GRAND CALUMET RIVER SEDIMENT REMEDIATION DEMONSTRATION PROJECT

ENVIRONMENTAL ASSESSMENT

EAST CHICAGO SANITARY DISTRICT
LAKE COUNTY, INDIANA

04 November 2003

Environmental Formulation Section
Chicago District
U.S. Army Corps of Engineers
111 North Canal Street
Chicago, Illinois 60606

DRAFT

FINDING OF NO SIGNIFICANT IMPACT

GRAND CALUMET RIVER SEDIMENT REMEDIATION DEMONSTRATION PROJECT

EAST CHICAGO SANITARY DISTRICT, LAKE COUNTY, INDIANA

In accordance with the National Environmental Policy Act of 1969 and Section 122 of the River and Harbor and Flood Control Act of 1970, the U.S. Army Corps of Engineers (Chicago District) has assessed the environmental impacts associated with this project. The purpose of this Environmental Assessment is to evaluate the impacts that would be associated with the removal of contaminated sediments from a ditch tributary to the Grand Calumet River, in East Chicago of Lake County, Indiana.

The assessment process indicates that this project would not cause significant adverse effects on the quality of the human environment. The assessment process indicates that this project would not cause significant, adverse impact upon the ecological, biological, social, cultural, or physical resources of this area, but provide environmental benefits and insight into restoring the Grand Calumet River system. Any impacts associated with the project have been assessed as minor, and it has been concluded that this plan will not have a significant impact upon the biological, social, cultural, or physical resources of the area. Therefore, I have determined that an Environmental Impact Statement (EIS) is not required.

These factors were considered in the determination that the proposed project would only have short and long-term ecological benefits, which far outweigh the temporary and minor impacts during the restoration process. Those having information that would alter this assessment and lead to a reversal of this decision should notify me within 30 days of the date of this document.

Gary E. Johnston
Colonel, U.S. Army
District Engineer

ABSTRACT

The responsible lead agency for the project is the Chicago District, U.S. Army Corps of Engineers; the local sponsor is the East Chicago Sanitary District. The proposed project would involve removal of contaminated sediments and habitat restoration at East Chicago in Lake County, Indiana. The selected plan would involve:

a) remediation of contaminated sediments and foreign debris
b) clearing, grubbing and grading of the west bank of the discharge channel
c) re-meandering of the discharge channel
d) placement of clean substrate
e) creation of riffle-pool sequence
f) addition of in-stream habitat
g) introduction of native species

This environmental assessment documents the environmental impacts of the proposed alternatives.

SEND YOUR COMMENTS TO THE DISTRICT ENGINEER WITHIN 30 DAYS OF THE DATE ON THE LETTER ACCOMPANYING THIS ENVIRONMENTAL ASSESSMENT

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SECTION 1 – PURPOSE AND NEED FOR ACTION

PURPOSE OF PROPOSED ACTION

The purpose of this project is to demonstrate promising technologies (biological/engineering) for sediment remediation to establish a basis for future environmental improvements along the Grand Calumet River system in Lake County, Indiana (Plate A). This project involves aquatic and riparian habitat restoration and the dredging of the sanitary discharge channel leading from the East Chicago Sanitary District (ECSD) to the Grand Calumet River (west bank). This site exhibits many of the conditions of the Grand Calumet River including contaminated sediment and similar overbank conditions.

The proposed demonstration project includes dredging of approximately 3,000 cubic yards of contaminated sediments, installation of a sediment barrier to demonstrate the feasibility of isolating contaminated sediment in a channel, installation of a new natural streambed that will demonstrate the feasibility of in-stream capping, and re-sloping and replanting the banks to demonstrate stabilization and recontamination avoidance. After completion of construction activities, the project will undergo a three-year monitoring period to evaluate the effectiveness of project features to restore water quality and aquatic habitat and resist recontamination.

The following goals, objectives and potential measures were identified:

Goal	Objective	Potential Measures
Remove contaminated sediments and prevent re-contamination	To remove contaminated sediments from aquatic ecosystems and properly dispose of and prevent re-contamination	Dredge contaminated sediments Dispose at appropriate landfill Treat waste water from the process Sediment Barrier
Restore in-stream habitat	To provide required flows, substrates and vegetation for fishes, mussels and benthic invertebrates	Place clean substrata Create riffle-pool sequence Create sand/gravel bar w/ vegetation Introduce riverine species
Restore riparian habitat	To provide habitat for reptiles, amphibians and birds	Plant with native plant species
Gain knowledge for restoration of entire Grand Calumet River system	To determine effects of surrounding contaminated sediments on restored habitats and substrata	Monitor the conditions and ecological quality of the restored channel

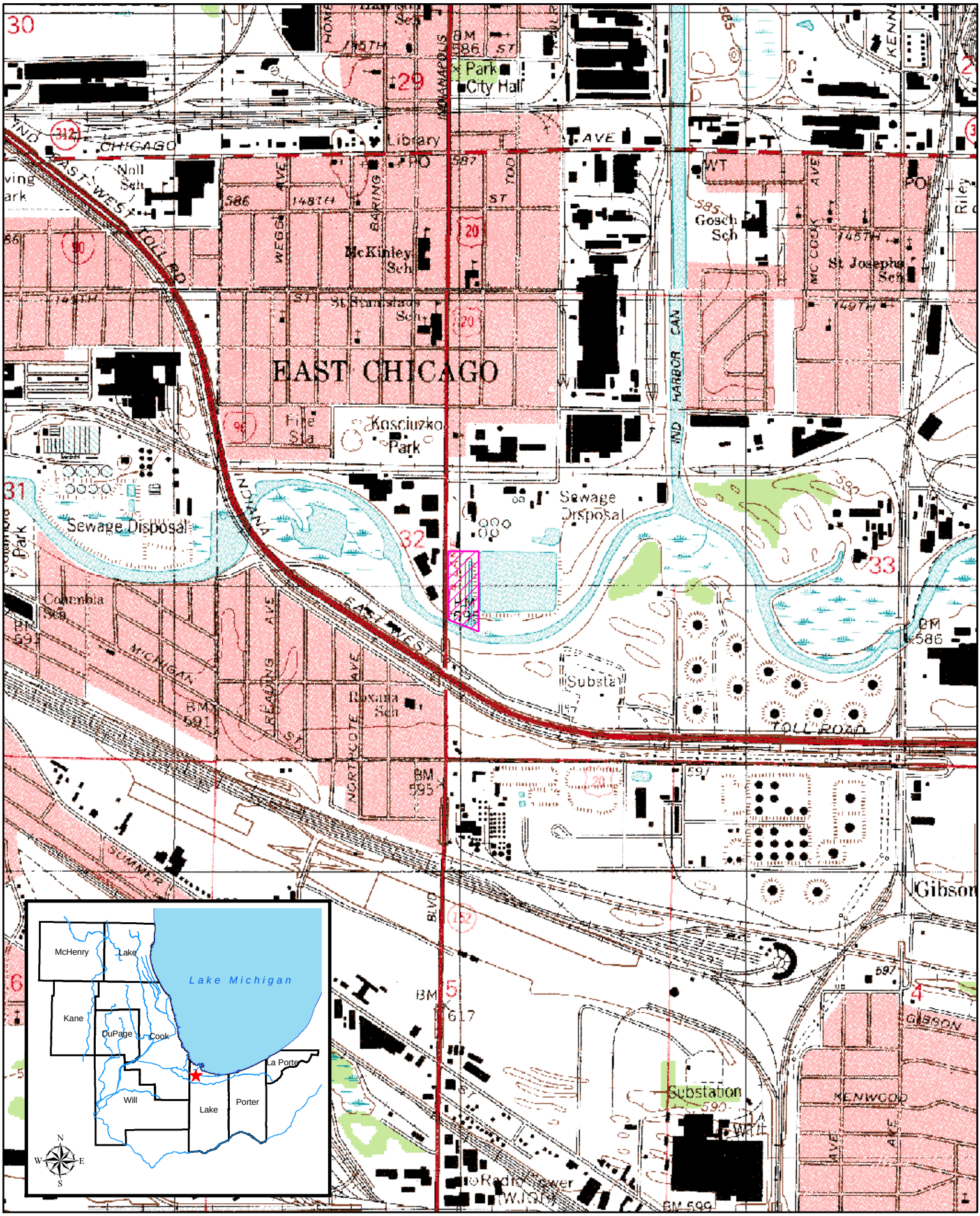
This project will provide additional knowledge and experience on integrating technologies for sediment removal, benthic habitat restoration, and recontamination prevention would be of significant value to future planning and design of sediment remediation project for the Grand Calumet River system.

This project would perform dredging and an aquatic habitat restoration within and along the discharge channel leading from the East Chicago Sanitary District to the Grand Calumet River. The Grand Calumet River has suffered major adverse impacts over the past 100 years, especially to its substrate, hydrology and river morphology. The Calumet region was historically a biologically diverse area with unique flora and fauna. The need for a stretch of sustainable habitat and substrate is imperative to regain diversity within the Grand Calumet River system; and this is with the hope that in the next 10 to 20 years, the Grand Calumet River may be restored as well. This project will serve as a model for projected potential restorations on the Grand Calumet River.

US Army Corps of Engineers
Chicago District

East Chicago

Plate A



NEED FOR ACTION

The Grand Calumet River watershed in northwestern Indiana is an area of federal interest because of the severe contamination and degradation of unique habitats. The Grand Calumet River and Indiana Harbor Canal was identified as an Area of Concern (AOC) in 1978, one of 43 on the Great Lakes. AOCs are regions within the Great Lakes of severe biological impairment that fail to support a selection of beneficial use categories. In a 1997 report "Sediment Cleanup and Restoration Alternatives Project Report," the U. S. Army Corps of Engineers (Corps) evaluated the current conditions along the Grand Calumet River. Although there have not been intensive remediation projects along the river, the Grand Calumet River has shown signs of biological improvement in recent years. Improvement is likely due to the improved water quality in the area through the control of industrial discharges and wastewater treatment plants. Water quality in the river was documented in a Corps 2001 report "Total Maximum Daily Load (TMDL) Study for Grand Calumet River watershed in Lake County, Indiana." Additional biological improvement along the Grand Calumet River will require the remediation of contaminated sediments and the improvement of habitat within the river channel and respective riparian zone.

There is currently strong public support for habitat improvement along the river, in connection to a planned recreational path along the West Branch of the Grand Calumet River. The pre-settlement substrata of the Grand Calumet River system have degraded from a sand/gravel matrix with organic detritus to a thick, anoxic mass of oils, organic compounds and heavy metals. The presence of this deleterious material has prevented the Grand Calumet River system from recovering in terms of ecological function and biodiversity. The lack of in-stream habitat is a limiting factor as well. Stream channelization and unnaturally high flow rates stemming from industrial discharge have nearly removed all in-stream habitat diversity such as velocity and depth variation, aquatic macrophytes, woody debris and gravel.

The opportunity arises in the East Chicago Sanitary District discharge channel. The discharged water is of sufficient quality, clarity and flow that it has attracted stream fishes, although most are non-native and tolerant species. This discharge channel remediation project would provide valuable information for the restoration of the entire Grand Calumet River system; providing critical information as to whether the contaminated sediments could be successfully remedied and that restored habitat would persist.

AUTHORITY

The East Chicago Sediment Remediation Demonstration Project is being conducted as a component of the Grand Calumet River and Indiana Harbor Ship Canal and Nearshore Lake Michigan Remedial Action Plan (RAP) and is a cooperative effort between the US Army Corps of Engineers, Chicago District (USACE) and the East Chicago Sanitary District. The Corps has been providing support to the Grand Calumet River Remedial Action Plan (RAP) in each of the past seven years under the authority of Great Lakes Remedial Action Plans and Sediment Remediation (Section 401 of the Water Resources Development Act (WRDA) of 1990 as amended by Section 515 WRDA 1996, Section 505 WRDA 1999, and Section 344 WRDA 2000. This Act authorizes the Secretary of the Army to provide technical, planning and engineering assistance to states and local governments in the development and implementation of Remedial Action Plans for Areas of Concern (AOC) in the Great Lakes identified under the Great Lakes Water Quality Agreement of 1978 and requires the non-Federal interests to contribute at least thirty-five percent (35%) of the costs of such assistance. Each year the Corps executes a Memorandum of Agreement (MOA) that documents and certifies the cost sharing with the non-federal sponsor.

Section 401(b) of WRDA 1990 and Section 515, WRDA 1996 amended, authorize the Corps of Engineers, in consultation with the US Environmental Protection Agency (EPA) to "conduct pilot- and full-scale projects of promising technologies to remediate contaminated sediment" at sites within the

Great Lakes. FY03 will be the first year CG funds will be requested under the authority. HQ will have to provide implementation guidance before an agreement can be finalized with the non-federal sponsor for use of CG funds under the RAP authority.

LOCAL SPONSOR

The local sponsor is the East Chicago Sanitary District.

COMPLIANCE WITH ENVIRONMENTAL STATUTES

The proposed project is in full compliance with all appropriate statutes, executive orders, and memoranda including the National Environmental Policy Act, the Historic and Archaeological Preservation Act, the Clean Air Act, Sections 401 and 404 of the Clean Water Act, the Corps of Engineer's Operational and Maintenance regulations (33 CFR 209, 335-338), Natural Historic Preservation Act of 1966; the Endangered Species Act of 1973; the Fish and Wildlife Coordination Act; Executive Order 12898 (environmental justice); Executive Order 11990 (protection of wetlands); Executive Order 11988 (floodplain management); and the Rivers and Harbors Act of 1899.

SECTION 2 – CONSIDERED PLANS

NO ACTION

Information: The no action plan would result in an information gap that would not allow for the Grand Calumet River system to be adequately restored. A knowledge base of design and ecology would not exist for the further restoration of this highly impaired river system.

Ecological: The no action plan would result in preserving the exiting conditions of the discharge channel. Although water quality is sufficient for stream flora and fauna to exist, it is severely limited by sediment composition, the lack of natural hydraulic dynamics and the absence of in-stream habitat. These limiting factors will continue to promote the existence of tolerant and non-native flora and fauna within the project site.

The no action plan would not implement any beneficial change to the environment through Corps funding. It is unlikely that local sponsors have sufficient funds to proceed with ecological restoration independently; therefore there would be no future restoration activities at this site. Without this project, small stream habitat and plant communities within the study area will remain in a state of high degradation and low diversity. Water quality will most likely continue to improve, but habitat (plant communities, substrate and in-stream structure) will not recover without the direct physical restoration activities. Without this project, food web dynamics will still incorporate the factor of bioaccumulation of harmful organic compounds that are currently, and will continue to be present in the sediments of the East Chicago discharge channel. In particular, the feeding habitat of the state endangered black crowned night heron (*Nycticorax nycticorax*) will continue to be of low quality and insufficient. Without this project to begin the long process of basin wide restoration, it may impossible to ever reintroduce rare and charismatic species such as the lake sturgeon (*Acipenser fulvescens*), river otter (*Lutra canadensis*) and giant floater (*Pyganodon grandis*). Without this demonstration project valuable knowledge that is applicable to the entire Grand Calumet River system would not be gained.

MEASURES of THE SELECTED PLAN

The selected measures were chosen via coordination with experts from state and federal agencies. These measures were determined to be the most effective in terms of sediment remediation and habitat restoration for the project site.

1. Sediment Barrier

The sediment barrier will serve to separate the contaminated sediment of the Grand Calumet River from the rehabilitated discharge channel. The barrier will be installed prior to dredging at the downstream end of the discharge channel prior to its intersection with the Grand Calumet River (Plate B). After dredging is complete, the channel will be backfilled with the new substrates up to the termination of the channel at the sediment barrier. At this point the barrier will have no real structural function and it will not affect flow within the channel. We are currently considering three different options for the design. Considering that all options being considered will be able to fulfill the simple engineering function of serving as a barrier, the design selection will be based mainly on cost and its relation to disturbance and simplicity. This barrier would become obsolete once the Grand Calumet River is restored.

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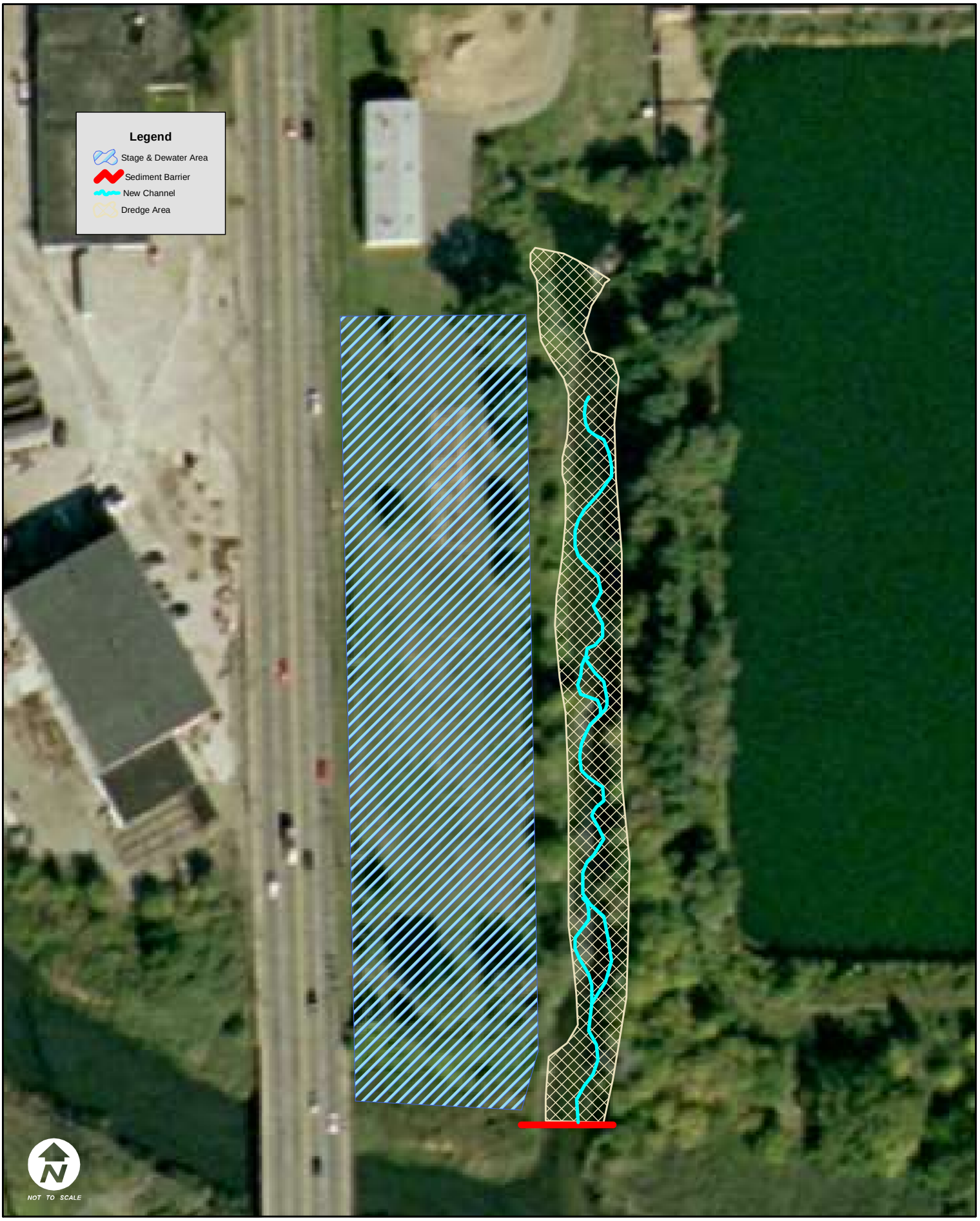
Chicago District

Sediment Remediation Plan

Plate B



Option 1 – Sheet Pile

The first design option is a sheet pile barrier that will be installed into the hardpan below the soft sediment and rise up to the top of the contaminated sediment. This will certainly be effective at keeping the two regions separated though it has several disadvantages. There will be a high cost to mobilize the pile driver to do the installation. Also, driving the pile will be a noisy operation which may disturb the black crowned night herons that nest in the trees nearby. Since sheet pile is typically used for structural support, using it for this application could be considered an over design.

Option 2 – Submerged Wall

The final design option involves the use of grout or Quickrete concrete bags that will serve as the barrier. Contaminated sediment will be excavated in a trench across the channel and stone and precast panels will be laid down as a support for the wall. The wall will then be built up to the level of the sediment and then backfilled to conceal its visibility. This is good option since, like the panels, it offers little disturbance and a minimal cost, though it will be highly labor intensive (requiring workers in the stream to install the bags and build the wall).

Option 3 –Precast Concrete Panels

The second option being considered involves using a series of vertical precast panels that would be installed across the channel. The vertical panels will be supported by horizontal panels placed below the contaminated sediment on both sides of the vertical panels. The contaminated sediment would first be dredged out in a trench across the channel so that the horizontal panels can be installed. The vertical panels will then be installed between the two rows of horizontal panels; if necessary they can be pushed down into the hardpan using heavy equipment. This design is a good option since additional heavy equipment will not be needed to install the wall (the only heavy equipment needed is a crane which will already be on site for the dredging operation); this will cut down on the cost of the operation. Additionally, very little help will be needed from laborers in the water. This is important since working in the channel can be dangerous due to the unstable nature of the sediment. This option has been selected for implementation.

2. Removal of Contaminated Sediments and Foreign Debris

To begin developing this project the first step will be to remove the contaminated sediment. Surveys conducted in spring / summer 2002 determined the 2500 yd^3 to be the quantity of contaminated sediment in the channel (see HTRW Appendix I).

The HTRW investigation performed in 2001 revealed contamination at levels that would preclude any beneficial use application and necessitate disposal of the material in a Subtitle D landfill. Local landfills were contacted.

Dredging is critical feature to the success of the project. The contaminated sediments present in the channel are the most severe impediment to developing a healthy aquatic community of fish and invertebrates. Without dredging the contaminated sediment, performing any of the other restoration activities would be futile. Restoration of the ecosystem cannot be done without removing the contamination. Most of the specific procedures for the dredging operations for this project will be left up to the contractor. Since the contractors themselves have the most experience with small dredging operations such as this one, it would be more appropriate for them to develop the specific design. USACE will provide specific restraints for the operation: 1) Dredge material must be dewatered to the point that it will pass the Paint Filter test (the wastewater treatment intake on site may be used for disposing of any decant or pore water that may be generated during this process), 2) The material must be placed in a lined, subtitle D landfill that will accept Special Waste material. Additional restraints may be required as outlined in the 401 water quality certification for the project, such as a specified type of dredging bucket, a silt curtain, or the time of year that dredging can be performed due to the risk of volatilizing organic contaminants in warmer weather. In all likelihood the contractor will use some form of mechanical dredging, which will produce a much drier

material than a hydraulic dredging operation. The field directly adjacent to the dredging operation (Plate B) can be used for drying or dewatering operations that may be required. The possibility also exists for a hydraulic operation using geotubes. The fact that the project operation is on the site of a wastewater treatment plant with a convenient location for pumping decant water brings hydraulic dredging under the realm of possibilities.

Due to the steep bank and the required distance to reach the channel, the dredging apparatus will require a long horizontal reach to access the sediment. This will require the use of either a crane with attached clamshell dredging bucket or a large hydraulic excavator able to achieve the required horizontal reach (at least 50 feet). The dredging apparatus will be placed on the firm soil on top of the bank and each load of sediment will be placed in a temporary holding pan where the sediment can settle leaving the pore water. This pore water will be pumped to the sanitary sewer access location where the water will return to the head-works of the wastewater treatment plant. After dewatering, the sediment can be transferred to a Subtitle D landfill. Trucks with sealed beds will perform transfer so that none of the pore water can seep out of the vehicles during transport.

3. Channel Restoration

A. Channel Re-meandering

Currently, the stream channel is a 45-foot wide ditch for conveyance of discharge water into the Grand Calumet River. This channelized ditch offers minimal, if any habitat diversity and structure through stream morphology for aquatic species. The Grand Calumet River system possessed streams characterized by wide pools and tight constrictions of sand and aquatic macrophytes. Thus the Grand Calumet system did not possess defined cobble riffle morphology. Due to unnatural hydraulic regimes, these sand based constrictions and pools could not be replicated or otherwise they would be blown-out after the first storm event.

To restore to a more natural configuration, the straightened ditch requires meandering. The wetted with of the stream would be about 10 - 15 feet where pools should be and 8 feet where riffles should be, like a natural stream. Meanders would be created through the placement of natural cobble and gravel bars. This measure would restore approximately 600 feet of channelized stream into a meandering and more natural stream (Plate C). This measure would provide critical habitat for aquatic plants and organisms that require these plants. It would also provide diversity in stream structure and flows that are required by lotic organisms.

Design criteria for this measure are 1) to restore a sinusoidal meander to the ditched channel resembling a natural stream; 2) the meanders must be within the current banks; 3) the east bank must not be impacted by any change in flow regimes.

B. Base Substrate

Natural substrata of the Grand Calumet River system, including the East Chicago Sanitary District discharge channel have become highly degraded in chemical as well as physical composition. Stream organisms are no longer able to survive in these substrata for these reasons alone.

Once all the dredged material is removed from the discharge channel, a clean, base substrata would be placed. The base substrata would be first a clay hardpan. This very fine and cohesive clay material would be placed in the channel and then be tamped down via a backhoe. Over a short period this clay hard pan will become hard and bound together; therefore it will not wash away overtime. Clay hardpan will provide structure for stream organisms to reside in, particularly

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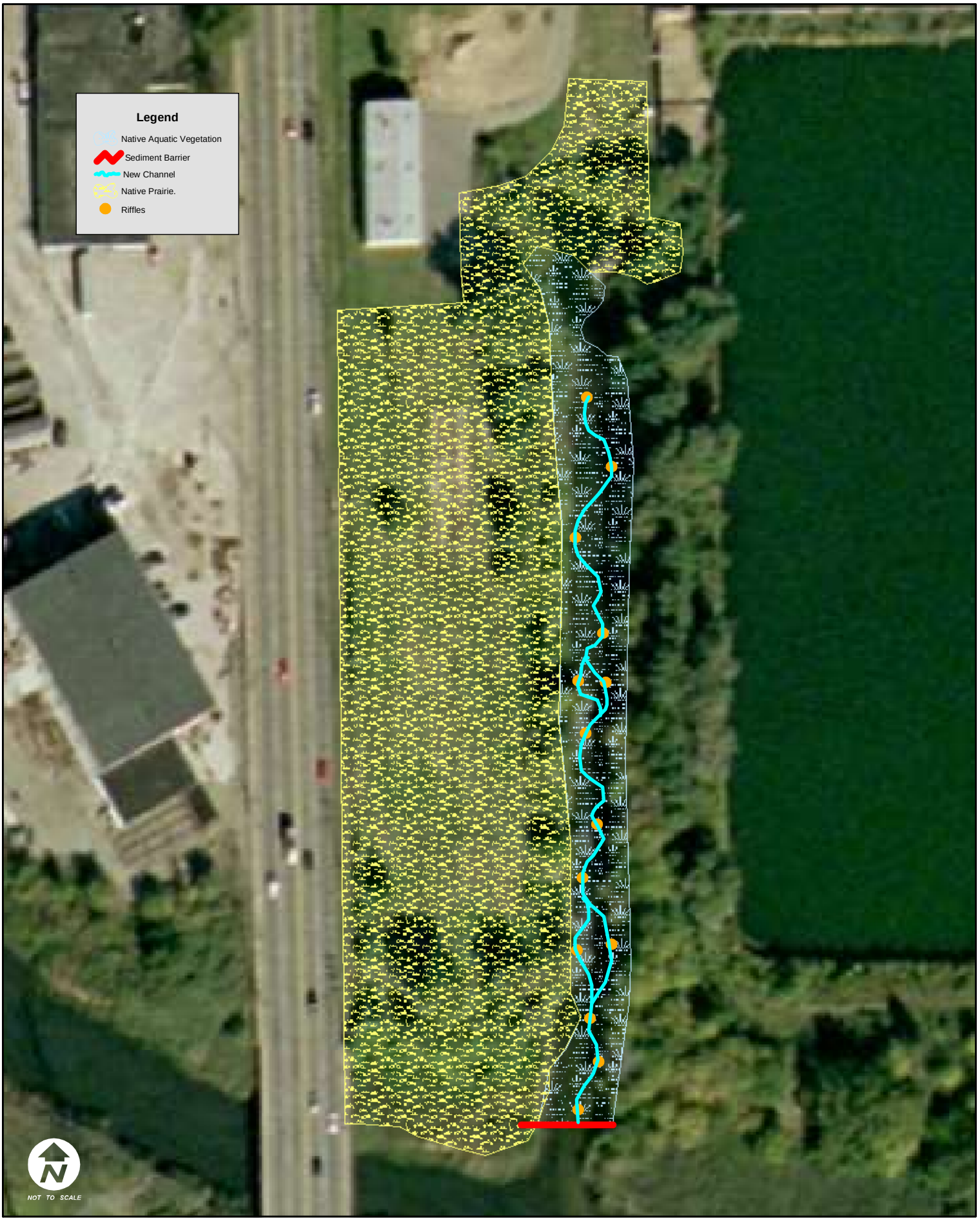
Chicago District

Restoration Plan

Plate C



burrowing benthic invertebrates such as the virile crayfish (*Orconectes virilus*). This measure would restore approximately 600 feet of stream base substrata.

Over the clay hardpan, a sand and gravel mixture, replicating glacial till and lacustrine sands will be placed in bowl shaped fashion as to run up sides of the banks. Placement of this fill is dependent on other measures the channel would be treated with. Boulders, cobble and gravel will also be placed as clean substrata, but would mostly be used in constructing riffles and bank tows. Sand and gravel bars may also be created to diversify habitat, diversify flows and provide substrata for aquatic plants.

Design criteria for this measure are 1) to restore base substrates that replicate sand, glacial tills and clay hardpan; 2) the placement of this clean base substrata should be as base, and not fill the entire channel back to its previous elevation; 3) clay hardpan replication should also function as a barrier to deeper lying contamination sources.

C. Riffle Creation

Riffle-pool sequences are one of the preferred methods to restore degraded stream habitat. The placement of a riffle would increase habitat diversity in terms of substrata and flow. Compared to the uniform flow conditions of a channelized reach, cobble riffles increase and diversify the velocity of flow, which in turn increases the complexity of in-stream habitat, the essential for a diverse aquatic community. These riffles provide substrate and flow velocity for water filtering bacteria and macroinvertebrates, and improve water quality by facilitating gas exchange.

The Calumet River system possessed streams characterized by wide pools and tight constrictions consisting of sand and aquatic macrophytes. Thus the Calumet River system did not possess defined cobble riffle morphology. Due to unnatural hydraulic regimes, these sand based constrictions and pools may not be replicated, otherwise they would be "blown-out" after the first storm event. Therefore, riffle-pool sequences would be placed within the discharge channel. These riffles would be created from alluvial material (not rip-rap chunks) of boulders, cobbles, gravel, and sand resembling substrates of the region and would be sized properly to with stand unnatural flows during peak discharge of the treatment plant.

Design criteria for this measure are: 1) riffle must be constructed to provide critical flows for stream invertebrates and fishes; 2) must be constructed of natural material to provide spawning habitat for simple lithophil species; 3) must provide scour pools (3 feet) for larger stream fishes.

D. In-stream Habitat

The absence of in-stream structure and habitat is another limiting resource in the ECSD discharge channel. Due to the ditched condition of the channel, tree roots, herbaceous vegetation root mats, aquatic macrophytes and undercut banks are absent.

Woody debris would be obtained from any of the trees that would be removed from the banks. Tree trunks should be placed at random within the streambed. Tree root masses should be placed at the tow of banks at the pool areas as to serve as undercut bank habitat. Maneuvering of these objects may be necessary once the stream has reached its new equilibrium. Native aquatic macrophytes such as lizard's tail (*Saururus cernuus*), pickerel weed (*Pontedaria cordata*) and bulrush (*Scirpus* spp.) would be planted or encouraged to grow in the headwater area of the newly restored stream.

Table 1: Suggested planting list for in-stream habitat.

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
Acorus calamus	SWEETFLAG	*Juncus dudleyi*	DUDLEY'S RUSH
Alisma subcordatum	COMMON WATER PLANTAIN	*Juncus effusus*	COMMON RUSH
Bidens cernua	NODDING BUR MARIGOLD	*Leersia oryzoides*	RICE CUTGRASS
Bidens coronata	TALL SWAMP MARIGOLD	*Mimulus ringens*	MONKEY FLOWER
Calamagrotis canadensis	BLUE JOINT GRASS	*Polygonum hydropiperoides*	WATER PEPPER
Carex comosa	BRISTLY SEDGE	*Pontedaria cordata*	PICKEREL WEED
Carex cristatella	CRESTED OVAL SEDGE	*Potamogeton nodosus*	LONG-LEAVED PONDWEED
Carex emoryi	RIVERBANK SEDGE	*Potamogeton pectinatus*	SAGO PONDWEED
Carex stipata	COMMON FOX SEDGE	*Rudbeckia laciniata*	WILD GOLDEN GLOW
Carex vulpinoidea	BROWN FOX SEDGE	*Sagittaria latifola*	BROADLEAF ARROWHEAD
Cephalanthus occidentalis	COMMON BUTTONBUSH	*Saururus cernuus*	LIZARD'S TAIL
Cyperus esculentus	FIELD NUT SEDGE	*Scirpus fluviatilus*	RIVER BULRUSH
Echinochloa crusgalli	BARNYARD GRASS	*Scirpus pungens*	CHAIRMAKER'S RUSH
Eleocharis smallii	MARSH SPIKE RUSH	*Scirpus validus creber*	GREAT BULRUSH
Eupatorium perfoliatum	COMMON BONESET	*Spartina pectinata*	PRAIRIE CORD GRASS
Iris virginica shrevei	BLUE FLAG		

Design criteria for this measure are: 1) tree root masses should be obtained from the trees that will be removed from the site; 2) undercut banks with root structure should be restored to provide cover for fishes; 3) native aquatic macrophytes should be propagated within the headwater of the stream for native fish spawning and cover.

E. Introduction of Native Fish Species

The main stem of the Grand Calumet River is highly degraded and very inhospitable to all but the tolerant and more vagile species. Once the East Chicago Sanitary District site is restored, it is of great importance to determine whether or not species would be able to tolerate and sustain them at the site.

This measure would consist of reintroducing warm water native fishes into the sanitary district discharge channel after the restored stream has become stabilized. Fishes would be collected from nearby streams in which they are abundant and in no danger of becoming rare. These fishes would be enumerated by species and released into the now restored ECSD stream. The ECSD stream would be sampled twice a year for the next five years. One sampling event would occur in May – June to determine if fishes are spawning in the restored stream. Another sampling event would occur in the fall to determine recruitment.

The project would result in the decline of non-native and tolerant species of fish such as common carp, goldfish and round goby, and would provide habitat and stream conditions for moderately sensitive and native species to be sustained. The current IBI score for the earthen channel is 26, rating it as a limited resource. It is recommended to introduce fish species to determine the ecological sustainability of the restored channel since it is unlikely that native stream fishes would not colonize through the hostile Grand Calumet River main stem. It is recommended to introduce the following species:

Table 2: List of recommended fish species for introduction into the restored ECSD discharge channel

Family	Species	Common Name	Local Abundance	Tolerance Level	Trophic Guild	Spawning Guild	Source Stream	Number Intro
Umbridae	*Umbra limi*	central mudminnow	high	high	insectivore	general	Salt	50
Esocidae	*Esox americanus*	grass pickerel	moderate	moderate	piscivore	vegetation	Plum	5
Cyprinidae	*Semotilus atromaculatus*	creek chub	high	high	generalist	general	Trail/Plum	100
	Nocomis biguttatus	hornyhead chub	high	moderate	insectivore	lithophilic	Plum	100
	Campostoma anomalum	central stoneroller	high	moderate	herbivore	lithophilic	Plum	100
	Rhinichthys atratulus	blacknose dace	high	moderate	generalist	lithophilic	Plum	50
	Luxilus chrysocephalus	striped shiner	high	moderate	insectivore	lithophilic	Plum	50
	Luxilus cornutus	common shiner	moderate	moderate	insectivore	lithophilic	Plum	20
	Cyprinella spiloptera	spotfin shiner	high	moderate	insectivore	general	Plum/Trail	100
	Notropis stramineus	sand shiner	high	moderate	insectivore	general	Trail/Lake Michigan	100
Catostomidae	*Erimyzon sucetta*	lake chubsucker	moderate	moderate	generalist	general	Kankakee Sands Area	25
Percidae	*Percina maculata*	blackside darter	moderate	moderate	insectivore	lithophilic	Plum/Trail	25
	Etheostoma nigrum	Johnny darter	high	moderate	insectivore	general	Plum/Trail	50

The introduction of these fish would increase the IBI from 26 to 35 – 40, which would then characterize the stream as valued resource. The source bodies of water from which these species would be introduced could be assessed to compare the restoration reach with a naturally "diverse" stream. The suggested sources are:

- Trail Creek: La Porte Co., IN (flows into Lake Michigan)
- Plum Creek: Will Co., IL (flows into the Little Calumet River)
- Salt Creek: Porter Co., IN (flows into the Little Calumet River)
- Lake Michigan: Lake Co., IN (Wihala Beach)
- Kankakee Sands Area: Newton Co., IN (various ditches of remnant Beaver Lake)

Design criteria for this measure are: 1) introduction of native fish species of intermediate tolerance with the unlikelihood of re-colonization; 2) selected species once occurred, or occur in other sections of the Grand Calumet River system; 3) would be monitored for at least five years to provide evidence of recruitment

4. Bank Restoration

Currently the west bank of the discharge channel has been overgrown with weedy and non-native plant species. Also, the bank is unnatural in shape and material, which as become inhospitable to native plant species.

The area compromising the west bank of the discharge channel was once used as a Municipal Solid Waste (MSW) landfill prior to the 1950's (the exact dates of use are known from knowledge gleaned from employees at the East Chicago Sanitary District it was likely used in the 1930's and 40's). Investigative test pits were dug along this bank in August 2002 in order to ascertain the type of material that exists in the bank. A backhoe was used to dig 5 pits equally spaced along the length of the channel and down to the approximate level of water in the channel. From the five test pits that were dug, MSW was only seen in the three more southerly-located test pits. MSW that was seen consisted mainly of bottles and broken glass as well as bits and some larger pieces of metal. Material that was seen would not be considered

hazardous as classified by RCRA or TSCA and therefore disposal would not be especially difficult or expensive. Test pits where MSW was seen the quantity was relatively small. The main component of the material was soil and separating the MSW from the soil is very feasible when construction takes place. MSW separated from the soil can be taken to the East Chicago Transfer Station, without any additional charge and disposed of like any other similar type of material.

The process of rehabilitating the banks will begin by using a backhoe to slope back the existing bank. This will serve to both remove some of the existing vegetation on the bank as well as serve the function of establishing the required topography of the bank. As mentioned above, the uncontaminated soil that is removed will have to be separated from the foreign debris; this will have to be done by combination of shovels, sifting grates, hand, and by the backhoe. The soil that will be removed will be spread over the adjacent field for prairie and savanna restoration. All exotic plant species will be removed. Cobbles, gravel and sand should be placed at the tow of the newly graded banks for stabilization at the bank water interface, and to support native vegetation, such as lizard's tail. A native ground cover seed mix will be applied in conjunction with a biodegradable coconut fiber erosion control blanket in order to control erosion on the bank until next spring when native vegetation can be planted. As vegetation emerges in the spring additional spot treatments of herbicide may have to be applied to control unwanted species and then native prairie seeds can begin to be planted.

Removal of existing invasive vegetation and replanting with native species plants is often an empirical process; depending on how the exotic vegetation reacts to countermeasures and how well native seeds, plugs, and trees grow determines the next step to take. Generally this means an alternating pattern of seeding and herbicide application or controlled burns/mowing in order to completely eradicate exotic and invasive species and encourage native vegetation to grow. To completely and successfully establish a community of native species plants could take up to 3-5 years. Table 3 provides a list of plants that will be used along the banks. A hired contractor will perform all herbicide and planting work. The area would need annual mowing and spot herbicide to maintain diversity throughout the project life.

Table 3: Suggested planting list for banks.

SCIENTIFIC NAME	COMMON NAME
Acorus calamus	SWEET FLAG
Alisma subcordatum	COMMON WATER PLANTAIN
Andropogon gerardii	BIG BLUESTEM GRASS
Andropogon scoparius	LITTLE BLUESTEM GRASS
Aster laevis	SMOOTH BLUE ASTER
Aster novae-angliae	NEW ENGLAND ASTER
Aster simplex	PANICLED ASTER
Bidens frondosa	COMMON BEGGAR'S TICKS
Bouteloua curtipendula	SIDE-OATS GRAMA
Calamagrostis canadensis	BLUE JOINT GRASS
Carex comosa	BRISTLY SEDGE
Coreopsis tripteris	TALL COREOPSIS
Echinochloa crusgalli	BARNYARD GRASS
Elymus canadensis	CANADA WILD RYE
Elymus virginicus	VIRGINIA WILD RYE
Iris virginica shrevei	BLUE FLAG
Juncus effusus	COMMON RUSH
Justicia americana	WATER WILLOW
Lobelia cardinalis	CARDINAL FLOWER
Monarda fistulosa	WILD BERGAMOT

SCIENTIFIC NAME	COMMON NAME
Panicum virgatum	SWITCH GRASS
Peltandra virginica	ARROW ARUM
Petalostemum purpureum	PURPLE PRAIRIE CLOVER
Polygonum pensylvanicum	PINKWEED
Pontederia cordata	PICKEREL WEED
Pycnanthemum virginianum	COMMON MOUNTAIN MINT
Ratibida pinnata	YELLOW CONEFLOWER
Rudbeckia hirta	BLACK-EYED SUSAN
Sagittaria latifolia	COMMON ARROWHEAD
Saururus cernuus	LIZARD'S TAIL
Scirpus validus creber	GREAT BULRUSH
Silphium laciniatum	COMPASS PLANT
Silphium terebinthinaceum	PRAIRIE DOCK
Solidago rigida	STIFF GOLDENROD
Sorghastrum nutans	INDIAN GRASS
Sparganium eurycarpum	COMMON BUR REED
Spartina pectinata	PRAIRIE CORD GRASS
Tradescantia ohiensis	COMMON SPIDERWORT
Vernonia fasciculata	COMMON IRONWEED
Viburnum lentago	NANNYBERRY

The restoration of this bank would provide a viable and productive riparian zone for aquatic, semi-aquatic and terrestrial species. This measure would be especially beneficial to bird species such as black crowned night herons (*Nycticorax nycticorax*) in providing greater cover and a higher quality food source. This measure would restore 2 acres of riparian vegetation and habitat.

Design criteria for this measure are: 1) bank must be configured to a more natural slope; 2) bank must be able to support native vegetation; 3) all work must not adversely impact the stream channel.

F. Prairie / Savanna Landscaping

The adjacent open area to the west of the channel would be restored by landscaping with native prairie and savanna species (Table 3). This measure would be the last step in the restoration process. Initially, all non-native species would be eliminated. Then the area would be slightly graded and the surface soil loosened. Finally the site would be seeded with native prairie and savanna seed as well as planting a few black oak (*Quercus velutina*) trees. The area would need annual mowing and spot herbicide to maintain diversity throughout the project life.

Table 3: Suggested planting list for Prairie / Savanna Landscaping

SCIENTIFIC NAME	**COMMON NAME**	**SCIENTIFIC NAME**	**COMMON NAME**
Andropogon gerardii	BIG BLUESTEM GRASS	*Hieracium canadense fas.*	CANADA HAWKWEED
Andropogon scoparius	LITTLE BLUESTEM GRASS	*Krigia biflora*	FALSE DANDELION
Calamovilfa longifolia magna	SAND REED	*Lespedeza capitata*	ROUND-HEADED BUSH CLOVER
Elymus canadensis	CANADA WILD RYE	*Liatris aspera*	ROUGH BLAZING STAR
Eragrostis spectabilis	PURPLE LOVE GRASS	*Liatris cylindracea*	CYLINDRICAL BLAZING STAR
Koeleria cristata	JUNE GRASS	*Lithospermum canescens*	HOARY PUCCOON
Panicum oligosanthes scr.	SCRIBNER'S PANIC GRASS	*Lithospermum croceum*	HAIRY PUCCOON
Panicum virgatum	SWITCH GRASS	*Lupinus perennis occidentalis*	WILD LUPINE
Sorghastrum nutans	INDIAN GRASS	*Monarda fistulosa*	WILD BERGAMOT
Stipa spartea	PORCUPINE GRASS	*Monarda punctata*	HORSE MINT
Arabis lyrata	SAND CRESS	*Phlox pilosa*	SAND PRAIRIE PHLOX
Artemisia caudata	BEACH WORMWOOD	*Ratibida pinnata*	YELLOW CONEFLOWER
Erigeron strigosus	DAISY FLEABANE	*Rudbeckia hirta*	BLACK-EYED SUSAN
Oenothera biennis	COMMON EVENING PRIMROSE	*Scrophularia lanceolata*	EARLY FIGWORT
Anemone cylindrica	THIMBLEWEED	*Silphium integrifolium deamii*	DEAM'S ROSIN WEED
Asclepias tuberosa	BUTTERFLY WEED	*Solidago speciosa*	SHOWY GOLDENROD
Aster azureus	SKY-BLUE ASTER	*Tephrosia virginiana*	GOAT'S RUE
Aster ericoides	HEATH ASTER	*Tradescantia ohiensis*	COMMON SPIDERWORT
Baptisia leucantha	WHITE WILD INDIGO	*Verbena stricta*	HOARY VERVAIN
Comandra umbellata	FALSE TOADFLAX	*Carex brevior*	PLAINS OVAL SEDGE
Coreopsis lanceolata	SAND COREOPSIS	*Carex muhlenbergii*	SAND BRACTED SEDGE
Desmodium canadense	SHOWY TICK TREFOIL	*Amorpha canescens*	LEAD PLANT
Desmodium paniculatum	PANICLED TICK TREFOIL	*Ceanothus americanus*	NEW JERSEY TEA
Desmodium sessilifolium	SESSILE-LEAVED TICK TREFOIL	*Opuntia humifusa*	EASTERN PRICKLY PEAR
Erigeron pulchellus	ROBIN'S PLANTAIN	*Rosa carolina*	PASTURE ROSE
Euphorbia corollata	FLOWERING SPURGE	*Salix humilis*	PRAIRIE WILLOW
Heliopsis helianthoides	FALSE SUNFLOWER	*Quercus velutina*	BLACK OAK
Helianthus occidentalis	WESTERN SUNFLOWER		

SECTION 3 – AFFECTED ENVIRONMENT

PROJECT AREA DESCRIPTION

The project area is within the Grand Calumet River system, which embraces the southern shore of Lake Michigan. The project locale is within Lake County, Indiana (Plate A). The City of East Chicago has a Sanitary District on the north side of the river, just to the west of the junction with the Indiana Harbor Canal. A 730-foot long channel that discharges the treated water back to the Grand Calumet River is part of the Sanitary District. The discharge channel is approximately 730 feet long (600 feet will be restored) and 40 feet wide. The west bank, which is directly adjacent to the discharge channel, consists of a 1:1 sloped flood bank adjacent to a level field with an area of approximately 2.2 acres (Plate D).

SEDIMENT QUALITY

The discharge channel sediment sampling conducted in Spring 2001 revealed sediments similar to those found throughout the Grand Calumet River/Indiana Harbor Canal system: viscous, oily, fine-grained material with elevated levels of PCBs and PAHs. The results of this investigation are best documented in the HTRW report included in Appendix I of this report. The contaminated sediment in the channel is the most significant barrier to the development of a healthy ecosystem in the discharge channel. The soil of the banks is not of this material, but of clean soil with bottles and inert debris.

WATER QUALITY

The source of water for the drainage channel unnaturally originates from the discharge of the East Chicago Sanitary District. This water is of great clarity and relatively little nutrients. The relatively stable flows have provided lotic conditions for stream fishes and aquatic insects to exist in a very hostile river system. One of the main reasons that aquatic organisms can survive within the channel is the fact that halide substances such as chlorine or fluorine are not used to disinfect treated water, but instead ultra violets lighting systems are used to neutralize harmful bacteria. Although unnatural, this channel may be classified as a limited resource in terms of its biological integrity. The limiting factor here is habitat and substrate, not water quality.

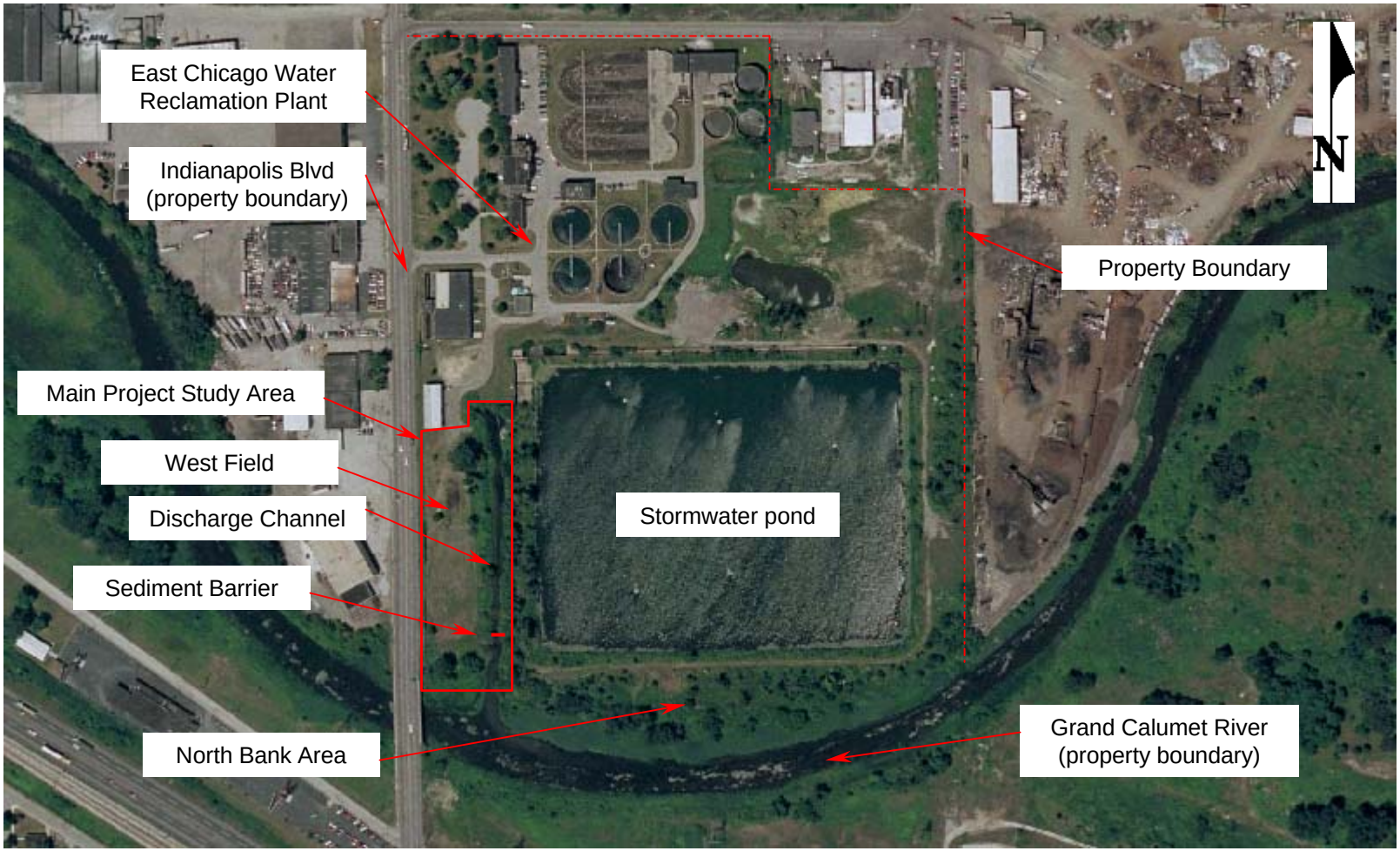
The flow in the Grand Calumet River and Indiana Harbor Canal is composed almost entirely of discharges from resident industries. The strict control of NPDES permits from these dischargers over the past 20 years has resulted in a significant improvement in water quality. Due to improved water quality, the biological community of fishes has shown improvement both in diversity and population though the contaminated sediments remain a barrier to a full return to form.

CURRENT CONDITIONS

Stream

The length of the discharge channel from the “headwaters” to the confluence of the Grand Calumet is approximately 800-feet and averages 1 – 2 feet in depth. The substrate of the immediate headwater area consists of an under layer of riprap, sand, gravel and detritus, in which aquatic macrophytes are growing. Approximately 100-feet downstream is a shallow riffle consisting of large and unnatural riprap. A short distance past this riffle there appears to exist a long sandy run; however, directly beneath the thin layer of sand is a layer of contaminated sediment that ranges from a half foot to five feet deep.

Plate D: East Chicago Project Site



Banks

The banks of the creek for the most party are low quality, non-native plant species, both woody and herbaceous. In the east part of the "headwater" section, there is a cement weir, which allows for storm overflow to discharge into the creek. This discharge falls onto a concrete slab that is about 25-feet long and is in contact with the discharge channel.

Grass Area

To the west of the discharge channel, there is a vacant area that for the most part is mowed turf grass. The un-mowed sections consist of low quality and non-native plant species. The area has potential for landscaping with prairie and savanna plant species.

AQUATIC COMMUNITIES

On 11 May 2001, 10 fish species were collected from the discharge channel through means of electro-fishing. All of the fish collected are considered to be tolerant species. The most abundant are the non-native fish followed by the native Cypriniformes. Fish that were not collected but are confirmed as present are the native smallmouth bass (*Micropterus dolomieu*), and Chinook salmon (*Oncorhynchus tshawytscha*), which are native to the Pacific Northwest but are stocked annually by the Indiana DNR.

The water quality in the discharge channel is of sufficient quality to support most native fish species. With this, aquatic habitat improvements would increase the success of the present species and would open up an opportunity for introducing and attracting other native species of fish, crayfish, mussels, amphibians and reptiles.

Table 4. Fish species and number collected on 11 May 2001 (20min).

Species	**Common Name**	**Number**
Cyprinus carpio	carp	8
Carassius auratus	goldfish	48
Notemigonus crysoleucas	golden shiner	1
Pimephales notatus	bluntnose minnow	37
Pimephales promelas	fathead minnow	3
Catostomus commersonii	white sucker	26
Lepomis cyanellus	green sunfish	3
Lepomis macrochirus	bluegill	2
Lepomis gibbosus	pumpkinseed	1
Neogobius melanostomus	round goby	62
n=10		**191**

WETLANDS

Currently, there are no hydrological functioning wetlands within the project area. Historically, this area consisted of the vast and sluggishly flowing wetland known as the Grand Calumet River. Due to extreme anthropogenic modifications of filling and draining, no wetland remnants were left at the project site.

THREATENED, AND ENDANGERED SPECIES

The state endangered Black-crowned night-heron (*Nycticorax nycticorax*) has been observed foraging in the East Chicago Sanitary District discharge channel. The following description was derived from the New Jersey Fish and Wildlife Service.

Description

The black-crowned night-heron is a stocky, medium sized, black, gray and white wading bird. In comparison to other egrets and herons, the legs and neck of the night-heron are relatively short. Adult black-crowned night-herons are distinct, with a black back and crown, gray hind neck and wings, and a white cheek and abdomen. In breeding plumage, long white streamers extend from the crown down the back beyond the neck. The bill, which is black in adults, is thick, stout, and spear-shaped. The legs are greenish-yellow, but turn pink in breeding adults. Eye color changes from yellow in juveniles to red in adults. In flight, the toes extend beyond the tail. Although their body shape is similar, the plumage of juvenile black-crowned night-herons is quite different from that of adults. Juveniles are buff below with brown streaking and brown above with buff-white markings. The bill is grayish-yellow at the base with a dark tip. Adult plumage is acquired by two years of age. Black-crowned night-herons are similar in appearance to yellow-crowned night-herons (*Nyctanassa violacea*), especially in juvenile plumage.

Habitat

In the Grand Calumet Region, scrub/shrub, marshes, ponds and stream corridors serve as nesting, roosting, and foraging habitats for black-crowned night-herons. Rookeries may be located in wooded swamps, coastal dune forests, vegetated dredge spoil islands, scrub thickets, or mixed phragmites (*Phragmites communis*) and cattail (*Typha* spp.) marshes that are in close proximity to water. Black-crowned night-herons avoid nesting at exposed sites that offer little cover. Black-crowned night-herons nest in forested or scrubby habitats containing vegetation of various heights. Maximum heights of vegetation at local colonies range from 1.5 to 12 m (4.9 to 39.4 ft). Within these habitats, nests are located, on average, 0.19 to 3.95 m (0.6 to 13 ft) above the ground. When nesting in mixed-species colonies with low vegetation height, black-crowned night-herons tend to nest closer to the ground than other species. Similarly, when in mixed-species colonies, black-crowned night-herons tend to nest nearby other black-crowned night-herons due to their similar habitat preferences. Black-crowned night-herons forage in marshes and along the edges of ponds and creeks.

ARCHAEOLOGICAL AND HISTORIC PROPERTIES

Land Use

Before 1890 - In the early nineteenth century the eastern portion of the Grand Calumet flowed east whenever its eastern outlet (at present Marquette Park in Gary) was open. As late as 1869 (when the state-line packing plant opened at Hammond) the Grand Calumet was probably relatively unpolluted; the region was only sparsely populated, and there was no industrial activity at the future site of East Chicago. Before about 1890, the project area was marsh, open water, and sand dunes.

Industrial Development - Between 1890 and 1910 the East Chicago area was transformed by a remarkable concentration of industries, including foundries, railroad-car fabricators, steel mills, chemical plants, non-ferrous foundries (lead, aluminum, copper), a soap factory, and oil refineries. The Grand Calumet River was polluted by the industries, and by untreated sewage (industrial and municipal); none of the communities along the river had any form of sewage treatment before the 1920s.

Canal and River - Construction of the Calumet Branch of the Indiana Harbor Canal began in 1903. The reach south of Columbus Drive was dug during 1908-1912; a 25 February 1910 article in the *Lake County Times* (Hammond, IN) declared that water in the Grand Calumet had dropped by at least 2 feet since the opening of the Indiana Harbor Canal. The east reach of the Grand Calumet River (east of Indianapolis Boulevard) has never been dredged by the Federal government; the same is true of the Calumet Branch of the Indiana Harbor Canal south of 141st Street (Columbus Drive).

Sewage Treatment - Before construction of its plant in 1945, East Chicago had no sewage treatment of any kind. In 1945 the plant provided primary treatment and aeration; this was apparently satisfactory until 1968, when the plant began to accept industrial sewage. The present system dates to April 1989, and involves pre-treatment, bar-screens, grid chamber, oxygen ditch, 5 circular secondary clarifiers, 6 sand filters, and ultra-violet disinfection. The plant discharges into the Grand Calumet east of Indianapolis Boulevard.

Industrial Sites

The earliest major industries on the Grand Calumet in East Chicago appear to have been the Graver Tank Car Works and Grasselli Chemical Company, both established in the early 1890s. East Chicago industries during 1895-1930 included the Bates Expanded Steel Truss Company, Goldschmidt Detinning Company, Grasselli Chemical Company (possibly the same location as Du Pont de Nemours), Graver Tank Works, International Lead Refining, Superheater Company, and United States Reduction Company.

There is a notable concentration of industrial sites on the river around Indianapolis Boulevard, and on the canal between the river and Columbus Drive. Several industries (and individual firms in some cases) have operated along the Grand Calumet and canal for 50 to 100 years. These persistent industries included the Bates Expanded Steel Truss Company (open by 1911, closed sometime before 1989), Union Tank Car Company (opened after 1931, operating in 1993), Grasselli Chemical Company (established 1892, operating as Du Pont in 1996), Shell refinery at Roxana Marsh (opened 1926), Metal Recovery Industries (a detinning site during 1917-1996), U.S. Lead Refining (smelting from 1905 to 1989), and U.S. Reduction Company (aluminum foundry, opened 1912, still operating in 1996).

Ecosystem Restoration Site

Before 1890 the project site was part of the complex of beach ridges, ponds, and marshes bordering the Grand Calumet River. Between 1890 and 1959 the surrounding landscape was drastically altered by the construction of railroads, canals, highways, and industrial plants, and by relocation of portions of the channel of the Grand Calumet River.

The East Chicago sewage treatment plant was built in 1945; the current narrow discharge channel was cut between 1968 and 1991(in a wetland, possibly a wider ditch excavated between 1945 and 1953).

The canal, river, and nearby remnant wetlands do not contain intact or significant archaeological material.

The surrounding area may contain structures of historical significance (particularly pre-WWII drawbridges and industrial plants), but such structures would not be affected by proposed ecosystem restoration measures. Bridges near the project area include the Indianapolis Boulevard bridge (ca. 1935) over the Grand Calumet River; the E J & E Railroad bridge (post-1900) over the canal; the Indiana Harbor Belt Railroad bridge (post-1900) over the canal; and the 151st Street bridge (post-1900) over the canal.

SOCIAL SETTING

Population, Income, Housing

The current population of East Chicago is about 32,400; that figure is less than the city's population of 1920, and reflects the industrial and economic decline of the Calumet region since the 1970s. East Chicago's population is about 52% Hispanic and about 36% African American.

Median household income is about $26,538; income per capita is about $13,517. Median value for owner-occupied housing units is about $35,600; about 3% of the city's housing stock was built after 1980.

Community History

In late 1887 the first subdivision at East Chicago was plotted; the town was incorporated in 1893; there were 1255 inhabitants in 1890 and 3411 in 1900. The owners of the Standard Steel and Iron Company and the Chicago & Calumet Terminal Belt Line Railroad established the city. By 1901 the city's population was 19,098. In 1901 Inland Steel came to East Chicago, attracting a steady influx of European immigrants (Scots, Welsh, Irish, English, and German) until 1914.

During WWI the need to increase steel production attracted workers from Canada, Mexico, and the southern United States. In 1920 the city's population was nearly 35,000; in 1930 the city's population was 50,000. Because so much of the city's area was occupied by railroads and industrial plants, little space remained for additional residents. During WWII, increased demand for steel attracted workers from the southern states and Puerto Rico. In 1960 East Chicago's population was at its all-time high of about 58,000; of that number, about 24% were African American and about 16% Hispanic.

By 1980 the city's population had fallen to under 40,000; the current population (reflecting the industrial and economic decline of the Calumet region) is about 32,400 (less than the population of 1920).

The Indiana Harbor Canal and the switching yards of the Indiana Harbor Belt Line Railroad divide the city into two parts. West of the canal/rail yard barrier is the area of original settlement, known as "East Chicago"; east of the barrier (adjacent to Lake Michigan and the former Inland/LTV steel complex) is the area known as "Indiana Harbor". Until the late 1970s, East Chicago had two flourishing shopping districts (one on the Indiana Harbor side, the other on the East Chicago side); both are largely vacant, with shuttered storefronts.

SECTION 4 – ENVIRONMENTAL IMPACTS

GENERAL IMPACTS (SECTION 122 OF PUBLIC LAW 91-611)

The proposed project would not adversely affect community cohesion or growth, tax revenues, property values, public facilities or services, regional growth, employment, business and industrial activity, man-made or natural resources; no people or farms would be displaced.

TEMPORARY IMPACTS

General Construction

Temporary increases in noise and a reduction in air quality and aesthetics would be associated with use of construction equipment, however no long term adverse impacts are anticipated.

Environmental Dredging

The discharge channel has accumulated a layer of contaminated sediment that spans about 400 to 500 feet downstream of the unnatural riprap riffle. The need to remove this material is required to reduce the biological oxygen demand (BOD) of the sediment, to increase the dissolved oxygen of the substrata and water, to recreate stream substrate that will support benthic invertebrates and stream fishes, and to remove attractive habitat for non-native and disruptive species such as the common carp (*Cyprinus carpio*), goldfish (*Carassius auratus)*, and round goby (*Neogobius melanostomus*). Removal of contaminated sediments and debris would provide the basis for benthic invertebrates, mussels and fishes to gain access to sustainable substrata. The removal of contaminated sediments would also eliminate bioaccumulation of heavy metals and organic compounds in the local food chain. This measure would remedy contaminated sediments and foreign debris for 730 feet of stream. The existing contaminated sediment is a major barrier to creating a healthy and sustainable environment for a diverse community of invertebrates and fishes.

Minor amounts of turbid water would flow into the Grand Calumet River from the dredging activities. This turbidity may make conditions for local fishes uncomfortable for a short period of time, which would most likely result in the fishes leaving these areas. The settling out of these sediments would not degrade any substrates within the Grand Calumet River since the substrate of the Grand Calumet River is considered to be more contaminated than the sediments in the East Chicago discharge channel.

Threatened and Endangered Species

All vegetation within the project site is to be removed with exception of a few cottonwoods (*Populus deltoides)*. Although black crowned night-heron have been observed foraging along the channel corridor, clearing all vegetation would only temporarily displace them. There is sufficient foraging habitat on the main stem Grand Calumet that would allow the herons to remain in the area. This restoration is necessary to improve foraging and nesting habitat and as well remove contaminants from the food chain in which the herons belong. Through restoring native vegetation such as cattails (*Typha* spp.), the black crown night-heron may eventually nest at the site. Adverse or long-term impacts to black crowned night-heron are not expected. The main benefit derived from this project is an increased, contaminant free foraging area.

STATE OF INDIANA PERMITS

Since the East Chicago Sanitary District discharge channel plant is an unnatural channel with relatively high banks, flow capacity of the channel will remain the same. It has been determined that the restoration

would not limit the capacity of the sanitary district nor having any flooding implications; therefore a permit is not required from the state of Indiana.

A 401-water quality certificate will be applied for through Indiana Department of Environmental Management. It is expected that the permit will be granted.

HUMAN HEALTH RISKS

Human health risks would be reduced through this project. The removal and proper disposal of contaminated sediment would reduce the risk of bioaccumulation through the food chain and eliminate the risk of accidental contact by humans within the project area.

ARCHAEOLOGICAL AND HISTORIC IMPACTS

The proposed project would not affect any archaeological or historic properties; the Indiana state historic preservation officer (SHPO) has been consulted, and is expected to concur with this determination.

SAFETY

There will be no adverse impacts to human safety due to completion of the project, however necessary precautions will be needed to prevent human injury in a construction area. Road blocks or fencing may be needed to prevent residents from entering construction areas, and plywood and markings may be needed to cover holes in the ground when unattended.

ENVIRONMENTAL JUSTICE

Environmental justice is not an issue. The project is entirely on the East Chicago Sanitary District's land and does not require the purchasing or use of low-income residential land. The disposal of the dredged sediment will be dewatered on the Sanitary District's land and finally disposed of at an authorized and licensed landfill, thus not requiring the purchase or use of low-income residential land. The proposed project would not involve adverse human health effects or adverse environmental impacts on minority or low-income populations.

OTHER IMPACTS

The proposed project would have no impact on threatened or endangered species. The project would not disturb any hazardous, toxic, or radioactive waste.

SECTION 5 – COORDINATION

PUBLIC INVOLVEMENT

During preparation of the 2003 environmental assessment, Chicago District Corps of Engineers staff will contact the following agencies, organizations, and individuals:

a) City of East Chicago (Mayor Robert A. Pastrick)
b) Indiana Department of Natural Resources
c) U.S. Fish and Wildlife

ENVIRONMENTAL ASSESSMENT RECIPIENTS

The 2002 environmental assessment for the East Chicago Sanitary District Sediment Remediation Demonstration project will be sent to the following elected officials, agencies, organizations, and individuals for review and comment:

FEDERALLY ELECTED OFFICIALS

Honorable Dick Lugar
1180 Market Tower
10 West Market Street
Indianapolis, IN 46204

Honorable Dick Lugar
Senator
306 Hart Senate Office Building
Washington, D.C. 20510-1401

Honorable Evan Bayh
Senator
1650 Market Tower
10 West Market Street
Indianapolis, IN 46204

Honorable Evan Bayh
Senator
463 Russell Senate Office Building
Washington, D.C. 20510-1404

Honorable Pete Visclosky
Congressman
701 East 83rd Avenue, Suite 9
Merrillville, IN 46410

Honorable Pete Visclosky
Congressman
2313 Rayburn House Office Bldg.
Washington, D.C. 20515

STATE ELECTED OFFICIALS

Honorable Joseph Kernan
Office of the Governor
State House Room 206
Indianapolis, IN 46204-2797

Senator Samuel Smith
Statehouse
200 West Washington Street
Indianapolis, IN 46204-2785

Representative John Aguilera
1311 Kosciusko Blvd.
East Chicago, IN 46319

Representative Earl Harris
4114 Butternut Street
East Chicago, IN 46312

FEDERAL AGENCIES

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620 South Walker Street
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ATTN: Scott Pruitt

U.S. Fish and Wildlife Service
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Chesterton, IN 46304-2616
ATTN: Liz McCloskey

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ATTN: Bonnie Eleder

U.S. EPA
77 West Jackson Blvd.
Chicago, IL 60604
ATTN: Kenneth Westlake

U.S. EPA
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Chicago, IL 60604
ATTN: Mike Mikulka

Thomas P. Simon
U.S. Fish and Wildlife Service
620 South Walker Street
Bloomington, IN 47403-2121

U.S. EPA, GLNPO
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ATTN: Scott Cieniawski

STATE AGENCIES

Indiana Dept. of Environmental Mgt.
504 Broadway, Suite 418
Gary, IN 46402
ATTN: Alex Da Silva

Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204
ATTN: Dr. Greg Wilson

Indiana Port Commission
150 Market Street, Suite 603
Indianapolis, IN 46204
ATTN: Bill Fritchley

IDNR Div. of Historic Preservation
402 West Washington, Room W-274
Indianapolis, IN 46204
ATTN: Jim Mohow

Indiana DNR
100 North Water Street
Michigan City, IN 46360
ATTN: Steve Davis

Indiana DNR Div. of Fish and Wildlife
402 West Washington, Room 273
Indianapolis, IN 46204
ATTN: Brant Fisher

Indiana Dept. of Environmental Mgt.
100 North Senate
Indianapolis, IN 46206
ATTN: Marty Maupin

Indiana Department of Environmental Mgt.
Office of Land Quality
100 N. Senate Ave. N-1101
Indianapolis, IN 46206-6015
ATTN: James Smith, Ph.D.

LOCAL ELECTED OFFICIALS

Honorable Robert A. Pastrick
Mayor, City of East Chicago
4527 Indianapolis Blvd.
East Chicago, IN 46312

LOCAL AGENCIES

Indiana Port Commission
6625 South Boundary Drive
Portage, IN 46367
ATTN: John Hughes, Pete McCarthy

Lake Michigan Develop. Commission
6100 Southport Road
Portage, IN 46368
ATTN: Barbara Waxman

East Chicago Sanitary District
5201 Indianapolis Blvd.
East Chicago, IN 46312-3892
ATTN: Michael Suty

East Chicago Sanitary District
5201 Indianapolis Blvd.
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ATTN: Pete Baranyai

Little Calumet River Basin Devel. Comm.
6100 Southport Road
Portage, IN 46368
ATTN: Dan Gardner

East Chicago Health Department
100 West Chicago Avenue
East Chicago, IN 46312

ORGANIZATIONS AND INDIVIDUALS

Dunes Calumet Audubon Society
P.O. Box 1232
Crown Point, IN 46308-1232

Chicago Audubon Society
5801-C North Pulaski Road
Chicago, IL 60646-6057

Sierra Club – Hoosier Chapter
6224 North College Avenue
Indianapolis, IN 46220

Sierra Club – Illinois Chapter
200 North Michigan Avenue, Suite 505
Chicago, IL 60601-5908

Grand Cal Task Force
2400 New York Avenue
Whiting, IN 46394

Lake Michigan Federation
220 South State Street, Suite 2108
Chicago, IL 60604

MARAD
2860 South River Road
Des Plaines, IL 60018
ATTN: Al Ames

Lake Carrier's Association
915 Rockefeller Building
614 Superior Avenue
Cleveland, OH 44113-1383
ATTN: Rick Harkins

Citizens for a Better Environment
407 South Dearborn, Suite 1775
Chicago, IL 60605

Dept. of Biology
Ball State University
Muncie, IN 47306
ATTN: Tom McCommish

LIBRARIES

East Chicago Public Library
2401 East Columbus Drive
East Chicago, IN 46312

Pastrick Branch Library
1008 West Chicago Avenue
East Chicago, IN 46312

NATIVE AMERICAN GROUPS

Kickapoo of Oklahoma Bus. Committee
P.O. Box 70
McCloud, OK 74851
ATTN: Mr. Thomas Garza, Chairman

Kickapoo of Kansas Tribal Council
P.O. Box 271
Horton, KS 66439
ATTN: Ms. Bobbi Darnell, Chairperson

Kickapoo Traditional Tribe of Texas
Box HC 1 9700
Eagle Pass, TX 78853
ATTN: Mr. Raul Garza, Chairman

Miami National Tribe in Indiana
P.O. Box 41
Peru, IN 46970
ATTN: Brenda Hartleroad

Miami Tribe of Oklahoma
P.O. Box 1326
Miami, OK 74355
ATTN: Julie Olds, NAGPRA coordinator

Midwest SOARRING Foundation
3013 S. Wolf Road #192
Westchester, IL 60154
ATTN: Joseph Standing Bear

Citizen Potawatomi Nation
1901 S. Gordon Cooper Drive
Shawnee, OK 74801
ATTN: Charles Clark, NAGPRA director

Forest County Potawatomi Exec. Council
P.O. Box 34
Crandon, WI 54520
ATTN: Clarice Ritchie Werle

Huron Potawatomi Tribal Office
2221 One-and-a-half Mile Road
Fulton, MI 49052
ATTN: Laura Spur, Director

Hannahville Potawatomi Comm. Council
N 14911 Hannahville B1 Road
Wilson, MI 49896-9728
ATTN: Mr. Kenneth Meshiguad

Pokagon Band of Potawatomi Indians
P.O. Box 180
Dowagiac, MI 49047
ATTN: Jefferson Ballew

Prairie Band Potawatomi Tribal Council
16281 Q Road
Mayetta, KS 66509
ATTN: Ms. Mamie Rupnicki

SECTION 6 – REFERENCES

Nevers, Meredith Becker, Richard L.Whitman, and Paul J. Gerovac. 2002. History and environmental setting of the Grand Calumet River. Proceedings of the Indiana Academy of Science 108/109: 3-10.

Whitman, Richard L., Meredith B. Nevers, and Shira Hammann. 2002. Ecological potential of the Grand Calumet basin. Proceedings of the Indiana Academy of Science 108/109: 163-175.

U.S. Army Corps of Engineers. 1997. Sediment Cleanup and Restoration Alternatives Project Report.

http://www.njfishandwildlife.com/ensp/pdf/end-thrtened/bcnightheron.pdf

Appendix I

HTRW Report

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE INVESTIGATION FOR EAST CHICAGO HABITAT ENHANCEMENT DEMONSTRATION

Prepared By:
U.S. Army Corps of Engineers, Chicago District
111 North Canal Street - Chicago, Illinois 60606

July 19, 2001

HAZARDOUS, TOXIC AND RADIOACTIVE WASTE (HTRW) AND NON-HTRW INVESTIGATION EAST CHICAGO HABITAT ENHANCEMENT DEMONSTRATION

Table of Contents

1.0 INTRODUCTION

The purpose of this report is to discuss the Hazardous, Toxic and Radioactive Waste (HTRW) investigation for the East Chicago Habitat Enhancement Demonstration. The methods used in performing the investigation and identifying the environmental issues are described in detail as are the conclusions and recommendations regarding potential HTRW impacts. Non-HTRW environmental issues are also identified and discussed in this report.

1.1 AUTHORITY

Engineer Regulation (ER) 1165-2-132, Hazardous, Toxic and Radioactive Waste (HTRW) Guidance for Civil Works projects, requires that a site investigation be conducted as early as possible to identify and evaluate potential HTRW problems. According to the HTRW Guidance, non-HTRW issues that do not comply with the federal, state, and local regulations should be discussed in the HTRW investigation along with HTRW issues. Therefore, non-HTRW and HTRW issues identified are discussed in this report.

No HTRW investigation can wholly eliminate uncertainty regarding the potential for HTRW associated with a project area. Performance of the HTRW investigation is intended to reduce, but not eliminate, uncertainty regarding the potential for HTRW in connection with a project area, and this practice recognizes time and cost constraints.

1.2 GUIDANCE

Supplemental guidance was provided by the Standard Practice for Environmental Assessments: Phase I Environmental Site Assessment Process (E 1527-94) prepared by American Society for Testing of Materials (ASTM). These standards include a records review, site reconnaissance, interviews, database research and report preparation. This report followed many of the ASTM guidelines but not to the same level of detail described by the ASTM guidance.

1.2.1 Hazardous, Toxic and Radioactive Waste

The objective of ER 1165-2-132 is to outline procedures to facilitate early identification and appropriate consideration of HTRW problems. This investigation, therefore, identifies potential HTRW problems and discusses resolutions and/or provides recommendations regarding the HTRW problems identified.

1.2.2 Non-Hazardous, Toxic and Radioactive Waste

According to ER 165-2-132, non-HTRW environmental issues that do not comply with federal, state and local regulations should be discussed in the HTRW investigation along

with HTRW issues. For example, solid waste is a non-HTRW issue that was considered. Petroleum releases for Leaking Underground Storage Tanks (LUSTs) are not considered HTRW but are regulated in Indiana under Title 329, Article 9.

1.3 LAWS AND REGULATIONS

The definition of HTRW according to the ER 1165-2-132 on page 1, paragraph 4(a) reads as follows:

> *Except for dredged material and sediments beneath navigable waters proposed for dredging, for the purposes of this guidance, HTRW includes any material listed as a "hazardous substance" under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq. (CERCLA). (See 42 U.S.C. 9601 (14).) Hazardous substances regulated under CERCLA include "hazardous wastes" under Section 3001 of the Resource Conservation and Recovery Act, 42 U.S.C. 6921 et seq.; "hazardous substances" identified under Section 311 of the Clean Air Act, 33 U.S.C. 1321; "toxic pollutants" designated under Section 307 of the Clean Water Act, 33 U.S.C. 1317; "hazardous air pollutants" designated under 112 of the Clean Air Act, 42 U.S.C. 7142; and "imminently hazardous chemical substances or mixtures" on which EPA has taken action under Section 7 of the Toxic Substance Control Act, 15 U.S.C. 2606; these do not include petroleum or natural gas unless already included in the above categories. (See 42 U.S.C. 9601(14).)*

As stated in the definition of hazardous substance in the Environmental Statues, 1988 Edition, the term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under the definition.

Underground Storage Tanks (USTs) are federally regulated under 40 CFR Part 280, technical standards and corrective action requirements for owner and operators of USTs. Information regarding leaking underground storage tanks (LUST) was obtained from the Indiana Department of Environmental Management.

1.4 PROJECT DESCRIPTION

The City of East Chicago is located within the Grand Calumet River watershed, and is adjacent to the north side of the west branch of the river. East Chicago has a water reclamation plant (WRP) on the north side of the river, just to the west of the junction with the Indiana Harbor Canal. An 700’ foot long channel that discharges the treated water back to the Grand Calumet River is part of the water reclamation plant. At least ten species of fish have been identified in the reach of the Grand Calumet River near the East Chicago discharge canal (SCRAP report, 1997). In addition, there is evidence of salmon migrating and attempting to spawn in this area during the last 5 years. It is recognized

that the current habitat provided within this discharge channel is minimal at best, but the water quality within the channel is good (TMDL Study, 2000).

The goal of this project is to perform a fish habitat enhancement along a portion of the East Chicago discharge channel. Enhancement will include recontouring the streambed, the addition of natural meanders and bars in the stream, and the addition of stones and logs in selected areas to provide a more natural fish habitat. In addition to the streambed enhancement, two stream banks located on the western side of the East Chicago Discharge Channel and the northern side of the Grand Calumet River will be restored with native species plants.

1.5 SITE DESCRIPTION

The East Chicago Sanitary District is bound by the Grand Calumet River to the south and east, Indianapolis Blvd to the west, and W. 152nd St to the North. The discharge channel, where the fish habitat rehabilitation will take place, flows directly into the Grand Calumet River and is located in the southwest portion of the property. The banks destined for vegetative rehabilitation are located to the west of the discharge channel and to the north of the Grand Calumet River bounded by the CSO containment basin. Figure 1 provides an aerial photograph of the site with the proposed rehabilitation areas indicated.

2.0 METHODOLGY AND METHODS

The following sections contain information that was requested and gathered in accordance with ER 1165-2-132 for this initial assessment. The information was obtained from the following sources:

- Observations made during the site visit
- Database research
- Interviews with knowledgeable individuals
- Existing data

The information gathered from the above list of sources is detailed in the following sections. This information was evaluated to assess the potential HTRW impacts.

2.1 SITE VISIT

The study area was visited several times during April, May, and June 2001 by members of the Hydraulics and Environmental Engineering Branch and the Planning Branch. The purpose of these trips was to gain first hand knowledge with the site of the proposed rehabilitation project and determine the presence of HTRW or non-HTRW. During the first visits the project site was toured by foot, the last two visits, on May 11 and June 7, 2001, the entire length of stream was waded. On the May 11 visit, sediment samples were collected in order to ascertain the quality of the sediment below the surface. The sediment in the discharge channel had a variety of surface covers: stones and gravel,

water flora, and sand, the underlying substrate though was visually consistent throughout the entire length of the stream: a deep black silty clay with an oily sheen that often had a slight odor of petroleum. The depth of this silty clay layer was often 1 to 2 feet and below this was a coarser layer of sand with silt and clay.

The Right Bank of the discharge stream where rehabilitation of the vegetation and is proposed (see Figure 1) showed no noticeable sign of HTRW. Non-HTRW evidence was visible in the area and along the banks of the discharge stream. Various types of Municipal Solid Waste (MSW) such as bottles and tires were visible in the area as well as in the discharge stream. Construction debris consisting of reinforced concrete slabs and was piled at the southern end of the open field towards where the discharge stream meets the Grand Calumet River.

The North Bank of the Grand Calumet River (see Figure 1) revealed no visible contamination or non-HTRW and was covered with a variety of flora.

2.2 DATABASE RESEARCH

Information was obtained from database listings compiled by VISTA Information Solutions, Inc. The database listings were obtained for the area in accordance with the recommended search distance provided by the Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process (ASTM E 1527-94). Search was performed based upon the longitude and latitude coordinates at the approximate center of the discharge stream. The database summary report can be found in Appendix A of this report.

The resultant search report from VISTA Information Solutions was reviewed for possible sources of contamination to the site. The database search compiled sites located up to 1 mile from the East Chicago WRP discharge channel and included lists from 17 federal and state databases. From the search a total of 24 sites were culled from the 17 databases, many of which, though, had zero sites associated with them. Of the databases that had “hits”, two were most conspicuous as possible sources of contamination. These were, the CORRACTS database, which are RCRA sites that have required corrective action for the release of Hazardous Waste into the environment, and the Leaking Underground Storage Tank database. There are a total of 4 CORRACTS sites within a 1-mile radius of the proposed project site and a total of 6 LUST sites within a ½ mile radius. These sites are possible sources of contamination though the sediment observed in the East Chicago discharge channel carries are a strong similarity to the heavily contaminated sediments within the Grand Calumet River, which is directly adjacent to the East Chicago discharge channel. This makes the Grand Calumet River a highly suspect source for the possible contamination in the discharge channel.

2.3 INTERVIEWS

On May 11, 2001, Peter Baranyai, the plant manager for the East Chicago Water Reclamation Plant, was interviewed at the proposed site of the Habitat Enhancement Demonstration. From the interview, the historical usage for the discharge channel and the land around the discharge channel was ascertained. Historically, the land around the discharge channel was used as a municipal solid waste landfill as early as the 1920's. From 1969 – 1972, during the construction of the East Chicago Water Reclamation Plant the present discharge channel was excavated. Since then there has not been any significant changes or harmful uses to the land surrounding the discharge channel.

The North Slope of the Grand Calumet River proposed for rehabilitation with native vegetation is composed primarily of excavated backfill from the Combined Sewer Overflow (CSO) basin.

2.4 EXISTING SEDIMENT DATA

The following sections describe sediment sampling and the resultant data that was collected during a recent sampling event.

2.4.1 Sediment Sampling

On June 7, 2001, five sediment samples were collected from the East Chicago WRP discharge channel (Figure 2 shows the sample locations including their longitude and latitude coordinates). The sample locations were determined in the field but an effort was made to equally space the collection locations along the discharge channel in order to characterize the entire stream length. The discharge channel was divided into five regions, whose boundaries were determined either by changes in the overlying sediment cover or physical separations such as a bend in the stream or a riffle. Within each of the five regions, one sample was collected from an area of soft sediment that was free of stones or cobbles. To collect core sediment samples, transparent, 2-inch diameter Cellulose Acetate Butyrate (CAB) tubes were inserted into the soft sediment by physically pushing them. The core tube was capped in order to maintain a seal and removed; this usually resulted in a 1.5' to 2' core sample. The core samples were removed from the tubes with a long plunging tool and placed into a stainless steel mixing bowl. Several cores (usually in the neighborhood of five to six) were collected from each sample location and the sediment was homogenized and placed into sample containers. Volatile samples were collected from a single core immediately after it was removed from the core tube. This was done to avoid any volatilization that may occur from mixing or exposure to the open air.

Sediment samples were placed in coolers, iced, and cooled to a temperature of 4º C. The samples were delivered directly to Severn Trent Laboratories on the same day as collection. Biological samples were packed in ice and express shipped for next day delivery to AScI in Duluth, MN.

The sediment sampling plan (May 16, 2001) provides a detailed explanation of the decontamination, documentation, and other procedures that were followed during the sampling.

2.4.2 Sediment Data – Chemical Analysis

The analytical data and QA/QC results from the June 7, 2001 sampling event can be found in Data Quality Assessment dated July, 2001. Table 1 compiles the data in a format that promotes comparison and examination. The first five columns (ECWRP-001 through ECWRP-005) contain the data for the sediment samples collected at East Chicago. The next two columns list the Risk Integrated System of Closure (RISC) standards for Residential and Industrial sites. RISC is an Indiana Department of Environmental Management (IDEM) program that provides a framework for the remediation of contaminated sites. RISC is categorized into Residential and Industrial standards, the residential standards generally being more stringent. The next two columns include data from sediment samples collected from the Grand Calumet River in the winter of 1999. These samples were collected from a location several hundred yards east of the confluence of the East Chicago discharge channel and the Grand Calumet River. The Sediment contamination in the Grand Calumet is legendary and the data listed in these two columns serves as a suitable reference because of its' close proximity to the East Chicago discharge channel.

Viewing Table 1, it is apparent that the first four samples are very similar in their chemical make up. The detected contaminants were consistent across the four samples, as were the contaminant concentrations. The chemical make-up of ECWRP-005 though is different. When ECWRP-005 was collected, it was noticeably different in consistency. The sample was free of an oily sheen or noticeable odor. The material's color was grayer and contained a higher percentage of coarser grained material unlike the fine grained deep black sediment found in the other four samples. ECWRP-005 was collected on what appeared to be a sand bar within the discharge stream. This was an isolated area within the discharge stream; the sediment around the bar was probed and it seemed to be similar to the sediment collected in the other four samples.

2.4.2.1 PCBs

PCBs were detected in all five of the East Chicago samples. Concentrations for total PCBs ranged from 2.1 to 6.5 mg/kg in the first four samples and 0.3 mg/kg in sample ECWRP-005. The levels of PCBs within the first four samples exceed RISC levels for the Residential standards and two of the samples exceeded the RISC Industrial standards. Curiously, the PCB levels were not similar to the levels in the samples from the Grand Calumet River - all of these returned non-detectable results, though other samples collected from the Grand Calumet River in locations further upstream and downstream did detect similar concentrations.

2.4.2.2 Landfill Parameters: TCLP, Ignitability, Paint Filter, Reactivity

The Landfill Parameters: Toxicity Characteristic Leaching Procedure (TCLP), Ignitability, Reactive Cyanide/Sulfide, and Paint Filter were analyzed as part of the requirements for local landfills. Before landfills can accept materials such as river sediments, contaminant concentrations have to be certified not to exceed certain levels. All TCLP parameters analyzed were non-detectable for all parameters with the exception of TCLP lead, which was detected in ECWRP-001 and ECWRP-004 at concentrations less than 1 mg/L. Ignitability results were all above 200° F, which is the cutoff for the regulatory flammability hazard. The samples from the Grand Calumet River were not analyzed for any of these parameters so a comparison could not be made. Though the results from these analyses do not pose a risk for landfill disposal, the aforementioned detection of PCBs, which are also a required analysis for landfills, will certainly be an obstacle to more convenient and economical disposal options such as a land application.

2.4.2.3 Metals

Toxic metals such as mercury and lead were detected in all collected samples though none of them exceeded the Indiana RISC levels for either Residential or Industrial properties. ECWRP-001 (the sample located closest to the WRP's outfall) and ECWRP-003, generally contained higher levels of metals than the other three samples. Compared to the Grand Calumet River samples the East Chicago samples show much lower concentrations for all metals that were measured.

2.4.2.4 Pesticides, Semivolatile, and Volatile Compounds

Of these compounds, the Semivolatiles showed the most significant concentration levels in the samples. The Volatile compounds had some detectable quantities but the concentrations were not significant and did not exceed any of the RISC standards. Volatile compound detections were much less frequent than those of Semivolatile compounds and the concentrations of Volatile compounds were generally much lower than the Semivolatiles. The majority of detected Semivolatile compounds were Polycyclic Aromatic Hydrocarbons (PAHs) and exceeded the RISC standards for many of the compounds. Compared to the Grand Calumet River samples, some of the concentrations were below the contaminant levels, some were very similar, and some were higher. Generally, both the Grand Calumet River and East Chicago discharge channel showed a significant presence of PAH compounds. For the Pesticide suite of compounds that were measured, none of the compounds returned detectable results.

2.4.2.5 General Chemistry

None of the general chemistry parameters exceeded their corresponding RISC standards. Though Free Cyanide was not actually measured, Cyanide amenable to Chlorination, which measures the components of Free Cyanide, CN^- and HCN, as well as other components, was well below the RISC standard for Free Cyanide. For that matter, the Total Cyanide value was well below the RISC standard. The only General Chemistry parameters that was analyzed for both the East Chicago samples and the Grand Calumet

River samples were Total Organic Carbon (TOC) and Oil and Grease. As seen in the Metals results, the Grand Calumet River samples showed higher levels of these two parameters though the concentrations in the East Chicago discharge channel should be considered significant.

2.4.2.6 Physical Make-up

The physical make-up of the samples was determined by a two stage solids analysis and a particle size analysis. The solids analysis showed a fairly strong similarity between the first four samples; the weight ratio of solids versus moisture was approximately 50/50 (± 5%) and the ash versus volatile solids weight ratio was approximately 90/10 (± 1%). The fifth sample had a 67/33 solid to moisture ratio and a 95/5 ash to volatile solids ratio. This is consistent with the higher sand concentration and lower organic matter concentration that was observed during sampling. The Particle Size analysis showed some similarities between the first four samples though results were highly subjective to the depth of the cores and the variety of superficial covers. Generally, the samples were composed primarily of sand and silt with a smaller portion being clay particles. The fifth sample as mentioned before had a higher distribution of coarser grained material. Table 1 provides a rough description of the particle size stratification. The complete results of the analysis can be found in Appendix C.

2.4.3 Sediment Data – Biological/Toxicological Results

The toxicity data report from AScI can be found in Appendix C of this document. The organism chosen for biological/toxicological analysis was the *Hyallela Azteca*. This species was chosen primarily because of the vast quantity of toxicity data from the Grand Calumet River region that currently exists for this particular organism. *Hyallela azteca* is a burrowing benthic amphipod that is considered sensitive and is appropriate as a benchmark species for toxicological analysis (USACE/USPEA, 1998). Table 2 below lists the *Hyallela azteca* survival rates for the three samples that were analyzed:

Table 2: Organism Survival Rates

Sample	West Bearskin (Control)	ECWRP-001	ECWRP-002	ECWRP-004
Survival Rate	96 ± 6 %	0 ± 0 %	16 ± 18 %	70 ± 26 %

Comparing the survival rates of the East Chicago samples to the control sample, which was collected from a lake in Cook County, MN, the mortality rates for the East Chicago sediment are significantly higher. As specified in the ASTM guidelines and the Inland Testing Manual, which was created by a joint effort between USACE and USEPA and is used to evaluate dredged sediment for disposal, the mortality rate for a control sediment sample must be greater than or equal to 80%; the 96% survival rate for the control certainly meets this requirement. According to the Inland Testing Manual, dredged material is predicted to be acutely toxic to benthic organisms when mean test organism mortality 1) is statistically greater than the reference sediment, and 2) exceeds mortality in the reference sediment by at least 10%. This “statistical difference” is measured by the

Dunnett's *t* test, which determines the Dunnett's critical value for the data and then compares it to the *t* value for each of the specific samples. If *t* values are greater than the Dunnett's critical value then the value is considered "statistically different" and the sediment is deemed toxic. The *t* values for the samples can be found in Appendix C of AScI's report. Sample ECWRP-004 has the lowest mortality rate of the East Chicago samples and thus the lowest *t* value (2.21). Compared to the Dunnett's critical *t* value of 2.11, the ECWRP-004 is close in value but still statistically higher. AScI points out the statistical significance of this similarity in the conclusions of their report:

> *"ECWRP-004 supported Hyalella survival of 70% and had a transformed t statistical value of 2.21, relatively close to the Dunnett's critical t value of 2.11. Although this sediment was statistically different than the West Bearskin control, it supported much higher survival than the other two test sites."*

The lower mortality rate for sample ECWRP-004 can be correlated with the typically lower contaminant concentrations that are found in the sample. Many of the parameters have lower concentrations in sample ECWRP-004 with contaminants such as COD, TKN, Ammonia, and Lead showing dramatic differences.

The second of the two criteria for determining sediment toxicity refers to the difference in the mortality rate between the control sample and the test sample. All three of the East Chicago samples differ in mortality rates by more than 10%, which technically classifies them as toxic to benthic aquatic organisms as outlined in the Inland Testing Manual.

3.0 CONCLUSIONS

The following two sections serve to summarize the HTRW and non-HTRW risks and draw conclusions of their potential impacts to the East Chicago Habitat Enhancement Demonstration project.

3.1 HTRW Environmental Issues

The most significant source of HTRW in the East Chicago WRP discharge channel is the substrate sediment of the streambed. The recent sediment sampling revealed the presence of contaminants, most notably PCBs and PAHs, at levels that would classify them as special wastes. The high mortality rates in the biological toxicity provide a more "real life" example of the sediment's risk. The discharge stream's close proximity to the heavily contaminated sediment in the Grand Calumet River reveals the likely contaminant source.

Though these sediments are not technically HTRW, significant contamination is present at levels that will make disposal difficult and expensive. PCB and PAH levels are high enough to preclude its use for a land application. Landfilling will likely be the most feasible and economical option.

3.2 Non-HTRW Environmental Issues

This investigation has revealed non-HTRW on the West Bank of the discharge channel as well as within the discharge channel itself. The presence of an MSW landfill on the West Bank has manifested itself in the bottles, tires, and trash in the stream and along the banks. Additional non-HTRW is located at the south end of the West Bank in the form of construction debris. Due to the presence of the MSW landfill, it is not advisable to excavate the West Bank due to the risks and liability that would be incurred. Excavation would require the disposal of any MSW that was uncovered and also opens the possibility of uncovering HTRW that may be present in the landfill.

4.0 References

ASTM. 1994. *Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods.* Method E1367-92.

ASTM. *Standard Practice for Environmental Assessments: Phase I Environmental Site Assessment Process (E 1527-94)*

USACE. 2000. *Federal Fiscal Year 1999 Activities for Total Maximum Daily Load (TMDL) Study for Grand Calumet River Watershed in Lake County, Indiana*

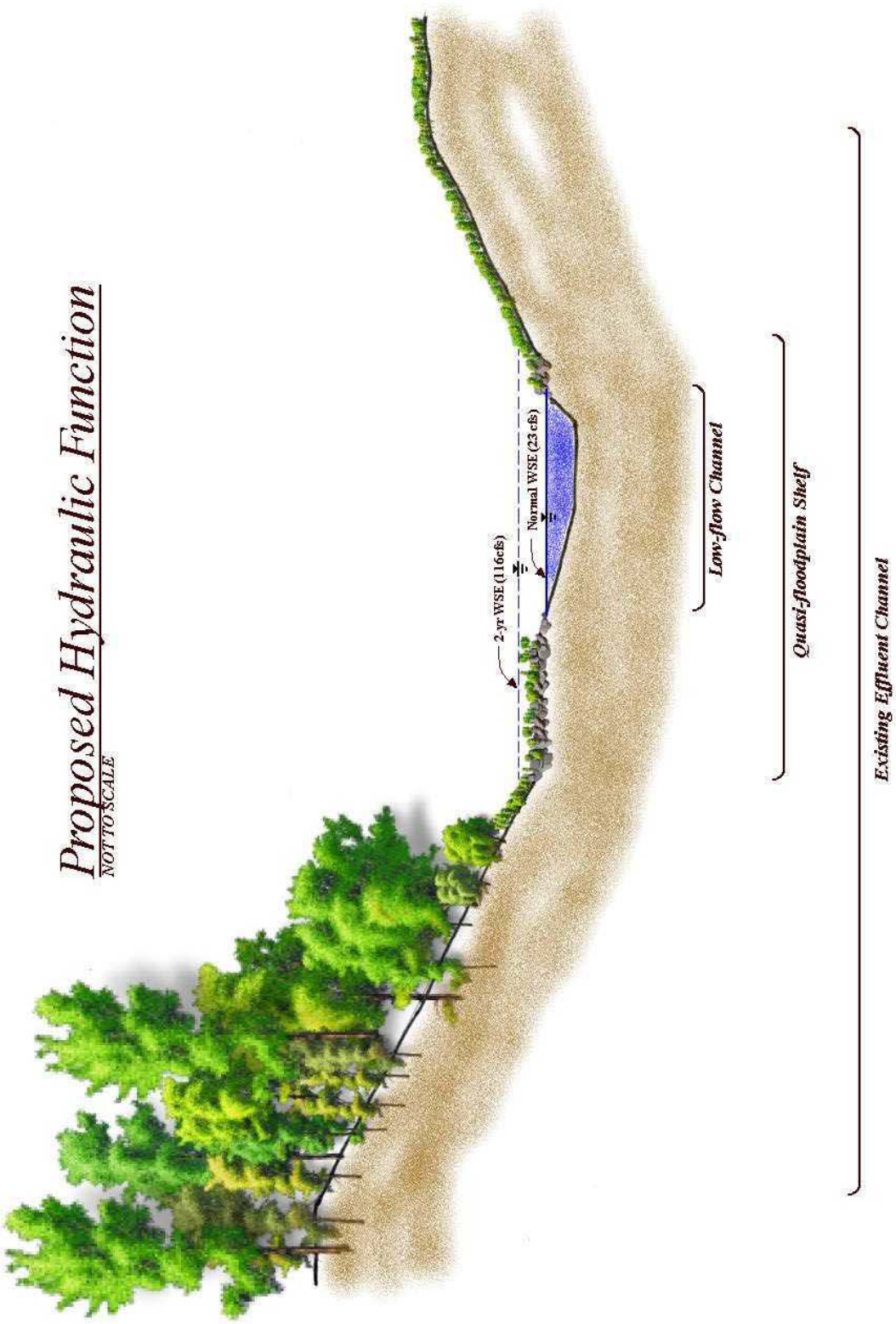
USACE. 1997. *Grand Calumet River – Indiana Harbor Canal Sediment Cleanup and Restoration Alternatives Project (SCRAP) Report*

USEPA/USACE. 1998. *Great Lakes Dredging Material Testing and Evaluation Manual.*

Appendix II

Channel Design Drawings

US Army Corps of Engineers® Chicago District	PROJECT TITLE: East Chicago Effluent Channel	COMPUTED BY: DFB	DATE: 25 Jul 03	SHEET: Plate 1
	COMPUTATION TITLE: Proposed Hydraulic Function	CHECKED BY:	DATE:	



US Army Corps of Engineers® Chicago District	PROJECT TITLE: East Chicago Effluent Channel	COMPUTED BY: DFB	DATE: 25 Jul 03	SHEET: Plate 7
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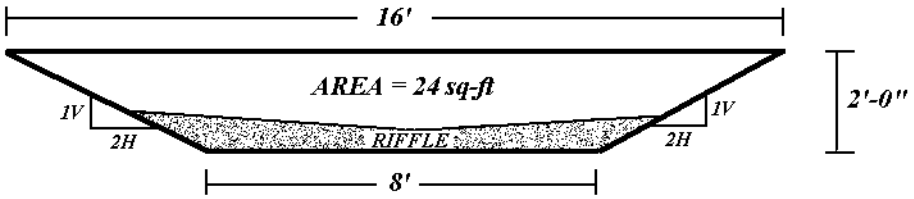

RIFFLE CROSS-SECTION

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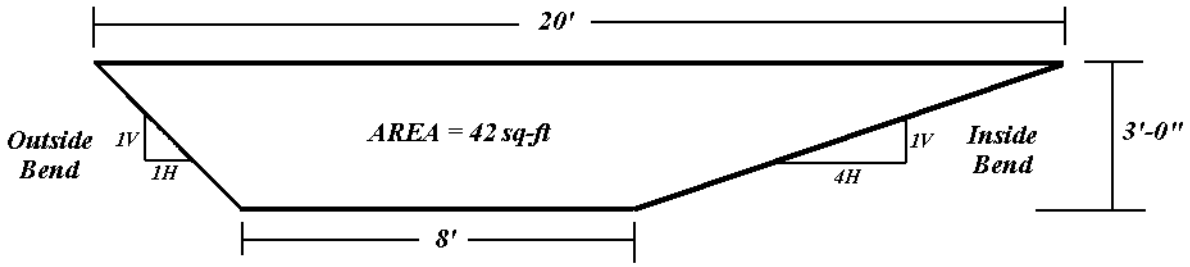

POOL CROSS-SECTION

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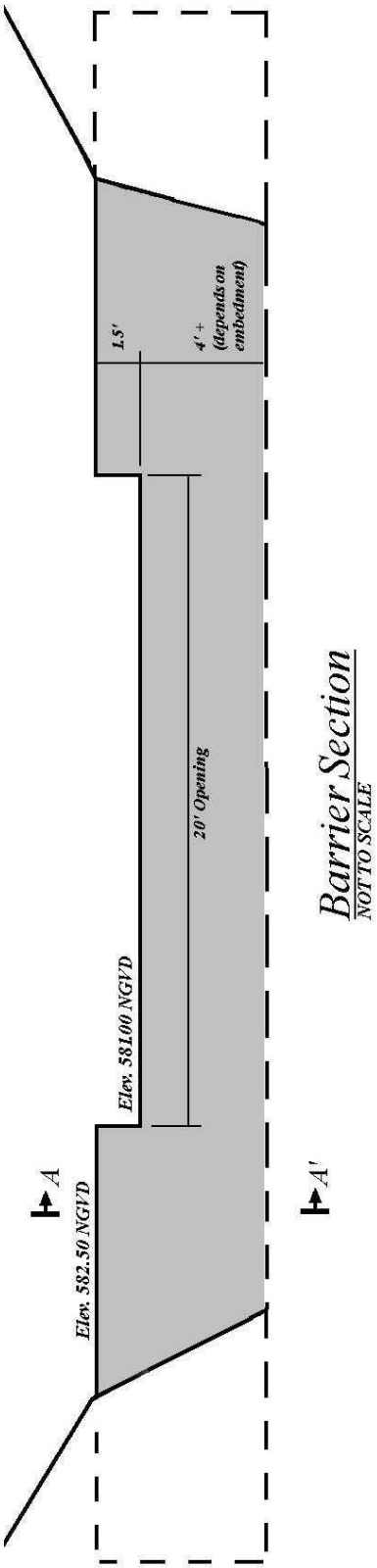
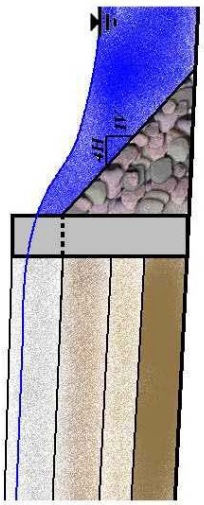
US Army Corps of Engineers® Chicago District	PROJECT TITLE: East Chicago Effluent Channel	COMPUTED BY: DFB	DATE: 25 Jul 03	SHEET: Plate 3
	COMPUTATION TITLE: Proposed Barrier Hydarulic Details	CHECKED BY:	DATE:	



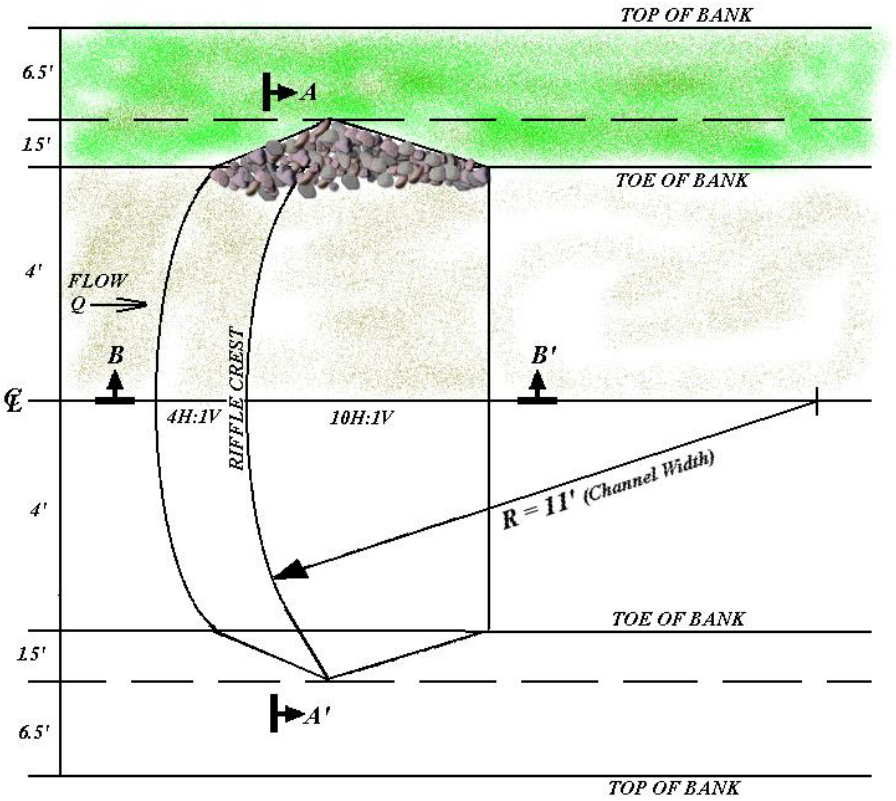
Barrier Section
NOT TO SCALE

Weir Characteristics:
Type:
Broad Crested
Width:
8" Concrete
Coefficient:
C = 3.4
Rip Rap:
Slope = 4H:1V
Depth = 3.5' Approx.
Width = 3.5'
Size = 0.5' Mean Dia.
Unit Wt. = 165 pcf
Volume = 65 cu.yd

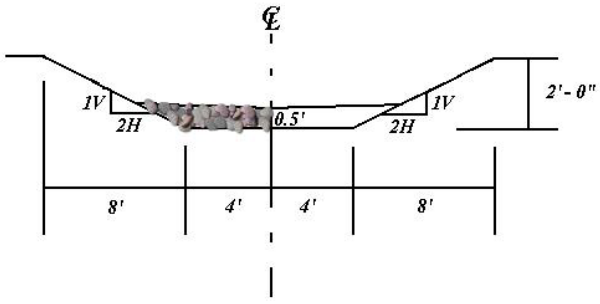


Section A - A'
NOT TO SCALE

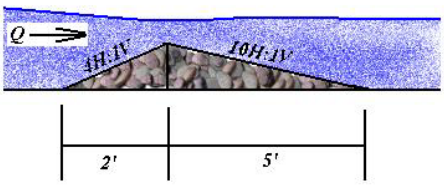
US Army Corps of Engineers® Chicago District	PROJECT TITLE: East Chicago Effluent Channel	COMPUTED BY: DFB	DATE: 25 Jul 03	SHEET: Plate 4
	COMPUTATION TITLE: Rock Riffle Design	CHECKED BY:	DATE:	



PLAN VIEW
NOT TO SCALE



SECT A - A'
NOT TO SCALE

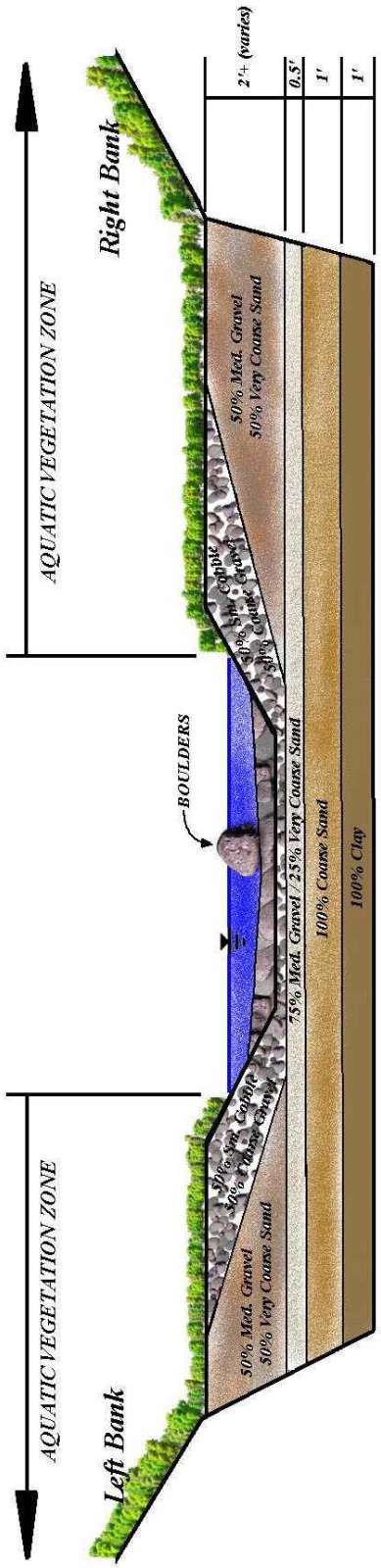


SECT B - B'
NOT TO SCALE

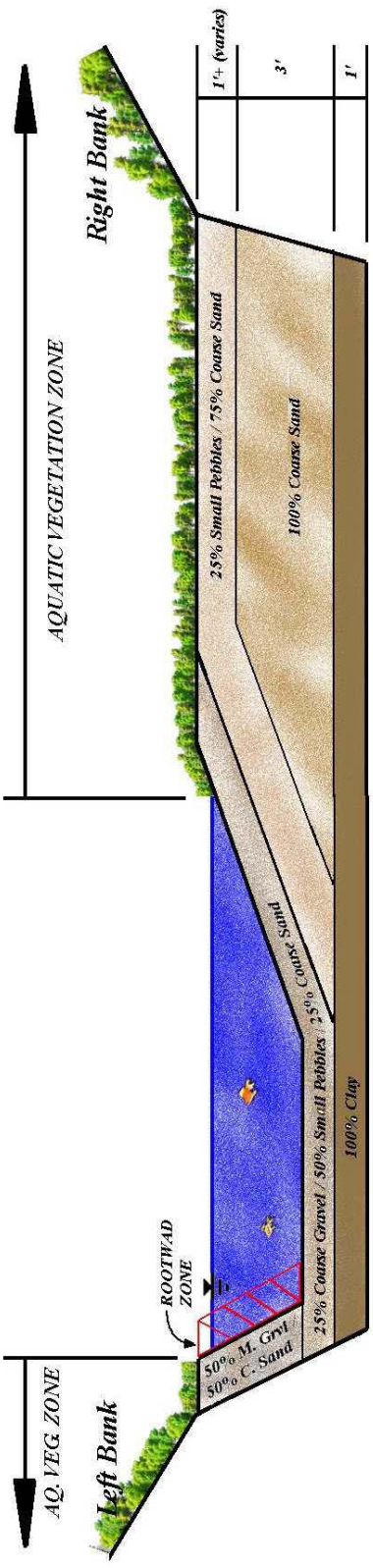
Rock Material:

Quantity:
Approx. = 21 sq-ft (0.8 cu-yd)
Type:
Small Cobblestone
Size:
Mean Size 4"-7" dia.

US Army Corps of Engineers® Chicago District	PROJECT TITLE: East Chicago Effluent Channel	COMPUTED BY: DFB	DATE: 25Jul03	SHEET:
	COMPUTATION TITLE: Proposed Backfilled Cross-Sections	CHECKED BY:	DATE:	



RIFFLE SECTION:
SCALE: 1" = 4'- 0"



POOL SECTION:
SCALE: 1" = 4'- 0"

Appendix III

Coordination

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, IL 60606-7206

REPLY TO
ATTENTION OF

Environmental Formulation Section

MAY 20 2003

Indiana Dept. of Natural Resources
Div. of Historic Preservation
402 W. Washington St. Room W274
Indianapolis, IN 46204
ATTN: Dr. Rick Jones

Dear Dr. Jones:

The Chicago District would appreciate your agency's comments on impacts of proposed ecosystem restoration measures at the sewage treatment plant at East Chicago in Lake County, Indiana. Maps of the project site are enclosed; the project would involve

- removal of contaminated sediments and debris from discharge channel;
- clearing, grubbing and grading of west bank of discharge channel;
- placement of clean substrate (gravel);
- creation of riffle-pool sequence;
- addition of instream habitat; and
- introduction of native species.

Before 1890 the project site was part of the wetland complex bordering the Grand Calumet River. Between 1890 and 1959 the project site and surrounding landscape was drastically altered by construction of railroads, canals, highways, and industrial plants; the sewage treatment plant and discharge channel were built in 1945. The project area does not contain standing structures or significant archaeological material; the project would not affect archaeological or historic properties.

Please mark your reply to the attention of Keith Ryder; questions may be directed to Mr. Ryder at 312/846-5587. Thank you for your assistance.

Sincerely,

Philip R. Bernstein
Chief of Planning Branch

Enclosure

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, ILLINOIS 60606-7206

REPLY TO
ATTENTION OF:

Environmental and Social Analysis Section

July 3, 2002

Indiana Dept. of Environmental Mgt.
100 North Senate
Indianapolis, IN 46206
ATTN: Marty Maupin

Dear Mr. Maupin:

The Chicago District would appreciate your comments on the proposed removal of contaminated sediments from the 800-foot long discharge channel of the East Chicago water reclamation plant, which discharges into the Grand Calumet River in East Chicago, Lake County, Indiana. The selected plan would involve:

- removal of contaminated sediments and foreign debris
- clearing, grubbing and grading of the west bank of the discharge channel
- placement of clean substrate
- creation of riffle-pool sequence
- addition of instream habitat
- introduction of native species

The purpose of the proposed project is to demonstrate sediment remediation and habitat restoration to establish a basis for future environmental improvements along the Grand Calumet River. An appropriate document (environmental assessment or environmental impact statement) will be prepared in accordance with the National Environmental Policy Act (NEPA). This letter is part of the scoping process undertaken during preparation of the NEPA document. I am particularly interested in your comments regarding the environmental impacts of the selected plan.

Your comments will assist the Chicago District in completing the feasibility report for the project. Please mark your reply to the attention of Frank Veraldi; questions should be directed to Mr. Veraldi at (312) 353-6400 ext. 2017, or at Frank.M.Veraldi@usace.army.mil. Thank you for your assistance.

Sincerely,

Philip R. Bernstein
Chief of Planning Branch

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, ILLINOIS 60606-7206

REPLY TO
ATTENTION OF:

Environmental and Social Analysis Section

July 3, 2002

IDNR Div. of Historic Preservation
402 West Washington, Room W-274
Indianapolis, IN 46204
ATTN: Jim Mohow

Dear Mr. Mohow:

The Chicago District would appreciate your comments on the proposed removal of contaminated sediments from the 800-foot long discharge channel of the East Chicago water reclamation plant, which discharges into the Grand Calumet River in East Chicago, Lake County, Indiana. The selected plan would involve:

- removal of contaminated sediments and foreign debris
- clearing, grubbing and grading of the west bank of the discharge channel
- placement of clean substrate
- creation of riffle-pool sequence
- addition of instream habitat
- introduction of native species

The purpose of the proposed project is to demonstrate sediment remediation and habitat restoration to establish a basis for future environmental improvements along the Grand Calumet River. An appropriate document (environmental assessment or environmental impact statement) will be prepared in accordance with the National Environmental Policy Act (NEPA). This letter is part of the scoping process undertaken during preparation of the NEPA document. I am particularly interested in your comments regarding the environmental impacts of the selected plan.

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Sincerely,

Philip R. Bernstein
Chief of Planning Branch

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, ILLINOIS 60606-7206

REPLY TO
ATTENTION OF:

Environmental and Social Analysis Section

July 3, 2002

Indiana DNR
100 North Water Street
Michigan City, IN 46360
ATTN: Brian Breidert

Dear Mr. Breidert:

The Chicago District would appreciate your comments on the proposed removal of contaminated sediments from the 800-foot long discharge channel of the East Chicago water reclamation plant, which discharges into the Grand Calumet River in East Chicago, Lake County, Indiana. The selected plan would involve:

- removal of contaminated sediments and foreign debris
- clearing, grubbing and grading of the west bank of the discharge channel
- placement of clean substrate
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Sincerely,

Philip R. Bernstein
Chief of Planning Branch

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, ILLINOIS 60606-7206

REPLY TO
ATTENTION OF:

Environmental and Social Analysis Section

July 3, 2002

U.S. Fish and Wildlife Service
120 South Lake Street, Suite 230
Warsaw, IN 46580
ATTN: Liz McCloskey

Dear Ms. McCloskey:

The Chicago District would appreciate your comments on the proposed removal of contaminated sediments from the 800-foot long discharge channel of the East Chicago water reclamation plant, which discharges into the Grand Calumet River in East Chicago, Lake County, Indiana. The selected plan would involve:

- removal of contaminated sediments and foreign debris
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Sincerely,

Philip R. Bernstein
Chief of Planning Branch

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, ILLINOIS 60606-7206

REPLY TO
ATTENTION OF:

Environmental and Social Analysis Section

July 3, 2002

U.S. EPA
77 West Jackson Blvd. T-13J
Chicago, IL 60604
ATTN: Mazin Enwiya

Dear Mr. Enwiya:

The Chicago District would appreciate your comments on the proposed removal of contaminated sediments from the 800-foot long discharge channel of the East Chicago water reclamation plant, which discharges into the Grand Calumet River in East Chicago, Lake County, Indiana. The selected plan would involve:

- removal of contaminated sediments and foreign debris
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Sincerely,

Philip R. Bernstein
Chief of Planning Branch