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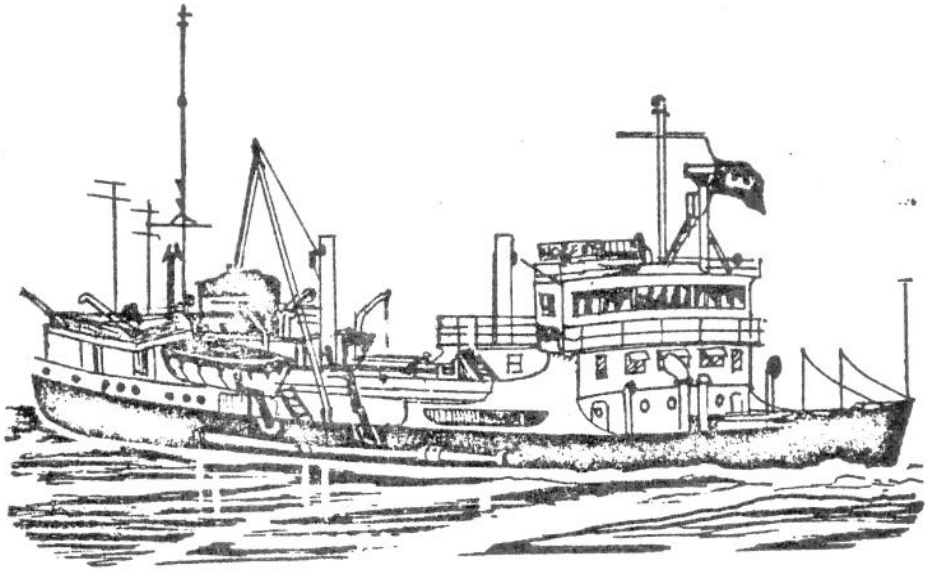
FINAL ENVIRONMENTAL IMPACT STATEMENT

relating to

OPERATION, MAINTENANCE, AND
DREDGED MATERIAL DISPOSAL
at

GREEN BAY HARBOR

WISCONSIN



prepared by

Department of the Army
Chicago District, Corps of Engineers
219 South Dearborn Street
Chicago, Illinois 60604

NOVEMBER 1977

SUMMARY

OPERATION, MAINTENANCE, AND

DREDGED MATERIAL DISPOSAL

AT GREEN BAY HARBOR, WISCONSIN

( ) DRAFT ENVIRONMENTAL STATEMENT (X) FINAL ENVIRONMENTAL STATEMENT

RESPONSIBLE OFFICE: Colonel Andrew C. Remson, Jr.
District Engineer
U. S. Army Engineer District, Chicago
219 S. Dearborn Street
Chicago, Illinois 60604
(312) 353-6509

1. NAME OF ACTION: (X) Administrative ( ) Legislative

2. DESCRIPTION OF ACTION: This Environmental Impact Statement was prepared by the U. S. Army Corps of Engineers, Chicago District, to fulfill the requirements of the National Environmental Policy Act of 1969 (NEPA) and the Department of the Army, Engineers Regulation 1105-2-507, "Planning, Preparation, and Coordination of Environmental Statements," which requires an independent assessment of the environmental impacts associated with the operation and maintenance of the Green Bay Harbor Federal Navigation Project. Periodic maintenance dredging is to be performed at Green Bay Harbor to remove shoaled materials from the navigation channel. It is anticipated that 1,200,000 cubic yards of sediments classified as unsuitable for unrestricted disposal by Region V, U. S. Environmental Protection Agency will be removed during an eight year period after 1978. A confined disposal facility for this dredged material, with an incorporated effluent filter, will be constructed on a 55 acre water site in Green Bay approximately 800 feet off-shore of Bay Beach Park in the city of Green Bay. A previous "Final Environmental Impact Statement, Maintenance Dredging and Contained Disposal of Dredged Materials at Green Bay Harbor, Wisconsin," was filed with the Council on Environmental Quality on 10 November 1976 to cover periodic dredging and disposal operations at Green Bay Harbor utilizing the Bayport site.

3. (A) ENVIRONMENTAL IMPACTS: The proposed operation, maintenance and disposal of dredged material at Green Bay Harbor would:

(1) Provide for continued safe navigation and use of harbor facilities by commercial and recreational vessels.

revised 11/3/77

(2) Provide for continued growth potential for harbor-related businesses in the Green Bay Harbor area.

(3) Provide for the confinement of polluted sediments in a diked confined disposal facility which, upon completion, is proposed to become a wildlife sanctuary and off-shore breakwater for a proposed future small-boat harbor.

(B) ADVERSE ENVIRONMENTAL EFFECTS: The adverse environmental effects for which no ameliorative action is practical considering the balancing of economic, environmental, social, and other considerations are as follows:

(1) Temporary effects on air quality and aesthetics in the harbor area during all phases of the proposed operation and maintenance activities due to the release of air pollutants, the generation of noise and odors, and the presence of the maintenance equipment.

(2) Temporary, minor inconveniences to users of the harbor during all phases of the proposed operation and maintenance activities.

(3) Temporary effects on water quality during dredging operations including resuspension of bottom sediments and increased turbidity levels.

(4) Temporary disruption and some permanent loss of aquatic and benthic communities within the shoaled portions of the harbor requiring dredging.

(5) Temporary disturbance of fish and wildlife populations during dredging operations. The magnitude of this impact is dependent upon the time of year dredging takes place.

(6) Permanent loss of 55 acres of aquatic habitat in Green Bay due to the construction of the confined disposal facility.

4. ALTERNATIVES TO THE PROPOSED ACTION:

(A) Discontinue Federal Maintenance Activities (No Action)

(B) Control of Erosion

(C) Alternate Dredging Equipment

(D) Maintaining Alternate Channel Dimensions

(E) Open Water Disposal of Dredged Material

(F) Chemical Treatment of Dredged Material

(G) Control of Sediment Pollutants

(H) Alternate Confined Disposal Facility Sites

(I) Other Alternative Dredged Material Disposal Methods

5. COMMENTS REQUESTED: The Federal, state and local agencies listed below were asked to comment on the Draft Environmental Impact Statement. Other agencies, groups, and individuals that were sent copies of the DEIS are listed on the mailing list following this summary.

Advisory Council on Historic Preservation
U. S. Dept. of Agriculture
U. S. Dept. of Commerce
U. S. Dept. of Health, Education, and Welfare
U. S. Dept. of Housing and Urban Development
U. S. Dept. of the Interior
U. S. Dept. of Transportation
U. S. Environmental Protection Agency
State of Wisconsin
  Office of the Governor
  State Historic Preservation Officer
  Department of Natural Resources
  State A-95 Clearinghouse, Bureau of the Budget
  Dept. of Local Affairs and Development
  Dept. of Transportation
  Bay-Lake Regional Planning Commission
  Green Bay-Brown County Planning Commission
  Brown County Board of Harbor Commissioners
  Mayor, City of Green Bay
  Mayor, City of DePere

6. COMMENTS RECEIVED: Comments on the DEIS were received from the following agencies. These comments have been included in the Comment/Response portion of Section 9.

U. S. Dept. of Agriculture
U. S. Dept. of Commerce
U. S. Dept. of the Interior
U. S. Environmental Protection Agency
State of Wisconsin
  State Historic Preservation Officer
  Dept. of Natural Resources
  Dept. of Transportation
  Green Bay - Brown County Planning Commission
  Fox Valley Water Quality Planning Agency

Draft Statement to CEQ 15 July 1977
Final Statement to CEQ _____

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Protection Commission
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Green Bay, Wisconsin 54301

WLUK - TV
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Green Bay, Wisconsin 54304

WNFL Radio Station
P.O. Box 520, Bellevue Road
Green Bay, Wisconsin 54305

WBAY - TV - AM FM
115 South Jefferson Street
Green Bay, Wisconsin 54301

Crane / Form Publ.
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Green Bay, Wis. 54301

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Green Bay, Wis. 54306
ATTN: Bill Meindl

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In School
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Green Bay Press Gazette
Walnut & Madison Streets
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DePere, Wisconsin 54115

The Daily News
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Green Bay, Wisconsin 54303

Fort Howard Paper Co.
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Green Bay, Wis. 54301
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FINAL ENVIRONMENTAL IMPACT STATEMENT

relating to

OPERATION, MAINTENANCE, AND DREDGED
MATERIAL DISPOSAL AT
GREEN BAY HARBOR, WISCONSIN

Prepared in Accordance with Section 102(2)C
of the National Environmental Policy Act of 1969
Public Law 91-190

1. PROJECT DESCRIPTION

1.1 Location

1.1.1 The Green Bay Harbor Federal navigation project is located in the southern portion of Green Bay and extends up the Fox River to a location just downstream of DePere lock and dam. This area represents the terminus of an extensive midwestern drainage system consisting of the Fox River watershed which drains 6,443 square miles, the Wolf River watershed which drains 3,782 square miles to the Fox River, and Green Bay which is actually a part of Lake Michigan. The existing navigation project consists of an entrance channel approximately 13 miles long in Green Bay, a channel approximately 7 miles long in the Fox River, and three turning basins.

1.2 Authorization

1.2.1 The work under consideration in this Environmental Impact Statement (EIS) is the periodic maintenance of the completed channels that comprise the authorized Green Bay Harbor Federal navigation project and the construction, operation, and maintenance of a confined disposal facility of sufficient capacity to contain an eight year period of dredged material classified by the Administrator of the U. S. Environmental Protection Agency (USEPA) as unsuitable for unrestricted open-lake disposal (Appendix B). The confined disposal facility under consideration in this EIS has been designed with a capacity for an eight year dredging period as the first two years of the ten year confined disposal period called for in Public Law 91-611 (Appendix C) were provided by the Bayport diked disposal area. Use of the Bayport diked disposal area was considered in a previously issued Final EIS (May 1976) on maintenance activities at Green Bay Harbor. The existing Federal navigation project at Green Bay was authorized by the River and Harbor Acts of 23 June 1866, 13 July 1892, 26 June 1910, 8 August 1917, 3 March 1925, 30 August 1935, 26 August 1937, 2 March 1945, and 23 October 1962. The construction, operation, and maintenance of the confined disposal facilities was authorized by Section 123 of the River and Harbor Act of 1970 (PL 91-611, Appendix C).

1.3 History of the Project

1.3.1 Improvement of the harbor by the Federal Government began in 1867 when dredging was performed to cut a channel through a sand bar that blocked the entrance to the mouth of the Fox River. With this improvement, and later modifications of the project that provided for straightening, widening and deepening the channels, the harbor kept pace with the growing commerce of the area. The existing Federal project, as shown on Figure 1-1, was essentially completed in 1973, except for the inactive portion which consists of dredging from 150 feet downstream of the second C&NW Railway bridge through and to 1,700 feet upstream of the bridge (paragraph 1.4.1d). In August 1977, the Chicago District recommended that this portion be reclassified to active status by the Chief of Engineers. Assuming the project is reactivated and the Congress eventually appropriates funds to review the economic feasibility of construction, a separate environmental impact analysis will be completed for this portion of the project.

1.4 Authorized Project Features

1.4.1 The authorized Federal navigation project for Green Bay provides for the following:

a. An entrance channel in Green Bay 26 feet deep for a distance of about 11 1/4 miles from the 26-foot depth contour in the Bay to Grassy Island at widths of 500 feet to Long Tail Point Light then 300 feet wide to Grassy Island;

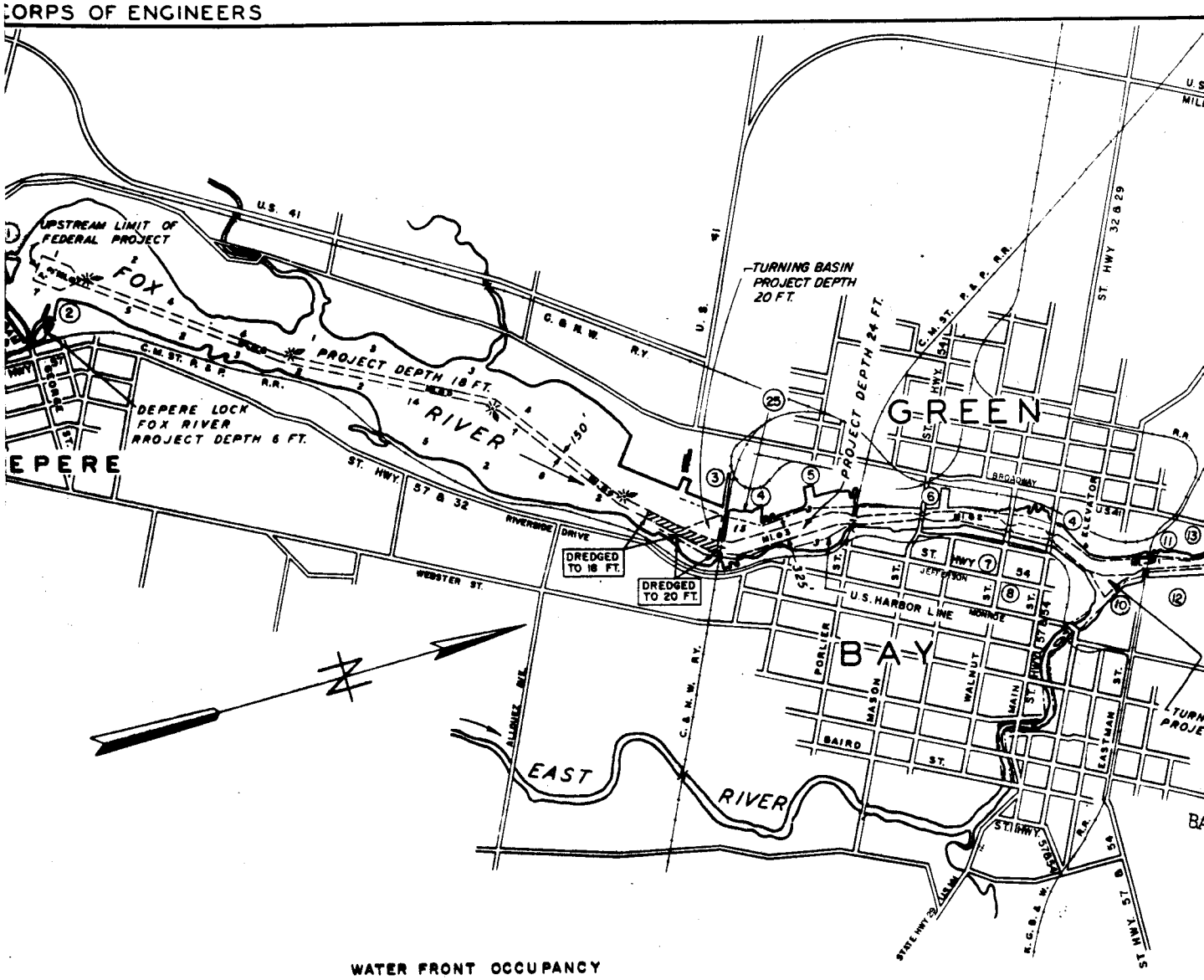
b. An entrance channel and river channel 24 feet deep and 300 feet wide from Grassy Island to a point about 1/2 mile upstream from the mouth of the Fox River;

c. A Fox River channel 24 feet deep at varying widths to a point 1,700 feet upstream from the Chicago & North Western Railway (C&NW) bridge near the mouth of the Fox River;

d. A Fox River channel 18 feet deep and 150 feet wide to the City of DePere with a turning basin at the upper end. The authorized depth of this reach has not been maintained since 1968 due to lack of usage by vessels requiring the 18-foot depth. If future shoaling in this reach develops to the point where existing traffic is in danger of being impeded, the depth required for that traffic will be maintained.

e. A turning basin 24 feet deep at the mouth of the East River;

f. A turning basin 20 feet deep just above the second C&NW Railway bridge (Figure 1-1).

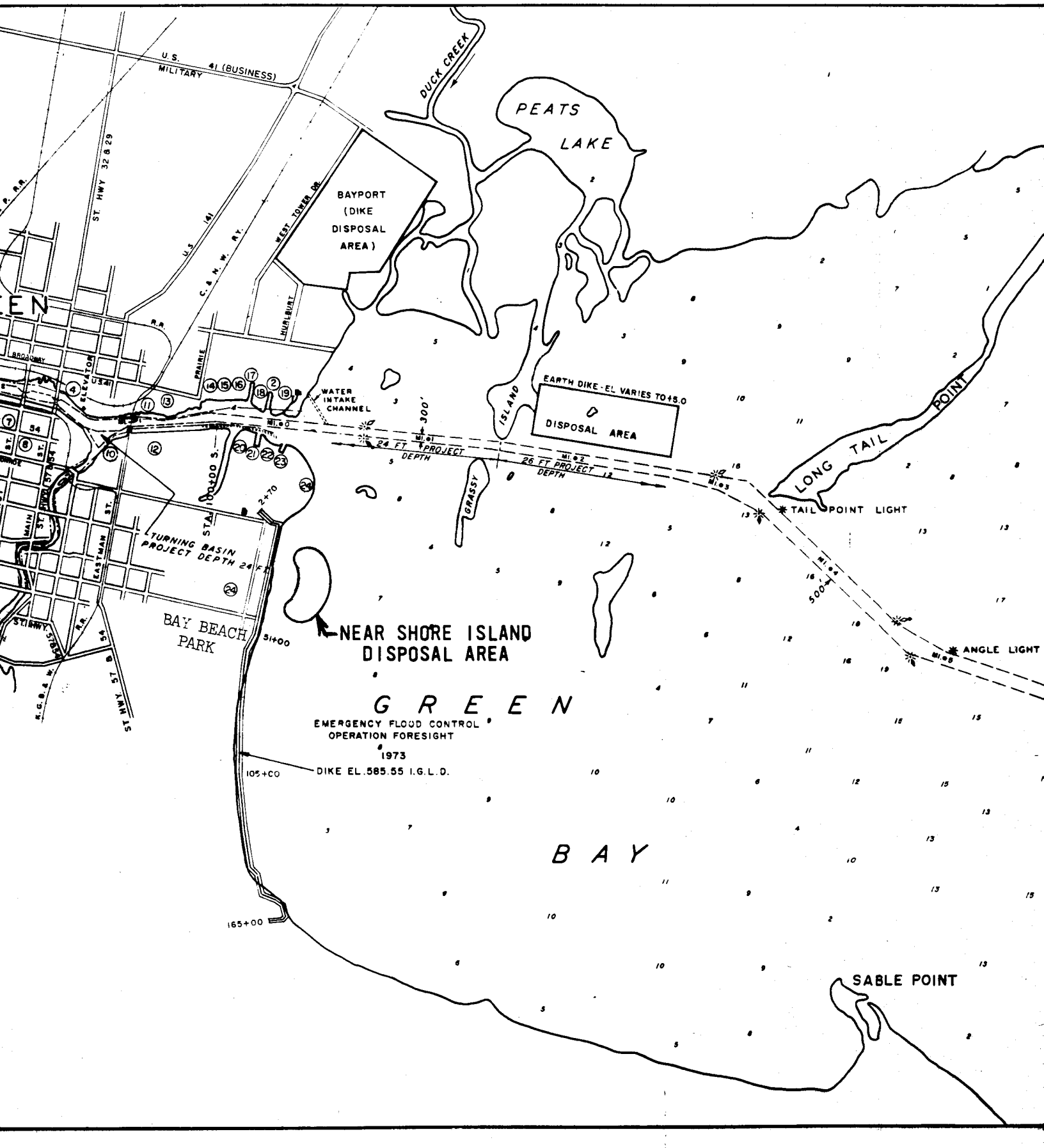


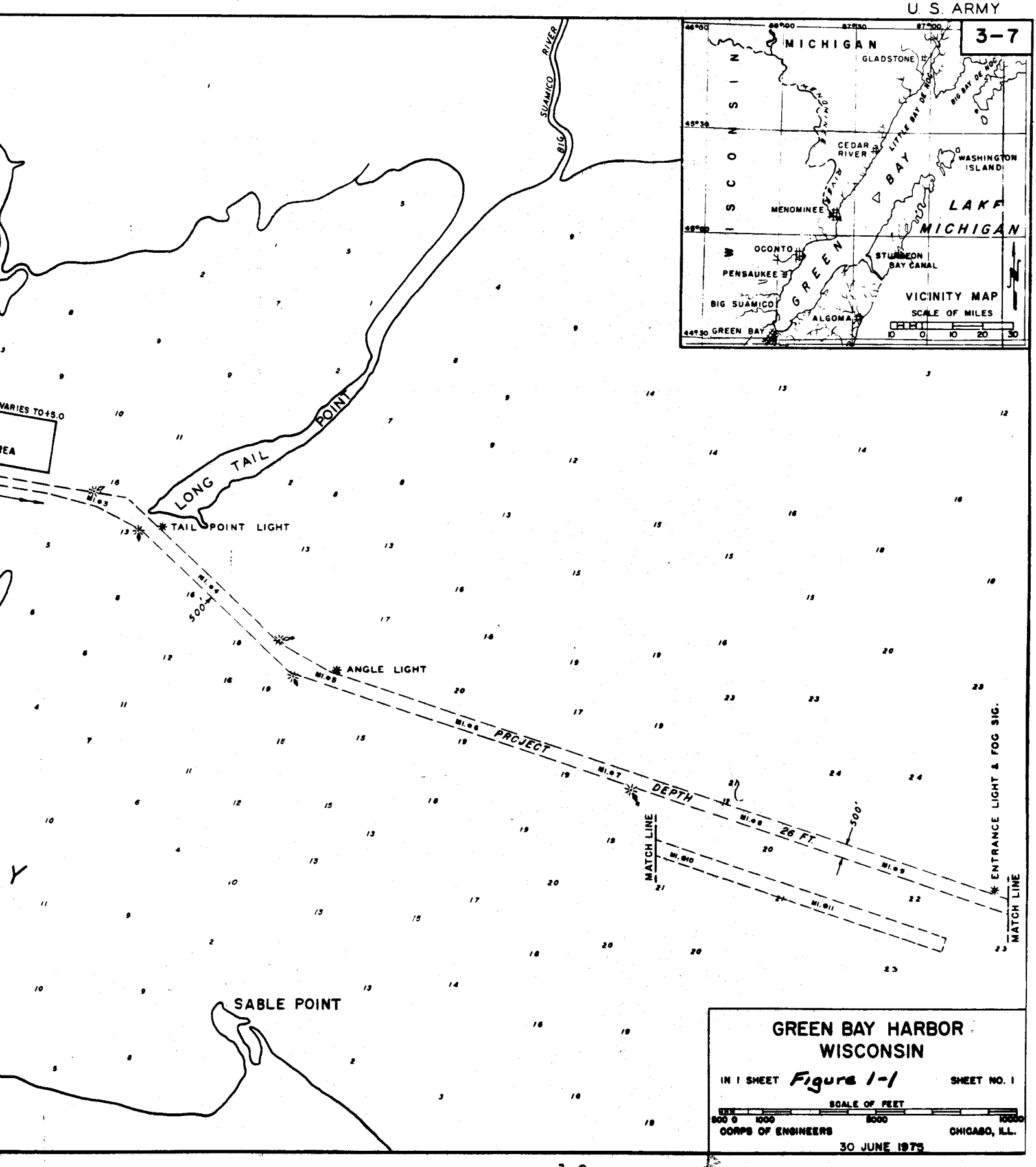
WATER FRONT OCCUPANCY

1. NICOLET PAPER CORP.
2. NORTHWESTERN HANNA
3. FORT HOWARD PAPER CO.
4. LEIGHT TR. & STORAGE CO.
5. HURON CEMENT
6. C. REIS COAL CO.
7. COUNTY COURT HOUSE
8. CITY HALL
9.
10. AMERICA CAN CO.
11. UNIVERSAL ATLAS CEMENT CO.
12. CHARMIN PAPER CO.
13. AMERICAN OIL CO.
14. MOBIL OIL CO. INC.
15. CITIES SERVICE OIL CO.
16. F. HURLBUT CO.
17. CLARK OIL & REFINING
18. GUSTAFSON OIL CO.
19. WISCONSIN PUBLIC SERVICE CORP.
20. TEXACO INC.
21. PHILIPS PETROLEUM CO.
22. SINCLAIR REFINING CO.
23. GREEN BAY YACHT CLUB
24. Mc DONALD LUMBER CO.
25. SHELL OIL CO. INC.

WORK REMAINING TO BE DONE SHOWN THUS: ////

PROJECT DEPTHS AND SOUNDINGS
ARE REFERRED TO LOW WATER DATUM
576.8 FEET ABOVE MEAN WATER LEVEL
AT FATHER POINT, QUEBEC. I.G.L.D. (1955)
(INTERNATIONAL GREAT LAKES DATUM)


U.S. 41 (BUSINESS)
MILITARY
DUCK CREEK
PEATS
LAKE
BAYPORT
(DIKE
DISPOSAL
AREA)
ST. HWY 32 & 29
U.S. 141
C. & N. W. RY.
WEST TOWER DR.
HURLBURT
PRAIRIE
BROADWAY
ELEVATOR
U.S. 41
WATER
INTAKE
CHANNEL
EARTH DIKE - EL VARIES TO +15.0
DISPOSAL AREA
ISLAND
300'
MI. 0
MI. 1
MI. 2
MI. 3
24 FT PROJECT DEPTH
26 FT PROJECT DEPTH
LONG TAIL POINT
TAIL POINT LIGHT
GRASSY
100+00 STA.
2+70
TURNING BASIN
PROJECT DEPTH 24 FT
MAIN ST.
EASTMAN ST.
ST. HWY. 57 & 54
R.R.
BAY BEACH
PARK
31+00
NEAR SHORE ISLAND
DISPOSAL AREA
500'
MI. 4
MI. 5
ANGLE LIGHT
G R E E N
EMERGENCY FLOOD CONTROL
OPERATION FORESIGHT
1973
105+00
DIKE EL. 585.55 I.G.L.D.
B A Y
165+00
SABLE POINT



GREEN BAY HARBOR
WISCONSIN

IN 1 SHEET Figure 1-1 SHEET NO. 1

SCALE OF FEET

500 0 1000 5000 10000

CORPS OF ENGINEERS CHICAGO, ILL.

30 JUNE 1975

1.5 Maintenance Activities

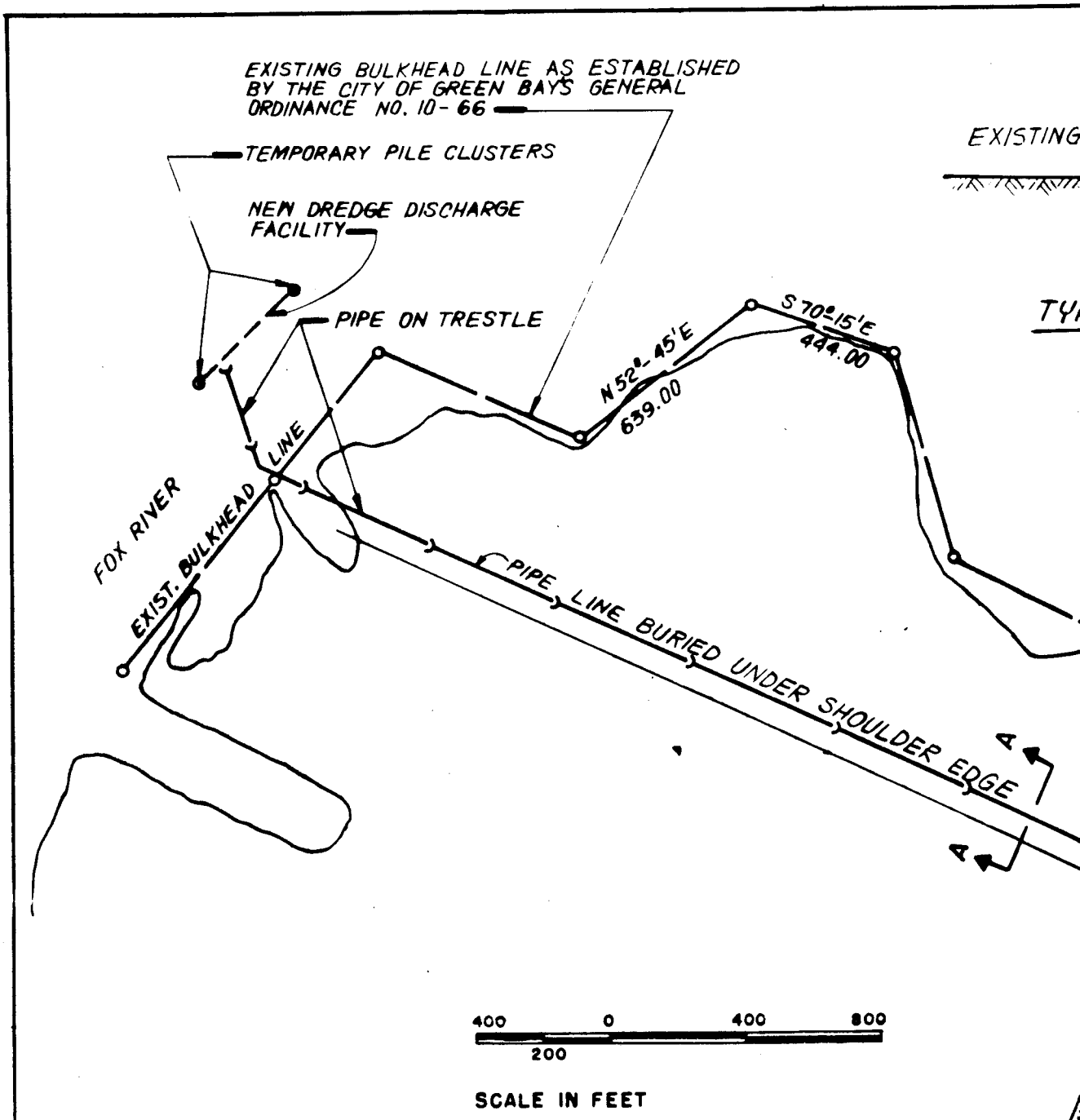
General

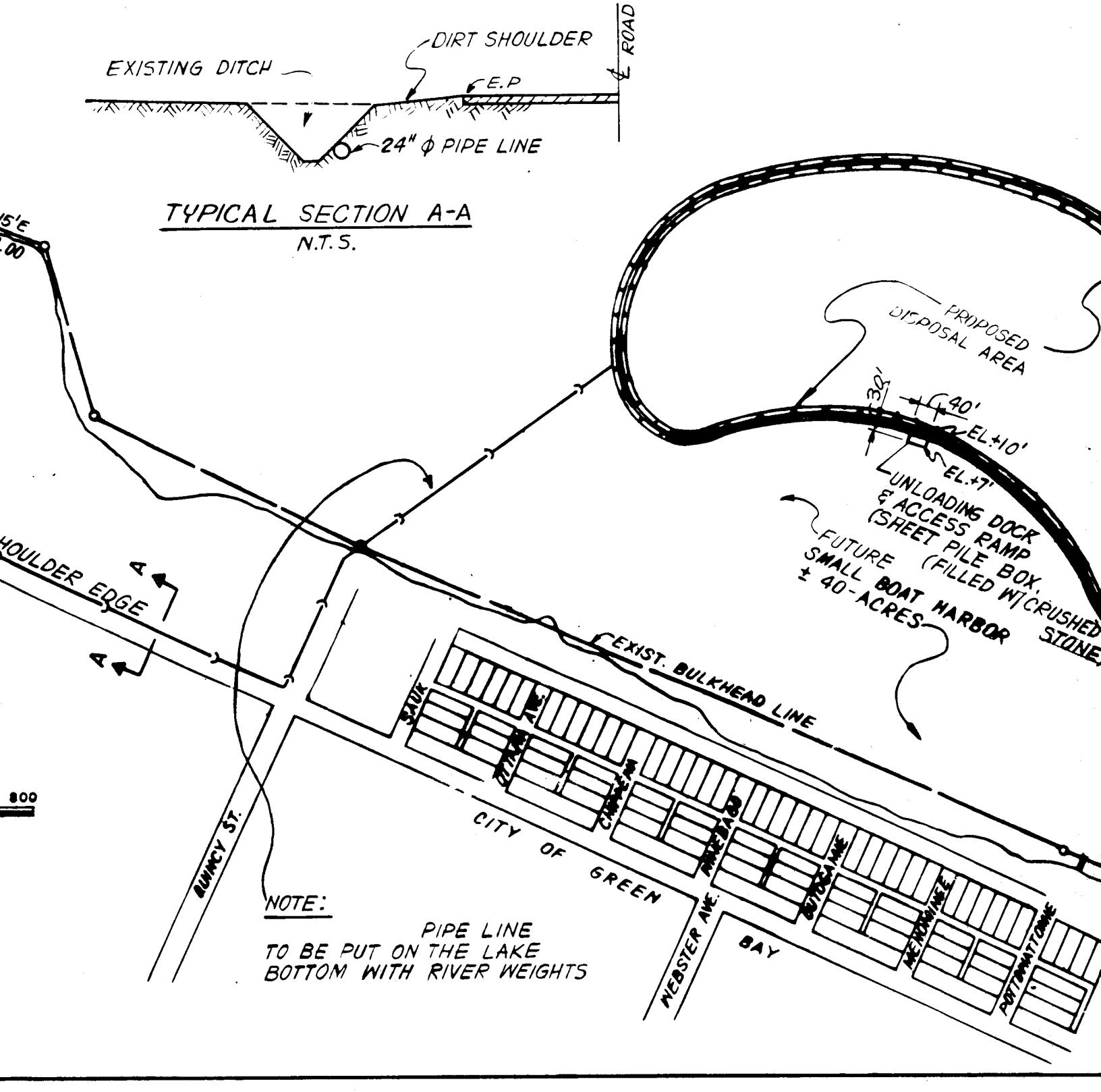
1.5.1 Based upon the Chicago District's past experience at Green Bay Harbor, and at similar Great Lakes' harbors, it is expected that maintenance activities will consist of various standard maintenance tasks performed with the objective of maintaining adequate water depths in the project channels and turning basins. The following sections generally describe harbor maintenance methods, equipment, and dredged material disposal methods that are expected to be used at Green Bay Harbor. Further descriptions of the various maintenance operations and vessels that may be employed at Green Bay Harbor are presented in Appendix D, Maintenance Equipment and Methods, and in Appendix E, Confined Disposal Facilities-Construction and Operation.

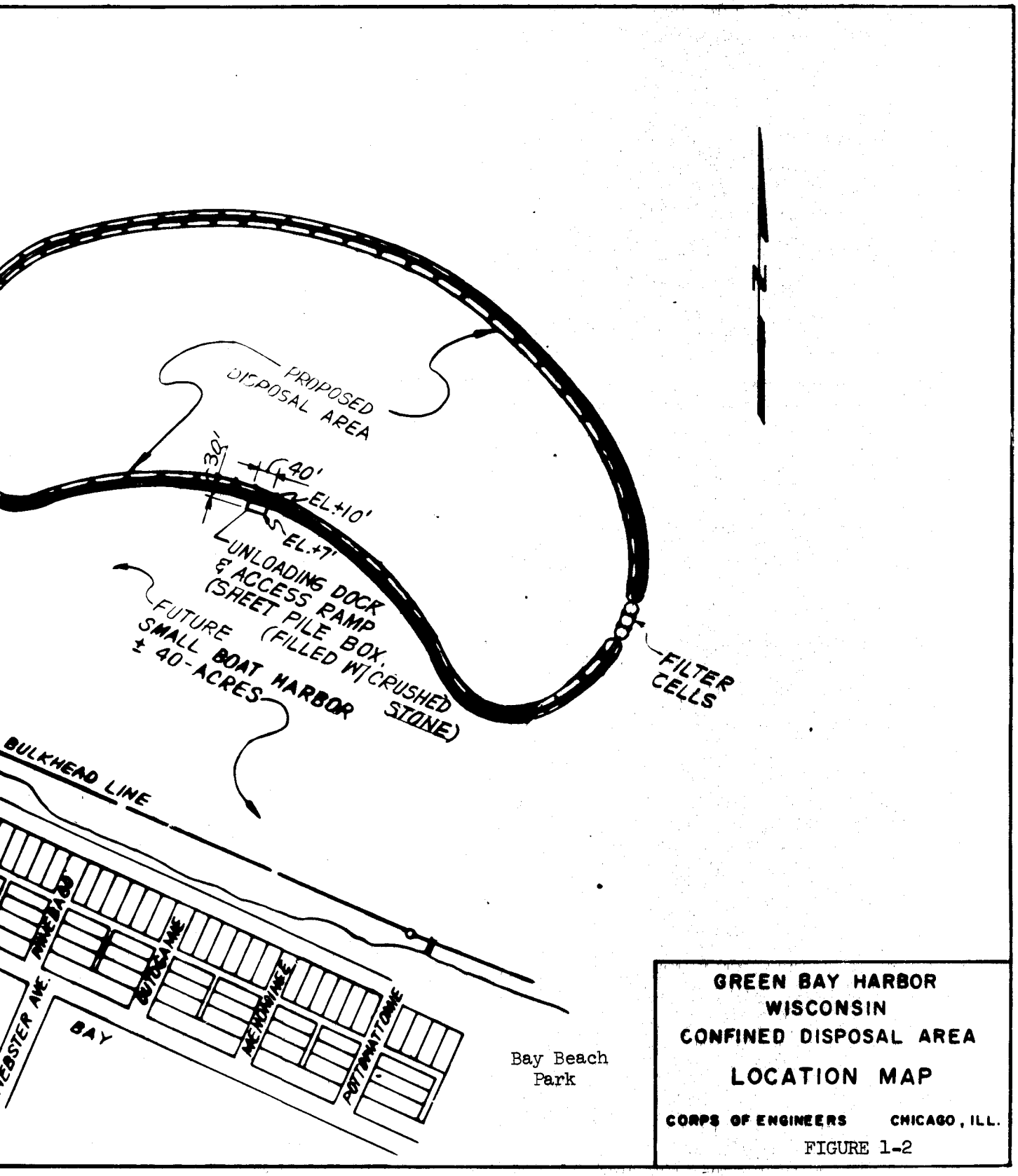
Channel Maintenance (Dredging)

1.5.2 The need for channel maintenance in the form of dredging arises from the periodic buildup of shoal areas in navigation channels that decrease available water depths to less than those desired. At the present time, much of the sediment being deposited in the harbor channel is from siltation in the watershed, municipal wastes, sloughage of channel sides and some littoral sand in the outer portions of the entrance channel. The sediments to be dredged from the channel have been classified by the USEPA, as being unsuitable for open-water disposal and will therefore be placed in a confined disposal area to be built as a nearshore island in Green Bay (Figures 1-1, 1-2). Maintenance dredging is mostly required in the harbor channel reach from a point in the Fox River about 3-1/2 miles upstream from the mouth to a point in the entrance channel in Green Bay that is about 4 miles bayward of the Fox River mouth. The average volume of dredged material to be dredged is expected to be about 140,000 cubic yards (cys) annually. Dredging will probably be accomplished by a Corps of Engineers' hopper dredge (Appendix D) that will convey the dredged material collected in onboard hoppers via a pumpout facility and pipeline on the eastern shore at the mouth of the Fox River to the nearshore island confined disposal facility (Figure 1-2). Maintenance dredging was last performed in 1977 and is proposed for 1979 with dredged material placement in the existing Bayport land disposal area along the shore of Green Bay immediately west of the mouth of the Fox River. It is estimated that future annual maintenance operations will take two to six weeks to complete.

1.5.3 Channel maintenance, consists of a series of specific operations that are conducted in order to locate and remove material that has entered the project channels. A sounding survey is periodically conducted at Green Bay Harbor to determine the location and amount of channel shoaling. The survey generally takes about two to three weeks to complete.


EXISTING BULKHEAD LINE AS ESTABLISHED BY THE CITY OF GREEN BAYS GENERAL ORDINANCE NO. 10-66
TEMPORARY PILE CLUSTERS
NEW DREDGE DISCHARGE FACILITY
PIPE ON TRESTLE
EXISTING
TY
N 52°-45'E
639.00
S 70°-15'E
444.00
FOX RIVER
EXIST. BULKHEAD LINE
PIPE LINE BURIED UNDER SHOULDER EDGE
A
A
400
0
400
800
200
SCALE IN FEET


EXISTING DITCH
DIRT SHOULDER
E.P
℄ ROAD
24" ϕ PIPE LINE
TYPICAL SECTION A-A
N.T.S.
PROPOSED DISPOSAL AREA
30'
40'
EL.+10'
EL.+7'
UNLOADING DOCK & ACCESS RAMP (SHEET PILE BOX, FILLED W/ CRUSHED STONE)
FUTURE SMALL BOAT HARBOR ± 40-ACRES
EXIST. BULKHEAD LINE
SHOULDER EDGE
A
A
SAUK AVE.
ZUNI AVE.
CHEROKEE AVE.
PAWNEE AVE.
BUTTE AVE.
NEZ PERCE AVE.
POTTAWATTOMIE
BUNCY ST.
CITY OF GREEN
WEBSTER AVE.
BAY
NOTE:
PIPE LINE TO BE PUT ON THE LAKE BOTTOM WITH RIVER WEIGHTS



GREEN BAY HARBOR
WISCONSIN
CONFINED DISPOSAL AREA

LOCATION MAP

CORPS OF ENGINEERS CHICAGO, ILL.

FIGURE 1-2

Shoaling information is gathered by the use of sounding equipment on a small boat. The recorded information is used to prepare charts that display channel depths in the project area. Charts showing the results of past sounding operations at Green Bay Harbor are available for review at the Chicago District Office. Sounding operations are performed by the Chicago District.

1.5.4 After the navigation channels have been surveyed, dredging activities are conducted, if necessary, to remove channel shoals that have decreased channel depths to levels that are less than desired depths. Future dredging at Green Bay Harbor is expected to continue to be done with a Corps of Engineers' hopper dredge performing the majority of the work. Some dredging may be performed by other types of dredging equipment (Appendix D) on a contract basis. For example, in 1973, dredging was accomplished in the turning basin upstream of the C&NW Railway Co. bridge with a hydraulic dredge (Appendix D). Upon completion of dredging activities, the channels are resounded to check post-work channel depths.

1.5.5 Since 1969, the majority of dredging required at Green Bay Harbor has been performed by a Corps of Engineers' hopper dredge. This hopper dredge is essentially a self-propelled ship that utilizes suction pipes equipped with drag (vacuum) heads to remove shoaled material from the channel bottom (Appendix D). The dredged material is then collected into onboard hoppers and the ship moves to a mooring site at or near the disposal facility. Other dredging equipment has been used in the past at Green Bay Harbor including dipper, hydraulic, and clamshell dredges (Appendix D). However, in the future, it is expected that a hopper dredge will do the majority of work at Green Bay Harbor with other dredge types used for limited additional dredging.

Disposal of Dredged Material

1.5.6 Shoaled sediments to be removed from Green Bay Harbor have been classified by the Administrator of the USEPA as unsuitable for open-lake disposal (Appendix B). Under Section 123 of the River and Harbor Act of 1970 (PL 91-611, Appendix C), the Corps of Engineers is authorized to construct confined disposal facilities on the Great Lakes to contain this type of dredged material. This confined disposal facility will therefore be built on a site that has been approved by all local, State, and Federal regulatory agencies and located as shown on Figures 1-1 and 1-2. Section 123 of the River and Harbor Act of 1970 also provides that the capacity of the confined disposal facilities will be sufficient to contain no more than a 10-year period of dredged material. Past experience at Green Bay Harbor has shown that approximately 140,000 cubic yards of sediments must be dredged annually to maintain required depths in the

channel. In addition, it is expected that private dredging under Department of the Army permit will total about 10,000 cubic yards annually. These private dredgings may be placed in the confined disposal facility with the private interest reimbursing the Federal Government at a fee per cubic yard, based on the proportional share of the cost of the containment structure. Therefore, the confined disposal facility has been designed with a 1,200,000 cubic yard capacity (140,000 cy of Corps' dredging annually + 10,000 cy of private dredging annually = 150,000 cy x 8-year period = 1,200,000 cy).

1.5.7 The confined disposal facility for Green Bay Harbor dredging will consist of a 55 acre "kidney-shaped" island in Green Bay about 800 feet off-shore and immediately northwest of Bay Beach Park which lies east of the Fox River mouth (Figures 1-1 and 1-2). One advantage of this site is that it creates an approximately 40-acre area of protected water suitable for future development of a small-boat harbor. Brown County, the local sponsor for the confined disposal facility (Appendix A), has stated that it would like a future small-boat harbor at this location and would use the filled disposal facility as a wildlife sanctuary available to wildlife viewers on a limited access basis. However, establishment of the island as a wildlife sanctuary or the construction of a small-boat harbor is not a part of the proposed action considered in this statement. A separate feasibility study of the small-boat harbor is being completed by the Chicago District under the authority of Section 107 of the 1960 River and Harbor Act, as amended. The future small-boat harbor study will include completion of a separate environmental impact assessment and preparation of a separate environmental impact statement.

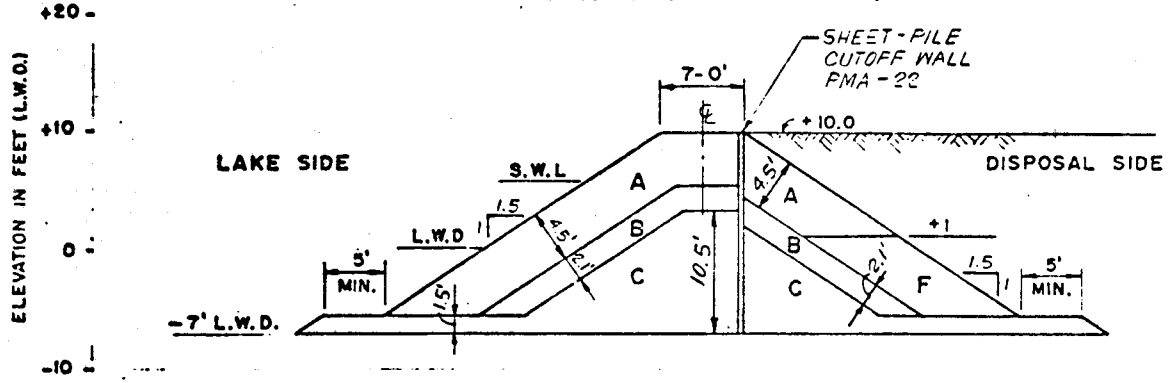
1.5.8 The confined disposal facility will require approximately two years to construct. The walls of the island will consist of graded stone dikes with a crest elevation of 10 feet above low water datum (+10LWD) with an internal steel sheet pile cutoff wall to prevent seepage of polluted materials (Figures 1-2, 1-3, and 1-4). A sand filter in a steel cellular structure (Figure's 1-2 and 1-5) will be installed in the facility wall to act as the water outlet structure and to filter the effluent from the facility prior to discharge to Green Bay. A hopper dredge pumpout facility will be constructed along the east bank of the Fox River to connect with a pipeline running from the pumpout site overland and submerged to the confined disposal facility (Figure 1-2). When the walls forming the island are completed, thereby sealing the area off from Green Bay, schools of fish may be inadvertently trapped within the disposal facility. If significant fish entrapment occurs, the Wisconsin DNR and the U. S. Fish and Wildlife Service will be contacted for possible remedial measures.

1.5.9 During hopper dredge pumpout, the pipeline will carry a slurry of approximately 80 percent water and 20 percent sediment. When this is pumped into the confined disposal facility, the excess water will

REACH I

EAST & NORTH BREAKWATER

PLAN B (OVERTOPPING)



TYPICAL SECTION

STA. 0+00 TO STA. 34+18
SCALE: 1"=10'

NOTE:
ALL STONES ARE 165 PCF
(SATURATED SURFACE DRY)

SCHEDULE OF STONES:

- A-STONE: 2 LAYERS OF 900-LBS. TO 2400-LBS. AVERAGE 1200 LBS
- B-STONE: 2 LAYERS OF 60-LB TO 240-LB AVERAGE 120-LBS.
- C-STONE: CORE STONE, 1-LB. TO 50-LB.
- F-STONE: 600 LBS TO 1200 LBS. AVERAGE 600 LBS.

GREEN BAY HARBOR
WISCONSIN
CONFINED DISPOSAL AREA

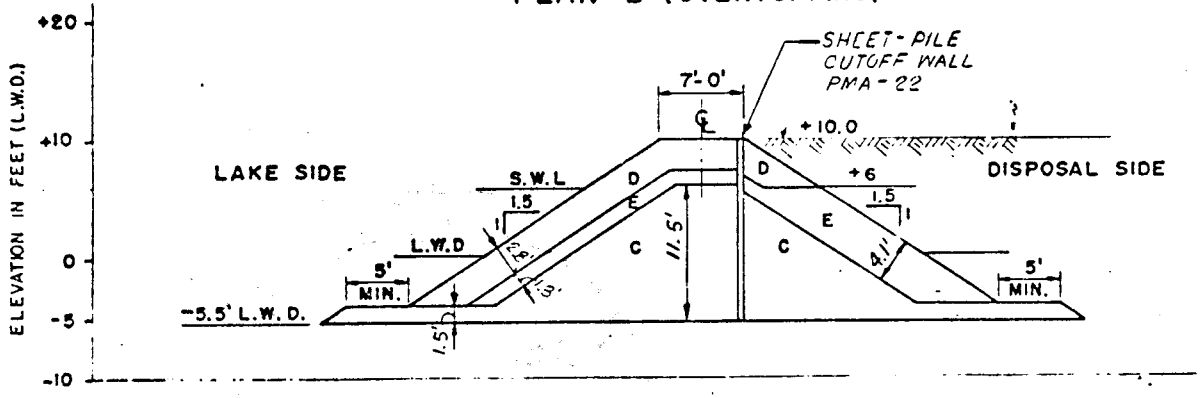
TYPICAL RUBBLE SECTION

CORPS OF ENGINEERS CHICAGO, ILL.
DECEMBER 1976 Figure 1-3
REVISED 2 SEP. 1977

REACH 2

WEST & SOUTH BREAKWATER

PLAN B (OVERTOPPING)



TYPICAL SECTION

STA. 34+18 TO STA. 64+87

SCALE: 1"=10'

NOTE:

ALL STONES ARE 165 PCF (SATURATED SURFACE DRY)

SCHEDULE OF STONES:

D-STONE: 2 LAYERS OF 230-LB TO 600-LB, AVERAGE 300-LB.

E-STONE: 2 LAYERS OF 20-LB. TO 60-LB, AVERAGE 30-LB

C-STONE: CORE STONE, 1-LB. TO 50-LB.

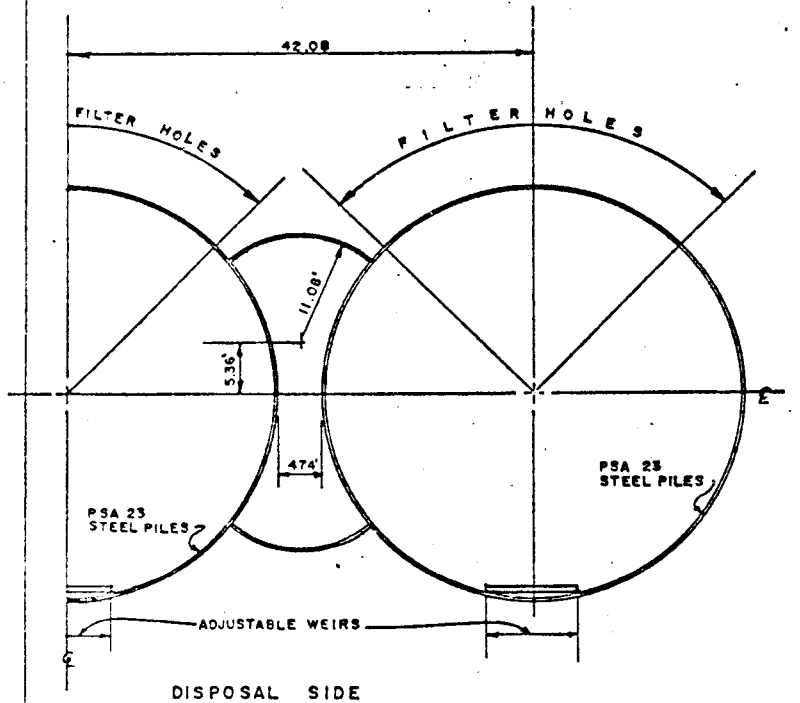
GREEN BAY HARBOR
WISCONSIN
CONFINED DISPOSAL AREA

TYPICAL RUBBLE SECTION

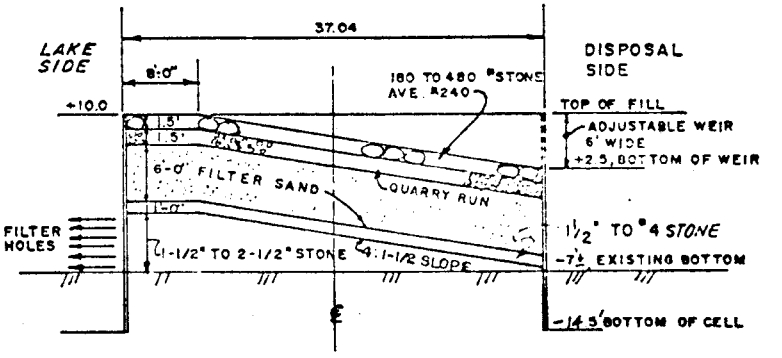
CORPS OF ENGINEERS CHICAGO, ILL.

DECEMBER 1976 Figure 1-4

REVISED 2 SEP. 1977



PLAN
NOT TO SCALE



SECTION

GREEN BAY, HARBOR
WISCONSIN
FILTER CELL
TYPICAL SECTION
CORPS OF ENGINEERS CHICAGO, ILL.
DECEMBER 1976 Figure 1-5

REVISED 2 SEPT 1977

exit through the sand filter which will prevent any sediments from entering Green Bay. A water quality monitoring plan for the facility has been developed by the Chicago District and will include sampling the facility area water quality before, during, and after disposal operations to monitor the effectiveness of the sand filter and island wall. This water quality monitoring program will include sampling of warranted physical, chemical, and biological parameters in coordination with the USEPA, the Wisconsin DNR and interested local agencies. Remedial action will be taken should the monitoring reveal any problems. Operation and maintenance of the confined disposal facility will include management techniques such as grading and establishment of sufficient drainage patterns to prevent the creation of shallow stagnant water pools as the facility reaches capacity because the pools may be conducive to mosquito breeding or incidents of waterfowl botulism.

1.5.10 Under Section 123 of the River and Harbor Act of 1970, the United States will pay 75 percent and the local sponsor will pay 25 percent of the total construction costs of the confined disposal facility. However, as possible through the Act (PL 91-611, Appendix C), the 25 percent cost to the local sponsor, Brown County, has been waived because the Administrator of the USEPA has determined that the general geographical area of the dredging project is in compliance with an approved plan for construction, modification, expansion or rehabilitation of waste treatment facilities. Therefore, the United States will pay 100 percent of the total construction cost of the confined disposal facility. However, the local sponsor, Brown County, will be required to furnish the site, rights-of-way, and certain assurances as to Federal liabilities and future maintenance of the filled facility. Brown County will retain the title to the filled confined disposal facility, any granted easements or rights-of-way, and must maintain the filled facility in a manner which the Secretary of the Army determines to be satisfactory.

1.6 Project Timetable

1.6.1 The confined disposal facility will require approximately two years to construct after final engineering design is completed, the project advertised, bids received, contract awarded, and construction begins. Construction, dredging and disposal operations will also be delayed until a Final Environmental Impact Statement has been prepared and filed with the Council on Environmental Quality for 30 days and all environmental issues have been resolved. At present, it is estimated that construction will begin in July 1978 with dredging and disposal of dredged material into the nearshore island confined disposal facility commencing in 1980. The Final Environmental Impact Statement for this proposed action, when submitted to the Council on Environmental Quality, will represent the last environmental document prepared before maintenance operations commence.

1.7 Environmental Protection

General

1.7.1 In an effort to minimize potentially adverse environmental effects of maintenance dredging operations, disposal area construction

and dredged material disposal operations at Green Bay Harbor, Corps of Engineers' or contract personnel will be required to abide by certain specifications on protection of the environment, and to comply with all applicable Federal, state, and local laws and regulations concerning environmental pollution control and abatement. Prior to the commencement of any work, a contractor must submit written proposals for implementing environmental protection specifications. In addition, the contractor must meet with Corps representatives to develop mutual understandings relative to compliance with, and administration of, a maintenance, construction, and disposal operation environmental program. During the course of any Corps' or contract work, a Corps' inspector will be present to insure that all specifications, including those pertaining to environmental protection, are met. If the inspector determines that the specifications are being violated, the Corps vessel or contractor will be immediately notified of observed violations and immediate corrective actions must be taken. General requirements for mitigating possible detrimental impacts on the natural and human environment are highlighted in the following sections.

Protection of the Natural Environment

1.7.2 Dust, smoke, fumes, odors, noise, and other potential forms of air pollution will be controlled during maintenance and construction operations. Dust control at any on-land storage or parking lots will be performed by approved means, such as sprinkling, whenever a dust nuisance or hazard occurs. All Corps vessel, contract vessels and land based construction equipment will be in compliance with applicable USEPA and State standards for the control of smoke and fume emissions. If, during the course of maintenance, construction or disposal activities, it is determined that objectionable, work-related odors are adversely affecting the adjacent community, appropriate measures such as those described in the U. S. Army Engineers Waterway Experiment Station (1976a) publication "Abatement of Malodors at Confined Dredged Material Disposal Sites," will be implemented to modify or eliminate such odors (Appendix E). Any objectionable noises originating from the proposed action will be controlled, if necessary, by actions such as eliminating all construction and resultant noise during the hours of 6 p.m. through 7 a.m.

1.7.3 Channel maintenance dredging operations consist primarily of activities under or on the surface of Green Bay and the Fox River, and, as such, usually do not include any work that would directly affect natural terrestrial areas adjacent to the harbor. However, in the event that any dredging operation may require work in a shoreline area such as locating the pipeline from the pumpout facility to the disposal area, every effort will be made to prevent landscape defacement. No ropes, cables, or guy wires will be fastened or attached to a tree for anchorage or support unless specifically authorized by the Corps. Where such special emergency use is permitted, the tree trunk will be adequately wrapped with a sufficient thickness of burlap or rags over which softwood cleats will be tied before any line is attached. Any trees, shrubs, or other landscape features outside the authorized work areas that may be unavoidably scarred or damaged will be restored as nearly as possible to their original condition. If a shoreline area or land area is unavoidably, extensively disturbed, the affected area will be graded, seeded and planted to prevent erosion and restore habitat in an effort to reestablish the original condition to the maximum feasible extent.

1.7.4 Special attention will be given to preventing or mitigating potential impacts on the aquatic environment during channel maintenance. All Corps and contract vessels will meet U. S. Coast Guard requirements for non-polluting discharge systems for the treatment of onboard wastes, and measures will be taken to prevent onboard waste materials from entering public waters. All dredges and supporting equipment used are required to have water-tight equipment, including coamings, which must be maintained in order to prevent accidental spillage of oils and dredged materials. Provisions for the control and elimination of accidental waste material spills are provided by the U. S. Coast Guard.

1.7.5 Every reasonable effort will be made to minimize the effects of dredging and disposal operations on water quality. In order to reduce the resuspension of potentially detrimental chemical constituents in dredged sediments, dredging of all sediments will be confined to shoaled portions of essential channels needed for safe navigation. It is now the Chicago District's policy not to allow hopper dredge pumping past overflow in cases where the materials to be dredged are seriously contaminated with mercury, arsenic, or PCB's. Sediment resampling to augment past sampling efforts (Appendix B) will be performed in October 1977 by USEPA to aid in determining if overflow will be permitted. During the pumpout of dredged material to the confined disposal facility by the landbased pipeline, care will be taken to prevent the spillage of dredgings.

1.7.6 In addition to mitigating adverse water quality conditions, these actions, taken to protect the natural environment, will also attempt to mitigate potential adverse effects on the environment of waterfowl and aquatic flora and fauna. The Chicago District's normal dredging season is restricted to the period from April to November on Lake Michigan due to severe winter weather encountered in the Great Lakes area. The weather restricted dredging season and the number of harbors that require maintenance on the Great Lakes limits the Chicago District's flexibility in scheduling dredging operations. Attempts will be made to avoid dredging at times and in locations that would interfere with fish spawning or migration or with heavy waterfowl usage. However, preliminary discussions with the Green Bay office of the Wisconsin DNR have revealed no fish or wildlife damages expected to result from the timing of an April to November dredging season.

Protection of the Human Environment

1.7.7 Attempts will be made, within the limits of equipment and labor availability, to schedule maintenance dredging and construction of the confined disposal area so as to prevent interference with dock facilities and harbor navigation at Green Bay Harbor. The Chicago District will notify local recreational and commercial interests prior to the start of operations to avoid preventable conflicts. Some operations may also be rescheduled to avoid potential significant conflicts, such as yacht regattas or arrival of a large number of recreational vessels, if the

Corps receives a sufficiently early notice of the time of the event and no other operational or environmental conflicts will result.

1.7.8 Corps or contract equipment will be operated to avoid major interference with commercial or recreational craft that may be present in the harbor during actual maintenance or construction activities. The U. S. Coast Guard will be requested to recommend aids to navigation where warranted.

1.7.9 Maintenance dredging operations include only the removal of recently accreated shoals in authorized navigation channels and, as such, does not include any new work dredging. However, should the maintenance dredging equipment or personnel discover any items having an apparent historical or archeological interest, the discovery will be left undisturbed and immediately reported to the Corps' inspector for notification of the Wisconsin State Historic Preservation Officer so that proper measures can be undertaken. Correspondence from the Wisconsin State Historic Preservation Officer (Section 9 and Appendix A) has indicated that no known historical or archaeological sites will be disturbed by this project.

1.7.10 Operational and maintenance procedures will be conducted in a manner that will minimize potential impacts upon the natural and human environment. By preventing spillage of dredged material during pumpout to the confined disposal site, potential impacts on lakeshore or harbor facilities will be minimized. Issuance of a public dredging notice at least 30 days prior to the initiation of maintenance activities will inform commercial and recreational navigation interests, as well as other potentially affected users, of proposed operations and solicit any objections.

1.8 Maintenance Costs

1.8.1 Harbor maintenance costs are dependent upon the nature of shoaling in the navigation channel, the type of dredge utilized, the method of dredged material disposal, and funding constraint. Therefore, costs vary from year to year. The previous practice of dredging and disposal of dredged material into the existing Bayport land disposal area cost approximately $2.00/cubic yard using a hopper dredge and pipeline to convey material from the dredge to the disposal area. In the future, the unit cost of dredging and disposal of dredged material into the nearshore island site is also expected to be about $2.00/cubic yard or approximately $280,000 per year. The total cost of the new nearshore island confined disposal facility will be approximately $6 million. All costs of construction, operation and maintenance of the confined disposal site at Green Bay Harbor are attributable only to the benefit of water quality improvement and as such are Federal responsibilities subject only to the provisions of local cooperation. Federal cost of this project to 30 September 1976 totaled $15.3 million, of which $9.4 million was for new work and $5.9 million was for maintenance.

2. ENVIRONMENTAL SETTING WITHOUT THE PROJECT

2.1 Existing Natural Environment

Topography

2.1.1 The Green Bay Harbor area lies in the Eastern Lowland and Ridges region classification of the physiography of Wisconsin. Maximum relief in the immediate city of Green Bay area is restricted to about 60 feet. The region's topography is modified by glaciation and is influenced, to a large extent, by underlying bedrock. Gently sloping topography is dominant. The Fox River valley, a continuation of the same depression forming Green Bay, slopes gently for its length from Lake Winnebago to Green Bay. The Niagara escarpment is the most conspicuous topographic feature in the region. This escarpment extends in an almost continuous line from the northeastern corner of Brown County to its southwestern corner. The escarpment rises steeply to a height of 200 to 250 feet above the valley. The Fox River, a few miles to the west, is about parallel with the escarpment. East of the escarpment is a slightly rolling plain which drains towards Lake Michigan.

Geology

2.1.2 Paleozoic bedrocks unconformably underlying the Green Bay Harbor region are of Ordovician, Cambrian and Precambrian age. Specifically, the straitigraphic units composing the bedrock from uppermost to lowermost are: the Sinnipee group - dolomite with some limestone and shale; the Ancell group - sandstone, shale and conglomerate; the Prairie Du Chien group - dolomite; the Trempealeau group - sandstone with some dolomite; the Tunnel City group - sandstone; the Dresbach unit - sandstone; and the Precambrian crystalline rock.

2.1.3 The Paleozoic bedrock is overlain by Quaternary deposits of an extinct glacial lake which covered the harbor area during the Pleistocene. These lake deposits generally consist of stratified sand interbedded with red clay and silt. The thickness of these surface deposits vary up to 200 feet. The presence of these lake deposits, indicative of an extinct glacial lake, show that at one time Green Bay was larger and deeper than it is today. These glacial deposits act as a smoothing agent on the regional topography and serve as parent material for soils.

2.1.4 Green Bay Harbor lies within a region of relatively quiet seismic activity. The closest major earthquake to the harbor occurred on 13 March 1905 and was centered near Menominee, Michigan. This earthquake occurred with a maximum intensity of "V" on the modified mercalli intensity scale of 1931 meaning the quake was felt by nearly everyone in the region; many awakened; some dishes, windows, etc., were broken; there were a few instances of cracked plaster; unstable objects overturned; and disturbances of trees, poles, and other tall objects also occurred. Reoccurrence of an earthquake of this intensity is unpredictable but the chance of a major earthquake at Green Bay Harbor is remote.

Soils

2.1.5 The soils adjacent to the Fox River and Green Bay are dominated by fill land and silty loams and clays. Soils adjacent to the waters of Green Bay are included in the Carbondale-Cathro-Marsh association which is described as very poorly drained, nearly level organic soils and marshes. Soils bordering the Fox River are mainly of the Oshkosh-Manoawa association which are deep, well-drained to somewhat poorly drained, nearly level to steep soils, that have a dominately clayey subsoil which forms on glacial lake plains dissected by narrow V-shaped valleys. A small amount of land on the east bank of the Fox River is covered by the Kewaunee-Manawa association that is composed of deep, well-drained to somewhat poorly drained, nearly level to steep, soils that have a dominately clayey subsoil formed on glacial till plains and ridges.

Climate

2.1.6 The city of Green Bay experiences a modified continental climate resulting from the influences of the waters of Green Bay, Lake Michigan, and Lake Superior and from slightly higher terrain north, south and westward, terminating in the Fox River valley. These modifying effects cause less severe temperature fluctuations than is common to northern Wisconsin.

2.1.7 July is the warmest month with a mean monthly temperature of 69.2°F. The coldest month is January with a mean monthly temperature of 15.4°F. More than half of the normal annual precipitation (27.01 inches) falls during the growing season, May through September. June is the wettest month; whereas, February is the driest month. Annual average snowfall amounts to 42.5 inches. Prevailing winds blow from a southwesterly direction most of the year except for March, April, and May when they blow predominately from the northeast. Winds are moderate with an annual mean of 10.2 m.p.h.

Hydrology

2.1.8 Green Bay Harbor is located at the terminus of the Wolf-Fox River basin which drains 4,086,451 acres (6,385 square miles) and is a subsection of the Great Lakes-St. Lawrence River continental drainage basin. The United States Geologic Survey (USGS) maintains a gage and recorder at Rapide Croche dam, near Wrightstown, to monitor the lower Fox River. This gage is located 18 miles upstream from the mouth of the Fox River in Green Bay. Stage and discharge levels of 6,150 square miles of the Wolf-Fox Rivers Watershed are recorded. The mean flow rate for the USGS water year, October 1974 to September 1975, was 3,907 cubic feet per second (cfs), with a minimum of 915 cfs. The average discharge for the 79 years of record is 4,185 cfs with a maximum discharge of 24,000 cfs on 18 April 1952 and a minimum daily discharge of 138 cfs on 2 August 1936.

2.1.9 The water levels in Green Bay Harbor are normally equivalent to and dependent on the water levels of Green Bay which is hydrologically connected to Lake Michigan. For the 116-year period of 1860 through 1975, the highest one month average lake level of 581.94 IGLD (International Great Lakes Datum 1955) occurred in June 1886 and the lowest of 575.35 IGLD in March 1964, a spread of 6.59 feet. The 1976 Lake Michigan has ranged from a high of 580.5 IGLD in July to a low of 578.5 IGLD in December. The long-term average Lake Michigan water level for the period 1900-1975 is 578.2 IGLD. In 1976, the Lake Michigan water levels ranged from 0.3 to 1.3 feet above the long-term average lake level.

Groundwater

2.1.10 The groundwater system underlying Green Bay Harbor has a potential yield of 10 to 100 gallons per minute from the glacial lake deposits and greater than 500 gallons per minute from bedrock aquifers. However, the city of Green Bay obtains its water by pipeline from Lake Michigan although other communities in Brown County utilize the ground water resource.

Water Quality

2.1.11 Table 2-1 describes Wisconsin ambient water quality standards applicable to the lower portions of Green Bay and the Fox River. These standards represent the minimum levels of water quality to be maintained in project area waters. The Wisconsin DNR enforces these water quality standards through a system of specific permits that place stringent water quality limits on each type of industrial or domestic effluent outfall into surface waters. In general, the State of Wisconsin requires the surface waters of the project area to be free of unsightly or harmful substances and capable of supporting fish and aquatic life and public recreation.

Table 2-1. Wisconsin Surface Water Quality Standards Applicable to the Mouth of the Fox River and Green Bay.

Categories or Standards	Requirements
General (to be met by all surface waters)	(a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of state.

Table 2-1. Wisconsin Surface Water Quality Standards Applicable to the Mouth of the Fox River and Green Bay. (cont'd)

Categories or Standards	Requirements
	(b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state. (c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state. (d) Substances in concentrations or combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.
Fish and Aquatic Life	Standards: (a) Dissolved oxygen content in surface waters shall not be lowered to less than 5 mg/l at any time (Variances allowed: Green Bay 1 Jan to 1 April - not lower than 2 mg/l; lower Fox River - not lower than 2 mg/l) (b) Temperature changes shall not adversely affect aquatic life. Natural daily and seasonal temperature fluctuations shall be maintained. The maximum temperature rise at the edge of the mixing zone above the existing natural temperature shall not exceed $5^{o}F$ for streams and $3^{o}F$ for lakes. The temperature shall not exceed $89^{o}F$ for warmwater fish. (c) pH shall be within the range of 6.0 to 9.0, with no change greater that 0.5 units outside the estimated natural seasonal maximum and minimum. (d) Unauthorized concentration of substances are not permited that alone or in combination with other materials present are toxic to fish or other aquatic life.

Table 2-1. Wisconsin Surface Water Quality Standards Applicable to the Mouth of the Fox River and Green Bay. (cont'd)

Categories or Standards	Requirements
Recreation	(a) Fecal Coliform - the membrane filter fecal coliform count shall not exceed 200 per 100 ml as geometric mean based on not less than 5 samples per month, nor exceed 400 per 100ml in more than 10% of all samples during any month.
Lake Michigan Thermal Standards	(a) Thermal discharges shall not raise the receiving water temperature more than 3°F above the existing natural temperature at the boundary of a mixing zone. (Variance allowed: the mouth of the Fox River and its mixing zone are specifically excluded from any maximum temperature raises to Green Bay).

Source: Wisconsin Administrative Code, Chapters NR 102, NR 103, and NR 104.

2.1.12 As can be seen in Table 2-2, water quality problems in the lower portions of Green Bay and the Fox River are principally related to organic wastes, excessive nutrients, toxic substances and oxygen-consuming wastes from industrial, sewage treatement and agricultural sources. The lower Fox River, the main tributary to Green Bay, contributes most of the nutrients, organic and toxic substances found in lower Green Bay. The Fox River itself has had, at times, little or no dissolved oxygen for considerable distances upstream from its mouth. One of the most signficant water quality problems of Green Bay is the excessive algal growth occurring every summer as a result of over-fertilization of the bay with aquatic nutrients. The heavy pollution load received by Green Bay depresses the overall level of dissolved oxygen available to aquatic life throughout the year but even more significant dissolved oxygen depletions are apparent in the lower bay in the late winter months when ice covers the area. Photosythesis and natural reaeration does not occur under this ice cover and low dissolved oxygen levels are depressed even further.

2.1.13 Degraded water quality in the form of high fecal coliform counts and other pollutants restrict the utilization of the lower Fox River and Green Bay as a public water source or recreation area. Low dissolved oxygen levels, excessive nutrients, heavy algal blooms and toxic pollutants have also caused the disappearance of many desireable but pollution intolerant aquatic species from the project area. However, the new sewage treatment plant at Green Bay, stricter Wisconsin DNR enforcement of effluent standards, improved erosion control and agricultural management should ultimately improve water quality in the project area.

Table 2-2. Wisconsin Water Quality Standards[1] vs Ambient Water Quality at Green Bay[2]

Storet Station Number				053001			053002			053020			10 Station Summary			Wisc. DNR Fox R.		
Location				Mouth Fox River 1961-1976			Mouth Fox River 1973-1975			Near-Shore Island Site 1973-1975			Lower Green Bay 1973-1975			Main St. Bridge 1975-1976		
Parameter	Measure	Unit	Standard	# of Samples	Mean	Range	# of Samples	Mean	Range	# of Sample	Mean	Range	# of Samples	Avg Mean	Range	# of Samples	Average	Range
Water	Temp	Cent	31.7	181	11.0	31. - 0.	32	20.05	25. -15.5	10	16.9	23. - 1.	198	17.6	25. - .7	18	12.2	26. - 0.
Turbidity	Tribidmtr	Hach FTU	-	17	11.18	25. - 3.9	-	-	-	-	-	-	-	-	-	18	11.18	22. - 3.9
Transp	Secchi	Meters	-	-	-	-	8	.51	.9 - .33	6	.52	.75 - .3	75	.81	7. - .3	-	-	-
Cnductvy	at 25C	Micromho	-	18	362.2	436. -291.	-	-	-	-	-	-	-	-	-	18	362	436. - 291.
DO	-	MG/L	5[3]	180	7.6	15.4 - 0.	7	6.5	9.4 - 2.5	11	7.1	10.1 - 4.2	156	7.85	12.8 - 2.8	18	9.1	15.4 - 4.8
BOD	5 Day	MG/L	-	163	5.6	17. - .8	5	12.2	30. - 4.9	2	6.75	7.4 - 6.1	33	6.1	11. - 3.4	18	4.81	8.9 - .8
BOD	6 Day	MG/L	-	5	5.6	8.9 - 3.1	1	9.8	9.8	-	-	-	6	9.9	14. - 8.2	-	-	-
pH		SU	6.0-9.0	181	7.6	8.9 - 6.9	5	7.9	8.2 - 7.9	-	-	-	19	8.11	8.65 - 7.2	18	8.02	8.9 - 7.3
T ALK	$CaCO_3$	MG/L	-	168	147.3	82. - 94.	-	-	-	-	-	-	-	-	-	18	149.	180. - 122.
Residue	Tot Vol	MG/L	-	167	15.1	100. 0.	1	13.	13.	-	-	-	18	14.05	24. - 3.	-	-	-
Residue	Tot NFLT	MG/L	-	168	18.7	100. - 0.	6	17.8	24.8 - 8.8	2	57.	60. -54.	41	19.1	74. - 2.8	-	-	-
Org N	N	MG/L	-	95	1.19	3. - .19	7	1.15	4.1 - .1	2	.40	.7 - .1	59	.70	2.3 - 0.	18	.92	2.5 - .19
NO3-N	Tot	MG/L	-	95	.21	1.1 - .02	7	1.20	3.5 - .101	2	.51	.53 - .48	59	.34	1.04 - .01	18	.20	.49- .05
NO3-N	Diss	MG/L	-	-	-	-	6	.011	.016 - .002	2	.017	.031- .003	41	.012	.035- .001	-	-	-
NO3-NO2	N-Tot	MG/L	-	77	.17	.48- .03	6	.124	.28 - .027	2	.069	.112- .026	41	.116	.73 - .001	-	-	-
Sol PO4-T	PO_4	MG/L	-	18	.14	.38- .01	1	.42	.42	-	-	-	18	.009	.31 - .01	18	1.49	.38- .01
Phos-Tot		MG/L	-	-	-	-	1	.013	.013	-	-	-	18	.039	.092- .005	-	-	-
Phos-Dis	Ortho	MG/L	-	96	.18	.46- .03	7	.15	.24 - .076	2	.33	.35 - .30	59	.14	.33 - .028	18	.146	.37- .05
Tot-Hard	$CaCO_3$	MG/L	-	18	.05	.17- .008	6	.02	.044 - .009	2	.02	.032- .009	41	.012	.064- .001	18	.05	.17- .008
Chloride	Cl	MG/L	-	168	176.6	244. - 38.	-	-	-	-	-	-	-	-	-	18	173.	208. - 143.
Sulfate	SO_4-Tot	MG/L	-	165	13.5	25. - 1.	5	21.6	40. -13.	1	18.	18.	33	14.7	28. - 7.	18	15.7	21. - 11.
Fluoride	F Tot	MG/L	-	3	26.	29. - 24.	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	Cd, Tot	UG/L	-	17	.23	.55- .15	-	-	-	-	-	-	-	-	-	18	.23	.55- .15
Chromium	Cr, Tot	UG/L	-	18	.28	2. - .0002	-	-	-	-	-	-	-	-	-	18	.14	.2 - .0002
Copper	Cu, Tot	UG/L	-	18	3.9	11. - .003	-	-	-	-	-	-	-	-	-	18	2.85	11. - .004
Lead	Pb, Tot	UG/L	-	18	3.38	7. - .004	-	-	-	-	-	-	-	-	-	18	2.66	7. - .003
Manganese	Mn	UG/L	-	18	23.4	100. - .03	-	-	-	-	-	-	-	-	-	18	12.6	100. - .03
Zinc	Zn, Tot	UG/L	-	18	38.8	50. - .04	-	-	-	-	-	-	-	-	-	18	29.4	50. - .04
Alpha	Tot	PC/L	-	17	27.	50. - 20.	-	-	-	-	-	-	-	-	-	18	14.5	20. - .05
Beta	Tot	PC/L	-	34	1.53	3. - 0.	-	-	-	-	-	-	-	-	-	15	2.14	4.8 - 1.3
Fec Coli	M-FCAGAR	/100ML	-	37	6.5	12.7 - .9	-	-	-	-	-	-	-	-	-	18	5.78	8.4 - 4.2
Fec Coli	MFM-FCBR	/100ML	200	27	816.2	11000. - 10.	-	-	-	-	-	-	-	-	-	-	-	-
Chlrphyl	A	UG/L	-	73	825.8	19000. - 5.	-	-	-	-	-	-	-	-	-	16	1,123.	1,300 - 10
Chlrphyl	A UC/L	Corr.	-	3	41.6	70. - 16.	-	-	-	-	-	-	-	-	-	-	-	-
				3	37	71. - 17.	6	36.3	75.2 13.3	2	42.9	70. -15.9	12	89.6	144.6 -33.	-	-	-
													37	29.6	61.8 - 0.	3	37.	71. - 17.

1 Wisconsin Administrative Code, Chapters NR 102, NR 103 and NR 104.

2 U. S. EPA Water Quality STORET System Access date 8/31/76.

3 Variance allowed in lower Fox River and Green Bay- 1 Jan. to 1 April not lower than 2 mg/l dissolved oxygen content

Air Quality

2.1.14 Air quality data pertinent to the city of Green Bay is described in Table 2-3. Among major parameters, only sulfur oxides and particulate matter are sampled on a regular basis. No violations were reported in 1976.

Sediment

2.1.15 Sedimentation of the Green Bay Harbor channels is a result of soil erosion from upstream reaches, urban and industrial sediment loadings and sloughing of channel sides into the channel. Basically, the sediments in the channels range from sand and red clay in Green Bay to dark silts within the Fox River. All of these sediments have been classified by the USEPA as moderately or heavily polluted and therefore unsuitable for open-lake disposal (Appendix B). In general, the sediments contain high levels of pollutants from organic, domestic and industrial waste sources. Additional sediment analysis of Green Bay Harbor by the U. S. Army Corps of Engineers and the Wisconsin DNR is present in Appendix B.

Terrestrial Flora

2.1.16 The original presettlement vegetation pattern of the Green Bay region was northern hardwood hemlock forest with marshes bordering the Fox River and lower Green Bay. This pattern has been replaced by man's activities and land uses adjacent to the harbor channels and the nearshore island disposal site. Today, with the exception of the Green Bay Wildlife Sanctuary, terrestrial vegetation on land adjacent to the nearshore island site and the navigation channel in the Fox River (Figure 1-1) is restricted to native or ornamental tree, shrub, forb, grass, and other vegetative species in Bay Beach Park, surrounding houses, industries, and commercial buildings or on small bay or river shore parcels of vacant land.

2.1.17 The overland pipeline route to carry the dredged material from the pumpout facility, to be temporarily erected near the mouth of the Fox River on the east bank, to the nearshore island disposal site will be the only terrestrial aspect of the proposed action. The land in this area, in its original, undisturbed condition was probably a marsh. However, due to the industrial and residential development of this area, no undisturbed wetland remains. Presently, this area is made up of filled or partly filled wetlands and its vegetative cover varies from bare soil through disturbed wetland species to predominantly weedy trees and shrubs.

Terrestrial Fauna

2.1.18 The terrestrial aspect of the maintenance proposal at Green Bay Harbor is limited to: the overland pipeline route from the

Table 2-3 Wisconsin Air Quality Standards[1] vs. 1976 Ambient Air Quality at Green Bay[2]

Pollutant	Standards				Ambient		
	Type of Standard	Averaging Time	Frequency Parameter	Concentration	City Hall 100 N. Jefferson Green Bay	West High School 966 Shawano Green Bay	Center City 1300 N. Quincy Green Bay
Sulfur Oxides	Primary	1 yr	Arithmetic Mean	80 ug/m^3	N/A	N/A	N/A
		24 hr	Annual/Max.	365 ug/m^3	A 435 ug/m^3	A 22 ug/m^3	A 226 ug/m^3
	Secondary	3 hr	Annual/Max.	1300 ug/m^3	B 201 ug/m^3	B 15 ug/m^3	B 199 ug/m^3
Particulate Matter	Primary	1 yr	Geometric Mean	75 ug/m^3	N/A	N/A	N/A
		24 hr	Annual Max.	260 ug/m^3	A 111 ug/m^3	A 84 ug/m^3	A 147 ug/m^3
	Secondary	1 yr	Geometric Mean	60 ug/m^3	N/A	N/A	N/A
		24 hr	Annual Max.	150 ug/m^3	B 108 ug/m^3	B 51 ug/m^3	143 ug/m^3
Carbon Monoxide	Primary and Secondary	8 hr	Annual Max.	10 mg/m^3	N/A	N/A	N/A
		1 hr	Annual Max	40 mg/m^3			
Photochemical Oxidants	Primary and Secondary	1 hr	Annual Max.	160 ug/m^3	N/A	N/A	N/A
Hydrocarbons	Primary and Secondary	3 hr (6am to 9am)	Annual Max.	160 ug/m^3	N/A	N/A	N/A
Nitrogen Dioxide	Primary and Secondary	1 yr	Arithmetic mean	100 ug/m^3	N/A	N/A	N/A

1 Wisconsin Administrative Code, Chapter NR 155.

2 U. S. EPA National Aerometric Data Bank as of 2 September 1976.
N/A = Not Available, A = Maximum observed, B = Secondary maximum.

pumpout facility to the nearshore island disposal site; riparian wildlife habitats adjacent to the Federal waterway; and open-water areas utilized by waterfowl. Therefore, this discussion will be limited to a representative vertebrate fauna which are important from an economic, ecological, aesthetic, commercial or recreational viewpoint. However, it should be mentioned that the abundance and diversity of other vertebrate and invertebrate species within the project area are of great importance to the total Green Bay Harbor natural energy cycle.

2.1.19 Due to the lack of a great amount of natural terrestrial vegetative cover adjacent to the Federal waterway and nearshore island site, the natural food, cover, and nesting habitat for many native mammalian species is poor. Only species adaptable to minimal amounts of natural nesting, resting, escape or communication cover, small territories, and lack of natural food can be found near the Federal waterway. Opportunistic species like the house mouse (Mus musculus) and Norway rat (Rattus norvegicus) live very well in man's communities and may be present in warehouses or industrial buildings. Other small native mammals such as mice and voles (Cricetidae), shrews (Soricidae), and some weasels (Mustelidae) may utilize riparian habitats along the Federal waterway. Eastern cottontail rabbit (Sylvilagus floridanus) and eastern fox squirrel (Sciurus niger) are found to a limited extent in the residential areas bordering the waterway. Such mamals as the striped skunk (Mephitis mephitis) and raccoon (Procyon lotor) are the largest mammalian wildlife species that may occasionally make use of the riparian areas of the waterway.

2.1.20 The lack of a great amount of natural vegetation along the waterway limits the reproductive, sheltering, and feeding areas available to birds. Normally, species such as the starling (Sturnus vulgaris), house sparrow (Passer domesticus), rock dove (Columba livia), chimney swift (Chaetura pelagica), barn swallow (Hirundo rustica), grackle (Quiscalus quiscula) and red-winged blackbird (Agelaius phoeniceus) can be observed adjacent to the waterway. However, by far the most populous vertebrate faunal element of the Green Bay Harbor area are the water associated birds. Five species of gulls (Larus argentatus, L. delawarensis, L. pipixcan, L. philadelphia, L. minutus), four species of terns (Sterna hirundo, S. forsteri, Hydroprogne caspia, Chlidonias niger), and about 40 other species of shore and wading including: sandpipers (Scolopacidae), plovers (Charadrius spp.), and rails (Rallidae) utilize the Green Bay Harbor area for nesting, resting, preening, and feeding.

2.1.21 Green Bay, including Green Bay Harbor, is within the Mississippi flyway for waterfowl. Approximately 31,000-100,000 dabbling ducks, 26,000-75,000 diving ducks, and 75,100-150,000 geese migrate through the Green Bay region each fall (Bellrose 1968). These numbers represents a total of 22 species of waterfowl which include: whistling swan (Olor columbianus), Canada and snow-blue geese (Branta canadensis, Chen caerulescens), 9 species of dabbling ducks (Anas spp., Aix sponsa), and 10 species

of diving ducks (Aythya spp., Bucephala albeola, Oxyura jamaicensis, mergus spp., and Lophodytes cucullatus). These birds utilize the Green Bay Harbor area during migration as a stopover to rest and feed. According to Mr. Daniel G. Olson, Wisconsin DNR, Approximately 400-500 Canda geese and 800-1000 mallard and black ducks winter in the vicinity of the near-shore island site in Green Bay.

2.1.22 Some raptors are present in the Green Bay region but are not commonly seen at the harbor because of human activity. Of special interest in the lower Green Bay area is the presence of the double-crested cormorant (Phalacrocorax auritus), considered an endangered species by Wisconsin, which nests on the islands of Green Bay and the presence and nesting of Forster's tern (Sterna forsteri) and the little gull (Larus minutus) in Atkinson marsh immediately west of the harbor area along the Green Bay shoreline. Atkinson marsh represents one of the few remaining nesting sites of Forster's terns in Wisconsin. The little gull is a European straggler that has not been reported elsewhere in Wisconsin.

2.1.23 Some reptiles and amphibians are provided a limited amount of riparian habitat along the borders of the Federal waterway. Typical amphibians include the American toad (Bufo americanus) and common reptiles include snakes like the red-sided garter snake (Thamnophis sirtalis).

Aquatic Flora

2.1.24 Abundant growths of emergent, submergent, or floating rooted aquatic vegetation are generally lacking in Green Bay Harbor near the navigation channels or at the nearshore island site. However, some marsh, such as Atkinson marsh, exists to the west of the harbor. The lack of rooted aquatics in the harbor is due to poor water and sediment quality and continued maintenance of the naviation channels. Although there is a lack of rooted plants, the large amounts of plant nutrients in the waters of lower Green Bay have traditionally caused extensive summer blooms of floating algae and diatoms. A study by the Wisconsin DNR (Patterson et al. 1975) indicated that this bloom shows differing species composition through the summer due to various growth limiting factors that may discourage growth of one species but allow growth of another. Most prominent of these organisms from late May through early September were the blue-green algae Aphanizomenon, Oscillatoria and Microcystis; the diatoms Melosira, Cyclotella, Stephanodiscus, and Asterionella; and the green algae Scenedesmus and Ankistrodesmus.

Aquatic Fauna

2.1.25 The Wisconsin DNR (Patterson et al. 1975) conducted a survey of zooplankton in lower Green Bay as part of a larger water pollution investigation. This study revealed that the zooplankton community was composed largely of dinoflagellates, such as Ceratium sp., and zooplankton, such as cladocerans, copepods and rotifers. The population

levels of these plankters appear to fluctuate in relationship to the algae blooms occurring during the spring, summer and fall months in lower Green Bay.

2.1.26 Howmiller and Beeton (1971) performed extensive macrobenthos sampling in lower Green Bay in 1969. The major macrobenthos organisms found included: Oligochaetes, Chironomidae, Sphaeiidae and Nematodes. Comparison of 1969 data to 1952 data by Howmiller and Beeton showed benthic invertebrates to be less abundant in 1969 than in 1952. This change indicated that the quality of the benthic habitat had deteriorated further between 1952 and 1969. In general, use of sampled benthic organisms to determine sediment quality has indicated that lower Green Bay is heavily polluted and approaches abiotic conditions near the mouth of the Fox River.

2.1.27 The fish species diversity present in the lower portions of Green Bay and the Fox River is not as great as that found in other portions of Lake Michigan or even northern Green Bay which still supports a considerable commercial fishery. According to Nelson and Fassbender (1972), the pollution load of the Fox River is so great that there is not sufficient dissolved oxygen to support a fishery much of the year. Erosion of clayey upland soils has created very turbid conditions in the Fox River compounding other pollution problems. Factors such as erosion of shorelands, siltation of pools, excess rates of eutrophication, and destruction of wetlands have contributed to fishery habitat decline. Spawning habitat cover and feeding areas have been destroyed or drastically reduced in quality as dock lines have replaced marsh edge or plant covered littoral zones. Winter and summer kills of fish due to oxygen depletion under an ice cover, algae bloom die-offs and industrial pollution limit the numbers and species of fish present year-round. Damming of the Fox River for navigation may have eliminated a great deal of upstream spawning areas historically available to fish species no longer present in the harbor area. The decline of sturgeon, walleye, northern pike and sucker populations in lower Green Bay may be related to restricted access to and decline of quality of spawning habitat. The Wisconsin DNR believes that fish habitat conditions in lower Green Bay have improved in the past several years and if improvement continues, a re-establishment of a more diverse fishery can be expected.

2.1.28 Table 2-4 lists the major fish species commonly found in the lower Fox River and Green Bay in the vicinity of the proposed project. During the spring, alewife and smelt may move up the Fox River in great numbers as do spawning-minded carp, northern pike, and suckers. In autumn, the Fox River attracts some of the fall spawning salmonids which have been introduced into Lake Michigan and chinook salmon have been observed clearing the DePere dam and continuing up the river (Kernan, 1974). Yellow perch constitute the most valuable commercial fish in lower Green Bay. However, both commercial and sportfishing are minimal in the immediate vicinity of the proposed project. Low water quality,

Table 2-4. Major Fish Species Present in Lower Fox River and Green Bay

Fish Species	Scientific Name	% of Total Catch L. Fox R.[1]	Mouth Fox R.[2]	L. Green Bay[3]
Black bullhead	Ictaluras melas	34	5.1	6.6
Carp	Cyprinus carpio	22	74.6	0.7
White bass	Morone chrysops	15	1.3	0.1
White sucker	Catostomus commersoni	9	0.9	1.4
Black crappie	Pomoxis nigromaculatus	4	1.8	T
Alewife	Alosa pseudoharengus	3.4	5.0	55.6
Walleye	Stizostedion vitreum	3.4	0.3	T
Gizzard shad	Dorosoma cepedianum	2.2	1.4	-
Freshwater drum	Aplodinotus grunniens	2.0	0.1	0.1
Yellow perch	Perca flavescens	1.4	7.0	23.1
Northern pike	Exos lucius	1.0	.6	T
Channel catfish	Ictalurus punctatus	0.4	T	T
Burbot	Lota lota	0.4	1.5	-
Sauger	Stizostedion canadense	0.1	-	-
Bluegill	Lepomis macrochivus	T	0.1	-
Golden shiner	Notemigonus crysoleucas	-	0.1	-
Pumpkinseed	Lepomis gibbosus	T	0.1	T

1. Kernen, 1974
2. Kernen, 1976
3. Green Bay=Brown Co. Plan. Comm., 1974.
T = Trace

preponderance of rough fish species, and lack of good public access contribute to a poor sport fishery. The nearshore island site is not located on or near any known fish spawning areas (Kernen, 1976).

Endangered and Threatened Species

2.1.29 According to the U. S. Fish and Wildlife Service's most recent publication of "Endangered and Threatened Wildlife and Plants" (Federal Register 27 Oct 76, 16 June 76), the only federally listed endangered or thereatened floral or faunal species in the Green Bay Harbor area are the southern bald eagle (Haliaectus l. leucocephalus) and the American peregrine falcon (Falco peregrinus anatum). These two bird species may rarely be seen in the harbor area during migration.

2.1.30 The Wisconsin DNR lists the following faunal species as endangered in the Green Bay region (Wisc. DNR 1975): double-crested cormorant (Phalacrocorax auritus); southern bald eagle; osprey (Pandion haliaetus); peregrine falcon; and wood turtle (Clemmys insculpta). With the exception of the coromorant which nests on the islands of Green Bay in summer and the wood turtle which may be present adjacent to the project area, the other endangered species are migrants that would rarely be found in the Green Bay region. Faunal species listed as threatened include: Cooper's hawk (Accipiter cooperii); red-shouldered hawk (Buteo lineatus); and yellow rail (Coturnicops noveboracensis). All of these threatened faunal species are migrants that may occasionally be seen in the Green Bay region. The Wisconsin DNR (1976) has also published a list of "Endangered and Threatened Vascular Plants in Wisconsin." Land adjacent to the Green Bay Harbor project area has been disturbed by man's activities to a considerable extent and probably does not provide suitable habitat for any of the listed floral species.

2.2 Existing Human Environment

Demography

2.2.1 Green Bay, the largest city in Brown County, had a 1976 population of 88,304. This was a 0.6 percent increase over the 1970 population and a 40.2 percent increase since 1960. About 37.8 percent of this 1976 population was 18 years of age or younger with a total population median age of 26.7. The population density of Green Bay in 1970 was 210 persons per square mile. Green Bay had a median educational level in 1970 of 12.2 years of school for all persons 25 years of age or older. The city of DePere, upstream of Green Bay on the Fox River, also encompasses a portion of the Fox River Federal navigation channel. The 1970 population of DePere was 13,340 and the 1970 population of all of Brown County was 158,244. (U. S. Dept. Commerce 1973, 1976)

2.2.2 There were 27,033 housing units in Green Bay in 1970 showing a 40.9 percent increase over 1960. Occupied housing units totaled 26,329 units in 1970 and averaged 3.3 persons per unit. The median value of an owner occupied single family dwelling in Green Bay during 1970 was $15,887. (U. S. Dept. Commerce 1973).

Commercial Navigation

2.2.3 The total commercial tonnage moving through Green Bay Harbor was relatively stable from 1966 through 1975. The highest tonnage during this 10-year period was 2,875,461 tons recorded in 1967, the lowest was 2,531,487 in 1974, and the 10-year average was about 2,715,000 tons. A pipeline completed in 1962 reduced the 1962-1973 petroleum tonnage by 700,000 tons from the levels recorded during the period from 1951-1961. Growth in the limestone and cement tonnage, for the most part, has offset slight decreases in other traffic. The 1975 tonnage composition was as follows: (1) coal, 60.9 percent; (2) building cement, 11 percent; (3) limestone, 5.4 percent; (4) barley and rye, 4.0 percent; (5) fuel oil, 3.6 percent; (6) nonmetallic minerals, 3.2 percent; (7) pulp, 2.8 percent; (8) asphalt, tar, and pitches, 2.8 percent and (9) other, 6.3 percent. In 1975, 217 inbound and 105 outbound vessels had drafts of 19 to 26 feet, and over 46.6 percent of those vessels had drafts of 22 feet or more requiring the channel depths up to 24 feet as provided for in the authorized project. Commerce at Green Bay is expected to approach 3,000,000 tons annually by the year 2000.

Recreation

2.2.4 Green Bay Harbor is a focal point for recreational boating on both the Fox River and Green Bay. Even though poor water quality tends to limit fishing and swimming activities in the harbor and adjacent

areas, recreational boats utilize the harbor channels to begin trips up the Fox River through DePere lock or out into Green Bay via the mouth of the Fox River. Although no public boat marinas exist in the harbor area, there are limited commercial and private boating facilities providing boat berths, winter storage, launching facilities, boating supplies, and repairs to the local boating interests. There are several public boating access points scattered along the harbor channels. Two boat landings at Mason Street and on the east bank of the Fox River between the Green Bay Yacht Club and the new Metro Sewerage Plant, are operated by the City of Green Bay. An additional boat landing at the Brown County Fairgrounds is operated by Brown County.

2.2.5 Land based recreation adjacent to the harbor channels includes community parks and playfields, as well as neighborhood parks, playgrounds, and playlots. However, actual harbor frontage in many of these facilities is restricted or non-existant due to the heavy industrial usage of the lower Fox River frontage. Most notable among these facilities is the Bay Beach Park and Wildlife Sanctuary immediately southeast of the proposed nearshore island disposal site. Bay Beach Park now offers both active and passive recreational pursuits including facilities for baseball, football, soccer, and picnics. In the future, should a small-boat harbor be constructed adjacent to the confined disposal facility, Bay Beach Park could become a focal point for recreational boating in Green Bay. The park and sanctuary offer a quality recreational experience to area residents and provide both active and passive recreational pursuits. The Green Bay Wildlife Sanctuary was acquired with assistance from the Land and Water Conservation Fund.

Land and Water Uses Adjacent to the Harbor

2.2.6 The lands bordering the Green Bay Harbor navigation channel in the lower Fox River are a diverse mixture of industrial, commercial, municipal, and residential developments. Harbor frontage will be described by starting on the western bank of the Fox River at its mouth and moving southward to DePere lock and dam. Harbor frontage description will then shift to the eastern shore at the mouth of the Fox River and move south again to DePere lock and dam. Description of the Green Bay frontage at the nearshore island site will be last. Major harbor frontage occupants are also shown on Figure 1-1.

2.2.7 The Pulliam Power Plant of Wisconsin Public Service Corporation, and its coal handling facility are located along the western shore of the Fox River at its mouth. Immediately south lies a complex of oil and liquid storage facilities utilized by Gustafson Oil Co., F. Hurlbut Co., Cities Service Oil Co., Mobil Oil, American Oil, and Clark Oil and Refining. A small remnant of wetlands coexist with these oil storage facilities. South of the oil storage area, the Fox River frontage is utilized by several industries and businesses, including Wisconsin Fishing Co., Green Bay Soap Co., Universal Atlas Cement Co., Western Lime &

Cement Co., Leight Transfer and Storage Co., Northwest Engineering Co., C. Reis Coal Co., Northern Coal & Supply Co., Huron Cement, McMulley & Pitz Construction Co., and the Fort Howard Paper Company. Land use along the west bank changes dramatically south of Fort Howard Paper Company water treatment facilities to residential, undeveloped, municipal, commercial, and recreational land uses. In this reach, extending south to DePere lock and dam, are many residences with river frontage, undeveloped wetlands and uplands, sewage treatment facilities and an incinerator for the city of DePere, a trucking company and the Nicolet Paper Corp., as well as the recreational facilities of the National Railroad Museum and Brown County Fairgrounds and Park.

2.2.8 McDonald Lumber Co., and the new Green Bay Metropolitan Sewage Plant completed in 1975 occupy the harbor frontage on the eastern bank at the mouth of the Fox River. Immediately south lie a City of Green Bay boat launching ramp and the facilities of the Green Bay Yatch Club, Sinclair Refining Co., Phillips Petroleum Co., Texaco Oil Inc., Green Bay Packaging Inc., Charmin Paper Co., and American Can Company. One parcel of undeveloped land still exists in this reach from the mouth of the Fox River on the eastern bank south to the mouth of the East River. Across the East River, lies the municipal and commercial land uses of the city of Green Bay business district which extends southward to the New Tilleman Memorial bridge. South of the bridge, river frontage use is predominantly residential and commercial with considerable amounts of undeveloped lands.

2.2.9 The Green Bay shorelands adjacent to the nearshore island site are composed of residential and recreational land uses. Bay Beach Park will be to the southeast of the nearshore island site with residential areas directly south and to the east of the site.

Public Services and Facilities

2.2.10 The Green Bay Harbor area has several Federal, State and local public services and facilities provided. On the Federal level, the U. S. Army Corps of Engineers, Chicago District, maintains the harbor channels; the U. S. Coast Guard provides aids to safe navigation; and the U. S. Environmental Protection Agency conducts periodic surveys of sediment, surface and ground water quality, as well as assisting local efforts to improve the conditions of the lower Fox River and Green Bay. The Wisconsin Department of Natural Resources also monitors the harbor waters, as well as providing assistance on land use, pollution abatement, recreation, ecology, and other questions. Health, education, fire fighting, police protection, sewage, recreation, water supply, land use planning, and many other services and facilities needed at the harbor are provided by various agencies of Brown County and the cities and towns of Green Bay, Ashwaubeon, Allouez, and DePere.

2.2.11 Sewage from the Green Bay metropolitan area is currently treated mainly at the recently expanded Green Bay Metro Sewage Plant

located near the mouth of the Fox River on the east bank. Plant expansion, completed in 1975 at a cost of $72 million, allows the plant to serve a population of approximately 130,000 in the communities of Allouez, Ashwaubenon, Scott, Howard, Bellevue, Hobart, and Green Bay. This facility is presently handling 52 million gallons of raw sewage per day including the pulping wastes of American Can Company and Charmin Paper Company. This plant is the first major joint municipal-industrial treatment plant in the nation and serves an 82-square mile area. The treated effluent outfall of the plant is located near the mouth of the Fox River adjacent to the Green Bay Yacht Club.

2.2.12 Green Bay obtains its raw water for domestic and industrial supply via a pipeline from an intake in Lake Michigan east of Green Bay in Kewaunee County. This raw water is of high quality and the water filtration plant has a filter capacity of 30 million gallons per day and a pumping capacity of 50 million gallons daily. Reserve city wells are capable of producing 10 million gallons daily.

Industry, Employment and Income

2.2.13 The three principal industries of the Green Bay area are paper production, food production and processing, and the manufacture of non-electrical machinery. Green Bay is known as the paper making capital of the world with four large paper mills and 16 industries producing paper and allied products. Green Bay is also known as cheese production center and has the largest meat packing facility east of the Mississippi River. Green Bay is the second largest jobbing, wholesale, and distribution center in Wisconsin. It also ranks third in retail sales. In 1972, the Green Bay area contained 251 manufacturers, of which 95 had 20 or more employees. There are almost 1,500 retail establishments in the area.

2.2.14 In 1970, Green Bay had almost 35,000 persons in its labor force. A breakdown of the leading types of employment by occupation and industry is listed below:

By Occupation:

(1) Clerical and kindred workers-28.4 percent of labor force

(2) Professional, technical, and kindred workers-26.5 percent of labor force

(3) Craftsmen, foremen, and kindred workers-17.6 percent of labor force

(4) Other occupations-27.4 percent of labor force

By Industry:

(1) Manufacturing-34.5 percent of labor force

(2) Wholesale and retail trade-26.2 percent of labor force

(3) Government-8.5 percent of labor force

(4) Construction-6.8 percent of labor force

(5) Educational services-5.8 percent of labor force

(6) Services-4.7 percent of labor force

(7) Other-13.5 percent of labor force

2.2.15 Income characteristics for the Green Bay area in 1969 showed a median family income of $9,975, with greater than 60 percent of the city's families earning between $7,000 and $15,000 per year (U. S. Dept. of Commerce 1973).

Transportation

2.2.16 The Green Bay Harbor area is served by U. S. Routes 41,141 and the as yet incomplete Interstate 43. Wisconsin routes 29, 32, 54 and 57 also serve the harbor area. The major local streets are Broadway on the west side of the harbor and Riverside Drive, Monroe Avenue, Washington and Quincy Streets (State HWY 32 and 57) on the eastside of the harbor. There are five road bridges and three railroad bridges crossing the harbor navigation channels. Starting at DePere lock and dam and moving northward (downstream) are the State Hwy 32 (Main-George St.) bridge at DePere lock and dam; the new Allouez-Ashwaubenon bridge to become part of Interstate 43; the Chicago and Northwestern Transportation Co. bridge; the Chicago, Milwaukee, St. Paul and Pacific Railroad bridge; the new Tilleman Memorial bridge carrying State Hwy 54 traffic on Mason St.; the Walnut Street bridge carrying State Hwys 29 and 32 traffic; Dousman Street bridge carrying U. S. Route 141 traffic, and the Green Bay and Western Railroad bridge located a short distance upstream of the Fox River mouth. A new high-level bridge at Tower Drive carrying Interstate 43 at the mouth of the Fox River is proposed to be completed in 1981.

2.2.17 Additional transportation facilities serving the Green Bay Harbor vicinity include: the Chicago and Northwestern Transportation Company; the Green Bay and Western Railroad; the Chicago, Milwaukee, St. Paul and Pacific Railroad; Austin Straubel Field served by North Central Airlines, two charter services and air freight airlines; 24 truck lines; three interstate bus lines; and various intra-city buslines and taxi services.

History

2.2.18 Prior to the arrival of the first white, the Green Bay region was the seat of the Winnebago Indian Nation. The Winnebagoes lived along the marshes and shallow waters of Green Bay and utilized the abundant fishery and other natural resources. In later years, other Indian tribes moved into the region as they were displaced from their traditional lands further east.

2.2.19 Green Bay, or as the French called it, "LaBaye Verte", was established in history in 1634 with the arrival of the French Voyageur, Jean Nicolet, who was looking for a passage to the interior. In 1641, two intrepid Jesuit priests, Fathers Joques and Rambault, established a mission at the mouth of the Fox River and from 1634 to 1669, French fur traders frequented the region. On 2 December 1669, the French presence was reinforced by the establishment of St. Francis Xavier mission. In 1673, Father Marquette and Louis Joliet carried through Nicolet's original mission, and discovered a short portage at Portage, Wisconsin between a portion of the upper Fox River and the Wisconsin River that allowed exploration and passage to the Mississippi Valley. The French further protected their fur trading and navigation interests at Green Bay by the establishment of Fort St. Francis or LaBaye between 1718 and 1721. The first permanent settler, Auqustin de Langlade, arrived with a family of eight to establish the first permanent settlement between 1744 and 1746 making Green Bay the oldest settlement in Wisconsin.

2.2.20 In 1761, the British established Fort Edward Auqustus near the mouth of the Fox River when they gained domination of the region following the French and Indian War (1756-1763). Fur trade continued to be the prime attraction in the region. The British continued to control the area until 1815 despite the Treaty of Paris (1783) which ceded the region to the United States and despite the establishment of the U. S. Northwest Territory in 1787.

2.2.21 Soon after the British left in 1815, the Americans established Fort Howard, a 600 man garrison, to protect the Green Bay region and administer the Wisconsin portion of the Northwest Territory. The Green Bay settlement started by Langlade under the French had grown to a population of 56 in 1786, 252 by 1812 and to 500 by 1824.

2.2.22 Wisconsin entered the Union as the 30th State on 29 May 1848 and Green Bay, which started as a French fur trading center, grew into a prosperous manufacturing and distribution center for all of northeast Wisconsin and Upper Michigan.

2.2.23 The harbor at Green Bay played an important part in the founding and growth of the city. The Fox River, together with the Bay outlet to the Great Lakes and the well-established Indian trails, gave

quick access to a wide area. With the development of the region, these natural routes were supplemented by man-made plank roads, railways and navigation improvements in the Fox River above DePere beginning in 1853 and at Green Bay Harbor in 1867. In 1866 and 1867, a total of $75,500 was appropriated by Congress to dredge a cut through Grassy Island (Figure 2-1) which blocked the entrance to Green Bay. With this first improvement and later modifications of the project, which provided for straightening, widening, and deepening the channels, the harbor has kept pace with the growth of commerce at Green Bay.

Cultural Resources

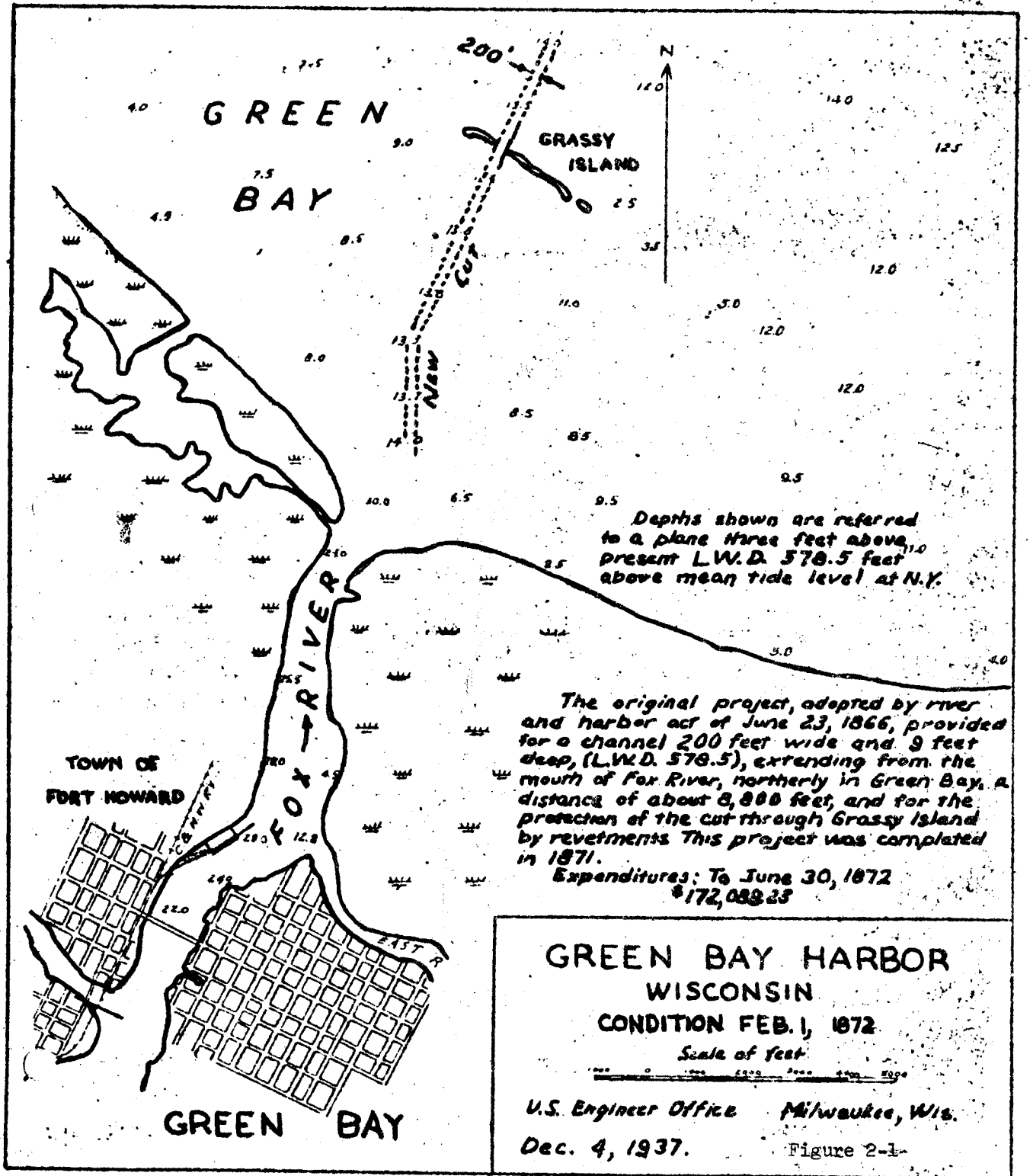
2.2.24 In a letter dated 30 July 1976, the Wisconsin State Historic Preservation Officer (SHPO). (Appendix A) indicated that:

> "There are no sites listed on the National Register of Historic Places that would be adversely affected by this project. Furthermore, there are no sites known to us of archeological, architectural, or historical significance in the project area that would be eligible for inclusion on the National Register of Historic Places."
>
> "No archeological or historical reconnaissance survey will be necessary."
>
> "We (SHPO) are informing the local historical society of this project and should they inform us of a site or building in the project area that we are unaware of, we will contact you immediately."

2.2.25 There are no Wisconsin Natural or Scientific Areas in or near the harbor.

2.3 Future Environmental Setting

2.3.1 Harbor related commerce at Green Bay is expected to approach 3,000,000 tons annually by the year 2000. This increased tonnage is in keeping with the expected rise in population and the continued importance of the region's economy to Wisconsin and the entire nation. Better sewage treatment, the elimination of polluting outfalls, and the dredging of at least portions of the accumulated polluted sediments in the lower Fox River and Green Bay with confinement of this dredged material should eventually lead to an improvement in water quality with benefits to health, recreation, aesthetics, and aquatic life.


GREEN
BAY
GRASSY
ISLAND
200'
N
New Cut
FOX RIVER
TOWN OF
FORT HOWARD
CANAL
EAST R
GREEN BAY
Depths shown are referred to a plane three feet above present L.W.D. 578.5 feet above mean tide level at N.Y.
The original project, adopted by river and harbor act of June 23, 1866, provided for a channel 200 feet wide and 9 feet deep, (L.W.D. 578.5), extending from the mouth of Fox River, northerly in Green Bay, a distance of about 8,800 feet, and for the protection of the cut-through Grassy Island by revetments. This project was completed in 1871.
Expenditures: To June 30, 1872
$172,089.23
GREEN BAY HARBOR
WISCONSIN
CONDITION FEB. 1, 1872
Scale of feet
U.S. Engineer Office Milwaukee, Wis.
Dec. 4, 1937.
Figure 2-1

3. RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS

3.1.1 The Chicago District, Corps of Engineers requested four public planning agencies, which have a particular interest in the Green Bay area, to evaluate the relationship of maintenance and disposal operations at Green Bay Harbor to their respective land use plans for the project area. The planning agencies were requested to analyze potential areas of compatibility or conflict between the harbor maintenance activities and the objectives and specific terms of existing or proposed land use plans, policies and controls, if any, that have been formulated for the harbor area. Types of plans considered included master plans, zoning regulations, and other related land use proposals.

3.1.2 In response to the Corps' request, the Brown County Board of Harbor Commissioners and the Green Bay-Brown County Planning Commission both supported the proposed action and saw no conflict with any existing or proposed land uses. According to the "Green Bay, Wisconsin Comprehensive Plan" produced by the Green Bay-Brown County Planning Commission, the current land use immediately to the south of the near-shore island confined disposal facility consists of residential and recreational land uses. Future land use of the nearshore island and adjacent land areas has been identified as primarily recreational land use. No response has been received from the Wisconsin Department of Natural Resources and Bay-Lake Regional Planning Commission to date.

4. THE PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

4.1 Introduction

4.1.1 The environmental setting of the Green Bay Harbor area is described in detail in Section 2. Any alteration of this setting is defined as an environmental impact. Environmental impacts resulting from the proposed operation and maintenance project can be classified by duration, magnitude, geographic level of impact and degree of permanency. Impact duration can be: temporary, experienced only during the time when maintenance operations are actually being performed; short-term, experienced for a period of days following cessation of maintenance activities; or long-term, changes in an environmental component experienced over a period of years. The magnitude of an impact can be expressed as high, medium, or low depending upon its relative environmental significance. For example, the elimination of 2 acres of a particular type of spawning habitat may be of high magnitude if it is known that only 3 acres of such habitat exist. Similarly, the elimination of 2 acres of spawning habitat may be of medium or low magnitude if it is known that hundreds of acres of such habitat exist. Geographic impact levels can be termed: immediate area, which includes only the spatial area within a few hundred feet of a particular activity site; project area, which includes the harbor, open-lake disposal sites, and adjoining areas; local which includes the city of Green Bay: regional, which includes Brown County and the lakeshore portion of Wisconsin; and national, which includes the entire country. The degree of permanency of an impact can be described as either reversible or irreversible and irretrievable. Reversible impacts are those which will be nullified within a period of a few years at most, while irreversible and irretrievable impacts are those which will not be nullified in less than 50 to 100 years.

4.1.2 Environmental impacts may result from harbor survey and inspection, dredging operations, transport of dredged material, disposal of dredged material, and construction of the confined disposal facility.

4.2 General Impacts

4.2.1 Maintenance vessels are powered by gas or diesel motors and can therefore be expected to release a very minor amount of oil and lead into harbor waters, and gaseous pollutants, especially hydrocarbons and carbon monoxide, into the atmosphere of the project area, producing temporary, low-magnitude adverse impacts on the water and air quality in the immediate area. These impacts will be partially imitigated because all Corps and contract vessels will be required to be in compliance with USEPA and State standards for the control of smoke and fume emissions.

4.2.2 Temporary, adverse aesthetic impacts of low-to-medium magnitude will result during the presence and operation of maintenance vessels in the project area. Maintenance vessels will be visible by persons wishing

to observe the natural harbor setting from piers, docks, bridge approaches and other structures adjacent to the harbor. Operation of project vessels is not expected to significantly increase noise levels except in the immediate work area. Therefore, aesthetic effects will be temporary and will affect only those people present in the immediate area, such as harbor users and residents of dwelling units peripheral to the project area. These people may also detect temporary, low-intensity odors from vessel emissions and exposed dredged material. The levels and types of odors that are detectable from dredged materials are believed to be related to the chemical and biological constituents contained within the dredgings. Observations by Chicago District personnel have indicated that odors from dredged materials may range from nondetectable in sandy materials to pungent odors, similar to those from hydrogen sulfide or petroleum, in highly-polluted materials. If, during the course of maintenance activities it is determined that objectionable, maintenance-related odors or noises are adversely affecting the adjacent community, appropriate measures such as those described in U. S. Army Waterway Experiment Station (1976a) "Abatement of Malodors at Confined Dredged Material Disposal Sites" for elimination of malodors, or eliminating construction and resultant noise, during the hours of 6 p.m. through 7 a.m. will be implemented to modify or eliminate such effects.

4.2.3 The presence of maintenance vessels in the harbor navigation channels will cause a temporary incovenience of low magnitude to vessels that must avoid work areas when entering or leaving the harbor.

4.2.4 The only impact of the proposed activities on terrestrial wildlife will be a temporary, low-magnitude disruption of the gulls, terns, mallards, songbirds, and shorebirds that utilize the piers, beaches, and harbor waters for nesting and feeding. These species may be driven away from the immediate area by maintenance activities and noises. No endangered plant species occur in the immediate project area. The habitat of the project area's endangered animals should not be disturbed.

4.2.5 A temporary, low-magnitude increase in the demand on local utilities, such as water and electricity, will occur due to the need for such resources by maintenance equipment and personnel. Maintenance vessels and activities will create a temporary, low-magnitude potential safety hazard to local boaters and other harbor users. The U. S. Coast Guard will be consulted to provide recommendations for the placement of any necessary navigational aids to reduce hazards to harbor uses. Community services, such as police, rescue, and medical services, may therefore be utilized if their particular assistance are required.

4.2.6 There are many commercial industries utilizing Green Bay Harbor, therefore, this project will have beneficial effect upon local revenue, employment, and earnings within these industries. Operation and maintenance of the harbor will affect local manufacturing since many manufacturing industries use Green Bay Harbor for the receipt of raw materials or shipping of finished goods. The presence of maintenance

personnel will result in short-term, low-magnitude benefits to local retail and service establishments due to expenditures for food, lodging, entertainment, and other items. The maintained navigation project will have an indirect long-term beneficial effect of medium magnitude on the revenue, employment and earnings of retail trade industries due to the stimulating effect harbor activities have on local business in general.

4.2.7 All phases of operation and maintenance of Green Bay Harbor will have a direct long-term effect of low magnitude upon the total energy supply available in the region. The fuel consumed during survey and inspection, construction of the confined disposal facility, dredging, transport, and disposal will be irretrievably lost. Operation and maintenance of the harbor will also allow for continued use of this facility by motor powered boats, thus increasing fuel use directly related to harbor activities. The exact impact of future harbor activities at Green Bay Harbor upon energy resources cannot be determined. However, due to the continued maintenance of authorized harbor channels, many of the motor powered craft presently utilizing Green Bay Harbor will probably continue to require considerable quantities of fuel for craft operation. Fuel consumption will also be affected by the number of non-local people using motor vehicles to arrive at Green Bay Harbor. However, continued maintenance of the harbor will provide continued local commercial and recreational facilities for the community, thus reducing motor vehicle traveling distances and fuel consumption for the local population.

4.2.8 Operation and maintenance activities at Green Bay Harbor should have neither a beneficial nor an adverse direct effect upon community and regional demographic and population parameters, such as rate of population growth, total population or number of persons displaced. The project will not directly affect Green Bay residential structures adjacent to the harbor, thus no persons will be displaced or require relocation. The project will have an indirect long-term beneficial effect on local population parameters indicative of community cohesion, such as a commercial harbor, due to the continued presence of a harbor as a focal point for group stability.

4.2.9 The project will have neither a beneficial nor an adverse short-term effect on local housing parameters such as repair and maintenance of existing structures, changes in home ownership or percent of owner occupied homes. Future operation and maintenance of the harbor may have a local long-term beneficial effect of low magnitude upon these parameters by preserving the of harbor as a commercial facility, thereby promoting maintenance up-keep and owner stability. Operation and maintenance of Green Bay Harbor will have a direct long-term beneficial effect upon the quality and utility of commercial properties available for industrial purposes, through the continued use of the harbor wharfing facilities.

4.2.10 The project will not affect Green Bay's water supply since no intake points are located within the project area.

4.2.11 Correspondence from the Wisconsin State Historic Preservation Officer (Appendix A) has indicated that no known historical or archaeological sites will be affected by continued operation and maintenance of this project. Should maintenance personnel discover items of possible cultural significance, operations will cease and consultation will be sought with the State of Wisconsin and the National Park Service.

4.3 Impacts Due to Survey and Inspection Operations

4.3.1 The impact of survey and inspection activities are expected to be temporary and of low magnitude and will occur only in the immediate area of the harbor due to the relatively small scale of these operations. There are no anticipated impacts on aquatic life due to survey and inspection operations. Aesthetic impacts and navigation inconveniences will be expected as previously described.

4.4 Impacts Due to Dredging Operations

4.4.1 Dredging operations at Green Bay Harbor will only be conducted when channel shoaling has reached a point where harbor navigation is impeded or unsafe. Therefore, dredging may not be accomplished every year but only when surveys of the harbor depths indicate dredging is necessary. Dredging the harbor only when necessary and placing the dredged material into the confined disposal area will reduce the overall impacts of dredging. Because the harbor may not be dredged every year, it may take longer than eight calendar years to fill the confined disposal area to capacity. However, the confined disposal facility authorization calls for a design capacity of a eight year period of dredging (1,200,000 cys at Green Bay) but does not require the facility to be filled within eight calendar years of construction.

4.4.2 Dredging may have a relatively long-term, high-magnitude beneficial effect upon sediment quality on the bottom of the lower Fox River and Green Bay if the quality of new sedimentation from sanitary outfalls and other sources show an improvement over the period of confined disposal. Thus, removal of approximately 1,200,000 cubic yards of polluted sediments should result in an overall improvement in the quality of the Green Bay Harbor sediment.

4.4.3 Impacts resulting from dredging operations, such as temporarily increased water turbidity, are affected by the type of dredge utilized. The majority of work at Green Bay Harbor will be accomplished by a Corps of Engineers' hopper dredge capable of collecting the dredge material into onboard containers and transporting it to the pumpout facility for transfer to the contained disposal facility (Figure 1-2). Minor amounts of work may be performed by smaller contract hydraulic, dipper, or clamshell dredges. Private interests dredging under Department of the Army permits may use a variety of small types of dredging equipment. Each type of dredge has differet operating characteristics that are further described in Appendix D.

4.4.4 A short-term, medium-to-high magnitude impact on water quality in the immediate dredging area of the dredge, and for a short distance down current will result from dredging operations. This will produce short-term medium-to-high magnitude effects on water quality. The mechanical mixing and agitation created by the dredging operations will produce some increase in turbidity and suspended solids. The presence of soluble chemical constituents in the polluted sediment will cause increase in their concentration in the surrounding water. Those constituents affected include: kjeldahl nitrogen, phosphorus, COD, oil and grease, and heavy metals. The amount of oxygen-demanding material contained in the polluted and unpolluted sediments will determine the extent of dissolved oxygen depletion resulting from the dredging operation. However, adverse increases in turbidity, solids, nutrients, COD, and heavy metals and decreases in dissolved oxygen levels should be almost totally reduced to predredging levels in a short time after dredging. Every effort will be made to minimize the effects of dredging on water quality. In order to reduce the resuspension of polluted sediments, dredging will be confined to shoaled portions of the navigation channels.

4.4.5 Turbidity, a direct but temporary result of dredging, will reduce the photosynthetic capability of aquatic vegetation by reducing the amount of light penetration into project waters. However, despite the temporary depressing effect of a turbidity cloud, sediment nutrients released by dredging operations may encourage both phytoplankton and zooplankton growth, especially algae blooms, in lower Green Bay after the temporary turbidity clouds disperse. If algae blooms occur, as they have in the past in lower Green Bay, an adverse impact may be felt in the aquatic ecosystem of the Bay because they can create an imbalance in the dissolved oxygen levels. Increased algae growth can ultimately lead to low dissolved oxygen levels which are detrimental to aquatic life.

4.4.6 Temporarily raised turbidity levels may be beneficial since it will promote absorption of heavy metals and toxic materials in the water column onto the sediment particles in suspension. However, it is conceivable that certain heavy metals and other undesirable substances released to the water column during dredging of polluted sediments will not be absorbed onto sediment particles and may enter the food chain through planktonic organisms and adversely affect the aquatic ecosystem. It should be pointed out that a lesser importance should be attached to potential toxic effects on plankton communities themselves because of their high reproductive capacity allowing for rapid population regrowth following even a massive reduction in number. However, sublethal toxic effects on the plankton and benthic macro-invertebrate communities may occur and could lead to a biomagnification of toxic materials through the food chain resulting in an impact upon feeding fish.

4.4.7 The impacts of dredging on aquatic invertebrates fall into two basic categories: the direct and indirect effects on the benthic community. The greatest concern is for the destruction of the benthos, a major food for many fish species. The removal of bottom sediments will destroy existing populations of benthic organisms, thus resulting in an alteration of the aquatic food web in the immediate area. Those benthic macroinvertebrates most affected are filter feeders and organisms of limited mobility in or near the navigation channel, including aquatic worms (oligochaetes) and midges (chironomids). However, since the project area has been previously subjected to intermittent dredging, the substrates present may not support mature benthic communities between dredging operations. The indirect long-term impacts on aquatic invertebrates related to dredging operations are more difficult to define than the direct impacts. It is not possible to say whether such impacts are adverse, beneficial, or as is more likely, a combination, although there is definitely a change in the physical environment of the benthos as a result of dredging activities.

4.4.8 Considering the low quality of the aquatic habitat and the low fish species diversity in the Green Bay Harbor area, it is probable that there will be a short-term, low-level impact on the local fish population from dredging activities. The temporary increase in turbidity can lead to correspondingly temporarily reduced photosythetic activity with resulting lower dissolved oxygen levels, decreases in the availability of food, and a short-term degradation of water quality. The degree of impact will be dependent upon the numbers and species of fish present in the harbor immediately preceding dredging and their reaction to dredging and related activities. Some fish species may temporarily relocate to adjacent areas due to disturbed conditions, while others may be attracted to suspended benthic food organisms. Some limited fish mortality, of a short-term, low-magnitude impact on the total fishery in the project area may occur due to increased suspended solids that might affect fish by clogging or damaging gill filaments and due to the actual mechanical killing of fish by dredging operations. There is no anticipated direct impact of dredging operations on commercial or sportfishing in Green Bay or the lower Fox River. All scheduling of dredging operations will be coordinated with the appropriate Federal, State, and local conservation agencies to minimize impacts upon fishery resources.

4.4.9 Conditions that agitate harbor waters and bottoms, such as heavy rains, winds during storms, and dredging, tend to resuspend nutrients in bottom sediments and therefore may have the potential for producing temporary periods during which coliform counts may greatly exceed recommended state standards. Effects on the coliform count are also influenced by currents, wind and storm conditions, and other factors present at the time of dredging. In addition, effects will be influenced by the existing high local coliform background levels, which have generally exceeded levels recommended by the State. If high coliform levels are caused by dredging, the Corps will suspend dredging operations.

4.4.10 Routine maintenance dredging may be conducted in a season in which several, annual, harbor-related community events may occur. Maintenance activities may be scheduled to avoid potential conflict with other major harbor events that may occur during the proposed dredging period if the Corps of Engineers receives a sufficiently early notice of the time of the event and no significant operational or other environmental conflicts will result.

4.5 Impacts Due to Transfer of Dredged Material

4.5.1 Transfer of the dredged material from the onboard collection hoppers of the hopper dredge to the confined disposal facility will be accomplished by an onland and submerged pipeline extending from the hopper dredge pumpout facility through an industrial area and then submerged to the confined disposal area (Figure 1-2). This pipeline will be checked for leaks before disposal operations begin and continuously monitored during operation. Transfer of the dredged material in a pipeline should prevent any adverse impacts from spillage of dredged material on land or in the water.

4.5.2 The pipeline will remain connected and in place for the useful life of the confined disposal facility. In order to avoid or reduce any conflicts to industrial or municipal roadways from the presence of the pipeline for an extended length of time, the pipeline will be buried beneath the shoulder of the road and under connecting roads and drives.

4.5.3 Transport of dredged material resulting from small amounts of work that may be performed by contract dredge will probably be infeasible by the onland pipeline method. Therefore, some direct rehandling of dredged material into the confined disposal facility from scows may be necessary. Care will be taken to prevent any spillage.

4.6 Impacts Due to Construction of the Confined Disposal Facility

4.6.1 The confined disposal facility to be used at Green Bay Harbor after 1977 will be built by water-based construction equipment on the approximately 55 acre site in lower Green Bay shown on Figures 1-1 and 1-2. Specific construction techniques are described in Appendix E "Construction and Operation of Confined Disposal Facilities." This facility will take approximately two years to construct. During construction, the movement of construction vessels, materials, workers and land-based vehicles through the waterways or streets adjacent to Green Bay Harbor will produce short-term, low-magnitude adverse impacts upon local water and land based traffic patterns. The motorized construction equipment will produce short-term, low-magnitude adverse impacts upon existing aesthetic, noise, air, and water quality levels of lower Green Bay and the recreational and residential land uses adjacent to the nearshore island site. Construction

of the facility will probably produce limited turbidity plumes and resuspend pollutants present in sediments at the construction site into the overlying water column. Considering the overall water quality of lower Green Bay, a temporary rise in turbidity levels and a small, temporary decline in the existing water quality should produce only a short-term, low magnitude impact. All motorized equipment will be adequately equipped with applicable noise, air, and water pollution abatement equipment required by law. Dust control at onland parking or storage lots will be implemented whenever dust becomes a problem.

4.6.2 Construction of the confined disposal facility will have a long-term, low-magnitude adverse impact upon the aquatic life now utilizing the nearshore island site. For example, all existing benthic life will be destroyed and schools of fish may be trapped within the disposal facility when the walls are closed. If significant fish entrapment occurs, the Wisconsin DNR and the U. S. Fish and Wildlife Service will be contacted for possible remedial measures. However, the project will also have a future long-term, low to medium-magnitude beneficial impact upon local aquatic biota. According to Mr. Lee T. Kernen, Area Fish Manager for the Wisconsin DNR...

> "Approximately 50 acres of the open water of Green Bay will be lost through construction of the nearshore island. This will displace those fish which now reside in that area. Since studies have shown fish species to be extremely mobile, this should impose no hardship on the fishery. Compared to the scope of Green Bay, this loss cannot be considered of major significance."
>
> "The disposal site is not located on or near any known fish spawning areas. The 40-acre sheltered harbor (created between the confined disposal facility and the shore) could well provide even better spawning habitat than now exists."

In addition, Mr. Daniel G. Olson, Area Wildlife Manager for the Wisconsin DNR states ...

> "The Near Shore Island Disposal Area will in all probability have some effect on waterfowl usage at the (Bay Beach Wildlife) Sanctuary. A slight reduction in the waterfowl population will not effect public use of the Sanctuary."
>
> "The creation of the Near Shore Island Project will have little effect on other terrestrial wildlife. Diving ducks have been observed using the project site. The disposal project will only move these waterfowl species to other areas. It will not affect their numbers unless for some reason the construction process would result in a catastrophic event-such as an oil spill."

"Following completion of the disposal project there could be some benefits to colony nesting birds such as gulls and terns. These birds could utilize the island as a rookery for raising their young. If, however, it is used for intensive recreation it will serve little use to wildlife."

Future use of the filled confined disposal facility will be decided by the local project sponsor, Brown County, with only the stipulation that the facility be maintained to the satisfaction of the Secretary of the Army.

4.6.3 None of the flora or fauna species now utilizing the nearshore island site are included in the U. S. Fish and Wildlife Service or Wisconsin DNR lists of endangered or threatened species. Similar benthic and open water habitats can be found in abundance in lower Green Bay so the present habitat at the nearshore island site is not unique. The Wisconsin State Historic Preservation Officer has not placed any historical, cultural, or archaeological significance on the site.

4.6.4 In a letter of 15 November 1976, Mr. David W. Martin, Engineer and Manager for the Green Bay Metropolitan Sewerage District stated ... "Recent studies, both completed and in progress, of the water quality in the lower (near shore) portion of Green Bay, indicate that the treated effluents discharged by our wastewater treatment facilities, strongly tend to follow the east shore of the Fox River from Mile 0.3 northward and then eastward along the bay shore past the proposed island site. Even though the effluent is well treated it does degrade the water quality somewhat and that may have an adverse impact on the proposed recreational value of the facility." However, Dr. Paul Sager, University of Wisconsin at Green Bay, has stated to the Chicago District that no significant lowering of water quality due to the confined disposal facility's interference with the effluent plume should occur if no solid causeways or other structures are placed from the shore out to the site. The Chicago District has completed an assessment of the water circulation patterns near the confined disposal facility site. This assessment indicated no significant degradation of water quality in lower Green Bay due to the presence of the proposed confined disposal facility. Further studies under separate authorization will be performed as part of the design of a small-boat harbor that is proposed landward of the confined disposal facility area. Construction of the proposed small-boat harbor is not a part of the proposed action considered in this Environmental Impact Statement. The small-boat harbor project will be the subject of a separate, future environmental impact statement.

4.7 Impacts Due to Disposal of Dredged Material

4.7.1 Use of the confined disposal facility for the containment of the dredged material from Green Bay Harbor should have a long-term, high-magnitude beneficial impact upon the water quality and sediment quality of the lower Fox River and Green Bay. Removal and confinement

of the sediments will prevent the potentially polluted materials (Appendix B) in these sediments from maintaining contact with the overlying water column containing aquatic organisms and utilized for recreational purposes. Removal of these polluted materials from the bottom of the navigation channel will offer a higher quality substrate for benthic organisms although this improvement may be negated by the need for frequent dredging.

4.7.2 The confined disposal facility will be constructed in such a manner that no impacts should occur due to polluted sediments reentering the waters of Green Bay. Disposal operations will be conducted so that there will be no spillage of dredged material during pumpout or over the walls of the facility. A cellular sand filter will be incorporated into the walls of the facility (Figure 1-2 and 1-5) to filter any effluent from the facility before discharge to Green Bay. Water quality monitoring of the effluent from the facility and of the surrounding area of Green Bay will be performed before, during, and after disposal operations to monitor the effectiveness of the facility. This program of water quality monitoring will be coordinated with the USEPA, Wisconsin DNR and any interested local agencies. Immediate remedial action will be taken should the monitoring reveal any problems.

4.7.3 Placement of dredged material into the confined disposal facility will probably occur every year after 1980 or 1981. For the first several years of use, dredged material will only rise above the interior water surface near the outlet of the transport pipeline. To distribute the material more evenly, the pipeline discharge may be moved around inside the facility or other mechanical methods may be used to provide for a more even distribution of the dredged materials. In the final years of use, the dredged material will rise above the interior water surface and should support a vegetative growth available as temporary wildlife habitat similar to the existing Bayport land disposal site located west of the mouth of the Fox River. Plants that may be expected to grow in this wet, rich substrate include moisture-tolerant plant species such as eastern cottonwood, black willow, red-osier dogwood, smartweed, and many sedges and grasses. As the facility reaches its containment capacity, the upper layers of dredged material will dry out more and probably support a mixture of wetland and old field plant species. If natural vegetation fails to develop insufficient quanity to control wind erosion of the dried sediments, plantings will be made to prevent wind erosion. The final vegetation and wildlife habitat of the site will be determined by the local sponsor, Brown County, when the completely filled facility is turned over to the county for management. At this time, Brown County intends to dedicate the filled nearshore island as a wildlife sanctuary for bird life, except for a small portion of the southern part of the island where some type of limited access wildlife viewing area has been proposed. Consideration is being given to the development of a small-boat harbor between the nearshore island and Bay Beach Park. However, proposals for a wildlife sanctuary or a small-boat harbor are not a part of the proposed action being considered in this Environmental Impact Statement.

4.7.4 Placement of dredged material within the confined disposal facility may produce short-term, low-magnitude adverse impacts on recreational and residential uses adjacent to the facility by the release of mild to strong odors to the local vicinity. However, it has been the experience of the Chicago District that these odors are only detectable close to the facility and that they do not persist long (a few days) after disposal operations cease. The USEPA has described the odors of the sediments as ranging from no odor to strong sewage odor. If odors originating at the facility become a problem, mitigative action such as those described in U. S. Army Engineers Waterways Experiment Station (1976a) "Abatement of Malodors at Confined Dredged Material Disposal Sites" will be taken to reduce or eliminate odors in the vicinity.

4.7.5 The Chicago District will take necessary preventative measures to reduce shallow ponding of stagnant water in the final stages of filling to prevent possible cases of mosquito breeding or waterfowl botulism.

4.7.6 The presence and operation of the confined disposal facility will offer a long-term, low-magnitude adverse aesthetic impact until the facility is completely filled and turned over to Brown County. The presence of the facility adjacent to recreational and residential land uses at and near Bay Beach Park may detract from the overall visual setting. Disposal operations will probably be conducted every year. Personnel and equipment needed to accomplish disposal operations are not a normal part of the surrounding visual environment and may unavoidably distract and annoy local residents or park users.

5. ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

5.1 Survey and Inspection Operations

5.1.1 A short-term low-magnitude inconvenience to a few recreational or commercial watercraft that must temporarily avoid the varying work areas in the harbor or navigation channel.

5.1.2 Short-term, low-magnitude adverse impacts on the local natural environmental quality caused by the release of small amounts of gaseous exhaust and noise into the harbor atmosphere and the release of minor amounts of oil, gas and lead from the survey vessel engines.

5.2 Dredging Operations

5.2.1 Minor, short-term inconveniences to recreational and commercial watercraft that must avoid the area immediately surrounding the working dredge.

5.2.2 Short-term, low-magnitude increases in pollutant levels of both air and water by the release of small amounts of gaseous exhaust, noise, gas, oil and lead from the vessel engines and equipment into the harbor.

5.2.3 Short-term, high-magnitude impacts upon the aquatic environment caused by any accidental spillage of dredged material from working vessels, thereby increasing turbidity and suspended solids levels and decreasing dissolved oxygen levels in the water column at the spill site and immediately down drift or downstream from a spill.

5.2.4 Short-term, high-magnitude destruction of the benthic and planktonic aquatic communities caused by channel dredging.

5.2.5 Prevention of the permanent reestablishment of a mature benthic community in maintained channels, regardless of improvements in water and sediment quality, due to continual dredging operations and accompaning disturbance.

5.2.6 Temporary distrubance or emigration of fish and other nektonic organisms due to higher turbidity and lower dissolved oxygen levels, resulting in short-term decline of fishery habitat.

5.2.7 Short-term, varying magnitude impacts on the aquatic environment caused by the disturbance and resuspension of sediments due to dredging operations. Small amounts of heavy metals, nutrients and other pollutants contained in the sediments may be re-released to the water column.

5.3 Transfer of Dredged Material

5.3.1 Short-term, low-magnitude adverse impacts on local air and water quality caused by the engines of the hopper dredge.

5.4 Construction of the Nearshore Island Confined Disposal Facility

5.4.1 Permanent replacement of 55 acres of open water aquatic habitat with 55 acres of terrestrial habitat with accompaning loss of benthic, nektonic and all other aquatic organisms previously utilizing site.

5.4.2 Medium-to-high-magnitude adverse impacts on land and water traffic patterns, lasting up to two years after construction begins, due to local increases in lower Green Bay boat traffic and accompanying land vehicle traffic in the city of Green Bay.

5.4.3 Localized, periodic, short-term, medium-to-high magnitude adverse impacts due to increases in water turbidity, COD, solids, heavy metals, nutrient levels and other pollutants and decreases in dissolved oxygen levels in the water column immediately surrounding the disposal site when it under construction. These impacts will result from the disruption of bottom sediments due to construction of the walls forming the confined disposal facility.

5.4.4 Short-term, low-magnitude adverse impacts on local air quality caused by the emissions from engines of both the land and water vehicles used in construction. The engines will emit minor amounts of noise and gaseous pollutants into the atmosphere above lower Green Bay.

5.4.5 Low-magnitude impact from the trapping of a few aquatic organisms within the contained disposal area when the walls are finally closed.

5.4.6 Long-term minor change in water currents in lower Green Bay due to the presence of the nearshore island confined disposal site.

5.5 Disposal Operations

5.5.1 Localized, short-term, low-to-medium magnitude effects on air quality and aesthetics during the actual filling of the contained disposal area.

5.5.2 Possible odor problems originating at the disposal facility during and after disposal operations.

6. ALTERNATIVES TO THE PROPOSED ACTION

6.1 Discontinue Federal Maintenance Activities (No Action)

6.1.1 It would be possible to discontinue all Federal channel maintenance operations in Green Bay Harbor. This alternative would not require Federal maintenance equipment, personnel, or funds. Average annual savings to the United States would be equivalent to the average annual maintenance costs at Green Bay Harbor.

6.1.2 Discontinuation of maintenance dredging at Green Bay Harbor would have a long-term effect of progressively increasing adverse economic impacts as water depths in the channels decreased through accumulation of sediment and debris. It is estimated that serious shoaling would occur in three years. Increased flow velocities in the channel would also result from the decrease in the available channel cross-section due to sedimentation. Continued deposition of polluted sediments from upstream and local sources would result in a long-term deterioration of sediment quality of progressively higher magnitude. Areas of shoaling would create safety hazards and would require in the short-run, a greater number of trips by lesser draft vessels to maintain the present levels of commerce. These increased number of trips would increase per ton transportation costs to businesses. In the long-run, the continued decrease in vessel drafts and rising per ton transportation costs would divert commerce to other modes, principally rail with a resulting increased shipping cost per ton, and higher cost of manufactured goods and services. Eventually, lack of maintenance dredging might result in the complete loss of access to Green Bay for all but recreational craft. However, there would be environmental advantages to the "no action" alternative. Benthic communities would be allowed to fully mature in the harbor channels with no periodic disturbances by dredging. Some additional fish spawning habitat might become available dependent upon the toxicity of the accumulating sediments. There would cease to be a need for a nearshore island confined disposal facility occuping 55 acres of presently open-bay aquatic habitat.

6.1.3 Loss of access to Green Bay Harbor would eventually result in the deterioration of commercial boating facilities and lower the value of commercial real estate and structures adjacent to the harbor. This, in turn, would probably result in lower assessed property values and decreased property tax revenue. There would also be an accompaning decrease in income and income tax revenue generated by loss of income to those workers who were formerly employed in shipping or harbor related activities. Industry and businesses might eventually be forced to move to other locations where commercial navigation was still possible. These impacts would constitute long-term, medium-to-high magnitude adverse effects on the city of Green Bay and the surrounding region. The impacts of discontinuing channel maintenance at Green Bay Harbor are considered to be of a higher magnitude than the environmental benefits of discontinued dredging including benefits to aquatic ecology and savings of project costs. Therefore, the "No action" alternative is not considered desirable.

6.2 Control of Erosion

6.2.1 The amount of sediment that settles in the authorized harbor navigation channels could be reduced by controlling the rate of erosion and subsequent supply of sediment from the entire Fox-Wolf River Watershed. Means for implementing erosion control include improved agricultural practices, building and zoning regulations and land use planning. While technically feasible, the implementation of erosion control measures is beyond the scope of authority under which the Corps of Engineers maintains Green Bay Harbor; implementation and funding of erosion control programs are matters of local and State responsibility.

6.3 Alternative Dredging Equipment

6.3.1 There are basically three types of dredging plants: hopper dredges, designed to remove loose materials by suction and carry the dredged materials to the vicinity of the disposal site in hoppers aboard the dredge; clamshell and dipper dredges, designed to remove loose or compacted materials by mechanical action and load them into scows; and cutterhead pipeline dredges, designed to remove loose or compacted materials by a combination of mechanical and suction actions and transport the materials through a hydraulic pipeline to a disposal area (Appendix D). Hopper dredges are expected to complete the majority of maintenance work at Green Bay Harbor after 1977. Since the sediments to be removed consist of loose material lying at the bottom of the navigation channels, the hopper dredge, in conjunction with other smaller dredges working in areas where the hopper dredge is less efficient or cannot manuever, will be the best dredge plant choices.

6.4 Maintaining Alternate Channel Dimensions

6.4.1 The scope of maintenance dredging at Green Bay Harbor could be reduced by dredging the navigation channels to lesser depths or widths than authorized. Such operations would be technically feasible using the same maintenance equipment and procedures described in Section 1 of this statement. Alternative costs would be dependent upon the reduction of dredging width and depth. However, because less actual work would be involved, costs would be lower. Total costs would also decrease on the construction of a confined disposal facility which could be designed with less capacity.

6.4.2 If channel dredging dimensions were reduced, dredging volume and time reductions would lessen impacts upon the aquatic ecology of Green Bay Harbor and allow benthic populations to more closely approach a mature community. Since a reduction in dredging volume would also reduce the amount of resuspended sediment and turbidity, the potential adverse effects on water quality would be concurrently reduced. Inconveniences to commercial and recreational vessels would also be reduced and confined to a shorter time period.

6.4.3 Dredging to less than authorized depths and widths might ha similar effects to those discussed in the "Discontinue Federal Maintena Activities" (No Action) alternative. Large commercial vessels may not be able to enter the harbor and more frequent and costly operations by smaller commercial craft may be required, thus raising the per ton ship ping costs.

6.5 Open Water Disposal of Dredged Material

6.5.1 An alternative to placing sediments dredged from Green Bay Harbor into a confined disposal facility would be to dispose of them in the previously established open-water disposal areas in Green Bay. Pri to 1966, and for some period after 1966, dredged materials were dispose of in Green Bay open-water disposal areas in a technically and economically feasible manner. However, the Administrator of the USEPA has determined that the sediments to be dredged from Green Bay Harbor are unsuitable for unrestricted open-lake disposal and may only be placed in a confined disposal facility.

6.6 Chemical Treatment of Dredged Material

6.6.1 An additional alternative to placing sediments dredged from Green Bay Harbor into a confined disposal facility would be to chemically treat the material aboard the hopper dredge and dispose of them in previously used open-water disposal areas in Green Bay or to treat the dredged material at land-based sewage treatement plants for later on-land disposal. At present, there are no suitably equipped hopper dredges available to dredge and treat polluted dredge material to allow for open-water dispos l. Building such a dredge is conceivably technically possible but the cost of such a project would probably surpass the $6 million estimated for construction of the confined disposal facility and dredging would have to be postponed until the dredge treatment plant was built. This alternative is not considered acceptable. Treatment of the dredged material at existing sewage treatment plants could be expected to be costly but technically feasible. Since no plant adjacent to the harbor could quickly treat the estimated 150,000 cubic yards of dredged material to be dredged annually, a temporary storage facility built to the same specifications as the confined disposal area, but smaller, would be needed to allow the dredged material to be slowly fed into the treatment plant. This alternative would probably be costly but remains a feasible alternative.

6.7 Control of Sediment Pollutants

6.7.1 A long-range goal to control sediment pollutants could eventually lead to the elimination of the need for a confined disposal facility. The implementation of pollution abatement measures throughout the Green Bay Harbor area and in the Fox-Wolf Rivers watershed could significantly reduce the addition of toxic and excessive nutrient

materials to the sediments requiring dredging. Some measures, such as the recent upgrading of the Green Bay Metropolitan Sewage Treatment Plant will help, but pollutants will continue to be added to the sediments until all sewage treatment plants are upgraded, settling basins are provided for retention of all combined sanitary and stormwater sewer overflows during storms or floods, and all polluting industrial outfalls are closed not only in the harbor area, but in the entire Fox-Wolf basin. However, this long-range goal does not allow deferment of presently needed dredging and so this is not an acceptable alternative. Implementation of this long-range alternative to improve the quality of sediments is beyond the Corps of Engineers authorization for harbor maintenance and would be the responsibility of units of government within the Fox-Wolf basin.

6.8 Alternate Confined Disposal Facility Sites

General

6.8.1 Five alternative disposal site locations, some with alternates were studied in detail. Other plans were investigated in a preliminary manner and discarded due to environmental, engineering or operational problems. The plans include continued use of the Bayport area, and construction of offshore and nearshore islands in various locations as possible confined disposal facilities.

Nearshore Island Site

6.8.2 At the suggestion of the Green Bay-Brown County Planning Commission, a plan to utilize the confined disposal area to provide sheltered water suitable for future development of a small-boat harbor was studied and is shown on Figure 6-1. This is the selected plan as described in Section 1.

Continued Use of the Bayport Site

6.8.3 The existing Bayport disposal area is the original "Green Bay Diked Disposal Area" furnished by the city of Green Bay for dredging disposal as an item of local cooperation for new work channel deepening. This area is being considered by the city of Green Bay as a commercial-industrial site, and eventually, a port district.

(1) Description: The existing diked disposal site is located west of the mouth of the Fox River in the city of Green Bay, as shown on Figures 1-1 and 6-1. The 400-acre diked site, as initially established, is bounded on the southwest by Tower Drive, on the east by the Wisconsin Public Service Corporation Pulliam plant, on the northeast by Green Bay, and on the northwest by the city of Green Bay incinerator and landfill area. This site was originally provided by the city of Green Bay as an item of local cooperation for the most recent harbor deepening project

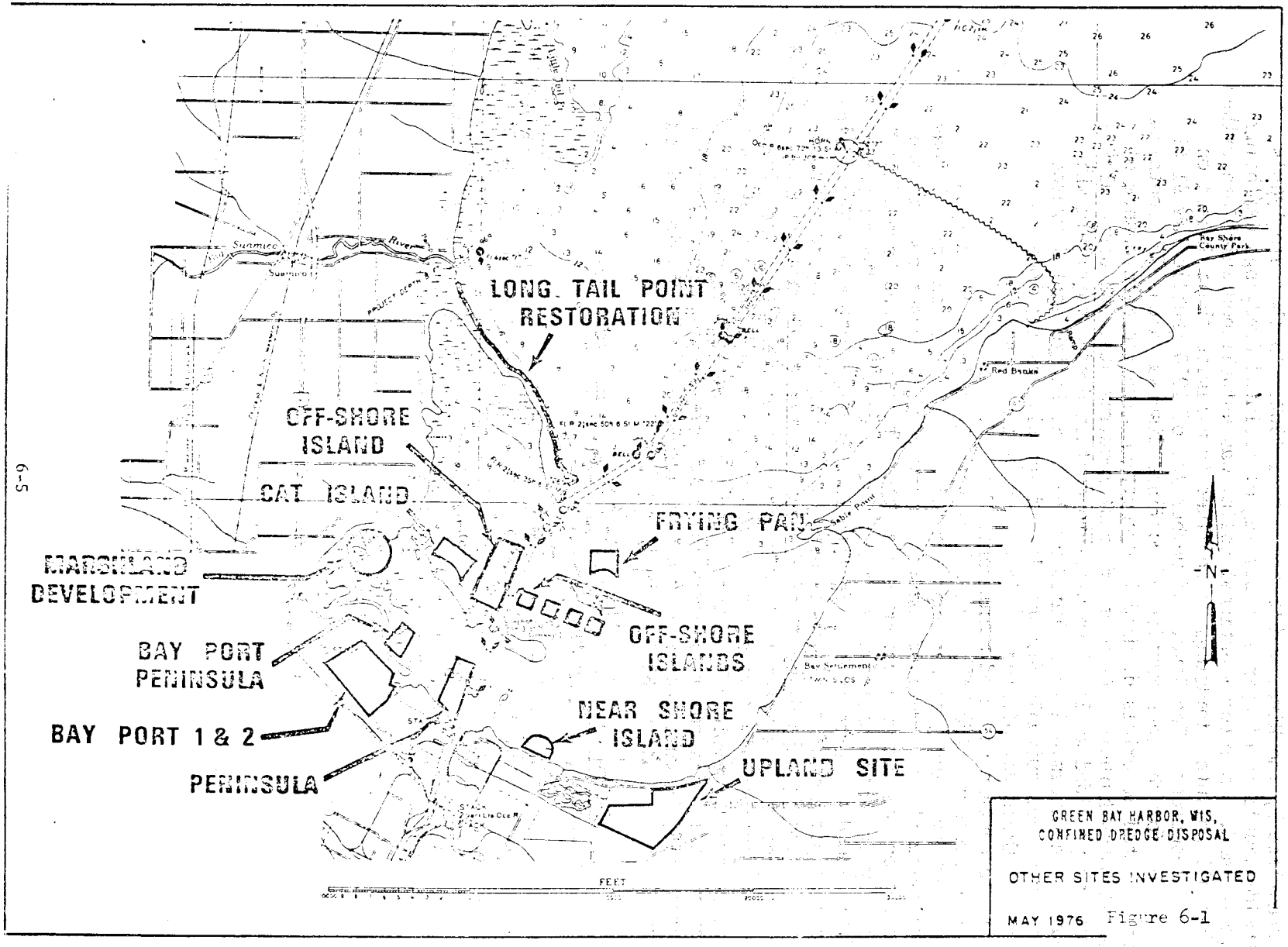

LONG TAIL POINT
RESTORATION
OFF-SHORE
ISLAND
CAT ISLAND
FRYING PAN
MARSHLAND
DEVELOPMENT
BAY PORT
PENINSULA
OFF-SHORE
ISLANDS
BAY PORT 1 & 2
PENINSULA
NEAR SHORE
ISLAND
UPLAND SITE
N
FEET
GREEN BAY HARBOR, WIS.
CONFINED DREDGE DISPOSAL
OTHER SITES INVESTIGATED
MAY 1976

Figure 6-1

authorized by the River and Harbor Act of 1962. In the late 1960's, the desirability of open-lake dumping of polluted dredgings was being questioned. An interim national policy was established which prescribed that all polluted dredgings be confined to minimize their impact on water resources. The River and Harbor Act of 1970 (Public Law 91-611) provided for the construction of confined disposal areas for containment of polluted materials dredged in connection with the maintenance of Great Lakes harbors. As part of local requirements, the disposal areas must be provided by local sponsors to contain dredge materials which have been determined as polluted by the U. S. Environmental Protection Agency as not suitable for open-lake disposal. As the local sponsor, the city of Green Bay offered continued use of the established Bayport disposal site to contain polluted maintenance dredgings from the Green Bay navigation project. When the site was originally offered for disposal of new work dredgings, it was approximately 400 acres in extent. It was predominantly in a wetland condition, however, its exact quality and condition was not well documented as the entire site had been filled to varying depths obliterating its original condition. The existing dike around the site is 11.0 feet to 13.0 feet above L.W.D. The north-central portion of this site is used by the Wisconsin Public Service Corporation for the disposal of fly ash from its coal-fueled Pulliam plant generating station located to the east of the site. The fly ash is six feet deep in some areas. Areas where the ash has been deposited are generally devoid of vegetation and represent a sterile disturbed environment. Six power transmission lines cross this area. Approximately 115,000 cubic yards of capacity remained in the original diked area below elevation 585 IGLD in 1976.

(2) Alternates: Two alternative plans were considered to provide the required capacity in this area.

(a) Plan B-1 obtains sufficient capacity by extending the area bayward to the existing bulkhead line, with height of fill kept at about elevation 585 IGLD (+8.2 LWD). In addition, provision is made for covering the fly-ash dumping area with about two feet of dredged material to stabilize it. New earth dikes would be required along the Tower Drive right-of-way, along the bulkhead line, with low dikes around the fly-ash area. The dikes facing the Bay would be protected from wave action by construction of a riprap stone revetment.

(b) In Plan B-2 the existing dikes are raised around the present area with a new dike adjacent to Tower Drive and filling to about elevation 588 IGLD (+11.2 LWD). The area is not expanded bayward, but the increase in elevation would require raising four existing power transmission lines crossing the area to provide required clearances and would have adverse impacts on the proposed road and railroad grades for the future commercial-industrial development. The dike along the bayside would be strengthened by construction of a riprap revetment to prevent erosion by wave forces.

(3) Capacity: Capacity of the areas are 1,500,000 cubic yards, with about 200,000 cubic yards spread on the fly-ash in Plan B-1 and th remainder within the bayport area.

(4) Operational Aspects: Dredged material would be transported to the area hydraulically through an existing pumpout facility and pipeline located on the west bank of the Fox River. The discharge end of the pipeline would be moved to place material where required and distribute it over the area. Material for covering fly-ash would be discharged into the fly-ash area, with the city of Green Bay or the Wisconsin Public Service Company responsible for final spreading and grading to provide a uniform cover over the fly-ash. Effluent from the disposal area would be discharged through a sand filter to remove suspended sediments prior to return to the bay.

(5) Costs:

(a) Construction costs are estimated to be $5,736,000 for Plan B-1 and $4,760,000, plus $260,000 in non-Federal relocation costs, for Plan B-2. These costs are based on 1976 price levels.

(b) Operational costs are estimated to be $2.00/cubic yard, including dredging and rehandling the dredged material.

(6) Construction and Usage Schedule: If required design documentation, environmental impact statements and plans and specifications were completed by 1977 and if construction funds were available, the dikes and area development could have been completed in time for use for the 1980 dredging season.

(7) Environemtnal Assessment: Approximately 1 acre remains in a ponded water condition and is considered to be wetland. This plus the remainder of the 30 acres which were substantially filled by previous disposal will be totally altered to a terrestrial environment. The proposed project would therefore result in the destruction of any remaining vegetation and wildlife on the site which are unable to migrate to adjacent areas or which may be affected by competition for survival in their new environment. There would also be conversion of about 60 acres of bay from an aquatic to a terrestrial environment in Plan B-1.

(8) Ultimate Future Usage: This area would be developed by the city of Green Bay in accordance with the Bayport Plan after completion of the dredge disposal program.

Frying Pan Site

6.8.4 (1) Description: This alternative was suggested by U. S. Fish and Wildlife Service and consists of an off-shore island about 4,000 feet east of the entrance channel angle point, shown on Figure 6-1. Te island would be rectangular with a reverse crescent on the leeward side.

(2) Capacity: The island would have a capacity of 1,500,000 cubic yards for maintenance dredging material and 180,000 cubic yards to contain dredgings from construction of an access channel to the site, with a top elevation at +12 Low Water Datum.

(3) Structures: The containment structure would be a rubblemound breakwater with a top elevation of +12 LWD and contain a steel sheet pile cutoff wall to prevent seepage into the Bay. In addition, steel cellular sand-filled filter cells would be provided to filter dredge effluent from the disposal area prior to discharge to the Bay.

(4) Operational Aspects: An access channel would be required from the existing navigation channel to the disposal facility which would allow hopper dredges to discharge directly into the area. A pipeline and trestle are not feasible because of the length of open-water which would have to be crossed.

(5) Costs:

(a) Construction costs are estimated to be $8,940,000 based on 1976 prices.

(b) Operational costs are estimated to be $2.00/cubic yard for dredging, additional travel and rehandling.

(6) Construction and Usage Schedule: If design documentation, environmental impact statements and plans and specifications were completed by the end of 1977 and if construction funds were available, construction could start in the spring of 1978 and be completed in about two years.

(7) Environmental Assessment: The reverse crescent form on the leeward side of the island would provide an area of still water for waterfowl resting and nesting areas, and would also benefit fish populations. The island would also benefit other bird species, such as gulls and terns or this island could be used as a destination and/or a harbor of refuge for recreational boating.

(8) Ultimate Future Usage: This area could be utilized for fish and wildlife habitat and for recreational boating.

Cat Island Sites

6.8.5 (1) Description: Six alternates were studied for the Cat Island site. All consist of one or more off-shore islands west of the navigation channel between Cat Island and Long Tail Point, see Figure 6-1.

(2) Capacity: The capacity of these alternates are all 1,500,000 cubic yards.

(3) Structures: The containment structures would be rubblemound breakwaters with steel sheet pile cutoff walls. Top elevations would be approximately +11 LWD. All alternates contain steel cellular sand filters to filter effluent prior to discharge.

(4) Operational Aspects: Temporary mooring facilities and pipelines and/or access channels are required for placing the material.

(5) Costs:

(a) Construction costs are estimated to be between $8.9 million and $15.0 million for these sites.

(b) Operational costs are estimated to be about $2.00/cubic yard including dredging and rehandling costs.

(6) Construction and Usage Schedule: The schedule of design and construction of a site in this area would be similar to the other offshore island sites. Therefore, the area would not be available for use until 1980.

(7) Environmental Assessment: This site was approved as a potential site by the Brown County Harbor Commission on 5 March 1975 and by the Brown County Board of Supervisors on 16 July 1975. However, during a summer field inspection of this site, U. S. Fish and Wildlife Service discovered nearby populations of double-crested cormorants and black-crowned night herons, both of which would be adversely affected by the noise and activity associated with constructing and filling the area for spoil containment. Double-crested cormorants are on the Wisconsin Department of Natural Resources endangered species list. Although the State does not consider the black-crowned night heron to be endangered at this time, they are conducting a close observation of this species to determine its status. In addition, the Brown County Conservation Alliance expressed concern that a containment vessel in this area might block adequate water circulation through certain channels between the islands which were noted in the past for good bass fishing. Consideration was given to moving the disposal site farther to the north. However, it was determined that this location might interfere with the commercial fishing industry. Because of this new information, the Fish and Wildlife Service requested that this site be dropped from further consideration as an alternative site.

(8) Ultimate Usage: This area could be used for fish and wildlife habitat and/or recreational boating.

Other Sites

6.8.6 a. General: Numerous other sites have been suggested and discussed during the search for an acceptable a confined dredge disposal facility site, but were rejected prior to more detailed analysis for various reasons. The more important proposals are briefly summarized below and shown on Figure 6-1.

b. Upland site located on the southerly shore of Green Bay and east of the mouth of the Fox River. The site is privately owned with development plans pending and is not available.

c. Off-shore island located between the mouth of the Fox River and Long Tail Point just west of the navigation channel, which would protect the wetland along the westerly Bay shore. This site has been developed into the sites presented on the Cat Island sites. The bottom land is presently owned by the city of Green Bay. An alternative to this site (site 2A) consisted of a peninsula connected to the shore just west of the Wisconsin Public Service power plant west of the mouth of the Fox River, running out toward Cat Island. These proposals are costly and may have detrimental impacts on the western portion of the Bay.

d. A series of off-shore islands located just east of the entrance channel north of Grassy Island and running parallel to the shore. The islands could eventually be developed for wildlife habitat. This alternative is considerably more costly than a single island alternative.

e. Marshland development located adjacent to shore between the mouth of Duck Creek and Long Tail Point. The feasibility of utilizing dredged material for marshland development is presently being investigated by the Waterways Experiment Station in Vicksburg, Mississippi. The many problems in connection with the design of retaining dikes to allow the intended use as marshland and the highly polluted nature of the dredged material and the necessity for detailed impact study lead to rejection of this plan as unfeasible at this time.

f. Peninsula adjacent to the Bayport Area located about 1,600 feet west of Bylsby Avenue along the established pierhead-bulkhead line and extending about 2,000 feet into the Bay. The area could be used for municipal dockage at a future date without substantially reducing the integrity of the adjacent wetlands. Use of this site would require modifications to the proposed Bayport development.

g. Restoration of Long Tail Point Local citizens suggested that the dredged material be deposited along Long Tail Point to restore it and protect it from erosion, combining this proposal with a Federal Section 103 Shore Erosion Protection project. The need to confine the polluted material in conjunction with the unknown impacts on erosion of adjacent areas and fish and wildlife impacts lead to the rejection of this proposal.

h. Regional Disposal Area A disposal area serving all the Federal harbors on Green Bay was proposed. Primary harbors to be served would be Green Bay, Sturgeon Bay and Menominee-Marinette. As the majority of dredged material would originate from Green Bay, a site at or near Green Bay would be the best location for such a facility. The costs of transporting material from the other harbors, 50 miles from Menominee-Marinette and about 47 miles from Sturgeon Bay, preclude this alternate.

6.9 Other Alternative Dredged Material Disposal Methods

6.9.1 Several other unique dredged material disposal alternatives were considered during the study period of this project. Most of these plans were investigated to a certain degree until environmental, engineering, operational or economical problems forced a plan's abandonement. All plans for distributing polluted untreated dredged materials over land areas as topsoil without being confined were abandoned for environmental reasons as unconfined leachates from the dredged material might endanger water sources and resident biological organisms. Plans for utilizing dredged materials to cover sanitary landfills were discarded because of the high cost of first stockpiling the sediments to dry out and then using costly overland trucks or vehicles to transport the dried dredgings. No suitable sanitary landfills were close enough to the harbor to consider the cost of a hydraulic pipeline to the landfill.

7. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.1.1 The removal and confinement of polluted sediments in the navigation channels containing potentially harmful organic and inorganic pollutants will have a beneficial effect upon long-term natural productivity by improving water quality and substrate conditions in the harbor. The removal of these polluted sediments will, in the long-term, make the harbor more attractive to fish and other aquatic organisms as a potential habitat and spawning ground. However, periodic dredging will also repeatedly interrupt the reestablishment of a completely diversified community of benthic invertebrates in the navigation channel.

7.1.2 The eventual replacement of 55 acres of presently open-bay aquatic habitat with a 55-acre terrestrial island will permanently destroy 55 acres of aquatic habitat. However, this island will serve a dual purpose of confining polluted sediments so water quality within Green Bay will not be further degraded and, when completely filled, will provide 55 acres of land to be utilized in the public interest by Brown County, the local sponsor.

7.1.3 Maintenance dredging and disposal activities in Green Bay Harbor will not disrupt the long-term natural productivity of Green Bay. Dredging will result in only a temporary degradation of water quality in the vicinity of the harbor since nutrients, potentially harmful pollutants, and suspended solids may be reintroduced into solution. In addition, as these materials settle following maintenance activities, a low-magnitude siltation of aquatic habitat will occur in the harbor channel but should not extend into other parts of Green Bay. The aquatic ecosystem within the harbor will be disrupted on a long-term basis due to the periodic disturbance or destruction of the benthic habitat by dredging. The confined disposal facility will not re-release any of the dredged materials placed within it to Green Bay. All effluent from the disposal site will pass through a sand filter cell designed to remove organic or inorganic pollutants in the water. Water circulation in the eastern part of Green Bay may be slightly altered but not blocked by the construction of the off-shore island but this should not effect overall water quality in this area.

7.1.4 Human productivity within the Green Bay Harbor area, in the city of Green Bay and in other locations in Northeastern Wisconsin where users of the harbor reside or do business, will benefit from continued maintenance dredging and subsequent use of the harbor. The harbor will continue to provide recreational, commercial, and economic opportunities to the city of Green Bay, as well as public revenues generated on the local, county, State and Federal Governmental levels through various taxes and licenses related to the harbor.

8. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE MADE IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

8.1.1 Continued maintenance dredging of the harbor, even on a periodic basis, will prevent the establishment of a diversified community of benthic invertebrates in the navigation channel. Bay and harbor currents may disperse turbidity arising from dredging, thereby creating siltation which would affect aquatic habitat not specifically within the actual harbor maintenance area, but not far from the navigation channel.

8.1.2 The construction of the proposed 55-acre off-shore island confined disposal facility will be an irreversible and irretrievable commitment of aquatic habitat to be changed to terrestrial habitat. The building stone and sheet steel for the facility walls will also be permanently committed to the project.

8.1.3 The time, capital, labor, materials and fuel committed to the maintenance dredging and construction and operation of a confined disposal facility at Green Bay Harbor will not be retrievable. About 2 to 6 weeks will be committed for each maintenance operation. Each dredging operation is expected to occur approximately once every year. Approximately $280,000 in average costs per operation will be committed to the maintenance dredging operations. Construction of the contained disposal facility will cost $6,000,000 including materials and labor. It will take approximately 2 years to complete construction.

9. COORDINATION

9.1 Public Participation

9.1.1 Various maintenance proposals and sites for the confined disposal facility were discussed with agencies of the City of Green Bay and Brown County, including the Brown County Board of Harbor Commissioners; the Wisconsin DNR; the USEPA; the U. S. Fish and Wildlife Service (USFWS); and other interested agencies and organizations. These preliminary contacts led to the publication of a site selection report (February 1976) in which many alternate confined dredged material disposal facility proposals were analyzed according to siting, construction, operation, and environmental considerations. The site selection report was reviewed by concerned Federal, State, and local governmental agencies and their comments were included in a "Letter Report on Confined Disposal Area for Green Bay Harbor Wisconsin" (May 1976). The entire results presented in the site selection study and the letter report were also presented at a public workshop on 22 March 1976 at Green Bay that was attended by both governmental representatives and private individuals. Based on the results of the workshop coordination the alternative identified as the "Combination Plan" was selected for implementation. The plan consists of using the Bayport disposal area until it reaches its filled capacity and then constructing and utilizing the new nearshore island confined disposal facility discussed in this statement.

9.2 Cultural Resources

9.2.1 In a letter to the Wisconsin State Historic Preservation Officer (SHPO), dated 21 July 1976, the Chicago District described the proposed maintenance activities at Green Bay Harbor and requested, in compliance with the procedures of the Advisory Council on Historic Preservation, as published in the 25 January 1974 Federal Register, that the Wisconsin SHPO make a preliminary determination concerning any possible adverse impact that the proposed maintenance dredging or confined disposal facility construction may have on any historical or archeological sites now included on or eligible for the National Register of Historic Places.

9.2.2 In a letter of reply, dated 30 July 1976, the Wisconsin SHPO indicated that "There are no sites listed on the National Register of Historic Places that would be adversely affected by this project" and that "No archeological or historical reconnaissance survey will be necessary."

9.3 Land Use Plans

9.3.1 The following land use planning agencies were contacted by the Chicago District by a 26 August 1976 letter as part of pre-DEIS

coordination to determine the relationship of Green Bay Harbor maintenance activities to land use proposals:

City of Green Bay
Green Bay-Brown County Planning Commission
Brown County Board of Harbor Commissioners
Bay-Lake Regional Planning Commission
Wisconsin Department of Natural Resources

9.3.2 Only the Green Bay-Brown County Planning Commission and the Brown County Board of Harbor Commissioners specifically replied to the letter, although, the City of Green Bay and the Wisconsin DNR had previously related their views. None of these agencies have indicated any problems with or adverse impacts to land use proposals from the harbor maintenance activities. Bay-Lake Regional Planning Commission has provided no response to date.

9.4 Environmental Resources

9.4.1 The following environmental agencies were contacted by the Chicago District by a 26 August 1976 letter as part of pre-DEIS coordination to determine the relationship of Green Bay Harbor maintenance activities to environmental resources and in an attempt to obtain any environmental background data they could provide:

U. S. Environmental Protection Agency
U. S. Fish and Wildlife Service
Wisconsin Department of Natural Resources

9.4.2 Only the USEPA specifically replied to the letter, although, the U. S. Fish and Wildlife Service and the Wisconsin DNR had previously related their views. The USEPA and the Wisconsin DNR provided environmental background data. The concerns of these agencies have been incorporated into this Environmental Impact Statement.

9.5 Comment/Response

9.5.1 The following agencies furnished comments on the Draft EIS. The following Comment/Response section presents the comments of these agencies and the Chicago District's responses.

U.S. Dept. of Agriculture
U.S. Dept. of Commerce
U.S. Dept. of the Interior
U.S. Dept. of Transporation
U.S. Environmental Protection Agency
State of Wisconsin:
  State Historic Preservation Officer
  Dept. of Natural Resources

Dept. of Transportation
Green Bay-Brown County Planning Commission
Fox Valley Water Quality Planning Agency

9.6 Future Coordination

9.6.1 Future coordination on the environmental aspects of the Green Bay Harbor project described in this statement will continue when the analysis of the USEPA resampling of the harbor sediments in October 1977 are available. This analysis is expected to be complete in late 1977 or early 1978. At that time, if deemed necessary, the Chicago District will contact the USEPA, the Wisconsin DNR and other interested agencies to determine whether hopper dredge overflow is advisable. In addition, a public notice will be issued by the Chicago District at least 30 days before the start of any construction or maintenance activities.