U. S. FISH AND WILDLIFE SERVICE

Technical Memorandum

Restoration Alternatives Development and Evaluation

West Branch of the Grand Calumet River Indiana

February 2002

FOSTER WHEELER

FOSTER WHEELER ENVIRONMENTAL CORPORATION

USFWS Contract No. 1448-98695-C008

WEST BRANCH OF THE GRAND CALUMET RIVER

TECHNICAL MEMORANDUM

RESTORATION ALTERNATIVES DEVELOPMENT AND EVALUATION

February 2002

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1. INTRODUCTION

This Technical Memorandum has been prepared by Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) in accordance with the requirements of the Scope of Work (SOW) for Task Order 0 1 -Y032 of Contract 1448-98695-98-CO08, dated September 6, 2001. The Technical Memorandum was prepared for the U.S. Fish and Wildlife Service (USFWS) Environmental and Facility Compliance Office at the request and direction of the USFWS - Bloomington Field Office as a project planning document for the development and evaluation of restoration alternatives for the river reach along the West Branch of the Grand Calumet River, Indiana (WBGCR) between the Indianapolis Boulevard Bridge and the Indiana/Illinois state line. The USFWS is acting as the contracting agency on behalf of the Grand Calumet River Restoration Fund Council (Council), which is composed of USFWS, Indiana Department of Environmental Management (IDEM), U.S. Environmental Protection Agency (EPA), and Indiana Department of Natural Resources (IDNR). In Section 2.0, the memorandum describes the literature and database reviews that have been conducted and the data needs that have been identified. Section 3.0 describes the path forward as currently envisioned to conduct the remainder of the project using existing data to the maximum extent possible followed by a preliminary schedule to complete these tasks in Section 4.0. A detailed site bibliography is presented in Attachment A.

In order for Foster Wheeler Environmental to conduct a meaningful data needs assessment, personnel had to become familiar with the overall project. This objective was accomplished by a site visit and review of existing reports and data for the affected part of the Grand Calumet River. The site visit was conducted on December 11, 2001. Representatives from USFWS, IDEM, IDNR, Region 5 of the EPA, and Foster Wheeler Environmental drove vehicles to discrete locations (e.g., parks, bridges, etc.) and walked along portions of the project reaches of the WBGCR. The site visit began at a small "boat ramp" located next to the Indianapolis Boulevard Bridge and ended at the Hohman Avenue Bridge located approximately one-half mile east of the Indiana/Illinois state line. Features that were observed and noted included water depths, bank line characteristics, sediment characteristics, vertical and horizontal clearances for bridges and other river crossings, potential equipment access locations, sediment sampling transect locations, and potential upland sites for dredged material disposal. A set of maps developed from U.S. Geological Survey (USGS) 7.5-minute series topographic maps was used to document salient features and the locations where photographs were taken (Figures 1a

through 1c). The photographs have since been catalogued for future reference with selected photographs presented on the figures for visual reference. Additional photograph logs are presented in Attachment B.

Since the site visit, we have received additional site data from EPA, including information on a recent hydrographic survey conducted by the U.S. Army Corps of Engineers (USACE), Chicago District, and an updated copy of the Grand Calumet River database (with maps) completed by Don MacDonald of MacDonald Environmental Services, Ltd. (MacDonald). These data will be very important in our assessment of the dredgability or cap-ability of the sediments. The database was provided to Foster Wheeler Environmental on January 4, 2002. Historical sampling maps for the WBGCR are presented in Attachment C.

Based on our preliminary analysis of potential remedial technologies, the physical site conditions, and waterway setting, Foster Wheeler Environmental proposes project reaches as follows:

1) from the Indianapolis Boulevard Bridge to the Interstate 90 Bridge,
2) from the Interstate 90 Bridge to the Columbia Avenue Bridge,
3) from the Columbia Avenue Bridge to the Calumet Avenue Bridge,
4) from the Calumet Avenue Bridge to the Sohl Road Bridge,
5) from the Sohl Road Bridge to the Hohman Avenue Bridge,
6) from the Hohman Avenue Bridge to the railroad bridge, and
7) from the railroad bridge to the Indiana/Illinois state line.

The above reaches are preliminary based on observations made during our site visit on December 11, 2001; the final selection will be based on further evaluation and discussion with the cognizant agencies and Council. Based on their detailed knowledge of the project, Foster Wheeler Environmental requests that USFWS and IDEM provide recommendations as to the number of project reaches that would be subject to independent alternative development. It will simplify the development of alternatives if the number of project reaches could be reduced to a practical minimum.

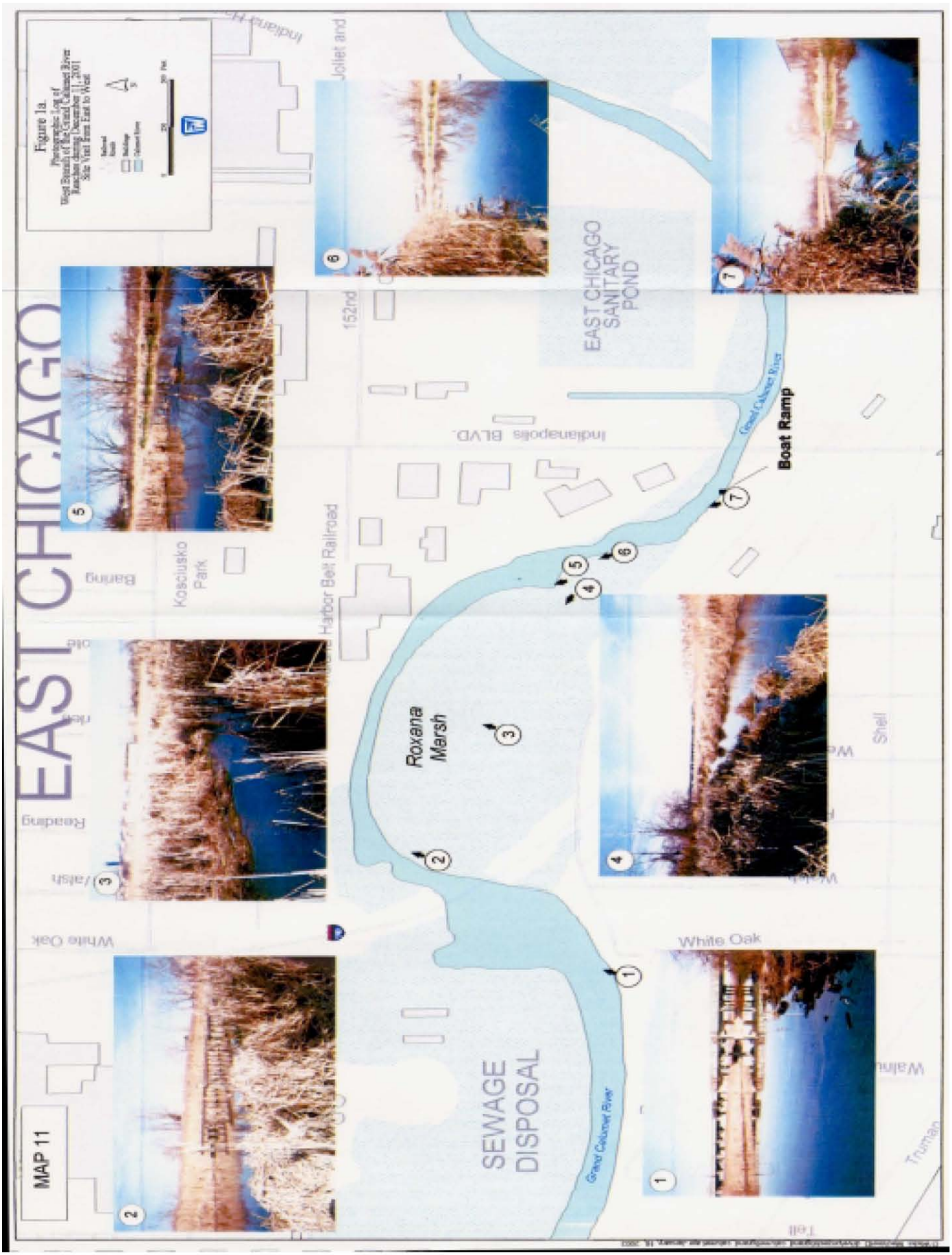
Figure 1a.
Photographic Log of
West Bank of the Grand Calumet River
Beaches during December 11, 2001
Site Visit from East to West
EAST CHICAGO
MAP 11
SEWAGE
DISPOSAL
Roxana
Marsh
EAST CHICAGO
SANITARY
POND
Boat Ramp
Grand Calumet River
Harbor Belt Railroad
Indianapolis BLVD
152nd
Joliet and
Kosciusko
Park
Baring
Reading
White Oak
Shell
Truman
1
2
3
4
5
6
7

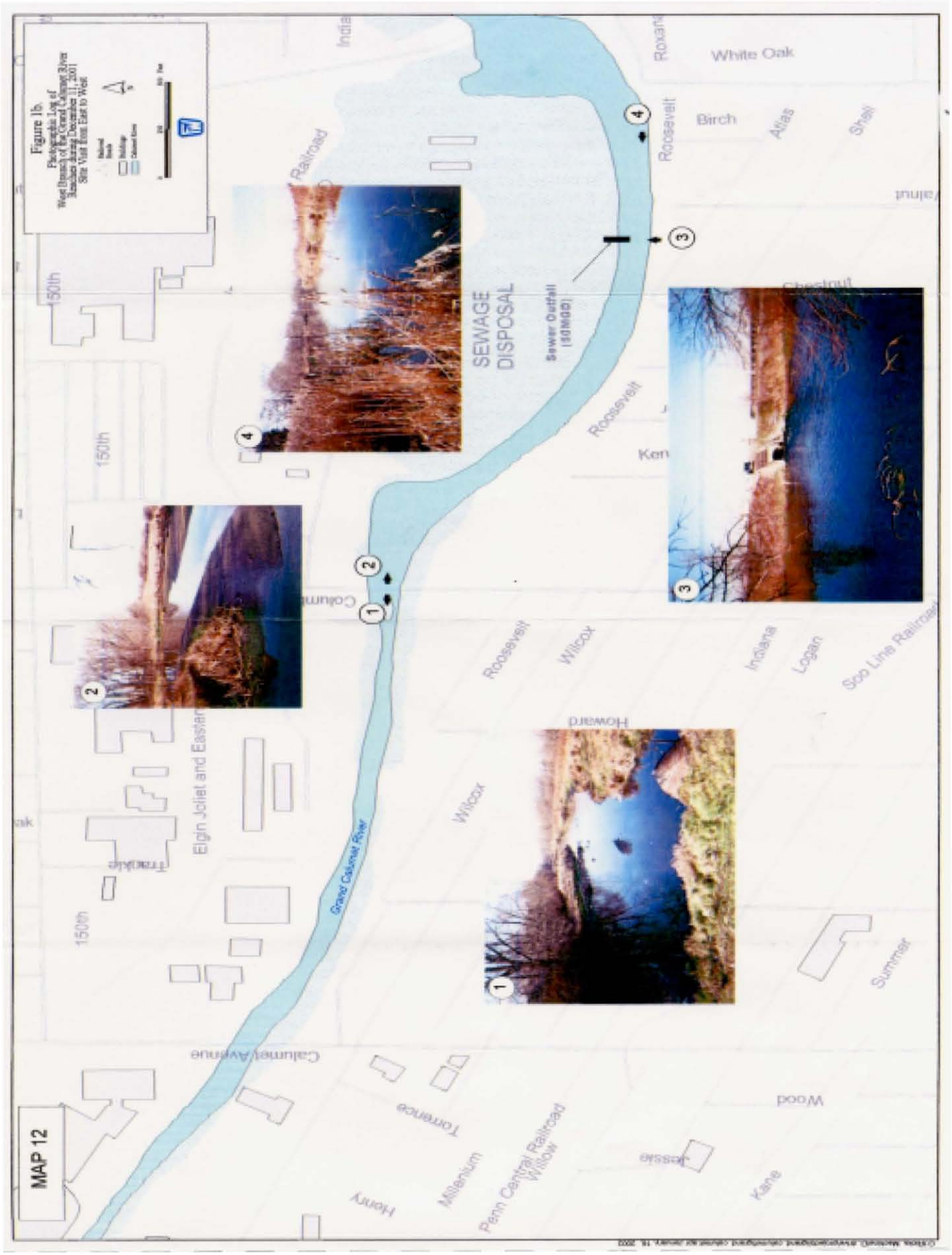
Figure 1b.
MAP 12
SEWAGE DISPOSAL
Sewer Outfall (60MGD)
Grand Calumet River
Railroad
White Oak
Roosevelt
Birch
Atlas
Shell
Chestnut
Ken
Wilcox
Indiana
Logan
Howard
Elgin Joliet and Eastern
Calumet Avenue
Torrence
Millenium
Penn Central Railroad
Willow
Wood
Kane
Summer
150th
Trailside
1
2
3
4


MAP 12a
Figure 1c.
MGP SITE
Spohn Middle School
Elgin Joliet and Eastern Ry
Baltimore
Torrence
Henry

2. LITERATURE REVIEW AND EVALUATION OF DATA NEEDS

As identified in the SOW, Phase I includes reviewing available data and literature and assessing the need to collect any additional data before developing restoration alternatives. Most of Phase I has been completed, with the exception of Task 4, Local Support, and the results are described in the following subsections. The evaluation of local support is ongoing and will be completed concurrently with the Restoration Alternatives Development and Evaluation Report as more specific, local support needs are identified. The report is not included in the current task order SOW, but is described under subsequent phases in the proposed project approach dated June 23, 2001.

2.1 LITERATURE REVIEW

During the course of several telephone calls and the site visit described above, Foster Wheeler Environmental representatives were apprised of various reports and other documents that have been generated for the project over the last 10 or more years. Copies of pertinent documents were requested and obtained from USFWS, IDEM, EPA, MacDonald, and other sources. Foster Wheeler has since completed review of the technical information required, and the site bibliography is listed in Attachment A.

The sediment database from MacDonald was used to establish the current areal and vertical extent of sediment contamination requiring remediation at the site. The database also provides some physical information to determine the dredgability and cap-ability of the sediments. The database was received on January 4, 2002. After completing our review, we have determined that additional sampling and testing will be required to assess the nature and extent of contaminants of concern and geotcchnical properties of the sediments. Sediment chemistry and biological data have been collected from only a few locations along this portion of the Grand Calumet (ThermoRetec 1999, 1997; IDEM 1999, 1998, 1994; URS 1998; Burton & Dorkin 1994; Hoke et al. 1993; Pol Is et al. 1993; Unger 1992; HNT13 1991, 1989). There are no recent (after 1994) sediment data for the river reaches between the Columbia Avenue and Calumet Avenue Bridges, 1-90 and Columbia Bridges, Calumet Avenue and Sohl Road Bridges, and only a few recent sampling locations between the railroad bridge and the Indiana/Illinois state line. Most of the sampling on the WBGCR was completed by URS Greiner (1998) at Roxana Marsh and ThermoRetcc (1997, 1999) near the historical location of the Manufacturing Gas Plant (the NIPSCO property), Southwest Of tile Sohl Road Bridge. In addition,

the data collected docs not include engineering properties of tile sediment that will be needed for remedial alternatives analysis and design. Table I presents information on previous sampling events along each reach of the VVBGCR, including number and type of samples, depth of sampling (if available), and testing. The locations of sampling locations in the West Branch are presented in Attachment C (MacDonald 2001).

2.2 IDENTIFICATION OF DATA GAPS

The review of existing information in the literature and databases led to the identification of several data gaps that will need to be filled before or during the alternatives evaluation process. At this time, the data gaps include the following six types of data and information:

1) Bathymetric survey data
2) Preparation of engineering base drawings
3) Transferal of historical sediment core data to base drawings
4) Collection of additional core samples for chemical and physical property tests
5) Gathering information on access to the river for implementation of the Restoration Plan
6) Need for local sources of services and material

These data needs are described in the following subsections along with the rationale and priority for acquisition.

2.2.1 Data Gap 1 - Need for Bathymetric/Topographic Survey

Foster Wheeler Environmental has evaluated the documents listed in Attachment A and determined that there is insufficient bathymetric and topographic data to establish the river bottom and adjacent upland topography. Bathymetric and topographic data are needed to locate the core borings both horizontally and vertically with relation to the river.

To fill this data gap, Foster Wheeler Environmental suggests a contract modification to the existing task order or a new task order from USFWS to conduct a bathymetric/topographic survey of the West Branch. A photogram metric survey of the WBGCR has also been proposed to supplement the topographic data in the upland areas.

Table 1. Historical Sediment Sampling Data for the Grand Calumet River - West Branch

River Reach	Study	Number of Stations	Surface Samples (depth ft)	Subsurface Samples (depth ft)	Testing
Indianapolis Blvd. Bridge - 1-90 Bridge	HNTB 1991	1		1 (09)	C,M,PAH,P,PCB,D,Ph
	Rainbolt 1993	1	1		BE
	Burton 1994'	1		4 (0-3), (3-7.8)	B
	Dorkin 1994	1		4 (0-3), (3-7.8)	C,M,PAH,V,Ph
	IDEM 1994	2	2		M, PAH,P,PCB
	IDEM 1998	1	1		M, PAH, P,PCB,Ph
	IDEM 1999	3	3		M,PAH,PCB,Ph
	URS 1999	8	5(0-0.16)	1 (0-2), 2(0-5),5 (2-7), 6(5-13)	B,C,M,PAH,P,PCB,V, Ph,Cy
	Simon 2000	1	1		BE
	IDEM 2000a	1	1		BE
1-90 Bridge – Columbia Ave. Bridge	HNTB 1989	2		4 (0-9)	M,PAH,P,PCB,D,Ph
	HNTB 1991	2	2 (0.8-1.1)	5 (0-12.2*)	C,M,PAH,P,PCB,D,Ph
	Unger 1992	1		3 (0-3,3-6,3-9)	PAH,P,PCB,Ph
	Hoke 1993	1	1		B,C,M,D,PAH,P,PCB
	Burton 1994[1]	3	1 (0-1)	15 (0-3), 14 (3-13)	B
	Dorkin 1994[1]	3	1 (0-1)	15 (0-3), 14 (3-13)	C,M,PAH,V,Ph
Columbia Ave. Bridge –Calumet Ave. Bridge	HNTB 1989	1		1 (0-9)	M,PAH,P,PCB,D,Ph
	HNTB 1991	1	1 (1-1.1)	3 (0-12.1*)	C,M,PAH,P,PCB,D,Ph
	Rainbolt 1993	1	1		BE
Calumet Ave. Bridge - Sohl Road Bridge	HNTB 1989	1		1 (0-9)	M,PAH,P,PCB,D,Ph
	Rainbolt 1993	1	1		BE
	Burton 1994[1]	1		4(0-3), 6(3-7.8)	B
	Dorkin 1994[1]	1		4(0-3), 6(3-7.8)	C,M,PAH,V,Ph
Sohl Road Bridge – Hohman Ave. Bridge	HNTB 1989	1		1 (0-9)	M,PAH,P,PCB,D,Ph
	HNTB 1991	1	1 (0.8-1)	3 (0-11.2)	CM,PAH,PXCB,D,Ph
	Rainbolt 1993	1	1		BE
	RETEC 1997	1		2 (2-4,2-4)	V,M,PAH,PCB
	RETEC 1999	2		4 (0-2,2-5)	B,C,M,PAH,V,Ph
	IDEM 2000a	1			BE
Hohman Ave. Bridge – Railroad Bridge	Unger 1992	1		3 (0-3,3-6,3-9)	PAH,P,PCB,Ph
	Hoke 1993	1	1		B,C,M,D,PAH,P,PCB
	Polls 1993	1	1		BE
	IDEM 1994	1	1		M, PAH, P, PCB
	Burton 1994[1]	1		5 (0-3),2 (3-5.1)	B
	Dorkin 1994[1]	1		5 (0-3),2 (3-5.1)	C,M,PAH,V,Ph
	RETEC 1997	9		8 (2-4), 3 (2-5)	V,M,PAH,PCB
	RETEC 1999	7	2 (0-0.83)	7 (0-2), 7 (2-4/5)	B,C,M,PAH,V,Ph
Railroad Bridge – State Line	RETEC 1997	2		2 (2-4, 2-4)	V,M,PAH,PCB
	RETEC 1999	2		3 (0-2), 2 (2-5)	B,C,M,PAH,V,Ph

Key: B=Bioassay, C--Conventionals, M=Metals, D=Dioxins, PAH=Polycyclic Aromatic Hydrocarbons, P=Chlorinated
Pesticides, PCB=Polychlorinated biphenyls, Ph=PhenoI, BE=Benthic Infauna, V=Volatiles, Cy=Cyanide.
* Represents multiple subsamples within this depth.
Burton 19941 and Dorkin 19941 - Multiple cores and samples were collected at each station.

With appropriate planning, these surveys could be completed concurrently with the proposed work in the Roxana Marsh (Task Order 02-YO08), if the timing can be arranged.

Survey information will be used to:

1) establish riverbed topography and core sample elevations in relation to the waterway and the project vertical datum,

2) develop remedial alternatives and estimated dredging/capping quantities for the various reaches of the project (due to the shallowness of the river, capping is considered infeasible as a stand-alone alternative),

3) assess potential disposal sites along the river,

4) evaluate potential access to the site, and

5) later, if needed, aid in the preparation of final restoration plans based on the selected alternative(s).

2.2.2 Data Gap 2 - Need to Prepare Engineering Base Drawings

Using the contour maps resulting from the bathymetric/topographic survey, Foster Wheeler Environmental will prepare engineering base drawings. These drawings will serve several purposes:

1) Historical sampling locations and riverbed topography will be located on the drawings.
2) Proposed sampling locations will be documented on the drawings.
3) After completion of additional sampling, contaminated sediment sections will be drawn.
4) The drawings will be used to lay out preliminary dredge prisms and capping areas and compute dredged material and/or capping material quantities (due to the shallowness of the river, capping is considered infeasible as a stand-alone alternative).
5) The drawings will also be used to preliminarily locate and lay out potential upland access and dredged material disposal areas adjacent to tile waterway.

2.2.3 Data Gap 3 - Need to Transfer Sediment Core Data to Engineering Base Drawings

The sediment core data collected from the MacDonald database must be transferred to the engineering base drawings. The sampling locations should have x,y,z coordinates, which will be used to locate the horizontal and vertical position of the cores. In addition, the bottom of the contaminated sediment in each core will be tied to the project vertical datum. Review of the data sets has shown that some x,y locations of cores will need to be either back calculated or collected as part of the bathymetric survey, and that core bottom elevations will need to be tied to the project vertical datum.

2.2.4 Data Gap 4 - Need to Take Additional Core Borings to Evaluate Nature and Extent of Contamination and Obtain Sediment Physical Properties

Based on a review of the sediment sampling data contained in the MacDonald Grand Calumet database and discussions with Don MacDonald, USFWS, and IDEM, it appears that there are insufficient data for the evaluation of nature and extent of contamination within many of the river reaches along the West Branch. There are substantially fewer data points proportionally in the West Branch than in the other reaches of the Grand Calumet River that were similarly evaluated in 2000 (Foster Wheeler 2000). Consequently, additional data are required to develop the restoration alternatives for the WBGCR. Restoration plans will require additional information on both sediment chemistry and physical characteristics (i.e., total metals, semivolatile organics, chlorinated pesticides, polychlorinated biphenyls, total organic carbon, and grain size distribution). Additional borings and sediment chemistry data are required in the following reaches of the West Branch:

- Between the Indianapolis Boulevard and 1-90 Bridges (including Roxana Marsh),
- Between 1-90 and Columbia Avenue Bridges,
- Between Columbia Avenue and Calumet Avenue Bridges,
- Between Calumet Avenue and Sohl Road Bridges,
- Between Sohl Road and Hohman Bridges, and
- Between the railroad bridge and the Indiana/Illinois state line.

There are also insufficient geotechnical data to evaluate the engineering properties of the sediment that will be needed for remedial alternatives analysis and design. The sediment characteristics will help in determining the range of dredging equipment and the capacity of the sediments to support equipment. Determining the sediment characteristics will require additional core borings and

geotechnical testing for Atterberg limits, percent solids, specific gravity, and Standard Penetration Test (STP) blow counts. Additional engineering property tests, such as in-situ shear strength, laboratory consolidation, column settling, or column consolidation may also be required.

2.2.5 Data Gap 5 - Need for Information on Available Access Sites

Based on the December 11, 200 1, site visit, Foster Wheeler Environmental notes the following site conditions that will have a significant influence on accessing the liver to support dredging and material handling:

1) First, there is very shallow water in which to perform dredging/capping. In most areas, the water depths were less than I foot on the day of the site visit.
2) Second, there are limited access points available to insert equipment into and remove it from the water. Another aspect of this operational constraint is that much of the river/canal bank is not conducive to equipment access or working with land-based equipment from the top of the bank. Stability and access will be a major concern for construction excavation, liver access, sediment dewatering, and hauling equipment.
3) Third, numerous bridges and trestles crossing over the river and canal have no horizontal and vertical clearances for moving equipment between adjacent river reaches (i.e., the river flows through culverts under every bridge west of the 1-90 Bridge. Dredging/capping equipment will have to be repeatedly mobilized into the water or to the adjacent bank (for land-based equipment) for each section of work and then be pulled out of the waterway and moved to the next section or reach of work.

During or following the bathymetric and photogrammetric surveys, information on property ownership and access points will be gathered, compiled, and assessed for use in the alternatives analysis.

2.2.6 Data Cap 6 - Local Sources of Services and Material

To develop the restoration alternatives, information on the availability and cost of local services and material will be needed. As a first step, to assist in this effort and to build on (lie preliminary information previously gathered during the evaluation of the other portions of the Grand Calumet River, telephone books for the local region (East Chicago, Gary, and Hammond) were procured.

In addition, alternative sources of vendor services will include use of internet search engines, commercial services databases, and qualified vendor/supplier databases maintained by the procurement department of Foster Wheeler Environmental. The directories will be used during the alternatives evaluation to obtain information for, but not limited to, the following:

- local labor,
- dredging equipment, construction equipment,
- fleet vehicles,
- aggregate,
- concrete,
- and related services.

As the need arises and individual service needs are identified, the directories will be used to obtain quotes from local vendors that could supply labor, equipment, services, or materials for the selected restoration alternatives.

Contact has already been made with Waste Management, Inc., which owns and operates sites that could be suitable for potential sediment handling facilities or disposal properties along the river. Additional contacts that will be made to prepare for additional sampling in the WBGCR and the completion of the Restoration Alternatives Development and Evaluation Report include, but are not limited to:

- Paul Buszka, USGS, for information on vertical and horizontal control points along the West Branch;
- Michael Unger, Hammond Sanitary District, for information on water quality sampling of sewer outfalls, vertical and horizontal control points, and potential dewatering and upland disposal sites of dredged material along the WBGCR;
- AMOCO and Wolverine Companies for information to locate petroleum pipeline crossings in the river and Roxana Marsh; and
- Other local utilities for information on other utility crossings of the river.

3. EVALUATION OF REMAINING PHASES

The SOW describes four tasks for Phase I of the project. Following the project orientation, database evaluation, literature review, and data gap analysis in Phase 1, the path forward for additional phases can be described in more detail than was previously provided in the task order SOW and proposal submitted by Foster Wheeler Environmental in June 2001. Each phase is further described below.

3.1 FIELDWORK

As discussed previously, bathymetric/topographic and photogrammetric surveys and additional sediment coring and testing are required (Phase 2) before we can complete the evaluation of restoration alternatives for the WBGCR in Phase 3. These data sets will be used to complete the necessary site characterization. A short description of the proposed level of effort for each is presented below.

3.1.1 Bathymetric/Topographic and Photogrammetric Surveys

The surveys will cover approximately three and one-half miles of the West Branch from Indianapolis Boulevard Bridge to the Indiana/Illinois state line. The results of the bathymetric/topographic surveys will be a contour map (with 1-foot contour interval) of the West Branch of the river. In addition, approximately 132 cross sections will be generated from bankline to bankline and may extend up to 500 feet on either side of the river if needed for upland assessment. These cross sections equate to about one section for every 200 feet of river length.

Foster Wheeler Environmental is aware that the U.S. Army Corps of Engineers, Chicago District, has obtained survey information for the generation and calibration of a hydraulic and hydrologic model of the West Branch (USACE 1996). The information was used to plot cross sections of the river, mainly at bridges over the river. While the cross sections developed were not based on sounding data for the West Branch, the elevations collected will provide an elevation check for the topographic and photogrammetric surveys.

3.1.2 Sediment Coring and Testing

Sediment coring and testing are required to further evaluate the areal and vertical extent of contamination on the WBGCR. Sediment cores are proposed for collection from three station transects across the river (bank to bank) separated approximately 1,000 feet apart within each reach.

Cores will be advanced using a vibracorer or equivalent sampling equipment beyond the deepest extent of contamination indicated by historical data and visual inspection, not to exceed 10 feet from the mudline, or until refusal. Based on a visual inspection of each core, approximately two sediment sample intervals from each core will be submitted for chemical analysis. Sample intervals selected for analysis will consider volumes required for chemical analysis, sediment stratigraphy, and likely dredge units (e.g., 2-foot intervals). Other sediment intervals not submitted for analysis will be archived for possible future analysis. Table 2 presents the proposed number of transects and cores for each reach, as well as proposed number of samples for testing.

Selected sediment samples may be analyzed for total organic carbon, metals, sernivolatile organics, chlorinated pesticides, and PCBs. Selected samples may also be analyzed for physical tests used to evaluate dredging and capping methods, dredged material transport and placement, dredge material behavior in the disposal site, potential short-term impacts at the dredge and disposal sites, and capacity of existing sediments to provide foundation support for capping material. Selected samples may be analyzed for grain size, Atterburg limits, specific gravity, elutriate testing, and SPT blow counts. Additional engineering property tests such as in-situ shear strength, laboratory consolidation, column settling, and column consolidation may also be required. Representative samples for some of these tests (e.g., SPT and consolidation tests) must be collected using a portable hollow-stem auger drill rig.

Before sampling can begin, Foster Wheeler Environmental and USFWS will prepare a sampling and analysis plan, including field sampling plan (FSP), quality assurance project plan (QAPP), and health and safety plan (HASP), that describes all sampling and testing procedures for this phase of work. These plans can be based substantially on standing plans to be made available to Foster Wheeler from USFWS and IDEM from prior work on other reaches of the Grand Calumet River to reduce the preparation effort involved.

Once sampling and testing have been completed, all chemistry and physical data will be entered into the Grand Calumet River database for further evaluation. A report will be completed that presents the nature and extent of contamination, including an assessment of sediment injury (probable effects concentration) in this portion of the river. MacDonald will assist Foster Wheeler Environmental and

Table 2. Proposed Sampling and Testing for the Grand Calumet River - West Branch

River Reach	Number of Transects	Number of Cores	Total Number of Samples	Number of Samples Analyzed'
Indianapolis Blvd. Bridge – 1-90 Bridge	4	12	60	24
1-90 Bridge – Columbia Ave. Bridge	4	12	60	24
Columbia Ave. Bridge - Calumet Ave. Bridge	3	9	45	18
Calumet Ave. Bridge - Sohl Road Bridge	2	6	30	12
Sohl Road Bridge – Hohman Ave. Bridge	2	6	30	12
Hohman Ave. Bridge - Railroad Bridge	--	--	--	--
Railroad Bridge - State Line	2	6	30	12
TOTAL	17	51	255	102

1/ Number of samples proposed for analysis is two samples per core. Additional samples may be required for analysis based on field observations and results of the initial sample analysis.

USFWS with updating the Grand Calumet River database and the assessment of sediment injury in the West Branch.

3.2 DEVELOPMENT OF RESTORATION ALTERNATIVES

Phase 3 includes the development of a Restoration Alternatives Report similar to that prepared for the East Branch of the Grand Calumet River and Indiana Harbor Canal (Foster Wheeler Environmental 2000). This will involve the development of the restoration alternatives, an evaluation of the alternatives, and preparation of a draft and final report.

3.2.1 Development of Restoration Alternatives

Once the nature and extent of contamination has been evaluated for the WBGCR, Foster Wheeler Environmental will work on the development of restoration alternatives for each reach. Based on our current knowledge of the proposed project reaches (stretches of the West Branch between bridges), potential sediment management actions that we will consider for each project reach include:

- no action
- natural recovery with monitoring
- dredging with upland onsite disposal (treatment of dredge runoff water may or may not be required, depending on results of elutriate tests conducted during pre-remedial design)
- dredging with upland disposal at a Regional Landfill, including onsite stockpiling and dewatering (treatment of dredge runoff water may or may not be required, depending on results of elutriate tests conducted during pre-remedial design)
- thin capping (also termed as enhanced natural recovery)
- isolation capping
- dredging and capping

Upland disposal will be in confined monofills if suitable sites are made available, or in commercial regional landfills. These alternatives will be preliminarily screened using factors of technical feasibility, implementability, environmental acceptability, and cost. Alternatives will consist of individual or a combination of sediment management actions for each project reach.

Sediment management actions and alternatives that are infeasible, unavailable, or have too high a cost to implement will be eliminated during the screening process. The candidate list of potential alternatives will then be narrowed down to the three most promising alternatives that will be carried forward for further evaluation. During this process, we will coordinate closely with the Council and address its concerns and requirements. As part of this phase, we will prepare a description and cost estimate of each candidate alternative, together with the assumptions upon which the alternative and cost estimate are based.

3.2.2 Evaluation of Restoration Alternatives

A comparative analysis of the restoration alternatives will be completed in cooperation with USFWS and the Council. That evaluation can be further broken down into determination of evaluation criteria

and evaluation of alternatives against the selected criteria. Before performing the comparative analysis of the restoration alternatives and applying them to each reach of the project, Foster Wheeler Environmental will develop a summarized list of appropriate evaluation criteria. Fourteen criteria developed for the East Branch and main stern of the river (Appendix E of the Grand Calumet River/Indiana Harbor Canal Restoration Alternatives Development and Evaluation Report, Foster Wheeler Environmental 2000) can be used as a starting point; these criteria were derived from those in the Grand Calumet River Interim Restoration Compensation Determination Plan (IRCDP) (IDEM et a]. 1998). Those 14 criteria were classified as threshold (3), ranking (6), and other NRDA (5) criteria, and developed for future use in identifying a preferred alternative from the four alternatives retained for analysis in the eastern reaches of the river. As directed by USFWS and IDEM, these criteria will be retained and brought forward for this evaluation, or modified if appropriate. Consideration will be given to eliminating, to the extent possible, overlaps and/or duplication. The draft evaluation criteria are included in Attachment D for consideration at this time by USFWS and IDEM. Foster Wheeler Environmental will work with USTWS and the Council to further synthesize and apply the criteria during the evaluation process, as appropriate. The approved criteria will be available to perform the comparative analysis after the alternatives undergo a first-level screening using factors of technical feasibility, implementability, environmental acceptability, and cost, as described in Section 3.2.1.

Starting with the materials, evaluations, and approaches previously developed for the East Branch of the Grand Calumet River and Indiana Harbor Canal, a list of potential alternatives, up to three, or as appropriate, will be carried forward for each reach. Foster Wheeler Environmental will then evaluate these alternatives using the list of criteria developed in the previous task. We will use any guidance contained in the source documents for individual evaluation factors or as requested by the Council. The evaluation will be provided in a format acceptable to the Council. The approved evaluation criteria will be listed and the comparative analysis will be performed for the three most promising alternatives under each criterion. The draft evaluation will be submitted to the USFWS for review. After the USFWS comments have been incorporated into the document, the draft will be submitted to the Council for its review and comment. Foster Wheeler Environmental will incorporate USFWS, IDEM, and the Council's comments into the evaluation document. The comparative analysis will then become part of the draft evaluation report.

3.2.3 Preparation of Draft Report

Using the comparative analysis criteria, Foster Wheeler Environmental will prepare a draft report that describes the most technically feasible primary restoration alternatives (up to three alternatives) for each reach. The report will present a summary of each alternative's strong points and weaknesses as they relate to each evaluation criterion. It will also clearly describe the rationale supporting the recommendation of the preferred alternative for each reach of the assessment area. The preferred alternative may vary, depending on the area and the level of contamination. For instance, isolation capping may be the preferred remedial technique in certain areas having relatively low levels of contamination that could support the establishment of a healthy benthic habitat.

On the other hand, areas with high levels of constituents of concern may be more effectively remediated by dredging and placement of the dredged sediments in an upland confined disposal fill (CDF) (monofill) site, where they would be contained and isolated. The number of project reaches for which remediation alternatives will be developed will be determined as described previously.

3.2.4 Preparation of Final Report

After the Council has reviewed the draft report, we anticipate that a meeting will be held at which Foster Wheeler Environmental will present the results contained in the draft report and respond to preliminary oral comments from the Council. After this meeting, the Council will finalize its comments and provide them in writing to the USFWS. Foster Wheeler Environmental will prepare a final draft report incorporating the Council's comments. The final draft will then be submitted to the Council for review and concurrence or inclusion of any final comments. The final report will then be submitted to the Council for approval. After the report is approved, it will be distributed in accordance with the Council's instructions.

4. SCHEDULE

Foster Wheeler Environmental proposes the following preliminary schedule for the remaining tasks in the Work Plan and additional phases described above. Once agreed upon by USFWS, we will finalize the schedule and update it as activities are completed or as necessary changes are made. Assuming we get notice to proceed and funding by the end of March 2002, the estimated completion dates for the proposed activities are:

ACTIVITY	ESTIMATED COMPLETION DATE
Received Updated MacDonald Database	January 4, 2002
Received Digital Ortho Quads (Aerials)	January 4, 2002
Complete draft FSP/QAPP/HASP	April 26, 2002
Complete final FSP/QAPP/HASP	May 10, 2002
Begin Bathymetric Survey, Sediment Coring and Testing	May 17, 2002
Complete Bathymetric Survey	May 24, 2002
Complete Sediment Coring	June 5, 2002
Complete Bathymetric Data Evaluation	June 21, 2002
Complete Sediment Testing	August 2, 2002
Sediment Characterization Report	September 6, 2002
Submit Draft Restoration Alternative Criteria	September 27, 2002
Finalize Restoration Alternative Selection Criteria	October 25, 2002
Complete Engineering Base Maps	November 8, 2002
Submit Four Alternatives for Application to Project Reaches	December 6, 2002
Develop Cost Estimate and Conduct Alternatives Analysis	January 17, 2003
Submit Draft Report	February 14, 2003
Review Draft Report	February 28, 2003
Submit Final Report	March 21, 2003
Review Final Report	April 4, 2003

ATTACHMENT A

SITE BIBLIOGRAPHY

ATTACHMENT A
SITE BIBLIOGRAPHY

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ATTACHMENT B

PHOTOGRAPHIC LOG

SITE VISIT ON DECEMBER 11, 2001

[See Attachment B File for copy of Photos]

ATTACHMENT C

SAMPLING STATION MAPS FOR SURFICIAL AND SUBSURFACE SEDIMENT CHEMISTRY, WEST BRANCH GRAND CALUMET RIVER (FROM MACDONALD ENVIRONMENTAL SERVICES, LTD.)

[See Attachment C File for copy of Maps]

ATTACHMENT D

PROPOSED EVALUATION CRITERIA

ATTACHMENT D
PROPOSED EVALUATION CRITERIA

Specific evaluation criteria were developed for the category of contaminated sediment management as specified in the Grand Calumet River Interim Restoration Determination Plan (IRDCP) (IDEM et al., 1998). Category-specific criteria were identified to ensure that the evaluation of alternatives remained focused on key considerations. Category-specific criteria are divided into two groups: threshold and ranking. Threshold criteria represent the requirements the alternative must satisfy to comply with statutory mandates, or may satisfy in accordance with state and federal policies, procedures, or other factors in order for the alternative to be considered for the selected remedy. The alternatives that meet the threshold criteria are then analyzed based on the ranking criteria. Ranking criteria take into account technical, cost, environmental, and risk concerns, providing relative measures by which actions can be compared and evaluated.

The evaluation of alternatives is intended to be consistent with current federal regulatory guidelines. In particular, the category-specific criteria developed by the trustees are intended to include and go beyond the evaluation criteria specified by the Department of the Interior's regulations for natural resource damage assessment (NRDA) (43 CFR Part 11) (DOI 1994).

The management of contaminated sediment category-specific criteria from the IRCDP are:

- Threshold Criteria
  * Does the project clearly address injuries to natural resources or losses of natural resource services?
  * Does the project comply with applicable federal, state, and tribal laws and regulations?
  * Is there general public support for implementation of the project?

- Ranking Criteria
  * Is the project technically feasible?
  * Will the project cause collateral injuries or other undesirable short-term impacts?
  * Can the project provide the desired habitat improvements within I reasonable time frame
  * Are the resource-based benefits of the project reasonable relative to the project's cost,? Is the project Consistent or Compatible with ongoing or planned response activities?
  * Will tile project simultaneously achieve one or more of the objectives defined under a comparable restoration effort?

The 1RCDP incorporates, by reference, the other NRDA criteria not explicitly stated above.

- These additional criteria include:
  * Are the resources able to recover with or without alternative actions?
  * What are the potential effects of the project on human health and safety?
  * What is the natural recovery period?
  * Is the project cost effective?
  * Is the project consistent with relevant federal, state, and tribal policies?

The individual criteria are discussed in more detail below. The criteria and their components are presented in Table D-1.

Does the project clearly address injuries to natural resources or losses of natural resource services?

This criteria assesses if the alter-native restores, rehabilitates, replaces, or acquires the equivalent of the natural resources and natural resource services that have been injured. Alternatives are evaluated to determine if they restore or rehabilitate the injured resources to their baseline condition. This is measured in terms of the physical, chemical, or biological properties that the injured resources would have exhibited or the services that would have been provided by those resources had the discharge of oil or release of hazardous substance under investigation not occurred. Alternatives are also evaluated to determine if they replace or acquire the equivalent of the natural resource or natural resource service with a resource that provides the same or substantially similar services.

Does the project comply with applicable federal, state, and tribal laws and regulations?

Alternatives are assessed to determine whether they will comply with relevant federal, state, and tribal laws and regulations. Applicable laws and regulations may include the Clean Witter Act, Clean Air Act, Endangered Species Act as amended, Resource Conservation and Recovery Act, and the National Environmental Policy Act.

Is there general public support for implementation or the project?

This criterion addresses the public's concerns, if any, for each alternative.

Is the project technically feasible?

This evaluation criterion is used to measure the technical feasibility of an alternative. The technology and management skills necessary to implement an alternative should be well known and each element of the alternative should have a reasonable chance of successful completion in an acceptable period of time. Feasibility includes the ability and time required to obtain any necessary approvals from agencies.

Will the project cause collateral injuries or other undesirable short-term impacts?

This criterion evaluates the potential for additional injury to the injured resources or other resources resulting from the proposed alternative, including long-term and indirect impacts. For example, will sediment removal activities impact functioning aquatic or riparian communities?

Can the project provide the desired habitat improvements within a reasonable timeframe?

The estimated amount of time needed for recovery based on completion of each alternative will be compared to the amount of time needed for natural recovery if no restoration, rehabilitation, replacement, and/or acquisition of equivalent resource efforts are undertaken beyond response actions performed or anticipated. The time estimate will be based on the best available information and, where appropriate, may be based on costeffective models.

Are the resource-based benefits of the project reasonable relative to the project's cost?

This evaluation criterion is used to assess the relationship of the expected cost of the proposed alternative to the expected benefits from the restoration, rehabilitation, replacement, and/or acquisition of equivalent resources. This criterion addresses the costs associated with the alternative, including direct capital costs (i.e., construction, equipment, land, services), indirect capital costs (i.e., engineering, contingency), long term monitoring costs, and operation and maintenance costs. An evaluation methodology that takes into account project costs and quantifiable and non-quantifiable benefits will be developed. For example, a sediment quality index that measures toxicity to sediment - dwelling organisms may be used to quantify restoration benefits related to sediment management. An example of a non-quantifiable benefit Is lifting tile recreational fishing advisory.

Is the project consistent or compatible with ongoing or planned response activities?

This criterion evaluates the alternatives in conjunction with the results of any actual or planned response actions. Alternatives should be in addition to response actions completed or anticipated pursuant to the National Contingency Plan.

Will the project simultaneously achieve one or more of the objectives defined under a comparable restoration effort?

This criterion evaluates the effects of implementing the alternatives on other restoration efforts. For example, it would evaluate how they will affect the development and implementation of the Remedial Action Plan for the International Joint Commission's Grand Calumet Area of Concern.

Are the resources able to recover with or without alternative actions?

This criterion evaluates the likelihood that the injured natural resources will recover with or without implementing the alternative. For example, what is the likelihood that the Grand Calumet River will return to its natural state if the contaminated sediment is not removed?

What is the natural recovery period?

Alternatives are evaluated relative to the time needed for the injured resource to recover if no restoration, replacement, and/or acquisition of equivalent resource efforts are undertaken beyond response actions performed or anticipated. This time period is used as the "No Action-Natural Recovery" period in the alternatives evaluation.

What are the potential effects of the alternative on human health and safety?

This evaluation criterion is used to measure how an alternative will achieve and maintain human health and safety. It assesses whether the risk posed to humans is eliminated, reduced, or controlled through each pathway by natural recovery, treatment, engineering, or institutional controls. This criterion also addresses the short-term risks posed to the community during implementation of an alternativc and the potential effects on workers during remedial action.

Is the alternative cost effective?

This evaluation criterion is used if two or more alternatives provide the same or a similar level of benefits. When this occurs, the least costly alternative that provides that level of benefits will be selected.

Is the project consistent with relevant federal, state, and tribal policies?

Alternatives are assessed to determine whether they are consistent with relevant federal, state, and tribal policies. The first step in assessing this criterion is to identify the relevant policies.

Table D-1. Detailed Evaluation Criteria

Group	Evaluation Criteria	Criteria Component
Threshold criteria	Does the project clearly address injuries to natural resources or losses of natural resource services?	Has the injured resource been restored to baseline conditions? Have any recreational or economic opportunities generated by the resource been restored?
	Does the project comply with applicable federal, state, and tribal laws and regulations?	What are the applicable federal, state, and tribal laws? Do all aspects of the alternative comply with these laws?
	Is there general public support for the implementation of the project?	Have any comments from the public been addressed and/or incorporated into the alternative?
Ranking criteria	Is the project technically feasible?	Are the technical components of the alternative implementable? What is the timeframe for resource restoration? Does each element of the alternative have a reasonable chance of successful completion?
	Will the project cause collateral injuries or other undesirable short-term impacts?	Will there be any long-term or indirect impacts to the injured resource? Will there be any long-term or indirect impacts to other resources?
	Can the project provide the desired habitat improvements within a reasonable timeframe?	What is the duration of the alternative? Is that duration reasonable?
	Are the resource-based benefits of the project reasonable relative to the project's cost?	What are the direct capital costs and indirect capital costs of the alternative? Will there be any long-term costs or operation and maintenance costs? What is the total net present value of the injured resource?

Table D-1. Detailed Evaluation Criteria

Group	Evaluation Criteria	Criteria Component
Ranking criteria (continued)	Is the project consistent or compatible with ongoing or planned response activities?	What other response activities are ongoing or planned? Do the projects complement or hinder each other?
	Will the alternative simultaneously achieve one or more of the objectives defined under a comparable restoration effort?	Is any component of the alternative beneficial to other projects in the area?
Other NRDA criteria	Are the resources able to recover with or without alternative actions?	What is the likelihood that the injured resources will return to baseline conditions without any alternative actions?
	What are the potential effects of the alternative on human health and safety?	Does the alternative expose people to chemical or physical risk? If so, what is the magnitude of the risk? Can the risk be mitigated?
	What is the natural recovery period?	What is the time needed for the injured resource to recover if no restoration, replacement, and/or acquisition of equivalent resource efforts are undertaken beyond response actions?
	Is the alternative cost effective?	Do other alternatives provide the same or similar level of benefits? If so, which is the least costly?
	Is the project consistent with relevant federal, state, and tribal policies?	What are the applicable federal, state, and tribal policies? Do all aspects of the alternative comply with these policies?