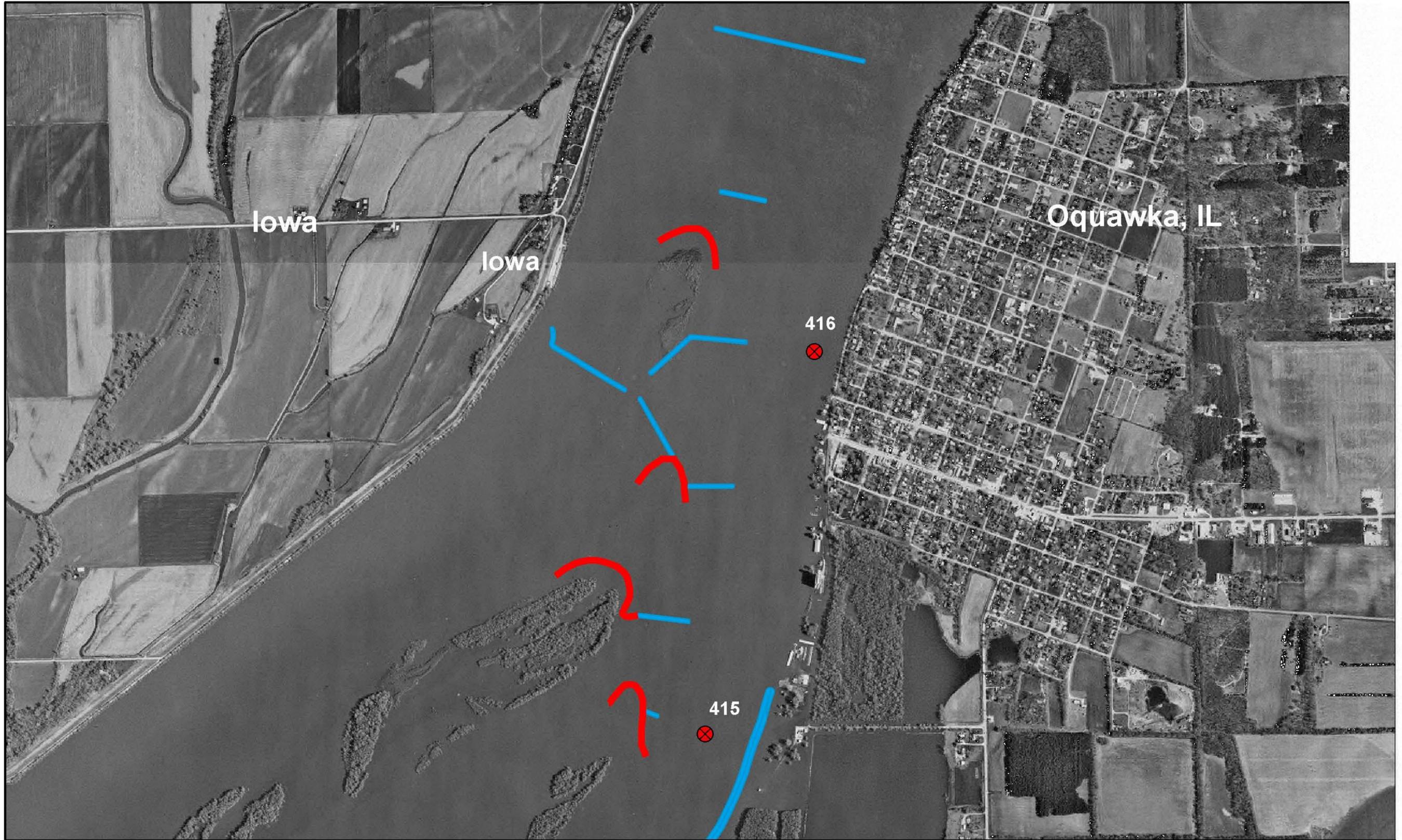
**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

PLATES



**US Army Corps
of Engineers**®
Rock Island District

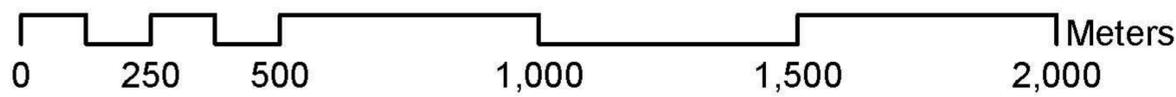
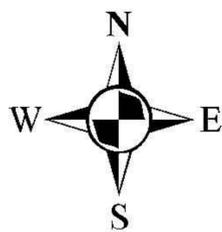


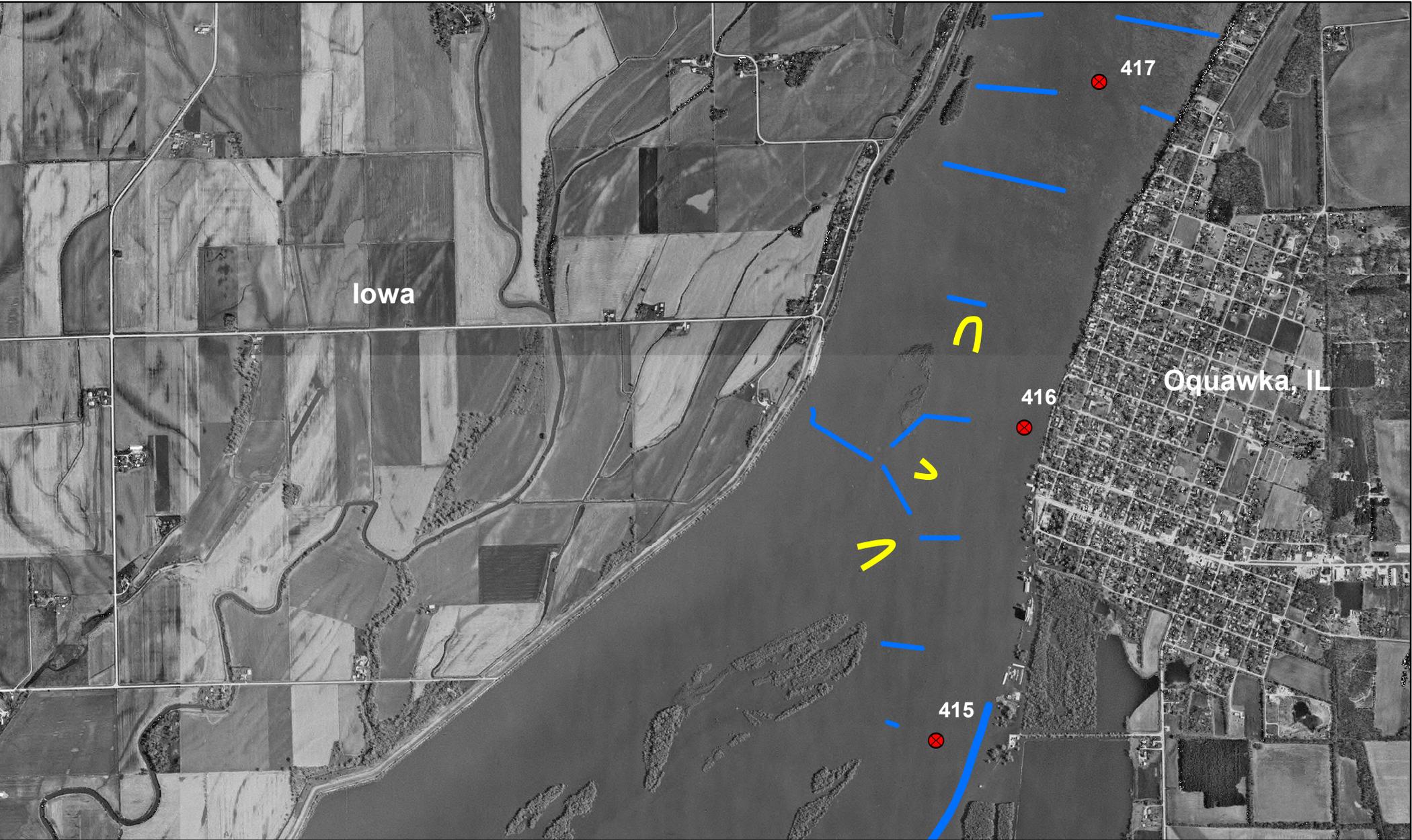
PLATE EA-1

Legend

 Proposed Chevrons

 River Miles

 Existing Channel Maintenance Rock Structures



**US Army Corps
of Engineers**®
Rock Island District

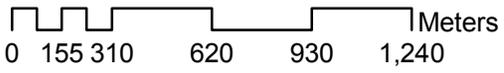
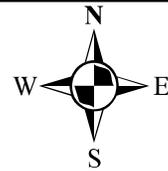
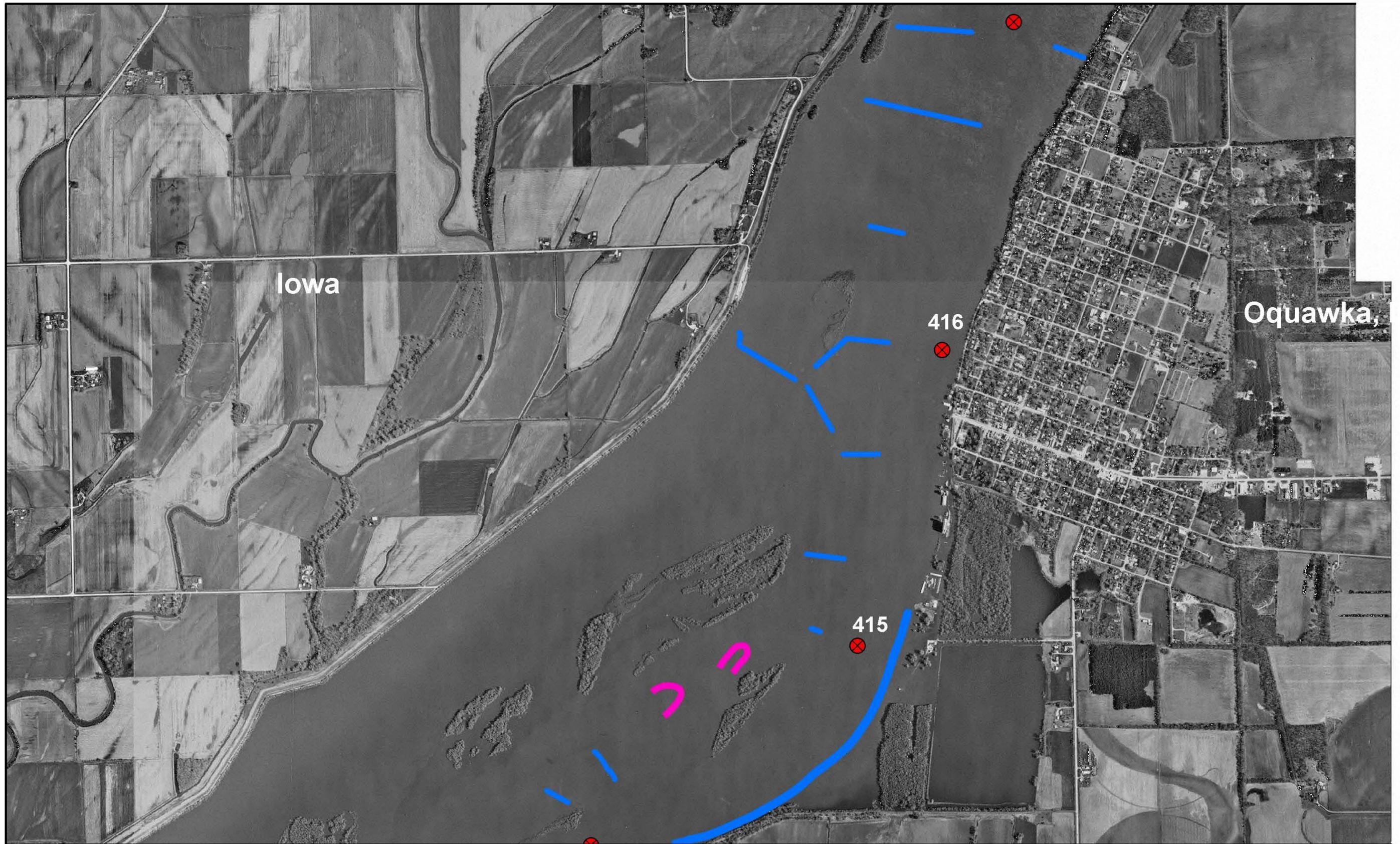


PLATE EA-3

Legend

-  Chevron Construction Alternative 2B Scenario 1
-  River Miles
-  Existing Channel Maintenance Rock Structures



**US Army Corps
of Engineers** ®
Rock Island District

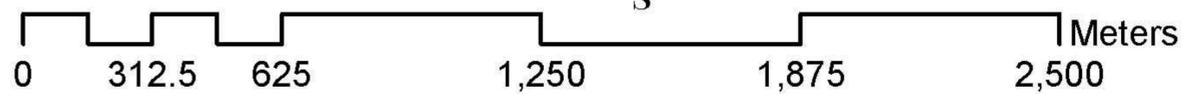
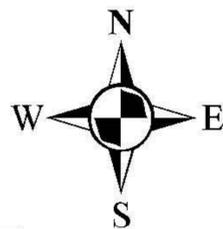


PLATE EA-4

Legend

-  Chevron Construction Alternative 2B Scenario 2
-  River Miles
-  Existing Channel Maintenance Rock Structures



**US Army Corps
of Engineers**®
Rock Island District

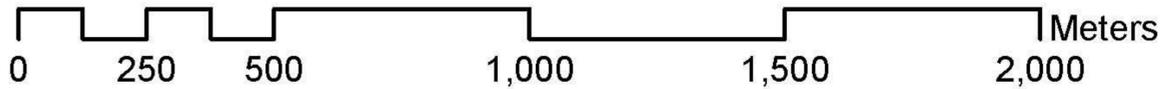
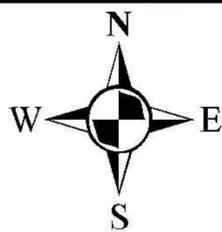


PLATE EA-5

Legend

-  Chevron Construction Alternative 2C Scenario 3
-  River Miles
-  Existing Channel Maintenance Rock Structures

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

APPENDIX A

PERTINENT CORRESPONDENCE

August 10, 2006

Planning, Programs and
Project Management Division

SEE DISTRIBUTION LIST

The Rock Island District, U.S. Army Corps of Engineers (Corps) is currently planning to construct up to four chevron dikes (also known as chevrons) (Encl. 1, 2 and 3) in Pool 18 of the Mississippi River in Des Moines County, Iowa, near Oquawka, Illinois. The Corps would construct a chevron at the upstream end of Oquawka Island (River Mile (RM) 415.4) and another chevron just upstream of Long Island of near RM 415. The Corps would construct a third chevron near RM 415.9 in the vicinity of the historic upstream edge of Oquawka Island. If needed, a fourth chevron would be constructed at RM 416.2, or at the head end of a historic unnamed island lost to the impoundment of the Mississippi River. At this time, the sites identified in Enclosure 1, 2 and 3 are the best sites meeting the navigation channel maintenance requirement and maximizing fish and wildlife benefit, yet the Corps has not determined the exact location, configuration, and number of structures at this location. Precise determinations within these sites will depend on river bottom conditions, fish and or mussel use, and final hydraulic modeling.

Each chevron would have a height not exceeding 531.5 mean sea level (m.s.l.), or 3.5 feet above flat pool elevation (528 m.s.l.) Each structure would be built to an average linear length of approximately 1,000 feet.

Enclosure 4 depicts a typical chevron design. The chevron dike is a V- or U-shaped rock structure pointing upstream. Not only do chevrons divert river flow like a wingdam, toward the main channel, they also create several different types of river habitat, with variable depth and flow velocities. River flows overtopping the structures during high water periods create a large scour hole inside of the chevron just downstream of the structure's apex. Downstream of this area the reshaped material deposits create a shallow bar.

After the flows drop below the crest of the structure, the scour hole formed at high flow becomes an area of deep slack water. This environment is very conducive to the needs of overwintering fish and provides the ideal conditions for a juvenile and larval fish nursery. The potential plant life established along the wetted edges and uneven rock structure would provide good escape cover and foraging habitat for young fish.

While chevrons produce habitat diversity, the primary goal of chevron construction is to reduce future demand for maintenance dredging in the 9-foot navigation channel along this stretch of the river, thus decreasing the impacts of dredging and dredge material placement, and the cost of operation and maintenance of the navigation channel.

Because the project involves new construction, the Corps is currently preparing National Environmental Policy Act documentation to address any impacts potentially resulting from this activity. The Corps is concurrently studying the impacts of wing dam improvements at approximately one mile downstream at RM 413.8L. The Corps is preparing an environmental assessment to address any impacts as a result of these wing dam improvements. The Corps is also considering other activities near the project area including island construction and water level management. The Corps will address cumulative impacts of these projects in conjunction with possible chevron dike construction.

We request your comments on this project with respect to concerns with, or anticipated effects on, any resources within your agency's area of interest. Please provide any comments you may have on this action within 30 days of the date of letter. If no significant impacts are identified in association with this project, construction is anticipated to begin in the summer of 2007.

If you have any questions or wish to request additional information, please call Joe Jordan of our Economic and Environmental Analysis Branch, telephone: 309/794-5791, or write to our address above, ATTN: Planning Division (Jordan).

Sincerely,

ORIGINAL SIGNED BY

Kenneth A. Barr
Chief, Economic and Environmental
Analysis Branch

Enclosures

CF: (all w/encls):
Dist File (PM-M)
✓ PM-A (Jordan)
PM-A (Coyle)
OD
OD-T (Brenner)

EC
EC-HH (Kirkeeng)
EC-DN (Pratt)

DISTRIBUTION LIST

Mr. Richard Nelson
U.S. Fish and Wildlife Service
4469 48th Avenue Court
Rock Island, IL 61201

Mr. Bob Clevenstine
Committee to Assess Regulatory Structures
4469 48th Avenue Court
Rock Island, IL 61201

CDR Scott Cooper
Marine Safety Office
US Coast Guard – Eighth District
1222 Spruce Street – Suite 1215
St Louis, MO 63103-2835

Ms. Karen D. Harvey, Wildlife Biologist
Port Louisa NWR, USFWS
10728 County Road X61
Wapello, IA 52753

Mr. Dick Steinbach, Manger
Mark Twain NWR, US FWS
1704 North 24th Street
Quincy, IL 62301

Director
Western Rivers Operations (OB)
U.S. Coast Guard, Eighth District
1222 Spruce Street
St. Louis, MO 63103-2835

Mr. U. Gale Hutton
Water Resources Protection Branch (WWPD/WRPB)
U.S. Environmental Protection Agency, Region 7
726 Minnesota Avenue
Kansas City, KS 66101

Mr. Mike Griffin
Iowa Department of Natural Resources
206 Rose Street
Bellevue, IA 52031

Dr. Bernard Schohnoff
Fairport Fish Hatchery
Iowa Department of Natural Resources
3390 Highway 22
Muscatine, IA 52761

Ms. Diane Ford-Shivvers
Policy and Coordination Conservation
and Recreation Division
Iowa Department of Natural Resources
Wallace State Office building
Des Moines, IA 50319

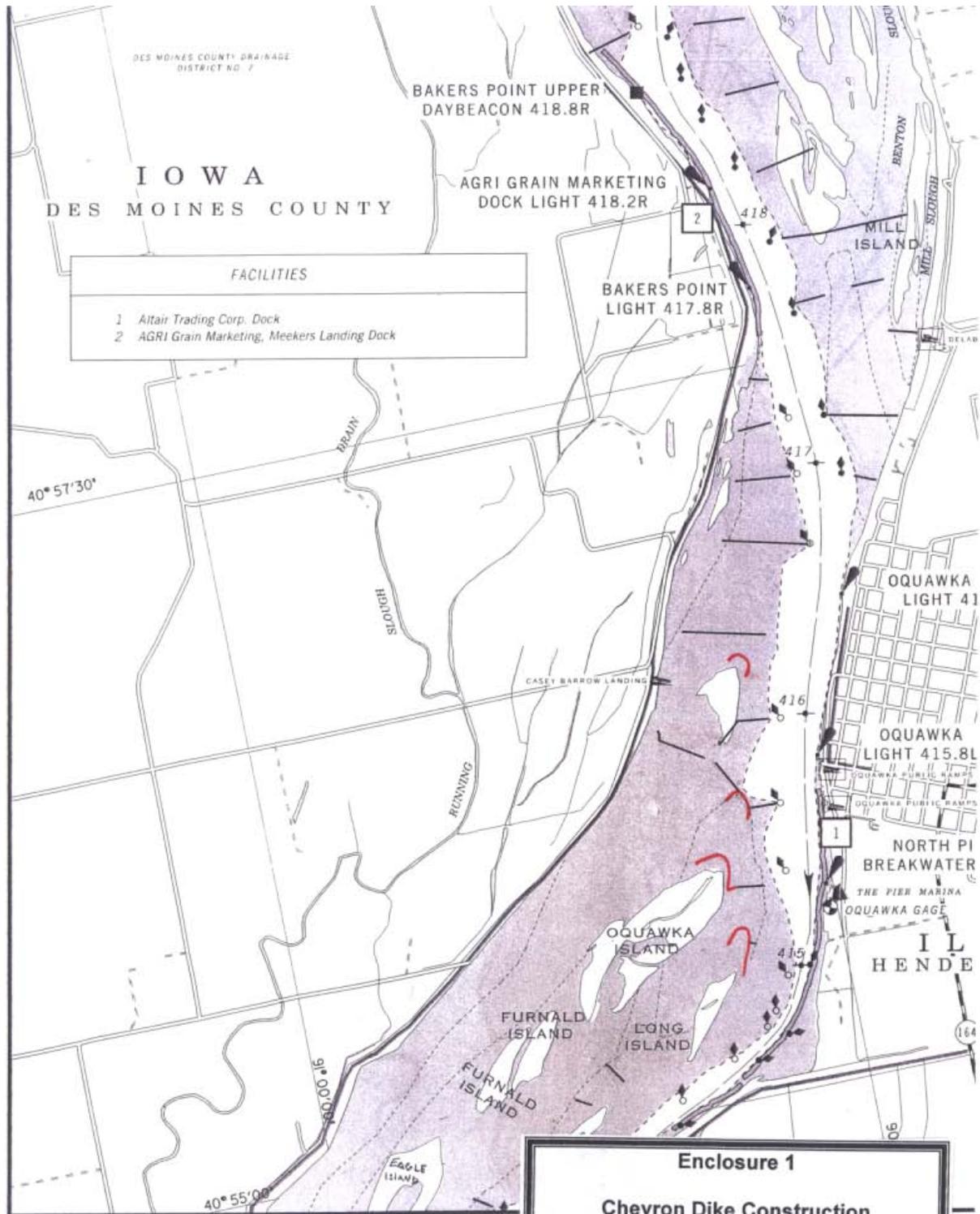
Mr. Bob Schanzle
Illinois Dept. of Natural Resources
One Natural Resource Way
Springfield, IL 62702

Mr. Tom Beissel
Regional Wildlife Biologist
Illinois Department of Natural Resources
2612 Locust Street
Sterling, IL 61081

Mr. Ed Walsh
806 NW 5th Street
Aledo, IL 61231

James Mick
Boundary Rivers Program
IL DNR-Office of Resource Conservation
Havana Field Headquarters
700 South 10th Street
Havana, IL 62644

Honorable Vern Alecock
Village Mayor
Village of Oquawka, Illinois
P.O. Box 496
Oquawka, IL 61469



2001 BUOY POSITIONS ON CHARTS ARE APPROXIMATE, SEE NOTICE ON LEGEND NO. 1

Enclosure 1

**Chevron Dike Construction
Proposed Locations**

Pool 18 Mississippi River

Not to Scale



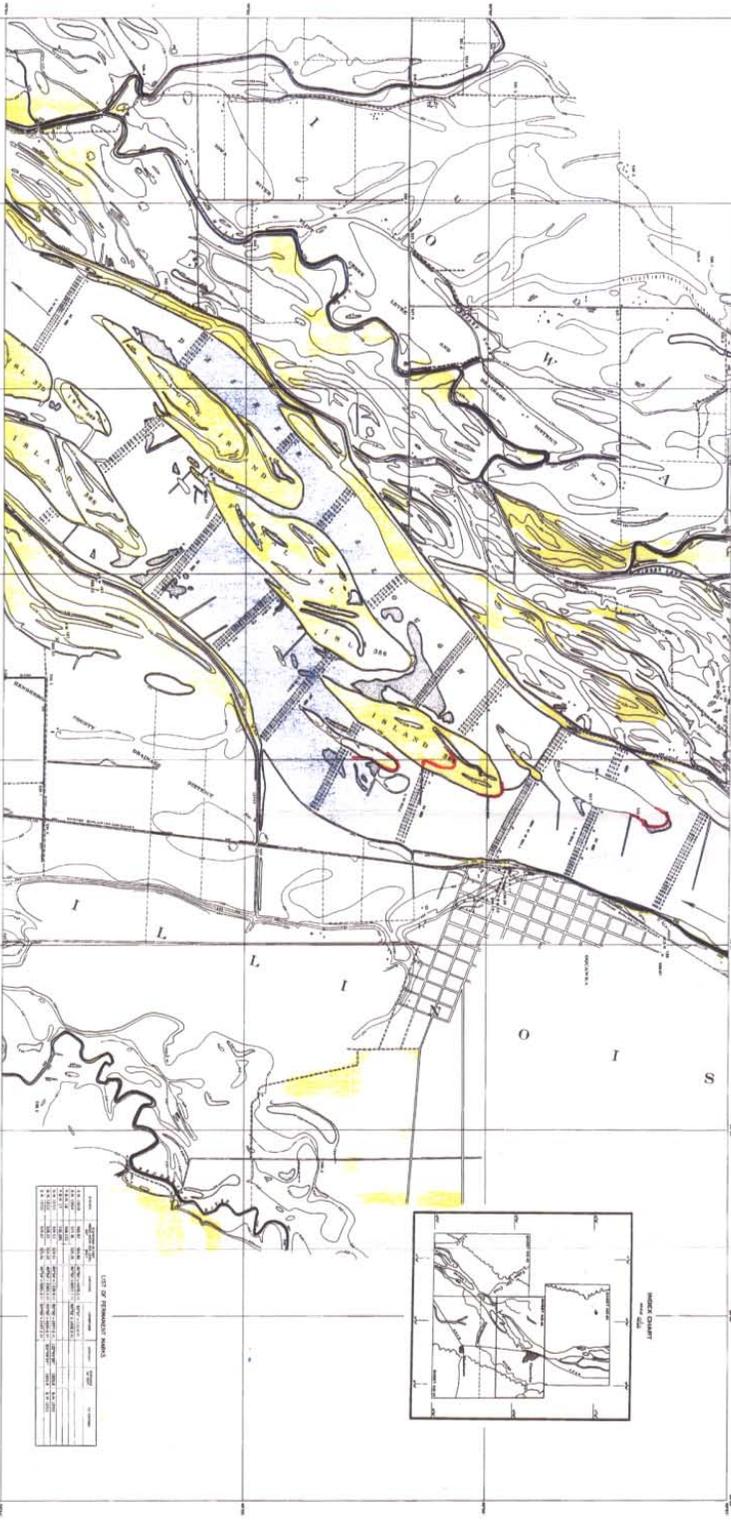
Enclosure 2

**Chevron Dike Construction
Proposed Locations**

Aerial Photo

Pool 18 Mississippi River

Not to Scale



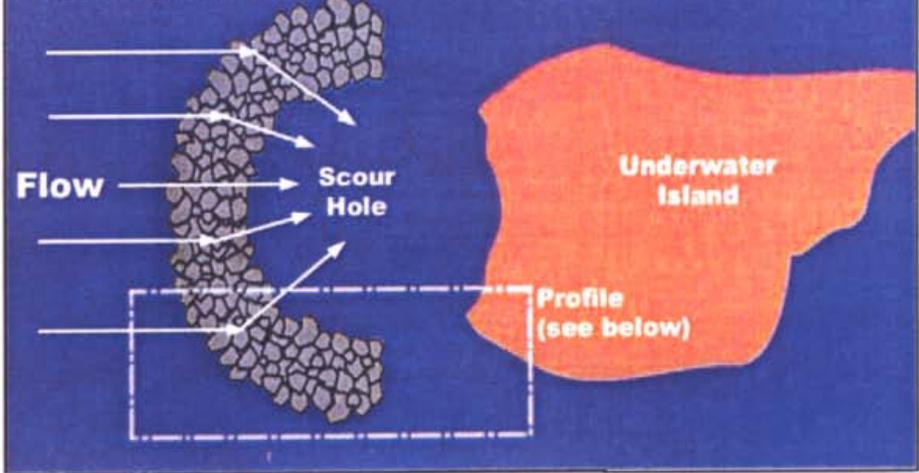
Enclosure 3
Chevron Dike Construction
Proposed Locations
1937 Brown's Survey
Pool 18 Mississippi River
Not to Scale

86
WAR DEPARTMENT
CORPS OF ENGINEERS, U. S. ARMY

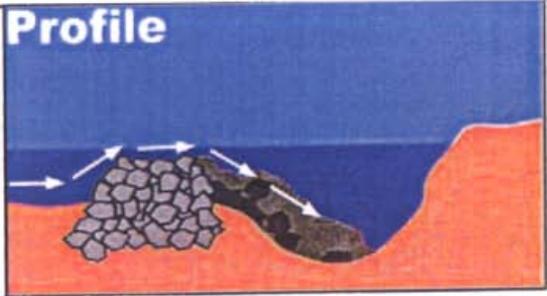
UPPER MISSISSIPPI RIVER
HASTINGS, MINNESOTA TO GRAYTON, ILLINOIS
SHEET 722-1500

SHEET NO. 66
66

Plan View



Profile



Enclosure 4
Chevron Dike Construction
Generic Cross Section
Pool 18 Mississippi River
Not to Scale



THOMAS J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

STATE OF IOWA

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

August 30, 2006

Mr. Kenneth A. Barr
U.S. Army Corps of Engineers
Rock Island Office
P.O. Box 2004
Rock Island, IL 61204-2004

RE: Environmental Review for Natural Resources
Construction of 4 chevron dikes within the Mississippi River in Pool 18 from
approximately RM 415 to RM 416

Dear Mr. Barr:

Thank you for inviting our comments on the impact of the above referenced project.

The Department has a record for Higgin's-eye near RM 416. A mussel survey should be conducted for all four dikes and their impact areas.

Also, a sovereign lands construction permit will have to be obtained from this Department prior to construction of the three dikes that are within the Iowa border. The mussel survey report should be submitted along with the permit application.

This letter is a record of review for protected species, rare natural communities, state lands and waters in the project area, including review by personnel representing state parks, preserves, recreation areas, fisheries and wildlife but does not include any potential comment from the Environmental Services Division of this Department. This letter does not constitute a permit and before proceeding with this project, permits may be needed from this Department or from other state or federal agencies.

If you have any questions about this letter or if you require further information, please contact Keith Dohrmann at (515) 281-8967.

Sincerely,

Diane Ford-Shivvers, Supervisor
Policy and Coordination
Conservation and Recreation Division

DFS:kld

CC: Christine Schwake, Water Quality Bureau, Iowa DNR (by email)

FILE COPY: Keith L. Dohrmann

06-4950L.doc

WALLACE STATE OFFICE BUILDING / DES MOINES, IOWA 50319
515-281-5918 TDD 515-242-5967 FAX 515-281-6794 WWW.STATE.IA.US/DNR



Illinois Department of Natural Resources

One Natural Resources Way • Springfield, Illinois 62702-1271
<http://dnr.state.il.us>

Rod R. Blagojevich, Governor

Sam Flood, Acting Director

September 11, 2006

Mr. Kenneth A. Barr
Chief, Economic and Environmental Analysis Branch
Rock Island District, Corps of Engineers
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Attn: Joe Jordan

Dear Mr. Barr:

This responds to your letter of August 10, 2006 concerning the Rock Island District's plans to construct up to four chevron dikes in Pool 18 of the Mississippi River near Oquawka, Illinois.

As you are no doubt aware, significant freshwater mussel resources have been documented in the Oquawka area. The "Oquawka Reach Bed" Illinois Natural Areas Inventory Site, identified in 2001, is located along the left descending river bank near mile 414.4. This mussel bed supports at least fourteen species including the Illinois threatened butterfly (*Ellipsaria lineolata*). Two additional state listed mussel species, the black sandshell (*Ligumia recta*) and spike (*Elliptio dilatata*), were represented by dead shell material and may still be extant within the bed. Additional sampling by IDNR staff in 2004 near river mile 415.0 resulted in the collection of eight species of live mussels and two recently dead.

It is likely that freshwater mussels are widespread in the project area and may be subject to mortality resulting from construction activities. While the Department is not opposed in concept to the proposed chevron dikes, we recommend that their construction be preceded by surveys to ensure the structures are not placed in areas of high mussel abundance or diversity.

Department biologists will be pleased to assist your staff with the recommended surveys. Please contact me at 217-785-4863 if we can be of assistance.

Sincerely,

Robert W. Schanzle
Permit Program Manager
Office of Realty and Environmental Planning

RWS:rs

cc: IDNR/ORC (Mick, Walsh), IDNR/OWR (Diedrichsen), USFWS (Clevenstine)

Printed on recycled and recyclable paper

May 29, 2007

Planning, Programs and
Project Management Division

SEE DISTRIBUTION LIST

The U.S. Army Corps of Engineers, Rock Island District (District) is currently evaluating the construction of four Chevron Dikes (chevrons) in Pool 18 of the Mississippi River in Des Moines County, Iowa, near Oquawka, Illinois.

Federal Undertaking

Pursuant to the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR Part 800, the District has determined that chevron construction has potential to cause effects to archeological historic properties [36 CFR 800.3(a)(1)] and as a consequence will require a determination of effect within the Area of Potential Effect (APE).

APE

The District has defined the APE as depicted in enclosure 1 to include a total of four chevrons constructed at the following locations: the upstream end of Oquawka Island (River Mile 415.4), the upstream end of Long Island (River Mile 415), and near the historic upstream edge of Oquawka Island (River Mile 415.9). Each chevron would have a height not exceeding 530 mean sea level (m.s.l.), or 2 feet above flat pool elevation (528 m.s.l.) and follow the typical chevron design depicted in enclosure 2. All construction work will be limited to the active river bed adjacent to historic islands and the navigation channel. Enclosure 3 documents the pre-inundation topography of the proposed chevron locations.

Consulting Parties

The District finds the organizations identified on the Distribution List are entitled to be consulting parties, as set out in 36 CFR 800.2, and invites them by copy of this letter to participate in the Section 106 process.

State Historic Preservation Officer (SHPO) Invitation

The District invites the SHPO to:

- Identify any other consulting parties as per 36 CFR 800.3(f);
- Comment as per 36 CFR 800.2(d)(3) on the District's plan to involve the public by utilizing the Corps' normal procedures for public involvement under the National Environmental Policy Act (NEPA); and,
-
- Comment on or contribute to identification efforts including definition of the APE, all as per 36 CFR 800.4(a-b).

Identification of Historic Properties

Review of Existing Information and Level of Future Identification Efforts:

The report entitled *An Investigation of Submerged Historic Properties in the Upper Mississippi River and Illinois Waterway (October 1997)* prepared by American Resources Group, Ltd. for the District (Contract No. DACW25-93-D-0012, Delivery Order No. 37), was reviewed. No underwater historic properties are documented within the proposed chevron construction locations. The District Geographic Information Systems archeological site file data base for the Mississippi River was queried for the construction locations and adjacent islands and no previously recorded historic properties were identified.

The District has determined that this undertaking will have No Effect on historic properties. All chevron construction work will be confined to the active river bed where little archeological integrity remains as a result of past scouring and deposition. Additionally, the negative evidence from historic map review indicates that there is very low potential for intact cultural resources within the APE.

Request for Information from Consulting Parties:

The District is seeking information from all consulting parties regarding their concerns with issues relating to this undertaking's potential effects on historic properties and, particularly, the tribes' concerns with identifying properties that may be of religious and cultural significance to them and may be eligible for the NRHP [36 CFR 800.4(a)(3-4)]. Concerns about confidentiality [36 CFR 800.11(c)] regarding locations of properties can be addressed under Section 304 of the National Historic Preservation Act which provides withholding from public disclosure the location of properties under several circumstances, including in cases where it would cause a significant invasion of privacy, impede the use of a traditional religious site by practitioners, endanger the site, etc.

The District has identified the consulting parties for this undertaking as set out in 36 CFR 800.2 and invites them by copy of this letter to participate in the Section 106 process (See Distribution List). We request your written comments on this project within 30 days, pursuant to 36 CFR 800.3(c)(4). Please comment or concur with our opinion and recommendations within 30 days, or the District will assume that you have reviewed the information package and agree with our findings.

If you have any questions regarding this matter, please call Mr. Jim Ross of our Economic and Environmental Analysis Branch at 309/794-5540, or you may write to our address above, ATTN: Planning, Programs, and Project Management Division (Jim Ross)..

Sincerely,

ORIGINAL SIGNED BY

Dorene A. Bollman

for Kenneth A. Barr
Chief, Economic and Environmental
Analysis Branch

Enclosures

CF (all w/encls):

Dist File (PM-M)

PM-A (Jordan, Ross, Coyle)

DISTRIBUTION LIST

Johnathan Buffalo
Historic Preservation Coordinator
Sac and Fox Nation of Mississippi in Iowa
349 Meskwaki Road
Tama, IA 52339-9629

Suzette McCord-Rogers
Iowa Tribe of Kansas and Nebraska
Native American Heritage Museum
RR1 Box 152 C
Highland, KS 66035

Lewis DeRoin
Tribal Chairperson
Iowa Tribe of Kansas and Nebraska
3345 Thrasher Road #8
White Cloud, KS 66094-4028

Patt Murphy
Cultural Resource Representative
Iowa Tribe of Kansas and Nebraska
2340 - 330th Street
White Cloud, KS 66094-9624

R&C Coordinator
State Historical Society of Iowa
600 East Locust
Des Moines, IA 50319-0290

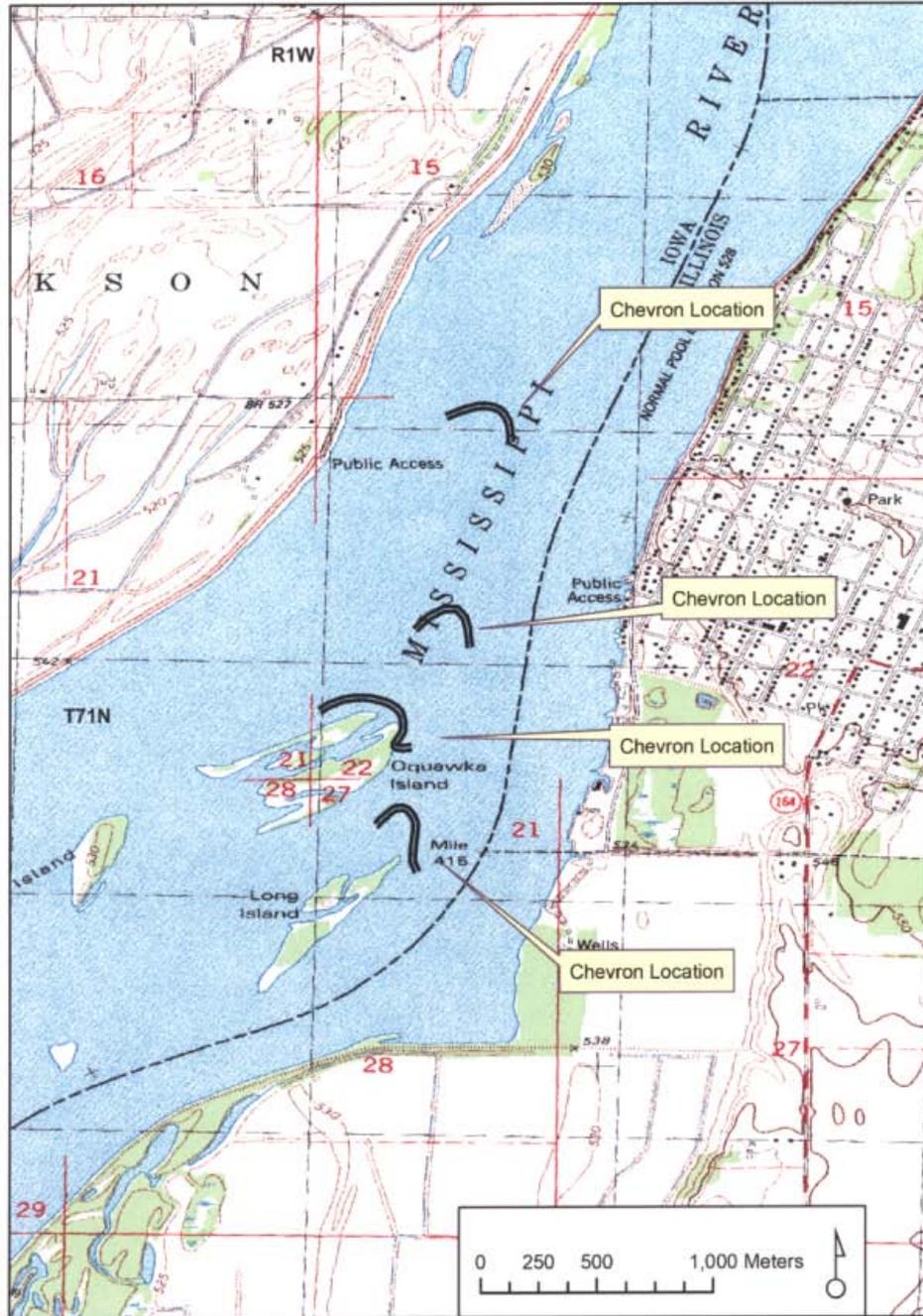
Cultural Preservationist
Iowa Tribe of Oklahoma
Route 1, Box 721
Perkins, OK 74059

Sandra Massey
NAGPRA Coordinator
Sac and Fox Nation of Oklahoma
Route 2, Box 246
Stroud, OK 74079

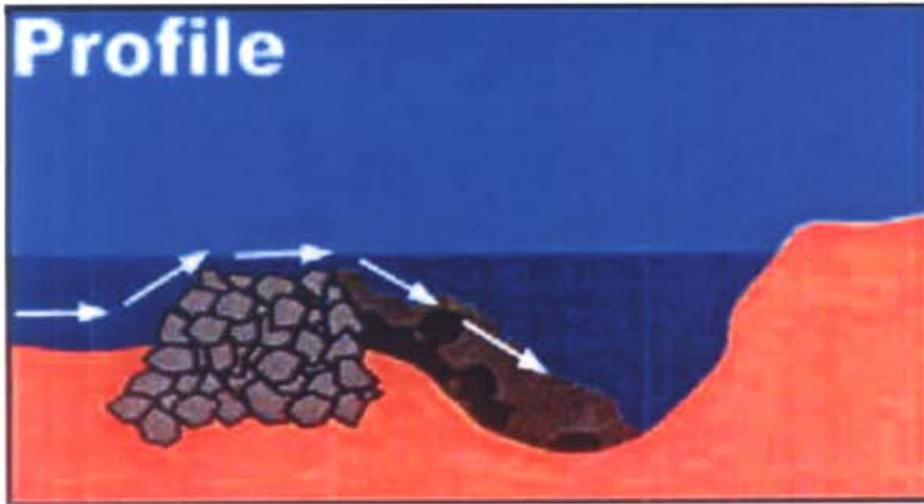
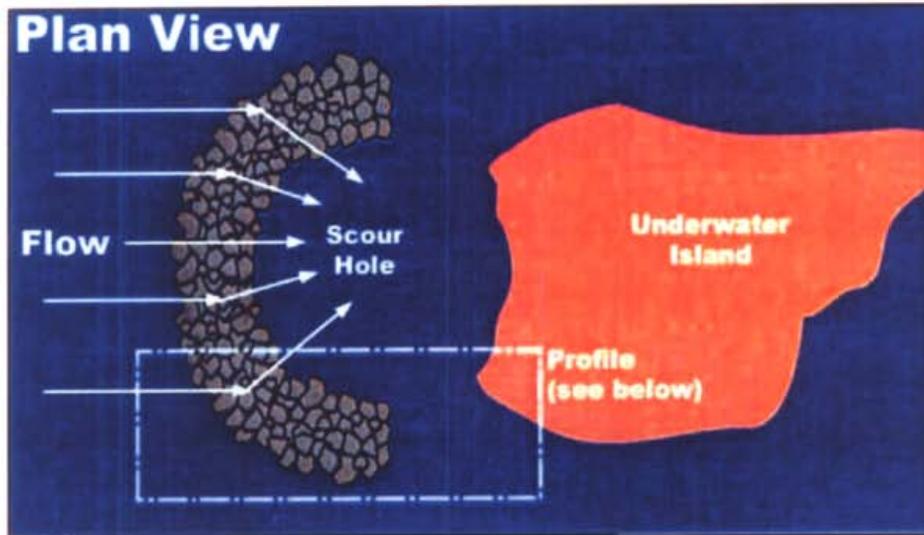
Deanne Bahr
NAGPRA Coordinator
Sac & Fox Nation of Missouri in
Kansas and Nebraska
305 North Main
Reserve, KS 66434-9723

Des Moines County Historical Society
1616 Dill Street
Burlington, IA 52601

Des Moines County Genealogical Society
1419 Division
Burlington, IA 52601



ENCLOSURE 1. Proposed Chevron Locations.



ENCLOSURE 2. Typical Chevron Design (Not to Scale).



ENCLOSURE 3. Proposed Chevron Locations Overlain on Brown Survey (1929-30) Topography and 1995 Orthophotography.

June 18, 2007

In reply refer to:
R&C#: 070629010

Mr. Jim Ross, Archaeologist
Economic and Environmental Analysis Branch
Corps of Engineers – Rock Island District
Clock Tower Building P.O. Box 2004
Rock Island, IL 61204-2004

RE: COE – DES MOINES COUNTY – MISSISSIPPI RIVER – CONSTRUCTION OF FOUR CHEVRON
DIKES IN POOL 18 AT RIVER MILE 415.4, 415, AND 415.9

RECORD OF CONCURRENCE WITH CORPS DETERMINATION:

Letter, May 29, 2007, Jim Ross

“The District has determined that this undertaking will have No Effect on historic properties. All chevron construction work will be confined to the active river bed where little archeological integrity remains as a result of past scouring and deposition. Additionally the negative evidence from historic map review indicates that there is very low potential for intact cultural resources within the APE.”

BY:



Daniel K. Higginbottom, Archaeologist
Iowa State Historic Preservation Office

****NOTES**

If design changes are made for this project which would involve undisturbed new rights-of-way or easements, please forward additional information to our office for further comment along with the Agency Official's determination of effect. If project activities uncover an item(s) that might be of archeological, historical or architectural interest, or if important new archeological, historical or architectural data should be encountered in the project APE, the agency should make reasonable efforts to avoid further impacts to the property until an assessment can be made by a qualified archaeologist.

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

APPENDIX B

**CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION**

APPENDIX B
CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

CONTENTS

I. Preface	EA-B-1
II. Project Description	EA-B-1
III. Factual Determinations	EA-B-4
IV. Potential Impacts	EA-B-10
V. References	EA-B-12

Findings of Compliance or Noncompliance

Figure EA-B-1 Typical Chevron Design.....	EA-B-2
Table EA-B-1 Estimated Chevron Dike Construction Dimensions	EA-B-3

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

APPENDIX B

**CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION**

I. PREFACE

The Administrator of the Environmental Protection Agency in conjunction with the Secretary of Army acting through the Chief of Engineers under Section 404(b)(1) of the Clean Water Act (33 U.S.C. 1344) developed the guidelines applicable to the specification of disposal sites for discharges of dredged or fill material into waters of the United States. The guideline's purpose is to restore and maintain the chemical, physical, and biological integrity of waters of the United States through control of discharges or fill material.

When the Corps of Engineers, Rock Island District (District) plans and proposes to perform any specific civil works action involving discharges of dredged or fill material, they first evaluate the action using specific criteria specified in Clean Water Act, 40 CFR Part 230, Subpart B Section 404(b)(1). This appendix presents the District's Clean Water Act Section 404(b)(1) Evaluation (Evaluation) for placing clean rock (fill material) in the Mississippi River (waters of the United States) for the purpose of maintaining the 9-foot navigation channel.

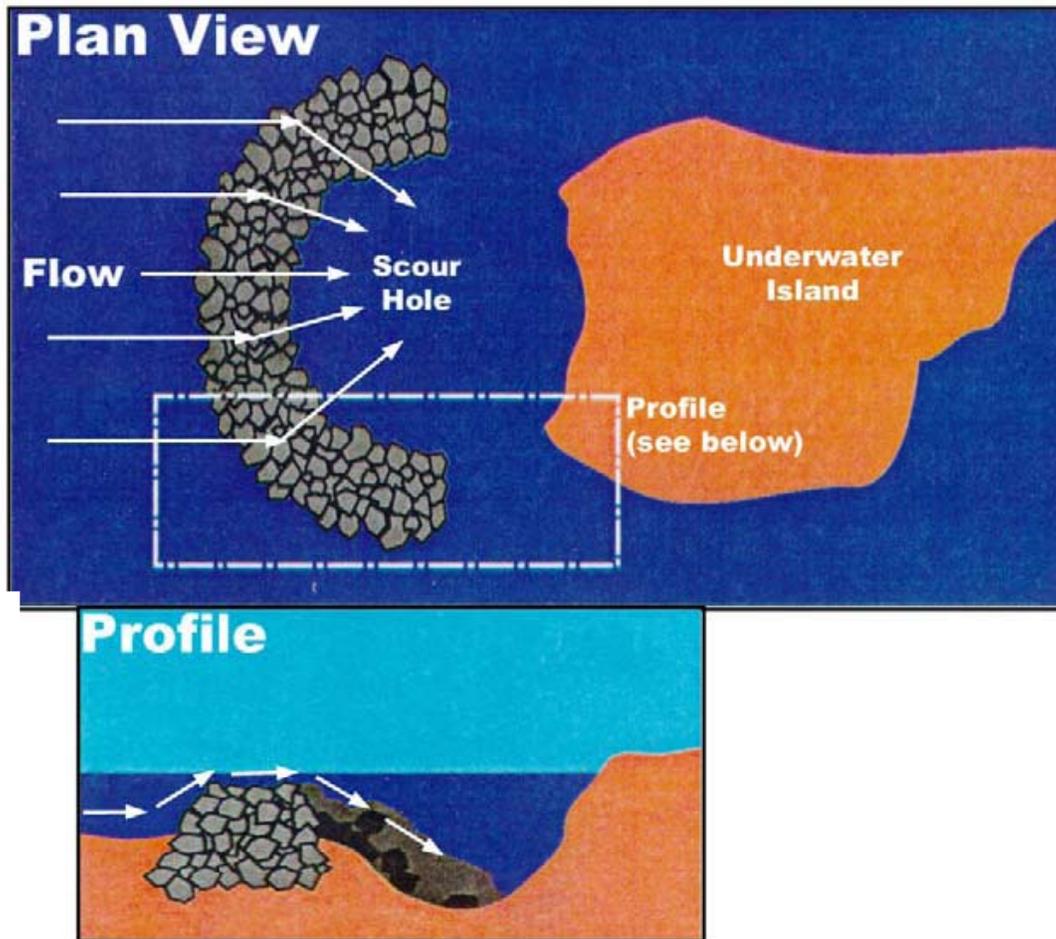
As part of this analysis, the District has considered the nature and degree of effect the proposed discharge would have, individually and cumulatively, in terms of potential changes to the parameters discussed in below. The District has also considered the proposed method, volume, location, and rate of discharge, as well as the individual and combined effects of current patterns, water circulation and fluctuations, wind and wave action, and other physical factors as part of this evaluation.

II. PROJECT DESCRIPTION

A. Location. This document specifically addresses proposed rock placement at four locations in Pool 18 of the Mississippi River. The District proposes to construct four chevrons in the right descending main channel border at river miles 415, 415.5, 415.7, and 416.2. While all four locations are located in Des Moines County, Iowa, the nearest town is Oquawka, Illinois, just across the main channel (plate EA-1).

B. General Description. New construction would include four chevrons built to an elevation of 531.5 mean sea level (msl), 3.5 feet above flat pool elevation of 528 msl. This means if the District constructs the chevrons, the structures would be 3.5 feet above the water surface at normal river stage. Each structure would be an average linear length of approximately 1,325 feet.

Chevrons do not connect to the shoreline like the typical wingdam. Figure EA-B-1 depicts a typical chevron design. The chevron is a V- or U-shaped rock structure pointing upstream. Not only do chevrons divert river flow like a wingdam, toward the main channel, they also create several different types of river habitat, with variable depth and flow velocities. River flows overtopping the structures during high water periods create a large scour hole just downstream of the structure's apex. Downstream of this area the reshaped material deposits create a shallow bar. After the flows drop below the crest of the structure, the scour hole formed at high flow becomes an area of deep slack water. This environment is very conducive to the needs of overwintering fish and provides the ideal conditions for a juvenile and larval fish nursery. The potential plant life established along the wetted edges and uneven rock structure would provide good escape cover and foraging habitat for young fish.



US Army Corps of Engineers, 2006

Figure EA-B-1 . Typical Chevron Design

While chevrons produce habitat diversity, the primary goal of chevron construction is to reduce future demand for maintenance dredging in the 9-foot navigation channel along this stretch of the river, thus decreasing the impacts of dredging and dredge material placement, and the cost of operation and maintenance of the navigation channel. If the Corps would construct chevrons at these locations, the need for dredging would probably not stop, yet the District anticipates the frequency, duration, and quantity of dredging would drop in this reach of the river.

C. Authority and Purpose. The formal authorization for the U.S. Army Corps of Engineers to perform operation and maintenance activities on the UMR was given in the Rivers and Harbors Act of 1927; as modified by the Rivers and Harbors Acts of 1930, 1932, and 1935; 1950, and a Resolution of the House Committee on Flood Control of September 19, 1944. These Acts and Resolution authorize the construction, operation, and maintenance of the 9-foot navigation channel on the Mississippi River between the mouth of the Missouri River and St. Paul, Minnesota.

This Evaluation is to comply with Section 404 of the Clean Water Act pertaining to guidelines for placement of dredged or fill material into waters of the United States. This evaluation, in conjunction with the EA, will assist the District in analyzing alternatives for the proposed project. Further, this evaluation will provide information and data to the State water quality certifying agency demonstrating compliance with State water quality standards. This will aid in the decision making process concerning State 401 water quality certification.

D. General Description of Fill Material. Table EA-B-1 displays the proposed amounts of Class C inert and uncontaminated limestone/dolomite rock.

Table EA-B-1. Estimated Chevron Dike Construction Dimensions

Chevron Location (Upstream to Downstream)	Length (ft)	Proposed Elevation (ft. above mean sea level)	Quantities (tons)	Foot Print Area (ft²)
RM 416.2	1098.13	531.5	13,200	72,476.58
RM 415.7	1140.21	531.5	35,300	75,253.86
RM 415.5	1661.04	531.5	25,400	109,628.60
RM 415.0	1399.73	531.5	29,900	92,382.18

E. Description of the Proposed Placement Sites. Three of the four proposed placement sites are located in the main channel border with a fairly consistent river bottom comprised of shifting sand in a dune-like pattern. The normal river depths are 2 to 10 feet deep.

Chevron location 415.5 is located furthest from the main channel at the upstream end of Long Island. This location is shallow (4 to 5 feet deep) and is comprised of a sandy/silty mix. There are submergent stumps and beached large trees throughout the area.

F. Description of Placement Method. Chevron construction typically involves the use of deck-mounted cranes and/or derricks, deck barges, endloaders, quarter boats, and tender craft. Using this equipment, the District would place the rock material on the specified alignments and shaped them to the design cross section. Large-grade stone is placed by crane or derrick.

The timing and duration of construction should be limited to one construction season (generally late spring to early fall) unless river conditions delay completion until the following construction season.

III. FACTUAL DETERMINATIONS

This Evaluation outlines the potential short-term or long-term effects of chevron construction (i.e., rock placement in the Mississippi River) on the physical, chemical, and biological components of the aquatic environment. This section also addresses the actions the District proposes to avoid or minimize any impacts of material placement at the project site.

A. Physical Substrate Determinations

Particle size, shape, and degree of compaction. The chevron rock would be much larger than the sand or clay sized material now on the river bottom. The District would build the proposed chevrons with Class C riprap of inert/uncontaminated quarried limestone/dolomite. Rough dimensions of Class C riprap are 5 to 36 inch diameter and 6 to 400 lbs. The placement site would experience 100 percent compaction from the weight of the chevron material. However compaction would be minimal given the compaction characteristics of sand and the distribution of the chevron rock.

Substrate elevation and bottom contours including outside the disposal areas. The elevation and slope of all placement sites would change. The actual increase would vary across the river bottom cross section, depending on the depth. The existing bottom elevations also vary according to the movement of the river's bedload. Substrate may accrete or degrade depending on the river's discharge stage.

While the completed structures would remain at their constructed elevation, adjacent and nearby bottom substrata would likely change. As intended, the structures would probably cause the main river channel to deepen and reduce the shoaling of new sediments, which would otherwise require dredging to remove them. Placing the newly constructed chevrons should reduce the shoaling currently a significant problem for channel maintenance.

Besides deepening the main channel, the chevrons would create a scour hole immediately downstream of the structure (Figure EA-B-1). High water events overtopping the structure would create the scour hole. The scour hole may be 9 to 12 feet deep, depending on the hydrology of the site. Material from the scour hole location would be displaced immediately downstream as a shoal. Periodic overtopping events would contribute to the scour hole cleanout and additional shoaling. Once the river resumes normal elevation (flat pool) the scour hole becomes a deep slack water pool and the shoal may become a shallow water area or emerged island of sediment. Both habitats are extremely beneficial to invertebrates, young fish, overwintering fish, and aquatic plants.

Movement of the chevron rock off site would be negligible due to the large-size and construction grade.

Material placement should not significantly affect benthic inhabitants. In fact, the large rock size would provide interstitial spaces for invertebrates and young fish. The only benthic inhabitants potentially affected are freshwater mussels. The District expects some loss of individual mussels during construction, but they do not expect a loss of a mussel bed or large assemblage of mussels. The

structures would attract mussel host fish species, and therefore the areas around each chevron should become populated with a diverse mussel population post construction.

Duration and physical extent of substrate changes. The District expects the structures to stay in place for more than 50 years. During that time, the District may repair the structures, based upon possible high water damage, or for routine maintenance. Repairs include regrading and/or placing additional rock to fill any voids.

Loss of environmental values. The District expects a short term loss of benthic organisms due to construction activities. The project area should quickly recolonize with a rich diversity of plant, fish, bird, and invertebrate organisms. The District expects a long-term gain of environmental values would greatly outweigh the loss of any environmental value caused by construction.

Nature and degree of effect, individually and cumulatively. The District determined there are no additional beneficial or negative effects contributing to this project's physical substrate impacts.

Actions to minimize impacts. The District expects the placement of riprap at each location would benefit aquatic resources by increasing substrate and water flow diversity. Any impact would be limited to short-term disruption of the aquatic ecosystem. The construction schedule would avoid impacting spawning season and threatened and endangered species.

B. Water Circulation, Fluctuation, and Salinity Determinations. Typically, analysis of sand sediments, such as those found in the immediate project area, reveals negligible evidence of pollutants due to the limited surface area of sand-sized particles and the lack of strong chemical bonding of contaminants to sand grains. Any contaminants in sandy materials would be those typically contained or transported by normal fluvial processes and therefore are common constituents of the Mississippi River system. Any activity disturbing the existing substrate therefore would not be anticipated to alter water chemistry in the water column.

Significant changes in the hydrologic regime. The proposed structures would affect currents and flows. The purpose of constructing the structures is to redirect a portion of the water flowing along the adjacent main channel border area into the main channel. In the immediate vicinity of the structures, flows would decrease. There would not be any significant decrease patterns upstream or downstream of the project. Changes in aquatic resources are difficult to predict, but the District anticipates an area of slack water directly down stream of each chevron under normal river flows. Current velocity could decrease in the adjacent main channel border areas. During high water events, the District anticipates water velocities over the chevrons to increase because of the increased vertical constriction. Main channel velocities should also increase in the immediate project vicinity. Stratification is not applicable in this riverine condition. As described in previous paragraphs, flow and resultant scouring would tend to increase in the main channel. These effects tend to become less noticeable as river discharges and stages rise. Also, these effects are usually local and would not affect the channel for more than a mile upstream or any farther downstream than Dam 18.

Alterations of bottom contours. If the District builds the four chevrons, the river bottom within the footprints of each chevron would change from a dune effect of shifting sand to a large rock structure. Immediately downstream the District anticipates a scour hole and a shoal of material develop.

Normal water level fluctuation. The proposed project would not have any impact to normal seasonal river stages.

Water chemistry. The proposed project would not have any impact to water chemistry.

Salinity. The proposed project would not have any impact to salinity.

Clarity. The proposed project would not have any impact to clarity or turbidity.

Color. The proposed project would not have any impact to color.

Odor. The proposed project would not have any impact to odor.

Taste. The proposed project would not have any impact to taste.

Dissolved gas levels. The proposed project would not have any impact to dissolved gas levels.

Temperature. The proposed project would not have any impact to water temperature.

Nutrients. The proposed project would not have any impact to current river level nutrients.

Eutrophication. The proposed project would not have any impact to eutrophication.

Loss of environmental values. The District expects a short term loss of benthic organisms due to construction activities. The project area should quickly recolonize with a rich diversity of plant, fish, bird, and invertebrate organisms. The District expects a long-term gain of environmental values would greatly outweigh the loss of any environmental value caused by construction.

Nature and degree of effect, individually and cumulatively. the District determined there are no additional beneficial or negative effects contributing to this project's water circulation, fluctuation, and salinity impacts.

Actions taken to minimize impacts. the District would use chemically stable materials and physical stabilization of materials to reduce impacts to the riverine system. By the chevron's design, habitat value is greater than the no action alternative or the construction of new wingdams. The chevron design allows for a reduction in channel maintenance as well as provides superior habitat benefit.

C. Suspended Particulate/Turbidity Determinations

Grain size of the material proposed for discharge. The District would build the proposed chevrons with Class C riprap of inert/uncontaminated quarried limestone/dolomite. Rough dimensions of Class C riprap are: 5 to 36 inch diameter and 6 to 2335 lbs.

Shape and size of plume of suspended particles. The discharge material would not create a noticeable plume of suspended particles. Once the discharged material strikes the river bottom, negligible amount of material would enter the water column. The amount would not significantly contribute to the overall Mississippi River suspended particulate bedload.

Duration of discharge and resulting plume. The chevron construction at the four locations would last less than one construction season (late spring – early fall) unless high water prevents delays the work until the next season. Any suspended material would resettle out of the water column quickly and in the vicinity of the construction zone. Negligible amounts of fine particulate may linger in the river's bedload, but would not significantly contribute to the overall amount of daily bedload.

Violations of applicable water quality standards. The District anticipates this project would not violate any applicable Iowa water quality standards. The District would obtain the permits, certification, and/or waiver of certification under Section 401 of the Clean Water before construction begins.

Loss of environmental values. The District does not expect a loss of environmental value to the water column due to construction activities.

Nature and degree of effect, individually and cumulatively. The District determined there are no additional beneficial or negative effects contributing to this project's amount of suspended particulate and turbidity impacts in the Mississippi River.

Actions Taken to Minimize Impacts. The District would use efficient rock placement techniques and the use physically stable and chemically non-contaminating material for project. The District would accomplish construction during normal water conditions. This would complete the work keeping the amount of suspended material to a minimum.

D. Contaminant Determinations. The District would use inert and uncontaminated limestone/dolomite rock from an approved quarry source.

E. Aquatic Ecosystem and Organism Determinations. The following discussion centers on how potential changes to the physical environment may affect the aquatic ecosystem and organisms living there and the rate of recolonization.

Substrate characteristics and elevation. The proposed project would alter the monotypic substrate to a substrate with diversity in grain size, interstitial places, and elevation. A commensurate diverse aquatic community would quickly follow. The Corps of Engineers, St. Louis District, constructed chevrons in 1993 near Mississippi River Mile 289.5, Pool 24. The St. Louis District built these chevrons to divert flow into the thalweg, reduce dredging and open water disposal, create islands, and create fish and macroinvertebrate habitat. Natural resource agencies agreed these chevrons should benefit fish and wildlife, however, monitoring was needed to confirm these benefits. Ecological Specialists, Inc., was contracted to analyze invertebrate populations on the chevrons and in the surrounding riverbed to determine if the chevrons were providing macroinvertebrate habitat. The macroinvertebrate assemblages were compared between the interior dike rock, exterior dike rock, interior soft substrate, and the surrounding soft substrate in 1994, 1995, and 1996. No unionids were found due to previous open water dredge disposal in the area. However, the chevrons and protected areas behind chevrons are providing habitat for invertebrates and fish. Diversity and taxonomic richness was higher on chevrons than in the surrounding soft substrates in all three years. (Ecological Specialist Inc., 1997)

Water or substrate chemistry. The District does not anticipate a change in water or substrate chemistry and their interaction on the aquatic ecosystem.

Nutrients. The District does not anticipate a change in nutrients either in quantity, quality, or distribution across the various river habitats and their bearing on the aquatic ecosystem.

Currents. The District anticipates a change in river currents. They expect a percent of the main channel border current to redirect to the main channel. This increase in current should not significantly impact any aquatic community between the proposed structures and the main channel.

Circulation. The District expects the circulation patterns at and near each structure to change. High water events would cascade over each structure and slack water (i.e. little circulation) would occur at normal water levels. Given this diversity in circulation, there should not be any significant impact to any present aquatic community. Conversely, the diverse circulation should attract a variety of aquatic organisms such as overwintering fish and juvenile fish to the structures.

Fluctuation. The District does not anticipate a change in river fluctuation and its bearing on the aquatic ecosystem.

Salinity. The District does not anticipate a change in salinity and its influence on the aquatic ecosystem.

Loss of environmental values. The District does not expect a loss of environmental value to the water chemistry or flow patterns due to construction activities and the final project. The project would add additional environmental value to a relatively monotypic river condition.

Nature and degree of effect, individually, and cumulatively. The District determined there are no additional beneficial or negative effects contributing to the project area aquatic ecosystem and organisms.

Actions taken to minimize impacts. The District would use clean, uncontaminated riprap. This material should not contribute to any water quality decline.

F. Proposed Placement Site Determinations. This section does not address any impact analysis; it addresses only the boundaries and parameters of the mixing zone.

Depth of water at the disposal sites

Location	River Mile	Depth Range (ft)
Chevron 1	415.0	8
Chevron 2	415.5	4-5
Chevron 3	415.7	10
Chevron 4	416.2	2

Current velocity, direction, and variability at the disposal sites. The District calculated velocities at the disposal site using a flow of 100,000 cubic feet per second (a moderately high flow). The velocities in the project area would be less than 2.5 feet per second.

The river's waters move from a generally north to south direction. In this reach, the river takes a slight southwesterly turn but resumes its southern pattern approximately two miles downstream. The water movement is fairly constant in the main channel border until the flow crosses a wingdam, island, or other irregularity in the river. The disposal sites are at or near existing wingdams and islands so the river flow variability should not significantly change.

Degree of turbulence. The project area is within a pooled portion of the river and there are no turbulent rapids or waterfalls in the project area. If the District builds the chevrons, turbulence should not change at normal river levels. When the river rises to overtop the chevrons, there would be a localized amount of turbulence immediately downstream of each chevron..

Stratification attributable to causes such as obstructions, salinity or density profiles at the disposal sites. The typical mixing zone of the Mississippi River main channel border includes the entire water column – surface to river bottom. The proposed project would not alter the stratification or the mixing zone in the project area.

Discharge vessel speed and direction. The work barge would be stationary. The work crew would use a fixed crane to place material. A skid steer on top of the structure would shape to final grade.

Rate of discharge. The rate of discharge would be no more than 30 days at each site.

Ambient concentration of constituents of interest. The fill material would be clean, uniform material. Its density and size would not allow it to migrate very far, if at all, from the disposal site.

Dredged material characteristics, concentrations, type of material, and settling velocities. The District would not dredge any material for this project.

Number of discharge actions per unit of time. Each chevron would have one initial construction period. The District does not anticipate adding additional material during the life of each structure unless a structure experiences major damage. In this case, the District would evaluate the need for additional rock or regrade the structure using the original rock.

Other factors of the disposal site affecting the rates and patterns of mixing. There are no other factors beyond what is described above.

G. Determination of Compliance with Applicable Water Quality Standards. Due to the nature of the fill material, all discharges are anticipated to be in compliance with Iowa water quality standards. The District would obtain Section 401 Water Quality certification, in compliance with the Clean Water Act, and all permits necessary for the completion of the project prior to project implementation.

H. Determination of Cumulative Effects on the Aquatic Ecosystem. The District conducted a cumulative effects analysis for the entire project including effects on wetlands and waters of the United States. This analysis is located in the EA, Section IV, A. 4. Placement of rock should add diversity to the substrate in this reach of the river. The District's analysis concluded there would be no significant negative cumulative impacts associated with this project. This additional habitat diversity offered by this project should provide crevices and interstices in which certain aquatic organisms can

feed and reproduce. In terms of habitat diversity, therefore, channel regulation structures would have a net positive effect on the aquatic ecosystem.

I. Determination of Secondary Effects on the Aquatic Ecosystem. While the District anticipates several secondary effects on the aquatic ecosystem, the proposed project may contribute to a channelizing effect to this reach of the river. The District recognizes navigation channel maintenance projects may cause a departure from natural river ecosystems. The District's goal is to minimize impacts to the environment when addressing channel maintenance duties. This is why this project deviates from the traditional submerged wingdam design to a chevron design. The chevron should create habitat diversity in the project area, protect existing islands from erosion, and have the potential to initiate island restoration at historic island locations. This determination is subject to reevaluation, if warranted by Federal, state, or local agency comment, as well as input from the general public.

IV. POTENTIAL IMPACTS

This section documents additional information and data the District considered in Section III, *Factual Determinations* and in Section VI, *Findings of Compliance or Noncompliance With the Restrictions on Discharge*.

A. Threatened and Endangered Species. There are several state- and federally-listed species listed for Des Moines County, Iowa, and Henderson County, Illinois. The District considered the following potential project impacts and the possible loss of threatened and endangered species values:

- Covering or otherwise directly killing species
- The impairment or destruction of habitat to which these species are limited

Given these possible impacts as well as the other potential project impacts, the District does not anticipate any significant impacts or effects to threatened and endangered species. The project EA details the project's potential impact to threatened and endangered species.

B. Fish. Fish species normally present in the construction area might temporarily avoid the project area until placement is complete. Fish populations would benefit from the decreased flow in the adjacent main channel border. The District considers chevrons as a very desirable habitat feature for fish. The interstitial spaces, overwintering benefits, and aquatic vegetation should attract a quality fish community.

C. Crustaceans. Freshwater, or fairy shrimp and crayfish would be the primary types of crustaceans affected by this project. Currently the project area does not contain the desirable habitat for crustaceans. If the District completes this project, the rock structures would create interstitial spaces and slack water, which would attract fairy shrimp and crayfish.

D. Mollusks. The District conducted a mussel survey (EA, Appendix C). They found mussels at each of the proposed chevron sites. The proposed project would cover a certain number of mussels and their local habitat. While any loss of a mussel resource is a concern, the District feels the habitat benefit derived from the project would outweigh any mussel losses.

A study by Miller and Whiting (1988) found wingdams enabled development of a dense and rich mussel assemblage compared to unprotected offshore area. Wingdams and other regulating structures like chevrons may encourage mussel colonization because they attract fish hosts necessary for most species.

E. Other Aquatic Organisms

Effects on biota, including primary producers (i.e., zooplankton and phytoplankton).

Suspension/filter feeders, and sight feeders, are anticipated to be short-term. Invertebrate population of mayflies, caddisflies, stoneflies, and other aquatic insects may increase on the additional rock substrate provided.

Effects on plankton, nekton, and benthos. Because the likelihood of contamination by pollutants is generally low for projects involving rock placement, the District anticipates the impacts to the aquatic ecosystem as negligible. Effects on plankton would be minimal. Effects on benthos would be limited to elimination of those organisms currently inhabiting the immediate placement sites. The placement of rock fill should provide interstitial spaces for invertebrate population production and limited vertebrate spawning potential. The type of benthos present in some areas may change toward species preferring quieter waters, since flows could be diminished somewhat.

Effects on nekton would be limited to displacement and temporary disruption of foraging patterns. Because the proposed activities are generally held to low-flow (hence, non-spawning seasons), impacts to spawning species should be negligible. Riprap, through invertebrate colonization, would provide an excellent food source and possible spawning sites. There is potential for formation of deep scour holes downstream of the structures some fishes would use for resting, feeding, and over-wintering sites.

Effects on aquatic food web. Effects on the aquatic food web would have beneficial impacts by increasing production at the lower trophic levels.

Other wildlife. Other wildlife normally present would temporarily avoid the project area during the construction. The proposed action would not negatively affect the food chain or critical habitat requirements of other wildlife. The project may provide additional foraging, resting, and nesting sites for migratory birds and turtles.

F. Special Aquatic Sites

Sanctuaries and refuges. The project would not affect any sanctuary or refuges.

Wetlands. The project would not negatively affect any wetlands. Emergent wetlands may evolve downstream on, or near chevron-produced shoals.

Mudflats. The proposed action would not affect any mudflats.

Vegetated shallows. The proposed action would not affect existing vegetative shallows. This type of habitat may evolve downstream on, or near chevron-produced shoals.

Coral reefs. The proposed action would not affect any coral reefs.

Riffle and pool complexes. The proposed action would not affect any riffle and pool complexes.

G. Human Use Characteristics

Municipal and private water supplies. The proposed action would not affect any municipal and private water supplies

Recreational and commercial fisheries . The proposed project may increase recreational and commercial fishing opportunities since the chevrons would attract a diverse fish community.

Water-related recreation. The proposed action would not affect any water-related recreation.

Aesthetics. The chevrons would be exposed above the surface of the river and visible from the Village of Oquawka, Illinois, and from boaters. The structures are not a significant addition to rock-protected levees and shorelines in the project vicinity.

Parks, national historical monuments, national seashores, wilderness areas, research sites, and similar preserves. The proposed action would not affect any parks, national historical monuments, national seashores, wilderness areas, research sites, and similar preserves.

H. Evaluation and Testing - General evaluation of dredged or fill material. The fill material would be clean, uncontaminated limestone. Therefore, the District would not conduct any chemical, biological, and physical testing of the rock.

V. REFERENCES

Ecological Specialists, Inc. 1997. *Macroinvertebrates Associated With Habitats of Chevron Dikes in Pool 24 of the Mississippi River*. Prepared for Parson Engineering Science, Inc., under contract to U.S. Army Corps of Engineers, St. Louis, Missouri. 44pp. with appendix. 96-034.

Miller, A. C., and R. Whiting. 1988. *The Value of Wingdams for Freshwater Mussels*. Environmental Effects of Dredging Technical Notes. U.S. Army Engineer Waterways Experiment Station, Environmental Laboratory. Vicksburg, Mississippi.

US Army Corps of Engineers. 2006. *Upper Mississippi River System Environmental Design Handbook. Chapter 5 - River Training Structures and Secondary Channel Modifications*. Rock Island, IL.

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

**CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION**

**FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH
THE RESTRICTIONS ON DISCHARGE**

1. The District made no significant adaptations of the 404(b)(1) Guidelines relative to this evaluation.
2. Evaluation of Alternatives Including the Proposed Action. (See EA Section II.)
 - A. No Federal Action. No action on the part of the Corps of Engineers means no new construction would occur. Without construction, repeated dredging would be required, as the existing structures are insufficient to reduce the need for future dredging and channel training works construction.
 - B. Construct Training Works in Other Locations or Configurations. While this alternative would meet the project objectives of assisting in maintaining the 9-foot navigation channel and providing habitat diversity, it did not meet the objectives of protecting existing islands from erosion and potentially building islands at historic island sites.
 - C. Chevron Construction. This is the preferred alternative. The District would build four chevrons; two at the head end of existing islands and two at historic island locations. This alternative would meet the project objectives of assisting in maintaining the 9-foot navigation channel; providing habitat diversity; protecting existing islands from erosion,; and potentially building islands at historic island sites.
3. This project complies with 40 CFR 230.11 Guidelines and project conditions to minimize pollution or adverse effects to the affected aquatic ecosystems. The District considered all the resources identified in 40 CFR 230 Subparts A through H in this Evaluation.
4. The District would obtain the permits, certification, and/or waiver of certification under Section 401 of the Clean Water before construction begins. The project will be in compliance with water quality requirements of the State of Iowa.
5. This project would not introduce significant quantities of toxic substances into nearby waters or result in appreciable increases in existing levels of toxic materials.
6. No significant impact to state- or federally-listed threatened or endangered species is anticipated from this project.

*Chevron Dike Construction
Near Oquawka, IL*

*Appendix B
Clean Water Act*

*Findings of Compliance or Noncompliance With
the Restrictions on Discharge*

7. The project would not affect any municipal or private water or degrade any waters of the United States.
8. The project would not affect marine sanctuaries.
9. The materials used for construction would be chemically and physically stable and noncontaminating.
10. The District; Committee to Assess Regulating Structures; state and Federal agencies; or the public have not identified other timely, practical alternatives. The proposed action is in compliance with Section 404(b)(1) of the Clean Water Act, as amended. The proposed actions would not significantly impact water quality and would improve the integrity of an authorized navigation system.

Date

Robert A. Sinkler
Colonel, U.S. Army
District Engineer

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

APPENDIX C

MUSSEL SURVEY

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

APPENDIX C

MUSSEL SURVEY

LOCATION. Pool 19, Mississippi River, River Miles 413.5–416.2, at four proposed chevron construction sites and at two wingdam rehabilitation sites (table EA- C-1 and plate EA-C-1)

Table EA-C-1. Oquawka Chevron Dike - Mussel Survey Locations

General Location	Dive	Coordinates ¹	
Site 1, RM 416.2	Dive 1	0671663	4534458
	Dive 2	0671571	4534404
Site 2, RM 415.8	Dive 3	0671373	4533353
	Dive 4	0671253	4533301
Site 3, RM 415.5	Dive 5	0671095	4533073
	Dive 6	0671270	4532879
Site 4, RM 415.0	Dive 7	0671272	4532545
	Dive 8	0671221	4532607

¹Coordinates are in UTM 15 NAD 83

DATE. September 26, 2006

WATER TEMPERATURE. 65°F

PERSONNEL. Richard Lewis, IL DNR
Robert Schanzle, IL DNR
Robert Clevenstine, USFWS
Kenny Brenner, USACE, Rock Island District
Charles Bishop, USACE, Rock Island District
Joe Jordan, USACE, Rock Island District

METHODOLOGY. The survey sites were located using global positioning units. Each site was predetermined based upon the proposed construction sites. At each site, a diver conducted two ten minute dives. The diver hand collected any mussel he encountered in the ten minute periods. At the conclusion of each dive, the team identified, quantified, and recorded all mussels. All mussels were returned to the river except for a few mussels retained by the ILDNR as specimen samples. The team recorded notable occurrences (i.e. presence of zebra mussels) and river physical data.

RESULTS. Table EA-C-2 summarizes the quantity of species found in the survey. The survey found 10 species at the four proposed chevron locations. The survey did not find any state or Federally listed threatened or endangered species. Individual dive data sheets are included in this appendix.

DISCUSSION. A mussel bed is defined as a group of mussels over a contiguous area with a minimum of 1 mussel per square meter. The measure of a quality mussel bed is harder to determine, yet we assume quality increases as species richness, density, and areal coverage increases. The personnel conducting this study determined the mussels collected represented good species diversity and density; however this particular study was cursory and did not determine mussel quantity per se. The mussels collected were common and abundant through this reach of the river.

In a related survey for a wingdam rehabilitation project at RM 413.5, a team of divers relocated every mussel in the proposed project area prior to construction. Their effort relocated over 2000 individuals representing 21 species. The mussel assemblage in the wingdam project area indicated the mussels were attracted to the hydrology, and/or river bottom the wingdams' hydraulics created. The District contends while the chevron project does not include any mussel relocation, the District feels construction would displace or kill some amount of mussels. Any loss of individual mussels should be recuperated with the habitat and hydraulic diversity created by the chevrons.

The group determined a high quality mussel bed was not present and any chevron construction should not significantly impact the mussel assemblage of the area, or impact any quality mussel bed in Pool 18.

Chevron Dike Construction
Near Oquawka, Illinois

Appendix C
Mussel Survey

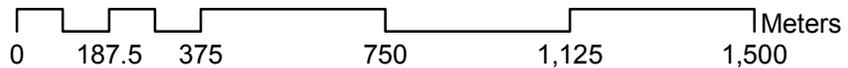
Table EA-C-2. Oquawka Chevron Construction Mussel Survey Results – Quantity of Species Found

Species	Common Name	TRANSECT								Total
		1	2	3	4	5	6	7	8	
<i>*Ligumia recta</i>	Black Sandshell									
<i>Plethobasus cyphyus</i>	Bullhead									
<i>Tritogonia verrucosa</i>	Buckhorn									
<i>*Ellipsaria lineolata</i>	Butterfly									
<i>Truncilla truncata</i>	Deertoe									
<i>*Fusconia ebena</i>	Ebonysell									
<i>*Elliptio crassidens</i>	Elephant-Ear									
<i>Lampsilis siliquidea</i>	Fat Mucket									
<i>*#Potamilus capax</i>	Fat Pocketbook									
<i>Truncilla donaciformis</i>	Fawnfoot	2								2
<i>Anodonta suborbiculata</i>	Flat Floater									
<i>Leptodea fragilis</i>	Fragile Papershell									
<i>Pyganodon grandis</i>	Giant Floater									
<i>Obovaria olivaria</i>	Hickorynut	2		3		1	5	1	2	14
<i>+*#Lampsilis higginsi</i>	Higgins' Eye Pearly Mussel									
<i>Toxolasma parvus</i>	Mapleleaf	4					1	3	3	11
<i>Quadrula quadrula</i>	Lilliput									
<i>Quadrula metanevra</i>	Paper Floater									
<i>Actinonaias ligamentina</i>	Mucket									
<i>Utterbackia imbecillis</i>	Monkeyface					1				1
<i>Pleurobema sintoxia</i>	Ohio River Pigtoe									
<i>Fusconia ozarkensis</i>	Ozark Pigtoe									
<i>Quadrula pustulosa</i>	Pimpleback	4	2			2		3	3	14
<i>*Potamilus alatus</i>	Pink Heelsplitter									
<i>Potamilus ohioensis</i>	Pink Papershell		1				1	1		3
<i>+Tritogonia verrucosa</i>	Pistolgrip (Buckhorn)									
<i>Lampsilis cardium</i>	Plain Pocketbook	1	2						1	4
<i>+*Cyclonaias tuberculata</i>	Purple Wartyback									
<i>+Arcidens confragosus</i>	Rockshell									
<i>+Pleurobema coccineum</i>	Round Pigtoe									
<i>+*#Plethobasus cyphyus</i>	Sheepnose									
<i>*Alasmidonta viridis</i>	Slippershell									
<i>Lampsilis teres teres</i>	Slough Sandshell									
<i>*Epioblasma triquetra</i>	Snuffbox									
<i>+*#Cumberlandia monodonta</i>	Spectaclecase									
<i>*Elliptio dilatata</i>	Spike									
<i>+Strophitus undulatus</i>	Strange Floater									
<i>Obliquaria reflexa</i>	Threehorn	18	4	2	1	1	3	6	4	39
<i>Amblema plicata</i>	Threeridge	11	3	1	2	3	2	3	1	26
<i>Fusconia flava</i>	Wabash Pigtoe									
<i>Quadrula nodulata</i>	Wartyback	20	4			1	2	5	6	38
<i>Megalania nervosa</i>	Washboard									
<i>Lasmigona complanata</i>	White Heelsplitter									
<i>+Lampsilis teres</i>	Yellow Sandshell									
	TOTAL	62	16	6	3	9	14	22	20	155
	Total Species	8	6	3	2	6	6	7	7	10

+ Iowa Listed Threatened or Endangered Species
* Illinois Listed Threatened or Endangered Species
Federally-listed Endangered Species



**US Army Corps
of Engineers®**
Rock Island District



Legend

-  **Mussel Survey Sites**
-  **Proposed Chevrons**
-  **River Miles**
-  **Existing Channel Maintenance Rock Structures**

**CHEVRON DIKE CONSTRUCTION
NEAR OQUAWKA, ILLINOIS**

POOL 18, MISSISSIPPI RIVER

**RIVER MILES 415.0 - 416.2
DES MOINES COUNTY, IOWA**

ENVIRONMENTAL ASSESSMENT

APPENDIX D

DISTRIBUTION LIST

OQUAWKA CHEVRONS**94I****FEB 08**

HONORABLE CHARLES GRASSLEY
UNITED STATES SENATOR
UNITED STATES SENATE
131 W 3RD ST #180
DAVENPORT IA 52801

HONORABLE TOM HARKIN
UNITED STATES SENATOR
UNITED STATES SENATE
1606 BRADY ST STE 323
DAVENPORT IA 52803

HONORABLE BARACK OBAMA
UNITED STATES SENATOR
UNITED STATES SENATE
607 E ADAMS ST
SPRINGFIELD IL 62701

HONORABLE PHIL HARE
REPRESENTATIVE IN CONGRESS-17TH DIST
US HOUSE OF REPRESENTATIVES
1535 47TH AVE #5
MOLINE IL 61265-7217

HONORABLE DAVE LOEBSACK
REPRESENTATIVE IN CONGRESS-2ND DIST
US HOUSE OF REPRESENTATIVES
125 S DUBUQUE ST
IOWA CITY IA 52240-4003

HONORABLE PETER ROSKAM
REPRESENTATIVE IN CONGRESS-6TH DIST
US HOUSE OF REPRESENTATIVES
150 S BLOOMINGDALE RD STE 200
BLOOMINGDALE IL 60108-1494

DIRECTOR US COAST GUARD, 8TH DIST
WESTERN RIVERS OPERATIONS (OB)
1222 SPRUCE ST
ST LOUIS MO 63103

JOHN ASKEW
REGIONAL ADMINISTRATOR
US ENVIRONMENTAL PROTECTION AGENCY - REG 7
901 N 5TH ST
KANSAS CITY KS 66101-2907

SHILOH BRADLEY
DISTRICT CONSERVATIONIST DES MOINES COUNTY
USDA NATURAL RESOURCES CONSERVATION SERVICE
3625 FLINT RIDGE DR
BURLINGTON IA 52601

EDWARD BUIKEMA
DIRECTOR
FEDERAL EMERGENCY MGMT AGENCY - REG V
536 S CLARK ST 6TH FLR
CHICAGO IL 60605-1509

BOB CLEVENSTINE
ECOLOGICAL SVCS FIELD OFC
US FISH AND WILDLIFE SERVICE
1511 47TH AVE
MOLINE IL 61265

JOE COTHERN
NEPA TEAM LEADER/BIG RIVERS COORD
US ENVIRONMENTAL PROTECTION AGENCY - REG 7
901 N 5TH ST
KANSAS CITY KS 66101-2907

AL FENEDICK
PLANNING & ASSESSMENT BR ME-19J
US ENVIRONMENTAL PROTECTION AGENCY - REG 5
77 W JACKSON BLVD
CHICAGO IL 60604

RICHARD HAINJE
REGIONAL DIRECTOR
FEDERAL EMERGENCY MGMT AGENCY - REG VII
9221 WARD PKWY STE 300
KANSAS CITY MO 64114-3323

KAREN HARVEY
WILDLIFE BIOLOGIST PORT LOUIS NWR
US FISH AND WILDLIFE SERVICE
10728 COUNTY RD X61
WAPELLO IA 52653

GALE HUTTON
DIRECTOR WATER WETLANDS PESTICIDES DIV
US ENVIRONMENTAL PROTECTION AGENCY - REG 7
901 N 5TH ST
KANSAS CITY KS 66101-2907

LCDR SHARON RICHEY
COMMANDER
US COAST GUARD GROUP UPPER MISSISSIPPI RIVER
1222 SPRUCE ST RM 7.103
ST LOUIS MO 63103-2818

DICK STEINBACH
REFUGE MGR MARK TWAIN NATL WILDLIFE REFUGE
US FISH AND WILDLIFE SERVICE
1704 N 24TH ST
QUINCY IL 62301

SUPERVISOR
USCG MSD PEORIA
FOOT OF WASHINGTON ST
E PEORIA IL 61611

SUPERVISOR ROCK ISLAND ARSENAL
USCG MSD QUAD CITIES
PO BOX 3220
ROCK ISLAND IL 61204

DIV ADMINISTRATION ENVIRONMENTAL PROTECTION
IA DEPT OF NATURAL RESOURCES
502 E 9TH ST WALLACE STATE OFC BLDG
DES MOINES IA 50319

TOM BEISSEL
IL DEPT OF NATURAL RESOURCES - WILDLIFE
2317 E LINCOLNWAY STE A
STERLING IL 61081

GARY CLARK
DIRECTOR OFFICE OF WATER RESOURCES
IL DEPT OF NATURAL RESOURCES
ONE NATURAL RESOURCE WAY
SPRINGFIELD IL 62702-1271

SAM FLOOD
ACTING DIRECTOR
IL DEPT OF NATURAL RESOURCES
ONE NATURAL RESOURCES WAY
SPRINGFIELD IL 62702-1271

DIANE FORD-SHIVVERS
LEGISLATIVE LIAISON
IA DEPT OF NATURAL RESOURCES
502 E 9TH ST WALLACE STATE OFC BLDG
DES MOINES IA 50319-0034

MIKE GRIFFIN
WILDLIFE BIOLOGIST MISS RIVER STATION
IA DEPT OF NATURAL RESOURCES
206 ROSE ST
BELLEVUE IA 52031

DARRELL HANSON
CHAIRPERSON ENVIRON PROTECTION COMMISSION
IA DEPT OF NATURAL RESOURCES
502 E 9TH ST WALLACE STATE OFC BLDG
DES MOINES IA 50319-0034

RICH LEOPOLD
DIRECTOR
IA DEPT OF NATURAL RESOURCES
502 E 9TH ST WALLACE STATE OFC BLDG
DES MOINES IA 50319-0034

TIMOTHY MARTIN
SECRETARY
IL DEPT OF TRANSPORTATION
2300 S DIRKSEN PKWY RM 300
SPRINGFIELD IL 62764

JIM MICK
RIVERS AND STREAMS PROG MGR HAVANA FIELD
HEADQUARTERS
IL DEPT OF NATURAL RESOURCES
700 S 10TH ST
HAVANA IL 62644

CATHERINE OLSON
DISTRICT CONSERVATIONIST HENDERSON COUNTY
USDA NATURAL RESOURCES CONSERV SVC
323 E MAIN ST
STRONGHURST IL 61480

NANCY RICHARDSON
DIRECTOR
IA DEPT OF TRANSPORTATION
800 LINCOLN WAY
AMES IA 50010

ROBERT SCHANZLE
PERMIT PROGRAM MANAGER OFC OF REALTY AND ENVIRON
PLANNING
IL DEPT OF NATURAL RESOURCES
ONE NATURAL RESOURCES WAY
SPRINGFIELD IL 62702-1271

BERNIE SCHONHOFF
FAIRPORT FISH HATCHERY
IA DEPT OF NATURAL RESOURCES
3390 HWY 22
MUSCATINE IA 52761

CHRISTINE SCHWAKE
WALLACE STATE OFFICE BUILDING
IA DEPT OF NATURAL RESOURCES
502 E 9TH ST WALLACE STATE OFC BLDG
DES MOINES IA 50319-0034

DOUGLAS SCOTT
DIRECTOR
IL ENVIRONMENTAL PROTECTION AGENCY
1021 N GRAND AVE E
SPRINGFIELD IL 62794-9276

OQUAWKA CHEVRONS

94I

FEB 08

JUNE STRAND
R&C COORDINATOR ATTN: REVIEW AND COMPLIANCE
PROGRAM
STATE HISTORICAL SOCIETY OF IOWA
CAPITOL COMPLEX 600 E LOCUST ST
DES MOINES IA 50319

ED WALSH
IL DEPT OF NATURAL RESOURCES
PO BOX 149
ALEDO IL 61231

HONORABLE RANDALL HULTGREN
IL REPRESENTATIVE DIST 95
IL HOUSE OF REPRESENTATIVES
225-N STRATTON OFC BLDG
SPRINGFIELD IL 62706

BOB BECK
CHAIRPERSON
DES MOINES COUNTY BOARD OF SUPERVISORS
COUNTY COURTHOUSE 513 N MAIN ST
BURLINGTON IA 52601

BRIAN CARTER
COUNTY ENGINEER
DES MOINES COUNTY COURT
13522 WASHINGTON RD
WEST BURLINGTON IA 52655

TOM HICKMAN
COUNTY ENGINEER
HENDERSON COUNTY
PO BOX 119
STRONGHURST IL 61480

MARTY LAFARY
CHAIRPERSON
HENDERSON COUNTY BOARD
COUNTY COURTHOUSE PO BOX 308
OQUAWKA IL 61469

HONORABLE VERN ALOCK
PRESIDENT
VILLAGE OF OQUAWKA
PO BOX 496
OQUAWKA IL 61469-0496

CONSOLIDATED GRAIN & BARGE
PO BOX 276
OQUAWKA IL 61469

KAREN THOMAS
OQUAWKA MARINA, LLC
PO BOX 26
GLADSTONE IL 61437

VICKI STOLLER
ADMINISTRATOR
TWO RIVERS LEVEE & DRAINAGE ASSOCIATION
5601 205TH ST
MEDIAPOLIS IA 52637

EXECUTIVE DIRECTOR
DES MOINES COUNTY CONSERVATION BOARD
13700 WASHINGTON RD
WEST BURLINGTON IA 52655-8658

CHAIRMAN JOHNATHAN BUFFALO
HISTORIC PRESERVATION OFFICER
SAC & FOX TRIBE OF THE MISSISSIPPI IN IA
349 MESKWAKI RD
TAMA IA 52339-9629

LEWIS DERGIN
TRIBAL CHAIRPERSON
IA TRIBE OF KANSAS & NEBRASKA
3345 THRASHER RD #8
WHITE CLOUD KS 66094-4028

SUZETTE MCCORD-RODGERS
NATIVE AMERICAN HERITAGE MUSEUM
IA TRIBE OF KANSAS & NEBRASKA
RR1 BOX 152C
HIGHLAND KS 66035

PATT MURPHY
NAGPRA REP
IA TRIBE OF KANSAS & NEBRASKA
206 S BUCKEYE AVE
ABILENE KS 67410

DIRECTOR
BURLINGTON PUBLIC LIBRARY
210 COURT ST
BURLINGTON IA 52601

DES MOINES COUNTY GENEALOGICAL SOCIETY
BOX 493
BURLINGTON IA 52601-0493

SHARON COLMAN
SIERRA CLUB
2217 15TH 1/2 ST
ROCK ISLAND IL 61201

CLAUDIA EMKEN
DIRECTOR OF GOVERNMENT RELATIONS IL CHAPTER
THE NATURE CONSERVANCY
301 SW ADAMS ST STE 1007
PEORIA IL 61602

OQUAWKA CHEVRONS

94I

FEB 08

HOLLY STOERKER
DIRECTOR
UPPER MISSISSIPPI RIVER BASIN ASSOC (UMRBA)
415 HAMM BLDG 408 ST PETER ST
ST PAUL MN 55102

DEB OLSON
DES MOINES COUNTY HISTORICAL SOCIETY
1616 DILL ST
BURLINGTON IA 52601-4008

KBKB RADIO
TELLY BROADCASTING COMPANY
PO BOX 70
BURLINGTON IA 52601-0070

CRIS CONNERS
KBKB NEWS DIRECTOR
BOX 70
BURLINGTON IA 52601-0070

MIKE HAYHOE
BRANCH MANAGER
WILTEL COMMUNICATIONS SYSTEMS
3210 DIVISION ST
BURLINGTON IA 52601-1653

JOHN PRITCHARD
PRESIDENT KKMI RADIO
PRITCHARD BROADCASTING COMPANY
2850 MOUNT PLEASANT ST
BURLINGTON IA 52601-2001

SYLVIA ST CLAIR
MANAGER
CARTHAGE NEWSLAND
917 WILLOW AVE
BURLINGTON IA 52601-1567

BILL MERTENS
EDITOR
BURLINGTON HAWKEYE
BOX 10 800 S MAIN
BURLINGTON IA 52601

JIM QUIRK
THE HAWK EYE
5 MAIN ST
BURLINGTON IA 52601

MIKE SINDEL
HAWKEYE NEWSPAPER
BOX 10
BURLINGTON IA 52601

NEWS ROOM
KBUR RADIO
1411 N ROOSEVELT AVE
BURLINGTON IA 52601

NEWS ROOM
KBUR-KGRS RADIO
1411 N ROOSEVELT AVE
BURLINGTON IA 52601

NEWS ROOM
KCPS TALK RADIO
205 S GEAR AVE
WEST BURLINGTON IA 52655-1003

JOHN GIANNETTINO
SANDCASTLE ENTERTAINMENT
KCPS TALK RADIO
205 S GEAR AVE
WEST BURLINGTON IA 52655-1003

JAMES LIVENGOOD
PRESIDENT KGRS 1073 RADIO FM
L W M INC
PO BOX 70
BURLINGTON IA 52601-0070

JOHN LOURETTA
THE HAWKEYE
800 S MAIN ST
BURLINGTON IA 52601

LORI SANDER
NEWS ROOM
KKMI RADIO
2850 MOUNT PLEASANT ST
BURLINGTON IA 52601