Appendix D

PORT EVERGLADES HARBOR DISPOSAL AREA STUDY

PORT EVERGLADES HARBOR

DISPOSAL AREA STUDY

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PORT EVERGLADES HARBOR
DISPOSAL AREA STUDY

INTRODUCTION

The Jacksonville District of the U.S. Army Corps of Engineers performed this study to determine the availability of upland sites in the vicinity of Port Everglades for disposal of dredged material. The purpose of the study was to determine the availability and feasibility of using upland sites in comparison to offshore dredged material disposal for Port Everglades Harbor. Upland disposal sites underwent an analysis of environmental, engineering, and economic criteria. The economic assessments included the cost to purchase the required land, construct the necessary features, and transport the dredged material to the site. The analysis involves environmental and economic impacts of offshore and upland disposal to obtain a cost comparison which would indicate the most feasible method of disposal. The analysis and evaluation presented in this study include information and conditions existing at the beginning of 1994. Further, more detailed study would be required to implement any upland site recommended in this report.

As this study is primarily for the disposal of dredged material from the Port Everglades Harbor Federal Project, the Federal navigation channel was the major concern. Any material dredged from local access channels and berthing areas was not a consideration at this time. The Intracoastal Waterway Jacksonville to Miami (IWW) was also excluded from this study as it is not part of the Port Everglades Harbor Federal Project. The IWW extends through the deep draft harbor project at Port Everglades and it provides a channel depth of 10 feet over a bottom width of 125 feet. Portions of the IWW and Port Everglades Harbor Federal projects overlap. The deeper depths of the Port Everglades Harbor are maintained in the overlap areas. The IWW has disposal sites for future maintenance work. The Dania Cutoff Canal is a local project located at the south end of Port Everglades. It provides access for small boats and commercial freighters west of the Intracoastal Waterway to Port Denison, a small commercial port. Recent dredging by local interests have provided depths of about 16 feet in the canal. Figure 1 is provided to show the location of Port Everglades Harbor. Figure 2 is provided to show the location of the maintenance areas (shoals).

INITIAL INVESTIGATIONS

Initial investigations centered on obtaining and reviewing any previous disposal area studies for Port Everglades and other harbors. Recent aerial maps of Broward and Dade Counties were inspected to determine the availability of upland disposal areas within a ten mile arc from the Port Everglades Harbor Turning Basin. Prior studies and reports provided a methodology for an upland area evaluation which included environmental, engineering and economic considerations. Information in the Final Feasibility Report for the Navigation Study of Port Everglades Harbor and Mayport Carrier Homeporting Disposal Area Study was helpful in preparing for this analysis and understanding the problems associated with dredged material disposal.

SHOAL CHARACTERISTICS

The initial analysis involved a determination of dredged material quantity and classification as well as the dredging interval for the entrance channel and turning basin of the harbor. A dredging history on the Federally constructed entrance channel and main turning basin is available in the Jacksonville District Office. That history contains the quantity of material removed from the entrance channel and turning basin during each dredging event with a recorded time frame. Analysis of the data determined the annual shoaling rate and dredging interval of entrance channel and turning basin in the harbor. After determination of the annual shoaling rate and dredging interval, an analysis of the Port Everglades Harbor maintenance dredging history determined the location and average depth of shoals within the entrance channel and main turning basin. Shoal quantity, surface area, and depth are important factors related to dredging costs for shoal removal. The results of that analysis are presented in table 1.

SITE IDENTIFICATION

Selection Criteria - To enable potential site identification, specific criteria was established with regard to size, shape, use, and boundary conditions. Potential sites less than 10 acres in size or with any dwelling were not considered for an upland disposal area. Wetlands or other environmentally sensitive areas were also avoided as potential sites. For any small site, shape would be a consideration to enable sufficient settling time for the return water to meet required water quality standards. Property boundaries influenced site selection because severance damages are a consideration in real estate values. Severance damages are paid to a

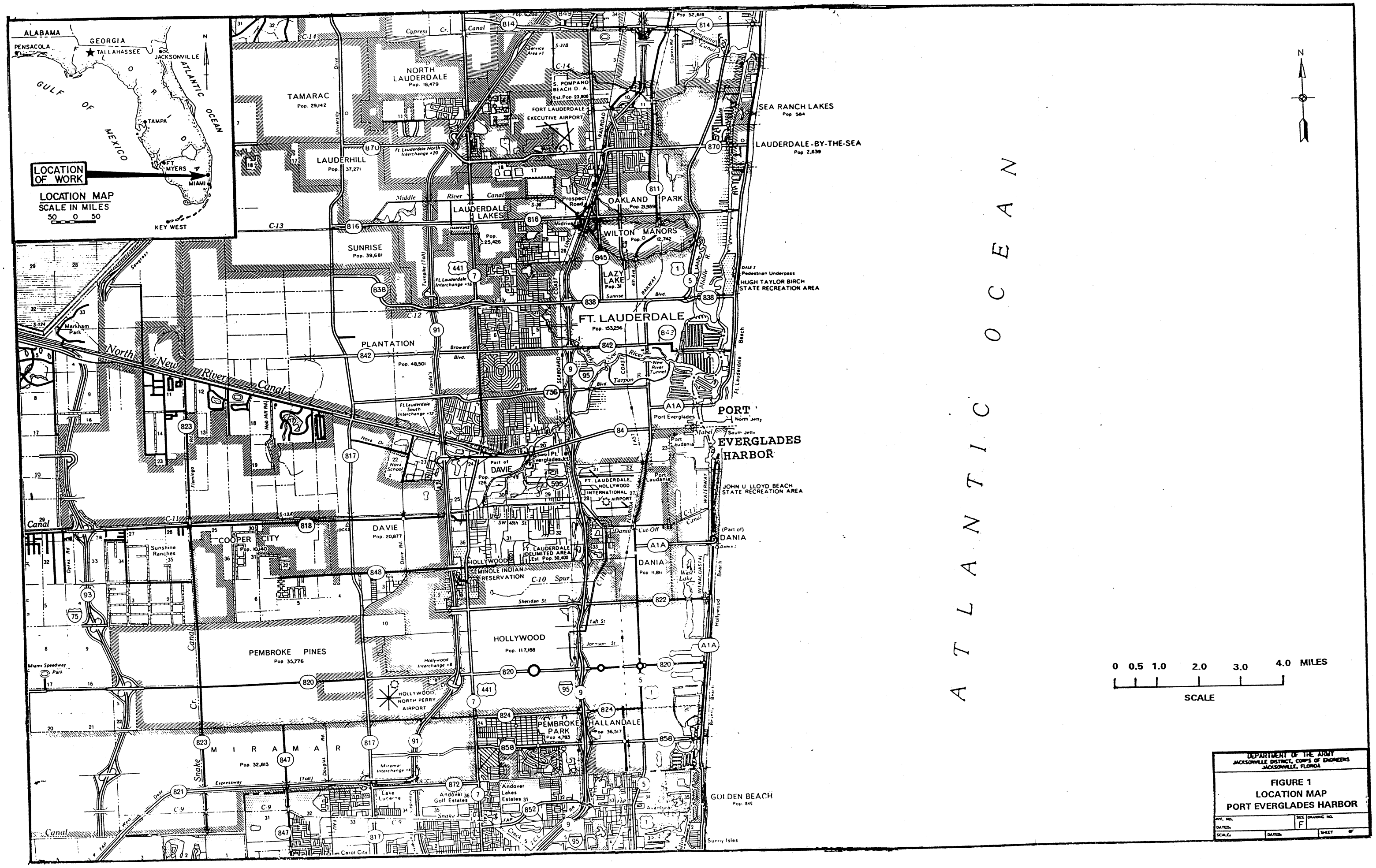

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FIGURE 1
LOCATION MAP
PORT EVERGLADES HARBOR

REV. NO.		SIZE F	DRAWING NO.
DATED:			
SCALE:	DATED:		SHEET

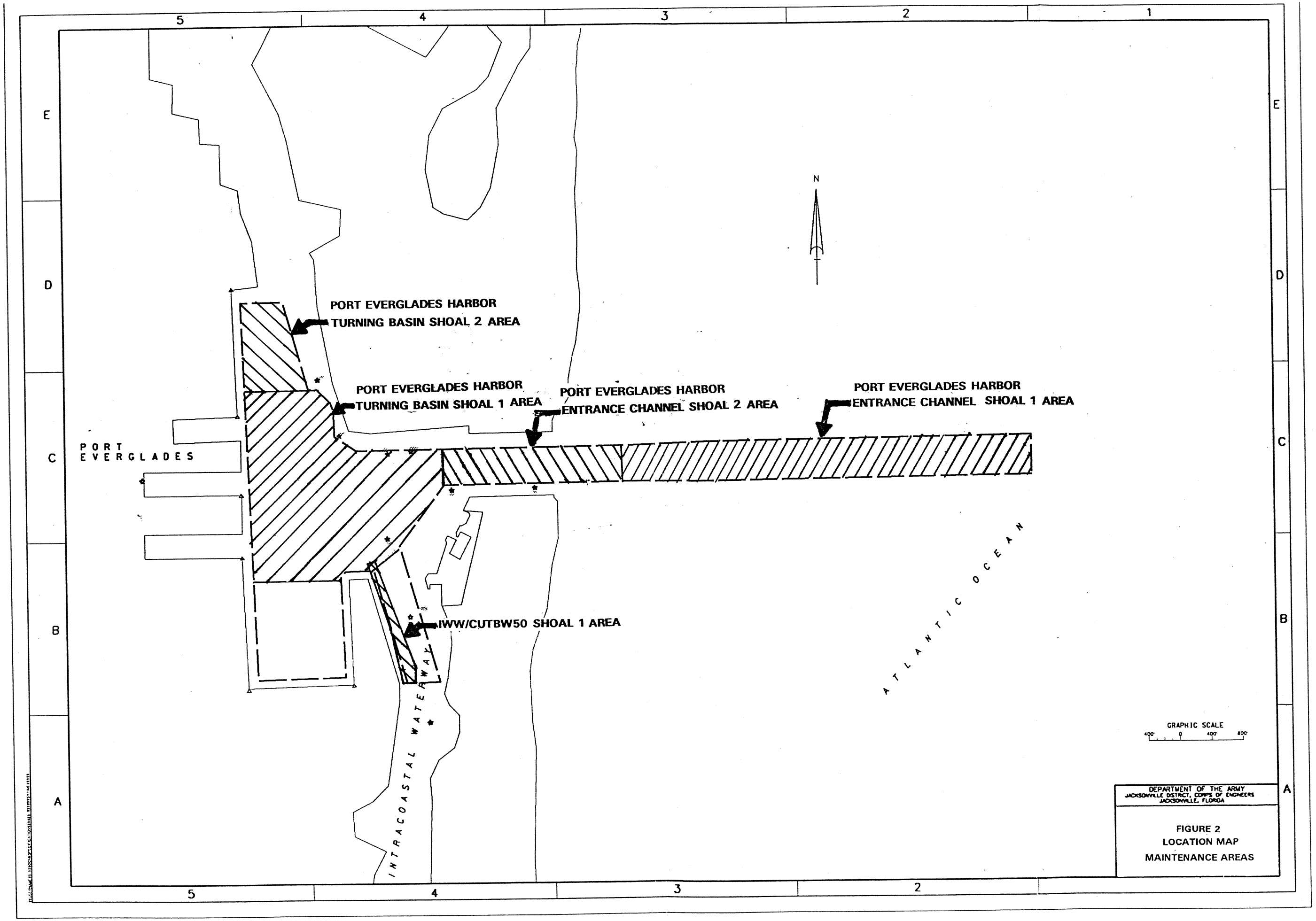

FIGURE 2
LOCATION MAP
MAINTENANCE AREAS

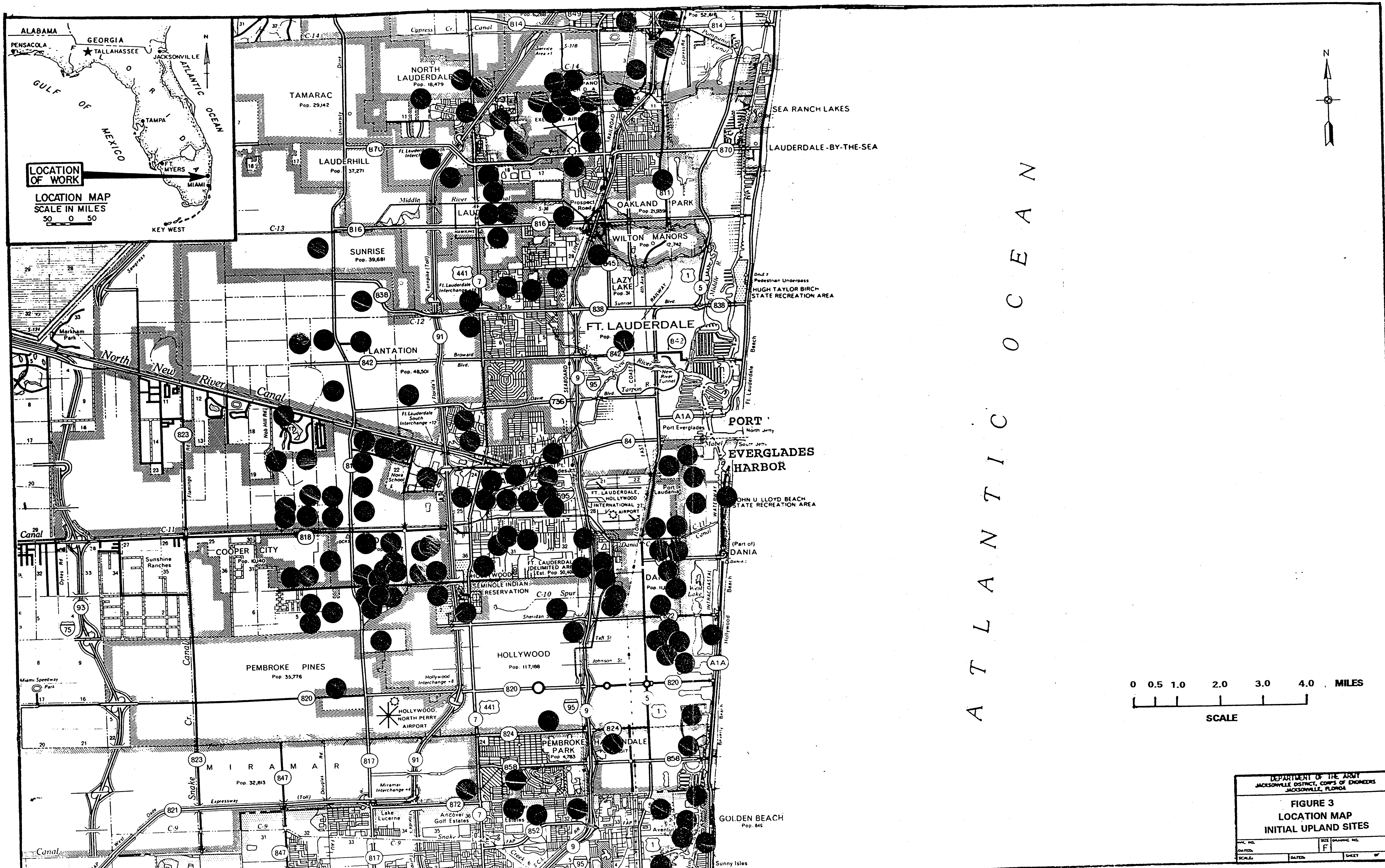

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FIGURE 3
LOCATION MAP
INITIAL UPLAND SITES

property owner when purchasing a portion of a parcel of land that devalues the remaining sections. In designating potential sites, utilization of the entire parcel was a major consideration to avoid any additional severance costs. With the criteria in place, the selection process went forward to identify the geographical boundaries as a means of limiting the scope of the search.

Geographical Boundaries - The identification of initial geographical boundaries usually involves a consideration for pipeline access to any potential site. The shoreline at the Atlantic Ocean forms the eastern limit. Equipment limitations relating to pumping dredged material to potential sites define the southern, western and northern boundaries. The detailed dredging analysis identifies a maximum pumping distance for this study as approximately 10 miles from the hydraulic dredge plant location. The pumping limit of 10 miles is based primarily on equipment limitations such as pipeline availability. Some respected experts in the dredging field consider only a 5 mile maximum pumping distance as reasonable based upon the availability of pipeline. For this study, however, the limit was extended to ensure all possible alternatives for upland locations in the vicinity of Port Everglades Harbor received full consideration. Geographical boundaries and equipment limitations greatly reduced the extent of potential site locations.

Site Selection - REDI maps with aerial photography dated 1991-92 of Broward and Dade Counties available in the Jacksonville District, U.S. Army Corps of Engineers, Regulatory Division Office were of assistance in determining potential upland disposal site locations. These REDI maps were accessible for inspection in numbered volumes covering portions of Broward and Dade Counties. Utilizing the previously mentioned selection criteria and geographical boundaries, the identification of 153 potential sites was possible in Broward and Dade Counties.

Site Characteristics - The selected sites were then measured from copies of the REDI maps to determine size and perimeter. Site numbers and characteristics are provided in table 2 with most site locations being presented in figure 3. Exact site locations are not identified due to real estate requirements.

TABLE 2
PORT EVERGLADES HARBOR
DISPOSAL AREA STUDY
SITE INFORMATION

SITE NUMBER	SITE SIZE (ACRES)	SITE NUMBER	SITE SIZE (ACRES)	SITE NUMBER	SITE SIZE (ACRES)	SITE NUMBER	SITE SIZE (ACRES)
BROWARD COUNTY, FL., VOLUME 1							
1	17	2	19				
BROWARD COUNTY, FL., VOLUME 2							
3	12	12	10	21	10	30	34
4	14	13	11	22	22	31	21
5	11	14	10	23	10	32	623
6	39	15	36	24	19	33	12
7	42	16	22	25	13	34	41
8	79	17	22	26	50	35	16
9	36	18	14	27	13	36	22
10	16	19	15	28	110	37	14
11	10	20	37	29	33	38	13
						39	10
BROWARD COUNTY, FL., VOLUME 3							
40	29	59	60	78	13	97	26
41	16	60	107	79	29	98	19
42	33	61	129	80	27	99	12
43	34	62	19	81	83	100	14
44	25	63	11	82	66	101	30
45	106	64	35	83	29	102	57
46	17	65	25	84	13	103	11
47	33	66	104	85	11	104	10
48	16	67	18	86	41	105	22
49	14	68	12	87	15	106	11
50	18	69	15	88	13	107	12
51	60	70	25	89	11	108	13
52	35	71	18	90	14	109	21
53	282	72	25	91	20	110	31
54	13	73	17	92	26	111	101
55	12	74	45	93	14	112	62
56	27	75	32	94	30	113	68
57	18	76	11	95	41		
58	39	77	13	96	30		
BROWARD COUNTY, FL., VOLUME 4							
114	213	122	15	129	184	136	10
115	14	123	13	130	15	137	22
116	15	124	11	131	11	138	10
117	39	125	600	132	18	139	11
119	13	126	13	133	19	140	110
120	17	127	59	134	142	141	29
121	14	128	48	135	136	142	12
						143	28
DADE COUNTY, FL., VOLUME 1							
144	23	147	104	150	15	153	11
145	13	148	99	151	31	154	14
146	10	149	10	152	30		

SITE VERIFICATION

Examination of aerial maps of each selected site enabled an environmental scientist to make initial observations concerning any significant environmental resources in the area. Any site with significant environmental resources was either dropped from consideration or redefined to avoid impacting those resources (see table 3). During initial site selection, the assumption was that each site remained as presented in the 1991 or 1992 aerial maps and that pipeline access to each site would not prohibit site utilization. A site verification trip provided a more current identification and characterization of each site. The site inspection verified the land use and current conditions of the sites under consideration.

Changed Conditions - Site visits identified changes in site conditions that had taken place since the aerial photography was taken in 1991 and 1992. These changes made some sites unsuitable for potential disposal areas. Sites 120, 130, 134, 141 and 144 were being developed to construct residential housing, high rise condominiums, a shopping center and an Amtrak passenger parking lot. Several sites were found to have certain features making them unsuitable for disposal areas. Site 40 has an electrical substation, storage tanks and fire hydrants; site 58 has seven radio towers; site 59 has wetlands, power lines and garbage recycling plant; site 62 has unacceptable pipeline access; site 108 is suitable but not for sale; site 135 is being acquired by the state of Florida a nature preserve; site 138 is a former sanitary landfill site. Consequently, these sites received no further consideration in this study and were dropped from the list of potential disposal areas.

Pipeline Access - An acceptable access route to the upland disposal site location is necessary. Access routes that must cross major highways, railroads, and other land parcels must take into account any environmental impacts and costs considerations to determine the practicality of such an action. Direct access to a site via an inland waterway is the most desired condition. Navigable waters of the United States do not require real estate easements. Small streams, canals, and drainage ditches can also provide access without an easement if they are attached to navigable waters. Access along highways and railroads is also possible and usually achieved by passing through culverts and under bridges. Site 62 was eliminated because of its access route crossed the busy traffic interchange of Eller Drive and U.S. Highway 1.

A potential site may be within the ten mile arc but a direct route to the site may not be available. In that case, the pipeline distance could exceed the ten mile limit and the site would be dropped from further consideration.

TABLE 3
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
INITIAL UPLAND SITES ELIMINATED

SITE NUMBER	SITE SIZE (ACRES)	REASON FOR ELIMINATION
BROWARD COUNTY, FL., VOLUME 1		
1	17	ENVIRONMENTAL CONCERNS
2	19	ENVIRONMENTAL CONCERNS
BROWARD COUNTY, FL., VOLUME 2		
3	12	ENVIRONMENTAL CONCERNS
4	14	ENVIRONMENTAL CONCERNS
5	11	PIPELINE DISTANCE > 10 MILES
6	39	ENVIRONMENTAL CONCERNS
7	42	ENVIRONMENTAL CONCERNS
8	79	ENVIRONMENTAL CONCERNS
9	36	ENVIRONMENTAL CONCERNS
10	16	PIPELINE DISTANCE > 10 MILES
11	10	ENVIRONMENTAL CONCERNS
12	10	ENVIRONMENTAL CONCERNS
13	11	ENVIRONMENTAL CONCERNS
14	10	ENVIRONMENTAL CONCERNS
15	36	PIPELINE DISTANCE > 10 MILES
16	22	PIPELINE DISTANCE > 10 MILES
17	22	PIPELINE DISTANCES > 10 MILES
18	14	PIPELINE DISTANCE > 10 MILES
19	15	ENVIR0NMENTAL CONCERNS
20	37	ENVIRONMENTAL CONCERNS
21	10	PIPELINE DISTANCES > 10 MILES
22	22	ENVIRONMENTAL CONCERNS
23	10	PIPELINE DISTANCE > 10 MILES
24	19	ENVIRONMENTAL CONCERNS
26	50	ENVIRONMENTAL CONCERNS
27	13	PIPELINE DISTANCE > 10 MILES
29	33	ENVIRONMENTAL CONCERNS
31	21	ENVIRONMENTAL CONCERNS
32	623	PIPELINE DISTANCE > 10 MILES
33	12	ENVIRONMENTAL CONCERNS
34	41	ENVIRONMENTAL CONCERNS
35	16	PIPELINE DISTANCE > 10 MILES
36	22	PIPELINE DISTANCE > 10 MILES
37	14	PIPELINE DISTANCE > 10 MILES
39	10	PIPELINE DISTANCE > 10 MILES
BROWARD COUNTY, FL., VOLUME 3		
40	29	SITE HAS AN ELECTRICAL SUBSTATION
41	16	ENVIRONMENTAL CONCERNS
42	33	ENVIRONMENTAL CONCERNS
43	34	ENVIRONMENTAL CONCERNS
44	25	ENVIRONMENTAL CONCERNS
45	106	ENVIRONMENTAL CONCERNS
46	17	PIPELINE DISTANCE > 10 MILES
47	33	ENVIRONMENTAL CONCERNS
48	16	SITE SIZE AND SHAPE
49	14	ENVIRONMENTAL CONCERNS
50	18	ENVIRONMENTAL CONCERNS
51	60	ENVIRONMENTAL CONCERNS
52	35	PIPELINE DISTANCE > 10 MILES

TABLE 3
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
INITIAL UPLAND SITES ELIMINATED

SITE NUMBER	SITE SIZE (ACRES)	REASON FOR ELIMINATION
BROWARD COUNTY, FL., VOLUME 3 (Cont'd)		
53	282	PIPELINE DISTANCE > 10 MILES
54	13	ENVIRONMENTAL CONCERNS
55	12	ENVIRONMENTAL CONCERNS
57	18	ENVIRONMENTAL CONCERNS
58	39	SITE HAS RADIO TOWERS
59	60	SITE HAS WETLANDS, POWERLINES AND LARGE GARBAGE RECOVERY MOUND
60	107	ENVIRONMENTAL CONCERNS
61	129	ENVIRONMENTAL CONCERNS
62	19	PIPELINE ACCESS
63	11	ENVIRONMENTAL CONCERNS
65	25	ENVIRONMENTAL CONCERNS
67	18	ENVIRONMENTAL CONCERNS
68	12	ENVIRONMENTAL CONCERNS
71	18	ENVIRONMENTAL CONCERNS
73	17	DEVELOPMENT IN PROGRESS
74	45	ENVIRONMENTAL CONCERNS
75	32	ENVIRONMENTAL CONCERNS
78	13	PIPELINE DISTANCE > 10 MILES
79	29	ENVIRONMENTAL CONCERNS
80	27	ENVIRONMENTAL CONCERNS
81	83	PIPELINE DISTANCE > 10 MILES
82	66	ENVIRONMENTAL CONCERNS
83	29	ENVIRONMENTAL CONCERNS
84	13	PIPELINE DISTANCE > 10 MILES
85	11	PIPELINE DISTANCE > 10 MILES
86	41	PIPELINE DISTANVE > 10 MILES
87	15	ENVIRONMENTAL CONCERNS
88	13	ENVIRONMENTAL CONCERNS
89	11	ENVIRONMENTAL CONCERNS
90	14	PIPELINE DISTANCE > 10 MILES
91	20	PIPELINE DISTANCE > 10 MILES
92	26	PIPELINE DISTANCE > 10 MILES
93	14	PIPELINE DISTANCE > 10 MILES
94	30	ENVIRONMENTAL CONCERNS
96	30	ENVIRONMENTAL CONCERNS
97	26	ENVIRONMENTAL CONCERNS
98	19	ENVIRONMENTAL CONCERNS
99	12	PIPELINE DISTANCE > 10 MILES
100	14	PIPELINE DISTANCE > 10 MILES
101	30	ENVIRONMENTAL CONCERNS
102	57	ENVIRONMENTAL CONCERNS
103	11	ENVIRONMENTAL CONCERNS
104	10	ENVIRONMENTAL CONCERNS
107	12	ENVIRONMENTAL CONCERNS
108	13	OWNER UNWILLING TO SELL PROPERTY
111	101	ENVIRONMENTAL CONCERNS
112	62	ENVIRONMENTAL CONCERNS
113	68	ENVIRONMENTAL CONCERNS

TABLE 3
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
INITIAL UPLAND SITES ELIMINATED

SITE NUMBER	SITE SIZE (ACRES)	REASON FOR ELIMINATION
BROWARD COUNTY, FL., VOLUME 4		
114	213	ENVIRONMENTAL CONCERNS
115	14	ENVIRONMENTAL CONCERNS
119	13	ENVIRONMENTAL CONCERNS
120	17	DEVELOPMENT IN PROGRESS
121	14	ENVIRONMENTAL CONCERNS
122	15	ENVIRONMENTAL CONCERNS
123	13	ENVIRONMENTAL CONCERNS
124	11	ENVIRONMENTAL CONCERNS
125	600	PIPELINE DISTANCE > 10 MILES
126	13	PIPELINE DISTANCE > 10 MILES
127	59	ENVIRONMENTAL CONCERNS
128	48	ENVIRONMENTAL CONCERNS
129	184	PIPELINE DISTANCE > 10 MILES
130	15	DEVELOPMENT IN PROGRESS
131	11	ENVIRONMENTAL CONCERNS
132	18	ENVIRONMENTAL CONCERNS
133	19	ENVIRONMENTAL CONCERNS
134	142	DEVELOPMENT IN PROGRESS
135	136	ENVIRONMENTAL CONCERNS
136	10	ENVIRONMENTAL CONCERNS
137	22	PIPELINE DISTANCE > 10 MILES
138	10	ENVIRONMENTAL CONCERNS
139	11	ENVIRONMENTAL CONCERNS
141	29	DEVELOPMENT IN PROGRESS
142	12	PIPELINE DISTANCE > 10 MILES
143	28	PIPELINE DISTANCE > 10 MILES
DADE COUNTY, FL., VOLUME 1		
144	13	DEVELOPMENT IN PROGRESS
145	13	ENVIRONMENTAL CONCERNS
146	10	ENVIRONMENTAL CONCERNS
148	99	ENVIRONMENTAL CONCERNS
149	10	ENVIRONMENTAL CONCERNS
150	15	PIPELINE DISTANCE > 10 MILES
151	31	PIPELINE DISTANCE > 10 MILES
152	30	ENVIRONMENTAL CONCERNS
153	11	ENVIRONMENTAL CONCERNS

DETAILED SITE ANALYSIS

The detailed site analysis considered the specific characteristics of each site in order to determine preparation requirements and capacity for material disposal. Preparation requirements included such items as clearing and grubbing, dike construction, and weir installation, all of which directly influence costs. Quantification of the work items enabled the development of costs for each site. The total estimated cost of all the work items to prepare a site is then divided by the site capacity to provide a cost per cubic yard ($/cy). Combining that unit cost with the dredging and real estate costs provides a total cost per cubic yard to utilize each site for disposal.

SITE SPECIFICS

An accurate determination of conditions at each site is essential in developing the correct site preparation cost. Site capacity depends upon the amount of usable area and dike heights at the site. Dike heights need to be established and the site area cleared for utilization. Each component is directly related to the utilization cost of a potential site.

Site Capacity - The volume of material that can be placed within the diked area is defined as the site capacity. Site capacity has three components, usable area within the dikes, dike height, and bulking factor. The sites were first identified in the initial site analysis and further reviewed during a field visit. The usable area has an influence on determining the dike height. Further engineering studies would determine the maximum dike height for each site. The vast majority of potential sites have acreages which could economically and engineeringly support dike heights of at least 20 feet. A freeboard of two feet in the dike height was a factor in estimating the site capacity. For a dike height of 20 feet, the freeboard consideration would limit material placement to a height of 18 feet. Material used for dike construction normally comes from inside the perimeter of the disposal area. The assumption is that each site has suitable material for dike construction. The dike material from inside the disposal area provides additional space for dredged material disposal. The bulking factor varies according to dredged material characteristics. Sand has a bulking factor of 1 while silt can have a bulking factor of 1.5. Based on previous dredging experience and the nature of the dredged material in the harbor, the bulking factor should be approximately 1.3. Based upon the above information, the estimated capacity of each potential site was calculated and is provided in table 4.

TABLE 4
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
SITE INFORMATION

SITE NUMBER	PERIMETER LENGTH (YARDS)	SITE SIZE (ACRES)	DIKE HEIGHT (FT)	DIKE X-SECTION (SF)	DIKE QUANTITY (CY)	BULKING FACTOR	CAPACITY DIKED AREA (CY)
BROWARD COUNTY, FL, VOLUME 2							
25	1,321	13	20	1,600	234,800	1.3	290,400
28	3,525	110	40	5,600	2,193,300	1.3	5,187,500
30	1,643	34	30	3,300	602,400	1.3	1,181,500
38	1,381	13	20	1,600	245,500	1.3	290,400
BROWARD COUNTY,FL, VOLUME 3							
56	1,536	27	30	3,300	563,200	1.3	938,200
64	1,841	35	30	3,300	675,000	1.3	1,216,200
66	3,908	104	40	5,600	2,431,600	1.3	4,904,500
69	1,226	15	20	1,600	218,000	1.3	335,100
70	1,807	25	30	3,300	662,600	1.3	868,700
72	1,081	25	30	3,300	396,400	1.3	868,700
76	1,017	11	20	1,600	180,800	1.3	245,700
77	1,047	13	20	1,600	186,100	1.3	290,400
95	2,433	41	40	5,600	1,513,900	1.3	1,933,500
105	2,027	22	30	3,300	743,200	1.3	764,500
106	975	11	20	1,600	173,300	1.3	245,700
109	1,304	21	30	3,300	478,100	1.3	729,700
110	1,644	31	30	3,300	602,800	1.3	1,077,200
BROWARD COUNTY,FL, VOLUME 4							
116	1,306	15	20	1,600	232,200	1.3	335,100
117	2,872	39	30	3,300	1,053,100	1.3	1,355,200
140	6,057	110	40	5,600	3,768,800	1.3	5,187,500
DADE COUNTY,FL, VOLUME 1							
147	3,419	104	40	5,600	2,127,400	1.3	4,904,500
154	1,236	14	20	1,600	219,700	1.3	312,700

Site Preparation - Preparation of a potential site for use as a disposal area involves planning and design for dike construction, installation of water control structures (weirs), provisions for returning water from the site, and clearing the site of trees and brush for efficient use. The number of weirs required for a disposal area depends upon disposal area and dredge size. For sites in this study, the area in each is sufficient to accommodate a 30 inch hydraulic dredge. To handle the discharge water from that dredge, each site would need six weirs at a cost of $75,000 per unit. Site clearing costs depend upon the amount and density of trees and bushes to be removed from an area. Aerial photography was valuable in determining this factor at each site. Table 5 provides the range of costs for clearing and grubbing. Site 66 is an example for estimating the clearing and grubbing cost. The site is a lightly covered (no trees) that is estimated to cost $58,200 to clear and grub. The value is derived from the 104 acres site size multiplied by the $560 per acre clearing category. The estimated cost for dike construction is $1.90 per cubic yard with the quantity provided in table 4. Mobilization and demobilization costs for moving equipment to and from the construction site also depends primarily upon the quantity of material needed for dike construction. Table 6 provides the range of costs employed for mobilization and demobilization. To cover the cost of uncertainties in the estimate, a contingency item is estimated at 25 percent of construction costs. Costs for engineering and design (E&D) and construction management (CM) are a percent of the total estimated construction costs. The combined percentage is 15.

Site Cost Summary - The purpose of the detailed site analysis is to determine the site preparation costs for disposal of dredged material. Table 7 provides a site cost summary for each element of cost associated with a potential upland disposal site. The last column in that table provides a cost per cubic yard of dredged material placed in each site. That unit cost is determined by dividing the total cost by the site capacity. The site cost is only a portion of the entire cost for upland disposal. The remaining facets of dredging and real estate are discussed in the following text.

EXISTING DISPOSAL AREAS

Sites 64 and 66 are two existing disposal areas located near Port Everglades Harbor. These sites do not have dikes. Dikes would have to be constructed around the sites for disposal of dredged material. At the present time, dredged material placed in these sites from prior maintenance dredging is at street level.

TABLE 5
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
CLEARING AND GRUBBING COST RANGES

CLEARING CATEGORY	COST PER ACRE
Light (no trees)	$ 560
Light (with trees)	1,230
Light to Medium	1,450
Medium	1,680
Medium to Heavy	2,130
Heavy	2,460

TABLE 6
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
MOBILIZATION AND DEMOBILIZATION COST RANGES

CUBIC YARDS	COSTS
30,000 to 311,000	$ 56,000
312,000 to 1,099,000	112,000
1,100,000 to 1,299,000	168,000
1,300,000 to 5,000,000	224,000

TABLE 7
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
SITE PREPARATION COSTS

SITE NUMBER	SITE SIZE (ACRES)	DIKE QUANTITY (CY)	MOB & DEMOB ($)	DIKE CONSTR ($)	CLEARING & GRUBBING ($)	CONTROL STRUCT ($)	SUBTOTAL ($)	CONTING @ 25% ($)	E&D AND CM @ 15% ($)	TOTAL ($)	DIKED AREA CAPACITY (CY)	COST ($/CY)
BROWARD COUNTY, FL, VOLUME 2												
25	13	234,800	56,000	446,120	16,000	450,000	968,120	242,030	145,218	1,355,368	290,400	4.67
28	110	2,193,300	224,000	4,167,270	135,300	450,000	4,976,570	1,244,143	746,486	6,967,198	5,187,500	1.34
30	34	602,400	112,000	1,144,560	41,800	450,000	1,748,360	437,090	262,254	2,447,704	1,181,500	2.07
38	13	245,500	56,000	466,450	16,000	450,000	988,450	247,113	148,268	1,383,830	290,400	4.77
BROWARD COUNTY,FL, VOLUME 3												
56	27	563,200	112,000	1,070,080	33,200	450,000	1,665,280	416,320	249,792	2,331,392	938,200	2.48
64	35	675,000	112,000	1,282,500	43,100	450,000	1,887,600	471,900	283,140	2,642,640	1,216,200	2.17
66	104	2,431,600	224,000	4,620,040	58,200	450,000	5,352,240	1,338,060	802,836	7,493,136	4,904,500	1.53
69	15	218,000	56,000	414,200	8,400	450,000	928,600	232,150	139,290	1,300,040	335,100	3.88
70	25	662,600	112,000	1,258,940	30,800	450,000	1,851,740	462,935	277,761	2,592,436	868,700	2.98
72	25	396,400	112,000	753,160	30,800	450,000	1,345,960	336,490	201,894	1,884,344	868,700	2.17
76	11	180,800	56,000	343,520	13,500	450,000	863,020	215,755	129,453	1,208,228	245,700	4.92
77	13	186,100	56,000	353,590	7,300	450,000	866,890	216,723	130,034	1,213,646	290,400	4.18
95	41	1,513,900	224,000	2,876,410	23,000	450,000	3,573,410	893,353	536,012	5,002,774	1,933,500	2.59
105	22	743,200	112,000	1,412,080	27,100	450,000	2,001,180	500,295	300,177	2,801,652	764,500	3.66
106	11	173,300	56,000	329,270	13,500	450,000	848,770	212,193	127,316	1,188,278	245,700	4.84
109	21	478,100	112,000	908,390	11,800	450,000	1,482,190	370,548	222,329	2,075,066	729,700	2.84
110	31	602,800	112,000	1,145,320	38,100	450,000	1,745,420	436,355	261,813	2,443,588	1,077,200	2.27
BROWARD COUNTY,FL, VOLUME 4												
116	15	232,200	56,000	441,180	18,500	450,000	965,680	241,420	144,852	1,351,952	335,100	4.03
117	39	1,053,100	112,000	2,000,890	56,600	450,000	2,619,490	654,873	392,924	3,667,286	1,355,200	2.71
140	110	3,768,800	224,000	7,160,720	190,400	450,000	8,025,120	2,006,280	1,203,768	11,235,168	5,187,500	2.17
DADE COUNTY,FL, VOLUME 1												
147	104	2,127,400	224,000	4,042,060	127,900	450,000	4,843,960	1,210,990	726,594	6,781,544	4,904,500	1.38
154	14	219,700	56,000	417,430	17,200	450,000	940,630	235,158	141,095	1,316,882	312,700	4.21

DETAILED DREDGING ANALYSIS

Dredging involves both the removal of material from the channel bottom and transportation to the designated disposal area. The analysis examined three methods of dredging. Hopper dredging and clamshell dredging with barge transport provide the most efficient methods to dispose of material in the offshore dredged material disposal site (ODMDS). The traditional hydraulic dredging with pipeline for pumping material to an upland site provides an efficient method for moving dredged material to upland disposal sites. As stated in the geographical boundaries section of this study, hydraulic dredging has a pumping limit of 10 miles which is based primarily on equipment limitations such as pipeline availability. Some respected experts in the dredging field consider only a 5 mile maximum pumping distance as reasonable based upon the availability of pipeline. For this study, however, the limit was extended to ensure all possible alternatives for upland locations in the vicinity of Port Everglades Harbor received full consideration.

OCEAN DISPOSAL

The dredging analysis included two methods for ocean disposal of dredged material as mentioned earlier. Hopper dredging and transport as well as clamshell dredging with barge transport are both applicable methods for ocean disposal. Currently, no usable ODMDS exists at Port Everglades Harbor. In order to determine cost for ocean disposal without a definite location for a ODMDS, cost estimates were computed for offshore disposal sites in 1 mile increments from Port Everglades Harbor entrance channel to a distance of 10 miles offshore. Figure 4 shows the location of the 1, 5, and 10 mile boundaries.

Hopper Dredge Estimates - The hopper dredge for estimating purposes has a carrying capacity of 3,600 cubic yard (cy). A hopper dredge hydraulically removes shoal material from the channel bottom and places it in a hopper on the dredge. As soon as the hopper is full, the dredge proceeds to the ODMDS where the bottom of the hopper opens and the material is deposited on the ocean floor. The material classification which greatly influences dredging efficiency and therefore costs was discussed earlier in the shoal characteristics section of this study. As stated in the same section, the Federal project was broken into sections or cuts identical to normal operations in the harbor (see figure 2). A sample estimate to hopper dredge one of the Port Everglades Harbor cuts is provided in table 8. Note that the unit cost given at the top excludes any costs related to mobilization, contingencies, engineering and design, as well as construction management. Table 9 provides the total dredging and transportation costs for each cut in the Port Everglades Harbor Federal Project. The costs for mobilization and demobilization are prorated over the project. As shown in table 9, hopper dredge costs increase with increases in the distance to the ODMDS.

Clamshell Estimates - The clamshell dredging techniques are similar to the hopper dredge. The clamshell removes shoal material from the channel bottom which is deposited in an ocean going barge for transport to the ODMDS. One benefit of the clamshell operation is that with multiple barges the clamshell dredge can operate almost continuously. However, the additional equipment does cost more to mobilize to the dredging location. The clamshell dredge (26 cy) utilizes a 26 cy bucket to remove silty material and a 21 cy bucket to remove sandy material. The dredge is estimated to need two barges for transporting the material. The clamshell dredge works continuously. While one barge is enroute to the ODMDS, the clamshell is loading another barge. The number of barges influences the operating efficiency of the dredge. Two barges are within reason to be available for such an operation. Table 10 provides a sample estimate summary which is similar to the hopper dredge estimate in table 8. Again, the mobilization and other costs absent in table 8 are also absent in the clamshell sample estimate. Table 11 provides the total dredging and transportation costs using a clamshell for each cut as shown in table 9. As with the hopper dredge costs, distance to the ODMDS is a factor influencing clamshell dredging costs.

UPLAND DISPOSAL

Upland disposal costs involved the traditional hydraulic dredging and transport to an upland site. As mentioned earlier, hydraulic dredging and material movement via pipeline has a 10 mile limit due to equipment limitations and dredging efficiencies. A pipeline access route was established to each potential upland site. The total cost for upland disposal includes dredging and transportation costs, site preparation cost, and site procurement cost. Further discussion of dredging and transportation costs is in the subsequent text.

Hydraulic Dredging - As stated throughout this report, hydraulic dredging is the traditional method for upland disposal and generally, the most economical for pumping distances less than 5 miles. This fact is possible because the dredge can work continuously without stopping to empty the hopper as with a hopper dredge or having to wait for a barge to return as with a clamshell dredge. A sample estimate for hydraulic dredging is given in table 12. The total cost is in table 13. As described earlier, hydraulic dredging to a disposal site is restricted to a distance of approximately 10 miles. The mobilization cost for each maintenance event was prorated over the entire harbor. The assumption was made that the entire harbor will be maintained during each maintenance event with the possibility of utilizing more than one site.

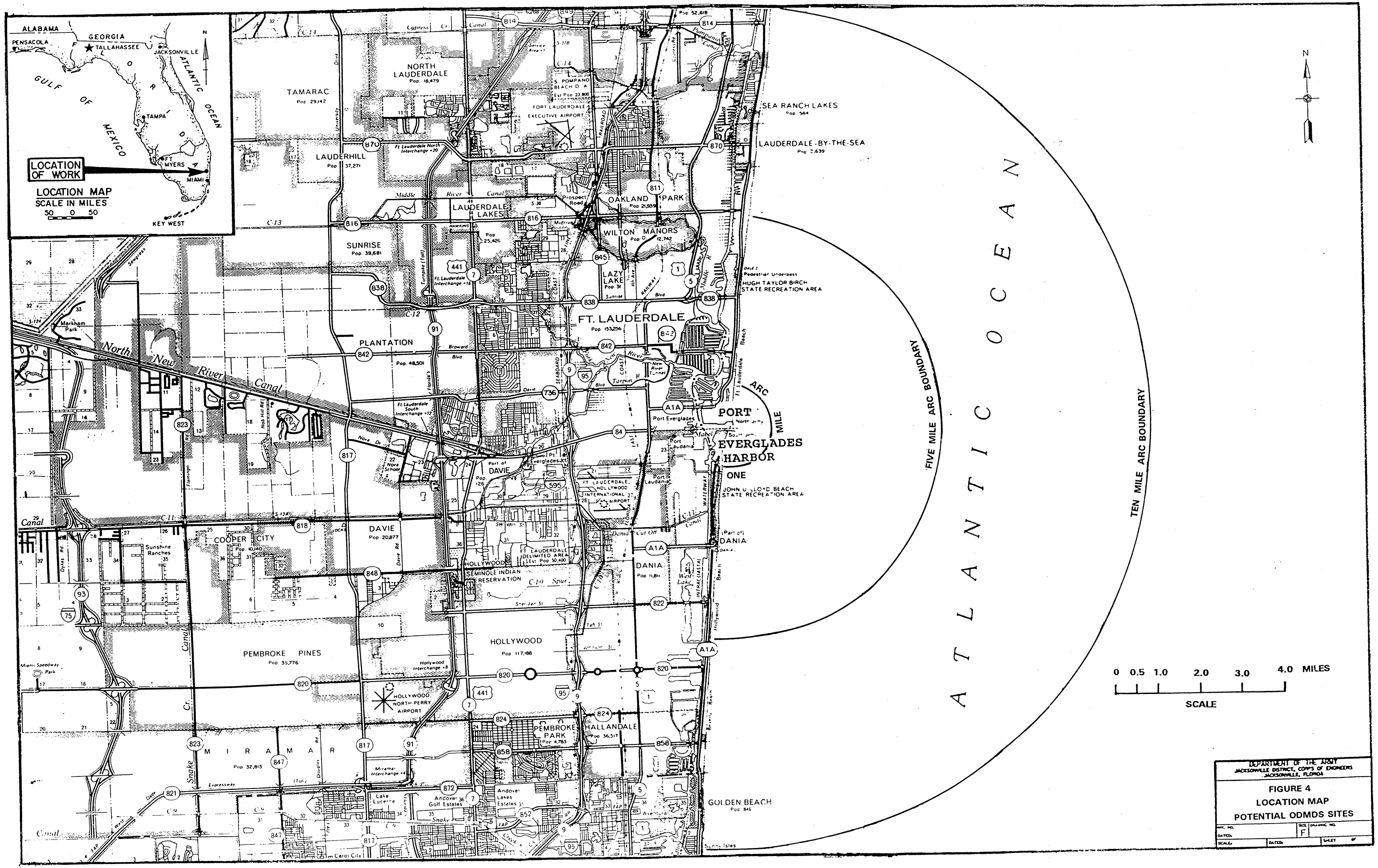

ALABAMA
GEORGIA
PENSACOLA
TALLAHASSEE
JACKSONVILLE
GULF OF MEXICO
ATLANTIC OCEAN
TAMPA
FT. MYERS
MIAMI
KEY WEST
LOCATION OF WORK
LOCATION MAP
SCALE IN MILES
50 0 50
NORTH LAUDERDALE
TAMARAC
LAUDERHILL
SUNRISE
PLANTATION
DAVIE
COOPER CITY
PEMBROKE PINES
MIRAMAR
HOLLYWOOD
HALLANDALE
PEMBROKE PARK
LAUDERDALE LAKES
OAKLAND PARK
WILTON MANORS
LAZY LAKE
FT. LAUDERDALE
PORT EVERGLADES HARBOR
DANIA
SEA RANCH LAKES
LAUDERDALE-BY-THE-SEA
GOLDEN BEACH
FORT LAUDERDALE EXECUTIVE AIRPORT
HOLLYWOOD NORTH PERRY AIRPORT
FT. LAUDERDALE INTERNATIONAL AIRPORT
SEMINOLE INDIAN RESERVATION
HUGH TAYLOR BIRCH STATE RECREATION AREA
JOHN U. LLOYD BEACH STATE RECREATION AREA
North New River Canal
ATLANTIC OCEAN
FIVE MILE ARC BOUNDARY
TEN MILE ARC BOUNDARY
ONE MILE ARC
N
0 0.5 1.0 2.0 3.0 4.0 MILES
SCALE
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA
FIGURE 4
LOCATION MAP
POTENTIAL ODMDS SITES
SIZE F

TABLE 1
PORT EVERGLADES HARBOR
HARBOR SECTIONS AND
SHOAL CHARACTERISTICS

SECTION NAME	DEPTH (FEET)	SECTION LENGTH (FEET)	ANNUAL SHOALING (CY)	DREDGE INTERVAL (YEARS)	TOTAL QUANTITY (CY)	SURFACE AREA (FEET^2)	PROJECTED SHOALING (FEET)	MATERIAL TYPE
ENTRANCE CHANNEL								
SHOAL 1	45	5,100	1,800	20	36,000	130,000	7.3	SAND
	46	5,100	2,300	20	45,220	130,000	9.4	SAND
	47	5,100	2,900	20	58,180	130,000	12.1	SAND
SHOAL 2	42	2,350	2,000	20	39,640	300,000	3.6	SAND
	43	2,350	2,700	20	53,140	300,000	4.8	SAND
	44	2,350	3,500	20	70,200	300,000	6.3	SAND
TURNING BASIN								
SHOAL 1	42	2,550	5,500	20	110,000	280,000	10.7	SAND
	43	2,550	6,700	20	134,820	280,000	13.0	SAND
	44	2,550	8,100	20	162,580	280,000	15.7	SAND
SHOAL 2	31	875	800	20	16,780	503,554	0.9	SAND
	32	875	2,000	20	39,240	503,554	2.1	SAND
	33	875	3,400	20	68,480	503,554	3.7	SAND
IWW/CUT BW50								
SHOAL 1	36	1,700	1,200	20	23,400	227,383	2.8	SAND
	37	1,700	1,300	20	26,680	227,383	3.2	SAND
	38	1,700	1,500	20	30,240	227,383	3.6	SAND

Fri 08 Apr 1994

TABLE 8
PORT EVERGLADES HARBOR
DISPOSAL AREA STUDY
HOPPER DREDGE ESTIMATE

TIME 09:58:34

CHECKLIST FOR INPUT DATA.
Planning Est. 08 Apr 94

BID QUANTITY	58,180 C.Y.
UNIT COST...	$1.34 PER C.Y.
EXCAV. COST.	$77,961
TIME.....	0.1 MONTHS

PG 1 OF 14: PROJECT TITLES

PROJECT -	Port Everglades Harbor Study
LOCATION -	Ocean Disposal-Mile 5
INVIT # -	Entrance Channel - Shoal 1
BID ITEM # -	0
FILENAME -	PEHS_HOP
EST -	B J Harrison
MIDPT DATE -	Jan-94
DESCRIPTION ENTERED? -	

PG 2 OF 14: EXCAVATION QTY'S

DREDGING AREA -	130,000 sf
REQ'D EXCAVATION -	58,180 cyds
% MUD -	20%
% SAND -	80%
% GRAVEL -	0%
PAY OVERDEPTH -	0 cyds
O.D. NOT DREDGED -	0 cyds
OVERDIG FOOTAGE -	1.00 ft
NONPAY YARDAGE -	4,800 cyds
GROSS YARDAGE -	62,980 cyds

PG 13 OF 14: MARKUPS USED

O.H. -	15.0%
PROFIT -	10.0%
BOND -	1.0%

PG 3 OF 14: LOCAL AREA FACTORS

FUEL COST -	$0.79 /gal
CFC RATE -	5.625%
USE MONTHS / YEAR -	10 mo/yr
MARINE INSUR -	1.5%
TAXES -	1.0%
PROVISIONS & SUPP -	$15 /man

PG 4 OF 14: DREDGE SELECTION (ALT-D)

DREDGE: SUGAR ISLAND

LOADS PER DAY -	10.29
CYCLE TIME -	119 min/load

PG'S 5-7 OF 14: PRODUCTION WORKSHEET

HOPPER CAPACITY -	3,600 cyds
EFF. HOPPER CAP. -	2,160 cyds
AVAIL DREDGING RATE -	2,100 cy/hr
AVAIL. DRAGHEADS -	2 ea
ACT. DRAGHDS USED -	2 ea
DRDGE RATE USED -	2,250 cy/hr
TURNS/CYCLE -	2 ea
MIN. PER TURN -	3 min
DISPOSAL DIST -	4.7 mi
TRVL SPD TO DISP -	10.8 mph
MAX TRVL SPD LOADED -	12.7 mph

DUMP/CONNECT TIME -	5 min
JET PUMP AVAIL? -	YES
TYPE OF DISPOSAL -	GRAVITY DUMP
PUMPING RATE -	cy/hr
TRVL SPD TO DREDG -	11.7 mph
MAX TRVL SPD LIGHT -	13.8 mph
EFFECTIVE TIME -	85.0%
OPER WORK DAYS/MO -	30.42 days
ADD. CLEANUP TIME -	15%
SPECIAL COST -	$7,000 /mo
SPECIAL COST -	$0 /job

PG'S 8-9 OF 14: PLANT OWN. & OPER.

DREDGE -	$382,835
PROPULSION TUG -	self prop.
SURVEY VESSEL -	$30,000
BOOSTER -	$0
CRANE BARGE -	$0
TENDER TUG -	$0
SHORE EQUIP -	$0

PG 14 OF 14: DREDGE OPER. ADJ. FACTORS

PUMP LOAD FACTOR -	50%
RPR & MAINT. ADJ -	1.00
JET PUMP % USAGE -	100%

PG'S 10-12 OF 14: LABOR, 24 Jun 88

OVERTIME % -	28.00%
VACATION/HOLIDAY % -	8.64%
TAX & INSUR % -	30.61%
FRINGE BENEFITS -	$4.35 /hr
DREDGE CREW:	
SUGG. CREW SIZE -	14 ea
USED CREW SIZE -	14 ea
SHORE CREW:	
USED CREW SIZE -	0 ea
GOVERNMENT PERSON -	3 ea
FRE. PD TRAVEL -	28 days
RT TRAVEL COST -	$400

TABLE 9
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
HOPPER DREDGE AND OCEAN DISPOSAL COSTS

CUT NAME	SHOAL QUANTITY (CY)	MOB & DEMOB PER CUT	EXCAVATION COST PER CUT	SUBTOTAL COSTS PER CUT	CONT COSTS 25%	E&D AND CM 15%	HOPPER TOTAL $	DREDGING COSTS $/(CY)
1 MILE OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	55,300	92,600	23,200	13,900	129,700	2.23
ENTRANCE CH – 2	70,200	45,000	70,900	115,900	29,000	17,400	162,300	2.31
TURNING BASIN – 1	162,580	104,300	172,300	276,600	69,200	41,500	387,300	2.38
TURNING BASIN – 2	68,480	43,900	93,800	137,700	34,400	20,700	192,800	2.82
IWW/CUT BW50	30,240	19,400	39,300	58,700	14,700	8,800	82,200	2.72
TOTALS – 1 MILE	389,680	250,000	431,600	681,500	170,500	102,300	954,300	
2 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	62,800	100,100	25,000	15,000	140,100	2.41
ENTRANCE CH – 2	70,200	45,000	78,600	123,600	30,900	18,500	173,000	2.46
TURNING BASIN – 1	162,580	104,300	187,000	291,300	72,800	43,700	407,800	2.51
TURNING BASIN – 2	68,480	43,900	101,400	145,300	36,300	21,800	203,400	2.97
IWW/CUT BW50	30,240	19,400	46,600	66,000	16,500	9,900	92,400	3.06
TOTALS – 2 MILES	389,680	250,000	476,400	726,300	181,500	108,900	1,016,700	
3 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	70,400	107,700	26,900	16,200	150,800	2.59
ENTRANCE CH – 2	70,200	45,000	93,400	138,400	34,600	20,800	193,800	2.76
TURNING BASIN – 1	162,580	104,300	203,200	307,500	76,900	46,100	430,500	2.65
TURNING BASIN – 2	68,480	43,900	108,900	152,800	38,200	22,900	213,900	3.12
IWW/CUT BW50	30,240	19,400	46,600	66,000	16,500	9,900	92,400	3.06
TOTALS – 3 MILES	389,680	250,000	522,500	772,400	193,100	115,900	1,081,400	
4 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	78,000	115,300	28,800	17,300	161,400	2.77
ENTRANCE CH – 2	70,200	45,000	101,100	146,100	36,500	21,900	204,500	2.91
TURNING BASIN – 1	162,580	104,300	232,500	336,800	84,200	50,500	471,500	2.90
TURNING BASIN – 2	68,480	43,900	116,400	160,300	40,100	24,000	224,400	3.28
IWW/CUT BW50	30,240	19,400	54,100	73,500	18,400	11,000	102,900	3.40
TOTALS – 4 MILES	389,680	250,000	582,100	832,000	208,000	124,700	1,164,700	
5 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	78,000	115,300	28,800	17,300	161,400	2.77
ENTRANCE CH – 2	70,200	45,000	115,800	160,800	40,200	24,100	225,100	3.21
TURNING BASIN – 1	162,580	104,300	247,100	351,400	87,900	52,700	492,000	3.03
TURNING BASIN – 2	68,480	43,900	131,500	175,400	43,900	26,300	245,600	3.59
IWW/CUT BW50	30,240	19,400	54,100	73,500	18,400	11,000	102,900	3.40
TOTALS – 5 MILES	389,680	250,000	626,500	876,400	219,200	131,400	1,227,000	
6 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	92,500	129,800	32,500	19,500	181,800	3.12
ENTRANCE CH – 2	70,200	45,000	123,600	168,600	42,200	25,300	236,100	3.36
TURNING BASIN – 1	162,580	104,300	269,900	374,200	93,600	56,100	523,900	3.22
TURNING BASIN – 2	68,480	43,900	139,000	182,900	45,700	27,400	256,000	3.74
IWW/CUT BW50	30,240	19,400	61,700	81,100	20,300	12,200	113,600	3.76
TOTALS – 6 MILES	389,680	250,000	686,700	936,600	234,300	140,500	1,311,400	
7 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	100,100	137,400	34,400	20,600	192,400	3.31
ENTRANCE CH – 2	70,200	45,000	131,300	176,300	44,100	26,400	246,800	3.52
TURNING BASIN – 1	162,580	104,300	284,500	388,800	97,200	58,300	544,300	3.35
TURNING BASIN – 2	68,480	43,900	154,100	198,000	49,500	29,700	277,200	4.05
IWW/CUT BW50	30,240	19,400	61,700	81,100	20,300	12,200	113,600	3.76
TOTALS – 7 MILES	389,680	250,000	731,700	981,600	245,500	147,200	1,374,300	
8 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	107,600	144,900	36,200	21,700	202,800	3.49
ENTRANCE CH – 2	70,200	45,000	138,300	183,300	45,800	27,500	256,600	3.66
TURNING BASIN – 1	162,580	104,300	307,300	411,600	102,900	61,700	576,200	3.54
TURNING BASIN – 2	68,480	43,900	160,900	204,800	51,200	30,700	286,700	4.19
IWW/CUT BW50	30,240	19,400	69,300	88,700	22,200	13,300	124,200	4.11
TOTALS – 8 MILES	389,680	250,000	783,400	1,033,300	258,300	154,900	1,446,500	
9 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	115,200	152,500	38,100	22,900	213,500	3.67
ENTRANCE CH – 2	70,200	45,000	153,700	198,700	49,700	29,800	278,200	3.96
TURNING BASIN – 1	162,580	104,300	330,000	434,300	108,600	65,100	608,000	3.74
TURNING BASIN – 2	68,480	43,900	168,500	212,400	53,100	31,900	297,400	4.34
IWW/CUT BW50	30,240	19,400	69,300	88,700	22,200	13,300	124,200	4.11
TOTALS – 9 MILES	389,680	250,000	836,700	1,086,600	271,700	163,000	1,521,300	
10 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	122,800	160,100	40,000	24,000	224,100	3.85
ENTRANCE CH – 2	70,200	45,000	160,800	205,800	51,500	30,900	288,200	4.11
TURNING BASIN – 1	162,580	104,300	344,700	449,000	112,300	67,400	628,700	3.87
TURNING BASIN – 2	68,480	43,900	176,000	219,900	55,000	33,000	307,900	4.50
IWW/CUT BW50	30,240	19,400	76,500	95,900	24,000	14,400	134,300	4.44
TOTALS – 10 MILES	389,680	250,000	880,800	1,130,700	282,800	169,700	1,583,200	

Thu 07 Apr 1994

TABLE 10
PORT EVERGLADES HARBOR
DISPOSAL AREA STUDY
MECHANICAL DREDGE ESTIMATE

TIME 16:56:18

CHECKLIST FOR INPUT DATA.

BID QUANTITY	58,180 C.Y.
UNIT COST...	$2.09 PER C.Y.
EXCAV. COST.	$121,596
TIME.....	0.17 MONTHS

Port Everglades Habor Study

PG 1 OF 9: PROJECT TITLES

FILENAME -	PEHSMEC
PROJECT -	Port Everglades Habor Study
LOCATION -	Ocean Disposal-5.0 Mile
INVIT # -	Entrance Channel-Shoal 1
DATE OF EST. -	07 Apr 94
EST. BY -	B J Harrison
MOB. BID ITEM # -	1
EXCAV. BID ITEM # -	2
TYPE OF EST. -	Planning Estimate

PG 2 OF 9: EXCAVATION QTY'S

DREDGING AREA -	130,000 sf
REQ'D EXCAVATION -	58,180 cyds
PAY OVERDEPTH -	0 cyds
CONTRACT AMOUNT -	58,180 cyds
NOT DREDGED -	0 cyds
NONPAY YARDAGE -	4,800 cyds
GROSS YARDAGE -	62,980 cyds
NONPAY HEIGHT -	1.0 ft overdig.
TOTAL BANK HEIGHT -	13.1 ft

PG 3 OF 9: EXCAVATION PRODUCTION WORKSHEET

DREDGE SELECTED -	26 CY Clamshell Dredge
TYPE OF MATERIAL -	SAND
BUCKET SIZE -	21
BUCKET FILL FACTOR -	0.70
OPTIMUM BANK -	9
BANK FACTOR -	1.00

PG 4 OF 9: EXCAVATION PRODUCTION WORKSHEET

BUCKET CYCLE TIME -	55 Seconds
OTHER FACTOR -	1.00 >
CLEANUP -	15% More Time
TIME EFFICIENCY -	60.0% of EWT

PG 5 OF 9: HAULING PRODUCTION WORKSHEET

TUG DESCRIPTION -	3000 HP Diesel--Twin Screw
PREPARE SCOW TOW -	15 min
HAUL DIST -	4.7 mi
SPEED TO D/A -	5 mph
SPEED FROM D/A -	6 mph

PG 5 OF 9: HAULING PRODUCTION WORKSHEET

DUMP OR PUMPOUT -	20 min
DISENGAGE TOW -	10 min
TOW EFFICIENCY -	80 %
SCOW DESCRIPTION -	3000 CY Split Hull Scow
USEABLE VOLUME -	90 %
% SOLIDS -	80 %

PG 6 OF 9: EQUIPMENT MATCHING

# OF PIECES:	Used
DREDGES -	1
SCOWS PER DREDGE -	1
TOWING VESSELS -	1
SCOWS PER TOW -	1
ADDITIONAL SCOWS -	0
TOT SCOWS ON JOB -	2

PG 7 OF 9: SPECIAL LABOR & EQUIPMENT

QUARTERS ON DREDGE? -	NO
SURVEY BOAT? -	YES
CREW BOAT? -	NO

PG 8 OF 9: LOCAL AREA FACTORS

PRESENT YEAR -	1993
ECONOMIC INDEX -	4718
LAF -	0.840
INTEREST RATE -	5.625% /yr
TIME PERIOD -	June to December, 1993
PLANT AVAILABLE -	10 mos/yr
FUEL PRICE -	$0.79 /gal

PG 9 OF 9: OTHER ADJUSTMENTS

SPECIAL COST/MO -	$7,000 Turbidity Monitoring
SPECIAL COST LS -	$0 >
CONTRACTOR'S O.H. -	15.0%
CONTRACTOR'S PROFIT -	10.0%
CONTRACTOR'S BOND -	1.0%

TABLE 11
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
MECHANICAL DREDGE AND OCEAN DISPOSAL COSTS

CUT NAME	SHOAL QUANTITY (CY)	MOB & DEMOB PER CUT	EXCAVATION COST PER CUT	SUBTOTAL COSTS PER CUT	CONT COSTS 25%	E&D AND CM 15%	TOTAL $	DREDGING COSTS $/(CY)
1 MILE OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	112,800	150,100	37,500	22,500	210,100	3.61
ENTRANCE CH – 2	70,200	45,000	179,000	224,000	56,000	33,600	313,600	4.47
TURNING BASIN – 1	162,580	104,300	318,700	423,000	105,800	63,500	592,300	3.64
TURNING BASIN – 2	68,480	43,900	302,000	345,900	86,500	51,900	484,300	7.07
IWW/CUT BW50	30,240	19,400	137,600	157,000	39,300	23,600	219,900	7.27
TOTALS – 1 MILE	389,680	250,000	1,050,100	1,300,000	325,100	195,100	1,820,200	
2 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	115,200	152,500	38,100	22,900	213,500	3.67
ENTRANCE CH – 2	70,200	45,000	181,800	226,800	56,700	34,000	317,500	4.52
TURNING BASIN – 1	162,580	104,300	323,500	427,800	107,000	64,200	599,000	3.68
TURNING BASIN – 2	68,480	43,900	304,700	348,600	87,200	52,300	488,100	7.13
IWW/CUT BW50	30,240	19,400	138,800	158,200	39,600	23,700	221,500	7.32
TOTALS – 2 MILES	389,680	250,000	1,064,000	1,313,900	328,600	197,100	1,839,600	
3 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	117,500	154,800	38,700	23,200	216,700	3.72
ENTRANCE CH – 2	70,200	45,000	184,600	229,600	57,400	34,400	321,400	4.58
TURNING BASIN – 1	162,580	104,300	330,000	434,300	108,600	65,100	608,000	3.74
TURNING BASIN – 2	68,480	43,900	308,200	352,100	88,000	52,800	492,900	7.20
IWW/CUT BW50	30,240	19,400	140,300	159,700	39,900	24,000	223,600	7.39
TOTALS – 3 MILES	389,680	250,000	1,080,600	1,330,500	332,600	199,500	1,862,600	
4 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	119,300	156,600	39,200	23,500	219,300	3.77
ENTRANCE CH – 2	70,200	45,000	187,400	232,400	58,100	34,900	325,400	4.64
TURNING BASIN – 1	162,580	104,300	336,500	440,800	110,200	66,100	617,100	3.80
TURNING BASIN – 2	68,480	43,900	311,600	355,500	88,900	53,300	497,700	7.27
IWW/CUT BW50	30,240	19,400	141,500	160,900	40,200	24,100	225,200	7.45
TOTALS – 4 MILES	389,680	250,000	1,096,300	1,346,200	336,600	201,900	1,884,700	
5 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	121,600	158,900	39,700	23,800	222,400	3.82
ENTRANCE CH – 2	70,200	45,000	190,200	235,200	58,800	35,300	329,300	4.69
TURNING BASIN – 1	162,580	104,300	343,000	447,300	111,800	67,100	626,200	3.85
TURNING BASIN – 2	68,480	43,900	314,300	358,200	89,600	53,700	501,500	7.32
IWW/CUT BW50	30,240	19,400	143,000	162,400	40,600	24,400	227,400	7.52
TOTALS – 5 MILES	389,680	250,000	1,112,100	1,362,000	340,500	204,300	1,906,800	
6 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	123,900	161,200	40,300	24,200	225,700	3.88
ENTRANCE CH – 2	70,200	45,000	193,100	238,100	59,500	35,700	333,300	4.75
TURNING BASIN – 1	162,580	104,300	349,500	453,800	113,500	68,100	635,400	3.91
TURNING BASIN – 2	68,480	43,900	317,700	361,600	90,400	54,200	506,200	7.39
IWW/CUT BW50	30,240	19,400	144,500	163,900	41,000	24,600	229,500	7.59
TOTALS – 6 MILES	389,680	250,000	1,128,700	1,378,600	344,700	206,800	1,930,100	
7 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	126,300	163,600	40,900	24,500	229,000	3.94
ENTRANCE CH – 2	70,200	45,000	195,900	240,900	60,200	36,100	337,200	4.80
TURNING BASIN – 1	162,580	104,300	364,200	468,500	117,100	70,300	655,900	4.03
TURNING BASIN – 2	68,480	43,900	320,500	364,400	91,100	54,700	510,200	7.45
IWW/CUT BW50	30,240	19,400	145,800	165,200	41,300	24,800	231,300	7.65
TOTALS – 7 MILES	389,680	250,000	1,152,700	1,402,600	350,600	210,400	1,963,600	
8 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	133,800	171,100	42,800	25,700	239,600	4.12
ENTRANCE CH – 2	70,200	45,000	198,700	243,700	60,900	36,600	341,200	4.86
TURNING BASIN – 1	162,580	104,300	390,200	494,500	123,600	74,200	692,300	4.26
TURNING BASIN – 2	68,480	43,900	323,900	367,800	92,000	55,200	515,000	7.52
IWW/CUT BW50	30,240	19,400	147,300	166,700	41,700	25,000	233,400	7.72
TOTALS – 8 MILES	389,680	250,000	1,193,900	1,443,800	361,000	216,700	2,021,500	
9 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	144,300	181,600	45,400	27,200	254,200	4.37
ENTRANCE CH – 2	70,200	45,000	201,500	246,500	61,600	37,000	345,100	4.92
TURNING BASIN – 1	162,580	104,300	416,200	520,500	130,100	78,100	728,700	4.48
TURNING BASIN – 2	68,480	43,900	327,300	371,200	92,800	55,700	519,700	7.59
IWW/CUT BW50	30,240	19,400	146,100	165,500	41,400	24,800	231,700	7.66
TOTALS – 9 MILES	389,680	250,000	1,235,400	1,485,300	371,300	222,800	2,079,400	
10 MILES OFFSHORE								
ENTRANCE CH – 1	58,180	37,300	147,800	185,100	46,300	27,800	259,200	4.46
ENTRANCE CH – 2	70,200	45,000	214,100	259,100	64,800	38,900	362,800	5.17
TURNING BASIN – 1	162,580	104,300	440,600	544,900	136,200	81,700	762,800	4.69
TURNING BASIN – 2	68,480	43,900	330,100	374,000	93,500	56,100	523,600	7.65
IWW/CUT BW50	30,240	19,400	147,600	167,000	41,800	25,100	233,900	7.73
TOTALS – 10 MILES	389,680	250,000	1,280,200	1,530,100	382,600	229,600	2,142,300	

Fri 08 Apr 1994

TABLE 12
PORT EVERGLADES HARBOR
DISPOSAL AREA STUDY
HYDRAULIC DREDGE ESTIMATE

TIME 13:49:46

CHECKLIST FOR INPUT DATA.

Port Everglades Harbor Study 4/94

BID QUANTITY	58,180 C.Y.
UNIT COST...	$1.81 PER C.Y.
EXCAV. COST.	$105,306
TIME.....	0.12 MONTHS

PG 1 OF 9: PROJECT TITLES

FILENAME -	PEHS_PI
PROJECT -	Port Everglades Harbor Study 4/94
LOCATION -	Site 66
INVIT # -	Entrance Channel - Shoal 1
DATE OF EST. -	08 Apr 94
EST. BY -	B J Harrison
MOB. BID ITEM # -	0
EXCAV. BID ITEM # -	0
TYPE OF EST. -	Planning Estimate

PG 2 OF 9: EXCAVATION QTY'S

DREDGING AREA -	130,000 sf
REQ'D EXCAVATION -	58,180 cyds
PAY OVERDEPTH -	0 cyds
CONTRACT AMOUNT -	58,180 cyds
NOT DREDGED -	0 cyds
NONPAY YARDAGE -	4,800 cyds
GROSS YARDAGE -	62,980 cyds
NONPAY HEIGHT -	1.0 ft overdig.
TOTAL BANK HEIGHT -	13.1 ft

PG 3 OF 9: MAXIMUM PIPELINE REQUIRED

FLOATING -	2,000 ft
SUBMERGED -	17,050 ft
SHORE -	1,000 ft
TOTAL -	20,050 ft
COST CATEGORY -	2 SAND
EQUIVALENT -	0 ft

PG 4 OF 9: MATERIAL FACTOR

DESCRIPTION	FACTOR	PERCENTAGE %
MUD & SILT	3	0
MUD & SILT	2.5	20
MUD & SILT	2	0
LOOSE SAND	1.1	0
LOOSE SAND	1	80
COMP. SAND	0.9	0
STIFF CLAY	0.6	0
COMP. SHELL	0.5	0
SOFT ROCK	0.4	0
BLAST. ROCK	0.25	0

RESULTANT MATERIAL FACTOR - 1.14

PG 5 OF 9: DREDGE SELECTION

DREDGE SELECTED -	30" HYDRAULIC DREDGE
COMPUTED BANK FACTOR -	1.1
BANK FACTOR USED -	1.1 >
OTHER FACTOR -	1 >
CLEANUP -	15% More Time

PG 6 OF 9: HORSEPOWER CONSIDERATIONS

CHART H.P. -	9,000 hp
AVAILABLE H.P. -	9,000 hp
BOOSTER H.P. -	5,200 hp(ea)
LOSS PER BOOSTER -	15%

PG 7 OF 9: CHART PRODUCTION ANALYSIS

AVE. PIPELINE -	17,500 ft
BOOSTERS -	0
BOOSTER FACTOR -	1.00
% EFF WORK TIME (GROSS)-	50.0%
MAX. POSSIBLE -	29,410 ft
TOTAL HP AVAIL -	9,000 hp
% EFF WORK TIME (NET) -	50.0%
OPERATING TIME -	365 hours per month

PG 8 OF 9: GROSS PRODUCTION & LOCAL AREA FACTORS

PRODUCTION OVERRIDE -	NO
NET PRODUCTION -	1,492 net cy per hour
OPERATING TIME -	365 hours per month
BASED ON -	0 booster(s)
PAY PRODUCTION -	484,833 pay cy per month
PRESENT YEAR -	1993
ECONOMIC INDEX -	4718
LAF -	0.84
INTEREST RATE -	5.625% /yr
TIME PERIOD -	June to December, 1993
PLANT AVAILABLE -	9 mos/yr
FUEL PRICE -	$0.79 /gal

PG 9 OF 9: OTHER ADJUSTMENTS

SPECIAL COST/MO -	$7,000 Turbidity Monitoring
SPECIAL COST LS -	$0 >
CONTRACTOR'S O.H. -	15.0%
CONTRACTOR'S PROFIT -	10.0%
CONTRACTOR'S BOND -	1.0%

TABLE 13
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
HYDRAULIC DREDGE AND UPLAND DISPOSAL COSTS

CUT NAME	SHOAL QUANTITY (CY)	MOB & DEMOB PER CUT	EXCAVATION COST PER CUT	SUBTOTAL COSTS PER CUT	CONT COSTS 25%	E&D AND CM 15%	TOTAL $	DREDGING COSTS $/(CY)
SITE 25								
ENTRANCE CH – 1	58,180	188,900	247,300	436,200	109,100	65,400	610,700	10.50
ENTRANCE CH – 2	70,200	228,000	327,800	555,800	139,000	83,400	778,200	11.09
TURNING BASIN – 1	162,580	528,000	570,700	1,098,700	274,700	164,800	1,538,200	9.46
TURNING BASIN – 2	68,480	222,400	419,100	641,500	160,400	96,200	898,100	13.11
IWW/CUT BW50	30,240	98,200	209,300	307,500	76,900	46,100	430,500	14.24
TOTALS – SITE 25	389,680	1,265,500	1,774,200	3,039,700	760,100	455,900	4,255,700	
SITE 28								
ENTRANCE CH – 1	58,180	186,700	234,500	421,200	105,300	63,200	589,700	10.14
ENTRANCE CH – 2	70,200	225,300	313,800	539,100	134,800	80,900	754,800	10.75
TURNING BASIN – 1	162,580	521,700	544,600	1,066,300	266,600	159,900	1,492,800	9.18
TURNING BASIN – 2	68,480	219,800	394,400	614,200	153,600	92,100	859,900	12.56
IWW/CUT BW50	30,240	97,000	200,800	297,800	74,500	44,700	417,000	13.79
TOTALS – SITE 28	389,680	1,250,500	1,688,100	2,938,600	734,800	440,800	4,114,200	
SITE 30								
ENTRANCE CH – 1	58,180	172,100	201,300	373,400	93,400	56,000	522,800	8.99
ENTRANCE CH – 2	70,200	207,600	275,200	482,800	120,700	72,400	675,900	9.63
TURNING BASIN – 1	162,580	480,800	479,600	960,400	240,100	144,100	1,344,600	8.27
TURNING BASIN – 2	68,480	202,500	354,000	556,500	139,100	83,500	779,100	11.38
IWW/CUT BW50	30,240	89,400	174,800	264,200	66,100	39,600	369,900	12.23
TOTALS – SITE 30	389,680	1,152,500	1,484,900	2,637,300	659,400	395,600	3,692,300	
SITE 38								
ENTRANCE CH – 1	58,180	184,600	222,200	406,800	101,700	61,000	569,500	9.79
ENTRANCE CH – 2	70,200	222,800	301,200	524,000	131,000	78,600	733,600	10.45
TURNING BASIN – 1	162,580	515,900	518,600	1,034,500	258,600	155,200	1,448,300	8.91
TURNING BASIN – 2	68,480	217,300	381,400	598,700	149,700	89,800	838,200	12.24
IWW/CUT BW50	30,240	96,000	188,400	284,400	71,100	42,700	398,200	13.17
TOTALS – SITE 38	389,680	1,236,500	1,611,800	2,848,400	712,100	427,300	3,987,800	
SITE 56								
ENTRANCE CH – 1	58,180	N/A						
ENTRANCE CH – 2	70,200	N/A						
TURNING BASIN – 1	162,580	N/A						
TURNING BASIN – 2	68,480	218,500	514,300	732,800	183,200	109,900	1,025,900	14.98
IWW/CUT BW50	30,240	N/A						
TOTALS – SITE 56	389,680	1,243,500	514,300	732,800	183,200	109,900	1,025,900	
SITE 64								
ENTRANCE CH – 1	58,180	120,700	105,900	226,600	56,700	34,000	317,300	5.45
ENTRANCE CH – 2	70,200	145,600	127,800	273,400	68,400	41,000	382,800	5.45
TURNING BASIN – 1	162,580	337,300	209,700	547,000	136,800	82,100	765,900	4.71
TURNING BASIN – 2	68,480	142,100	176,700	318,800	79,700	47,800	446,300	6.52
IWW/CUT BW50	30,240	62,700	73,500	136,200	34,100	20,400	190,700	6.31
TOTALS – SITE 64	389,680	808,500	693,600	1,502,000	375,700	225,300	2,103,000	
SITE 66								
ENTRANCE CH – 1	58,180	119,500	105,300	224,800	56,200	33,700	314,700	5.41
ENTRANCE CH – 2	70,200	144,200	127,100	271,300	67,800	40,700	379,800	5.41
TURNING BASIN – 1	162,580	334,000	208,100	542,100	135,500	81,300	758,900	4.67
TURNING BASIN – 2	68,480	140,700	176,000	316,700	79,200	47,500	443,400	6.47
IWW/CUT BW50	30,240	62,100	73,200	135,300	33,800	20,300	189,400	6.26
TOTALS – SITE 66	389,680	800,500	689,700	1,490,200	372,500	223,500	2,086,200	
SITE 69								
ENTRANCE CH – 1	58,180	N/A						
ENTRANCE CH – 2	70,200	196,100	262,500	458,600	114,700	68,800	642,100	9.15
TURNING BASIN – 1	162,580	454,300	465,000	919,300	229,800	137,900	1,287,000	7.92
TURNING BASIN – 2	68,480	191,300	380,100	571,400	142,900	85,700	800,000	11.68
IWW/CUT BW50	30,240	84,500	160,300	244,800	61,200	36,700	342,700	11.33
TOTALS – SITE 69	389,680	1,088,800	1,267,900	2,194,100	548,600	329,100	3,071,800	
SITE 70								
ENTRANCE CH – 1	58,180	N/A						
ENTRANCE CH – 2	70,200	222,500	333,500	556,000	139,000	83,400	778,400	11.09
TURNING BASIN – 1	162,580	515,300	559,300	1,074,600	268,700	161,200	1,504,500	9.25
TURNING BASIN – 2	68,480	217,000	380,700	597,700	149,400	89,700	836,800	12.22
IWW/CUT BW50	30,240	95,800	161,200	257,000	64,300	38,600	359,900	11.90
TOTALS – SITE 70	389,680	1,235,000	1,434,700	2,485,300	621,400	372,900	3,479,600	
SITE 72								
ENTRANCE CH – 1	58,180	172,300	200,700	373,000	93,300	56,000	522,300	8.98
ENTRANCE CH – 2	70,200	207,900	314,500	522,400	130,600	78,400	731,400	10.42
TURNING BASIN – 1	162,580	481,400	544,600	1,026,000	256,500	153,900	1,436,400	8.84
TURNING BASIN – 2	68,480	202,800	446,500	649,300	162,300	97,400	909,000	13.27
IWW/CUT BW50	30,240	89,500	175,700	265,200	66,300	39,800	371,300	12.28
TOTALS – SITE 72	389,680	1,153,800	1,682,000	2,835,900	709,000	425,500	3,970,400	
SITE 76								
ENTRANCE CH – 1	58,180	N/A						
ENTRANCE CH – 2	70,200	227,000	359,400	586,400	146,600	88,000	821,000	11.70
TURNING BASIN – 1	162,580	525,600	634,100	1,159,700	289,900	174,000	1,623,600	9.99
TURNING BASIN – 2	68,480	221,400	513,600	735,000	183,800	110,300	1,029,100	15.03
IWW/CUT BW50	30,240	97,800	209,300	307,100	76,800	46,100	430,000	14.22
TOTALS – SITE 76	389,680	1,259,800	1,716,400	2,788,200	697,100	418,400	3,903,700	

TABLE 13
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
HYDRAULIC DREDGE AND UPLAND DISPOSAL COSTS

CUT NAME	SHOAL QUANTITY (CY)	MOB & DEMOB PER CUT	EXCAVATION COST PER CUT	SUBTOTAL COSTS PER CUT	CONT COSTS 25%	E&D AND CM 15%	TOTAL $	DREDGING COSTS $/(CY)
SITE 77								
ENTRANCE CH – 1	58,180	N/A						
ENTRANCE CH – 2	70,200	N/A						
TURNING BASIN – 1	162,580	N/A						
TURNING BASIN – 2	68,480	N/A						
IWW/CUT BW50	30,240	98,400	247,700	346,100	86,500	51,900	484,500	16.02
TOTALS – SITE 77	389,680	1,267,500	247,700	346,100	86,500	51,900	484,500	
SITE 95								
ENTRANCE CH – 1	58,180	N/A						
ENTRANCE CH – 2	70,200	N/A						
TURNING BASIN – 1	162,580	N/A						
TURNING BASIN – 2	68,480	N/A						
IWW/CUT BW50	30,240	97,300	235,600	332,900	83,200	49,900	466,000	15.41
TOTALS – SITE 95	389,680	1,253,500	235,600	332,900	83,200	49,900	466,000	
SITE 105								
ENTRANCE CH – 1	58,180	141,000	131,500	272,500	68,100	40,900	381,500	6.56
ENTRANCE CH – 2	70,200	170,100	178,300	348,400	87,100	52,300	487,800	6.95
TURNING BASIN – 1	162,580	394,100	302,400	696,500	174,100	104,500	975,100	6.00
TURNING BASIN – 2	68,480	166,000	245,200	411,200	102,800	61,700	575,700	8.41
IWW/CUT BW50	30,240	73,300	95,900	169,200	42,300	25,400	236,900	7.83
TOTALS – SITE 105	389,680	944,500	953,300	1,897,800	474,400	284,800	2,657,000	
SITE 106								
ENTRANCE CH – 1	58,180	158,900	161,700	320,600	80,200	48,100	448,900	7.72
ENTRANCE CH – 2	70,200	191,800	222,500	414,300	103,600	62,100	580,000	8.26
TURNING BASIN – 1	162,580	444,100	375,600	819,700	204,900	123,000	1,147,600	7.06
TURNING BASIN – 2	68,480	187,100	315,700	502,800	125,700	75,400	703,900	10.28
IWW/CUT BW50	30,240	82,600	119,400	202,000	50,500	30,300	282,800	9.35
TOTALS – SITE 106	389,680	1,064,500	1,194,900	2,259,400	564,900	338,900	3,163,200	
SITE 109								
ENTRANCE CH – 1	58,180	140,700	131,500	272,200	68,100	40,800	381,100	6.55
ENTRANCE CH – 2	70,200	169,800	178,300	348,100	87,000	52,200	487,300	6.94
TURNING BASIN – 1	162,580	393,200	302,400	695,600	173,900	104,300	973,800	5.99
TURNING BASIN – 2	68,480	165,600	244,500	410,100	102,500	61,500	574,100	8.38
IWW/CUT BW50	30,240	73,100	95,600	168,700	42,200	25,300	236,200	7.81
TOTALS – SITE 109	389,680	942,500	952,300	1,894,700	473,700	284,100	2,652,500	
SITE 110								
ENTRANCE CH – 1	58,180	141,000	131,500	272,500	68,100	40,900	381,500	6.56
ENTRANCE CH – 2	70,200	170,100	178,300	348,400	87,100	52,300	487,800	6.95
TURNING BASIN – 1	162,580	394,100	302,400	696,500	174,100	104,500	975,100	6.00
TURNING BASIN – 2	68,480	166,000	245,200	411,200	102,800	61,700	575,700	8.41
IWW/CUT BW50	30,240	73,300	95,900	169,200	42,300	25,400	236,900	7.83
TOTALS – SITE 110	389,680	944,500	953,300	1,897,800	474,400	284,800	2,657,000	
SITE 116								
ENTRANCE CH – 1	58,180	161,300	174,000	335,300	83,800	50,300	469,400	8.07
ENTRANCE CH – 2	70,200	194,600	234,500	429,100	107,300	64,400	600,800	8.56
TURNING BASIN – 1	162,580	450,800	398,300	849,100	212,300	127,400	1,188,800	7.31
TURNING BASIN – 2	68,480	189,900	328,700	518,600	129,700	77,800	726,100	10.60
IWW/CUT BW50	30,240	83,800	130,600	214,400	53,600	32,200	300,200	9.93
TOTALS – SITE 116	389,680	1,080,500	1,266,100	2,346,500	586,700	352,100	3,285,300	
SITE 117								
ENTRANCE CH – 1	58,180	163,700	175,100	338,800	84,700	50,800	474,300	8.15
ENTRANCE CH – 2	70,200	197,500	236,600	434,100	108,500	65,100	607,700	8.66
TURNING BASIN – 1	162,580	457,500	422,700	880,200	220,100	132,000	1,232,300	7.58
TURNING BASIN – 2	68,480	192,700	341,000	533,700	133,400	80,100	747,200	10.91
IWW/CUT BW50	30,240	85,100	131,800	216,900	54,200	32,500	303,600	10.04
TOTALS – SITE 117	389,680	1,096,500	1,307,200	2,403,700	600,900	360,500	3,365,100	
SITE 140								
ENTRANCE CH – 1	58,180	171,500	201,300	372,800	93,200	55,900	521,900	8.97
ENTRANCE CH – 2	70,200	206,900	274,500	481,400	120,400	72,200	674,000	9.60
TURNING BASIN – 1	162,580	479,200	478,000	957,200	239,300	143,600	1,340,100	8.24
TURNING BASIN – 2	68,480	201,800	392,400	594,200	148,600	89,100	831,900	12.15
IWW/CUT BW50	30,240	89,100	160,900	250,000	62,500	37,500	350,000	11.57
TOTALS – SITE 140	389,680	1,148,500	1,507,100	2,655,600	664,000	398,300	3,717,900	
SITE 147								
ENTRANCE CH – 1	58,180	N/A						
ENTRANCE CH – 2	70,200	197,500	372,800	570,300	142,600	85,500	798,400	11.37
TURNING BASIN – 1	162,580	457,500	648,700	1,106,200	276,600	165,900	1,548,700	9.53
TURNING BASIN – 2	68,480	192,700	527,300	720,000	180,000	108,000	1,008,000	14.72
IWW/CUT BW50	30,240	85,100	221,700	306,800	76,700	46,000	429,500	14.20
TOTALS – SITE 147	389,680	1,275,800	1,770,500	2,703,300	675,900	405,400	3,784,600	
SITE 154								
ENTRANCE CH – 1	58,180	N/A						
ENTRANCE CH – 2	70,200	N/A						
TURNING BASIN – 1	162,580	N/A						
TURNING BASIN – 2	68,480	N/A						
IWW/CUT BW50	30,240	89,100	234,700	323,800	81,000	48,600	453,400	14.99
TOTALS – SITE 154	389,680	1,245,300	234,700	323,800	81,000	48,600	453,400	

REAL ESTATE VALUES

The following evaluations involve an assessment of real estate values on the upland sites. The real estate analysis is last because of the field work involved in obtaining estimates for each site. Engineering and environmental investigations reduced the number of sites prior to initiating the real estate analysis. During the real estate analysis, sites 40, 58, 59, 62, 108, 120, 130, 134, 135, 138, 141, and 144 were found to be unsuitable. Consequently, these sites were dropped from further consideration. The real estate evaluations are in Appendix A and the results are in table 14. The estimated real estate values are for a fee simple purchase of the site with any severance damage caused by the purchase and utilization of the site. The values do not include any easements required for pipeline access to the site. Appendix A provides details concerning the methods used to obtain the real estate values as well as assumptions and limitations of the analysis.

COST COMPARISON

The estimated real estate costs were added to the previously calculated total costs for dredging and upland disposal for each site. Dredging costs for each of the ocean disposal methods provided a base condition for comparison with potential upland sites to determine at this level of detail what upland areas appear feasible for future consideration. The ocean disposal costs in tables 9 and 11 provide the base costs for comparison with total dredging and site preparation cost on a site by site basis. Table 15 uses site 66 as a sample of the comparison generated for each potential upland site. The most economical alternative is identified with an "*". The cost comparison for all potential sites produced no upland site that was as economical as offshore disposal.

SENSITIVITY ANALYSIS

The method of cost analysis lends itself to sensitivity of several cost elements. The mobilization and demobilization cost for the hydraulic dredge can be equal or greater than the actual excavation cost. A sensitivity analysis was performed by reducing the cost for mobilization and demobilization by 50 percent. The results still indicated that no upland site was as economical as utilization of an ODMDS located up to 10 miles offshore. The same results were produced when the real estate cost for each potential site was reduced by 50 percent. A series of cost estimates were compiled based upon hopper dredging and disposal in an ODMDS located 20 miles offshore. The results were identical to the previous sensitivity analyses performed for real estate and mobilization costs.

TABLE 14
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
REAL ESTATE VALUES

SITE NUMBER	SITE SIZE (ACRES)	DIKED AREA CAPACITY (CY)	TOTAL COMPENSATORY VALUE ($)	($/CY)
BROWARD COUNTY, FL, VOLUME 2				
25	13	290,400	1,690,000	5.82
28	110	5,187,500	9,350,000	1.80
30	34	1,181,500	1,170,000	0.99
38	13	290,400	1,690,000	5.82
BROWARD COUNTY,FL, VOLUME 3				
56	27	938,200	4,752,000	5.07
64	35	1,216,200	3,150,000	2.59
66	104	4,904,500	10,965,000	2.24
69	15	335,100	1,350,000	4.03
70	25	868,700	2,250,000	2.59
72	25	868,700	3,250,000	3.74
76	11	245,700	990,000	4.03
77	13	290,400	1,170,000	4.03
95	41	1,933,500	3,690,000	1.91
105	22	764,500	1,980,000	2.59
106	11	245,700	4,290,000	17.46
109	21	729,700	2,835,000	3.89
110	31	1,077,200	4,030,000	3.74
BROWARD COUNTY,FL, VOLUME 4				
116	15	335,100	1,350,000	4.03
117	39	1,355,200	3,510,000	2.59
140	110	5,187,500	14,850,000	2.86
DADE COUNTY,FL, VOLUME 1				
147	104	4,904,500	14,040,000	2.86
154	14	312,700	1,820,000	5.82

TABLE 15
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
COST COMPARISON

		COSTS PER DREDGE AND DISPOSAL TYPE ($/CY)		
CUT NAME	QUANTITY PER CUT (CY)	CLAMSHELL TO OCEAN	HOPPER TO OCEAN	HYDRAULIC TO SITE 66
PORT EVERGLADES HARBOR – ENTRANCE CHANNEL				
SHOAL 1	58,180	$4.46	$3.85 *	$9.18
SHOAL 2	70,200	$5.17	$4.11 *	$9.18
PORT EVERGLADES HARBOR – TURNING BASIN				
SHOAL 1	162,580	$4.69	$3.87 *	$8.44
SHOAL 2	68,480	$7.65	$4.50 *	$10.24
PORT EVERGLADES HARBOR – IWW/CUT BW50				
SHOAL 1	30,240	$7.73	$4.44 *	$10.03

* – Most Economical Dredging Method Per Cut

SUMMARY

The initial analysis involved 153 potential upland disposal sites located within a 10 mile arc of the Port Everglades Harbor Turning Basin. Environmental evaluations determined that 83 sites were unsuitable for disposal. An examination of aerial maps and a field trip revealed development on six sites making them unsuitable for further consideration. One site was inaccessible by pipeline due to having to cross the traffic interchange at Eller Drive and U.S. Highway 1. After establishing a pipeline access route to the site, thirty-six sites were in excess of the 10 mile pipeline limit and removed from further consideration. One site had a shape that not conducive to dike construction and would not allow the outflow water to meet water quality standards. This site was removed from further consideration. Also, four other sites were unsuitable for the following reasons: the first site had an electrical substation and fire hydrants; second site had powerlines; third site had seven radio towers; fourth site owner unwilling to sell property. Table 16 contains the 22 sites (see figure 5 for general locations) considered suitable for disposal of the material from Port Everglades Harbor Entrance Channel and Turning Basin.

During the course of this study, the preparation of over 210 cost estimates enabled a detailed cost comparison between 3 possible dredging techniques. This report shows only a sampling of those estimates. Detailed documentation on the estimates is available in the Jacksonville District Office.

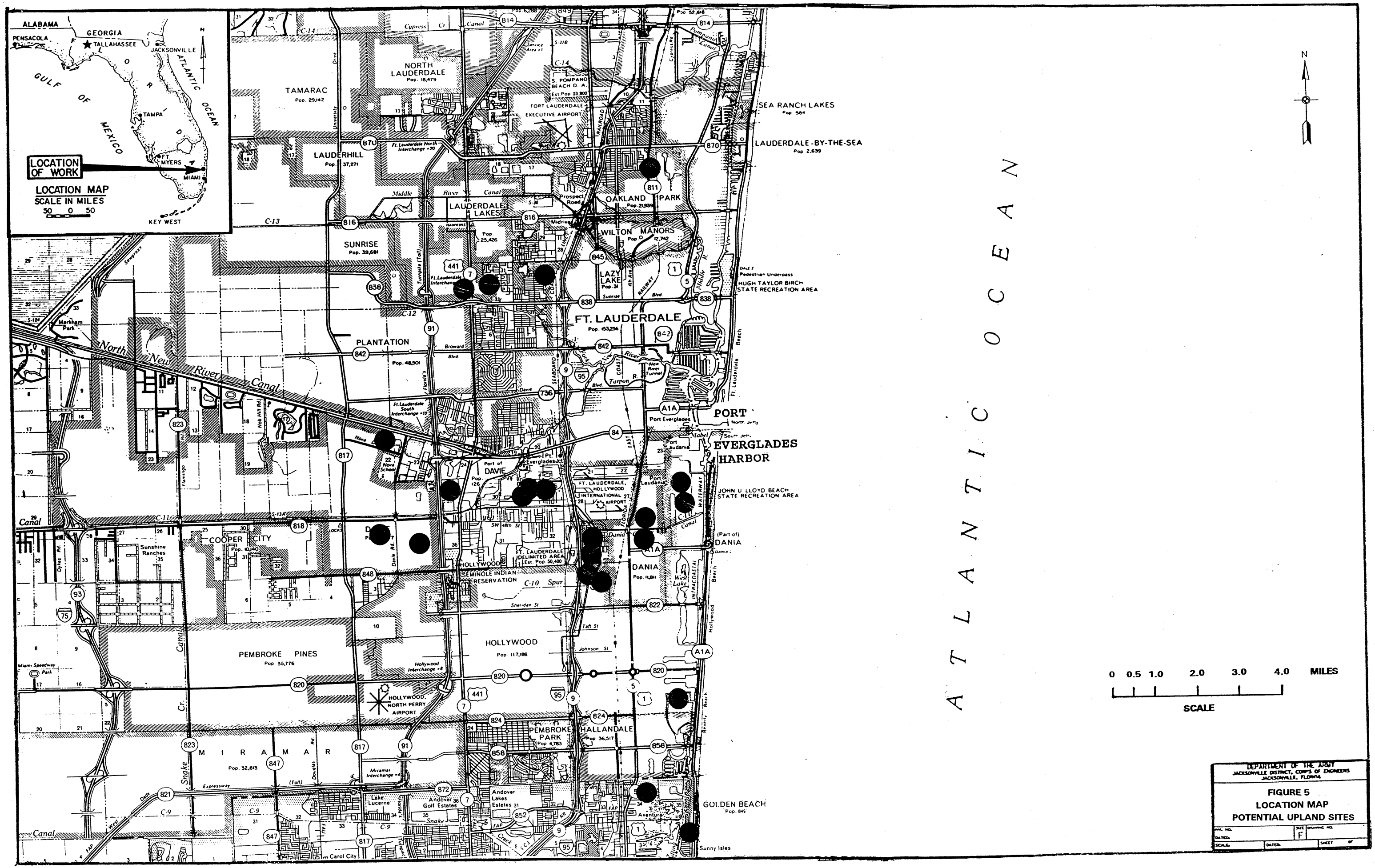
RESULTS

The results presented in tables 15 and 16 demonstrate the need for an Ocean Dredged Material Disposal Site (ODMDS) for the Port Everglades Harbor Federal Project. As shown by table 16, no upland disposal sites were found to be more economical than the use of the ODMDS. However, potential upland sites do exist if the material does not meet EPA criteria (see table 16).

TABLE 16
PORT EVERGLADES HARBOR DISPOSAL AREA STUDY
FINAL COST COMPARISION

SITE NUMBER	CAPACITY	ENTRANCE CHANNEL SHOAL 1 QUANTITY (CY)	ENTRANCE CHANNEL SHOAL 1 COSTS ($/CY)	ENTRANCE CHANNEL SHOAL 2 QUANTITY (CY)	ENTRANCE CHANNEL SHOAL 2 COSTS ($/CY)	TURNING BASIN SHOAL 1 QUANTITY (CY)	TURNING BASIN SHOAL 1 COSTS ($/CY)	TURNING BASIN SHOAL 2 QUANTITY (CY)	TURNING BASIN SHOAL 2 COSTS ($/CY)	IWW/CUT BW50 QUANTITY (CY)	IWW/CUT BW50 COSTS ($/CY)	PROJECT COSTS ($)	NOTES
ODMDS @ 10 MILES WITH HOPPER DREDGE													
ODMDS	UNLIMITED	58,180	3.85	70,200	4.11	162,580	3.87	68,480	4.50	30,240	4.44	1,584,000	1
ODMDS @ 10 MILES WITH CLAMSHELL DREDGE													
ODMDS	UNLIMITED	58,180	4.46	70,200	5.17	162,580	4.69	68,480	7.65	30,240	7.73	2,143,000	
UPLAND DISPOSAL SITES WITH HYDRAULIC DREDGE													
25	290,400	58,180	20.99	70,200	21.58	162,580	19.95	68,480	23.60	30,240	24.73	8,344,000	
28	5,187,500	58,180	13.28	70,200	13.89	162,580	12.32	68,480	15.70	30,240	16.93	5,338,000	
30	1,181,500	58,180	12.05	70,200	12.69	162,580	11.33	68,480	14.44	30,240	15.29	4,885,000	
38	290,400	58,180	20.38	70,200	21.04	162,580	19.50	68,480	22.83	30,240	23.76	8,115,000	
56	938,200	58,180	NA	70,200	NA	162,580	NA	68,480	22.53	30,240	NA	1,543,000	2
64	1,216,200	58,180	10.21	70,200	10.21	162,580	9.47	68,480	11.28	30,240	11.07	3,958,000	2
66	4,904,500	58,180	9.18	70,200	9.18	162,580	8.44	68,480	10.24	30,240	10.03	3,555,000	2
69	335,100	58,180	20.91	70,200	17.06	162,580	15.83	68,480	19.59	30,240	19.24	6,911,000	2
70	868,700	58,180	NA	70,200	16.66	162,580	14.82	68,480	17.79	30,240	17.47	5,326,000	2
72	868,700	58,180	14.89	70,200	16.33	162,580	14.75	68,480	19.18	30,240	18.19	6,274,000	2
76	245,700	58,180	NA	70,200	20.65	162,580	18.94	68,480	23.98	30,240	23.17	6,872,000	2
77	290,400	58,180	20.21	70,200	NA	162,580	NA	68,480	NA	30,240	24.23	1,909,000	2
95	1,933,500	58,180	NA	70,200	NA	162,580	NA	68,480	NA	30,240	19.91	602,000	2
105	764,500	58,180	12.81	70,200	13.20	162,580	12.25	68,480	14.66	30,240	14.08	5,093,000	2
106	245,700	58,180	30.02	70,200	30.56	162,580	29.36	68,480	32.58	30,240	31.65	11,853,000	2
109	729,700	58,180	13.28	70,200	13.67	162,580	12.72	68,480	15.11	30,240	14.54	5,275,000	2
110	1,077,200	58,180	12.57	70,200	12.96	162,580	12.01	68,480	14.42	30,240	13.84	5,000,000	2
116	335,100	58,180	16.13	70,200	16.62	162,580	15.37	68,480	18.66	30,240	17.99	6,426,000	2
117	1,355,200	58,180	13.45	70,200	13.96	162,580	12.88	68,480	16.21	30,240	15.34	5,430,000	2
140	5,187,500	58,180	14.00	70,200	14.63	162,580	13.27	68,480	17.18	30,240	16.60	5,677,000	2
147	4,904,500	58,180	NA	70,200	15.61	162,580	13.77	68,480	18.96	30,240	18.44	5,191,000	2
154	312,700	58,180	NA	70,200	NA	162,580	NA	68,480	NA	30,240	25.02	757,000	2

NOTES:
1. The most economical alternative for project maintenance is an ODMDS located up to 10 miles offshore.
2. The entire project can not be maintained using only this site. Additional sites would have to be utilized.


ALABAMA
GEORGIA
PENSACOLA
TALLAHASSEE
JACKSONVILLE
GULF OF MEXICO
ATLANTIC OCEAN
TAMPA
FT. MYERS
MIAMI
KEY WEST
LOCATION OF WORK
LOCATION MAP
SCALE IN MILES
50 0 50
NORTH LAUDERDALE
Pop. 18,479
TAMARAC
Pop. 29,142
LAUDERHILL
Pop. 37,271
SUNRISE
Pop. 39,681
PLANTATION
Pop. 48,501
COOPER CITY
Pop. 10,140
PEMBROKE PINES
Pop. 35,776
MIRAMAR
Pop. 32,813
HOLLYWOOD
Pop. 117,188
HALLANDALE
Pop. 36,517
PEMBROKE PARK
Pop. 4,783
DANIA
Pop. 11,811
FT. LAUDERDALE
Pop. 153,256
WILTON MANORS
Pop. 12,742
OAKLAND PARK
Pop. 21,359
LAZY LAKE
Pop. 31
LAUDERDALE LAKES
Pop. 25,426
SEA RANCH LAKES
Pop. 584
LAUDERDALE-BY-THE-SEA
Pop. 2,639
S. POMPANO BEACH D. A.
FORT LAUDERDALE EXECUTIVE AIRPORT
HUGH TAYLOR BIRCH STATE RECREATION AREA
PORT EVERGLADES HARBOR
JOHN U. LLOYD BEACH STATE RECREATION AREA
(Part of) DANIA
GOLDEN BEACH
Pop. 845
Sunny Isles
Port of DAVIE
Port Everglades
Port Laudania
FT. LAUDERDALE, HOLLYWOOD INTERNATIONAL AIRPORT
HOLLYWOOD, NORTH PERRY AIRPORT
SEMINOLE INDIAN RESERVATION
FT. LAUDERDALE DELIMITED AREA
Est. Pop. 50,400
Miami Speedway Park
Markham Park
Sunshine Ranches
Lake Lucerne
Andover Golf Estates
Andover Lakes Estates
Aventura
Carol City
North New River Canal
Snake Creek Canal
C-11
C-12
C-13
C-14
C-9
C-10 Spur
Middle River Canal
Cypress Cr. Canal
Sheridan St
Taft St
Johnson St
Broward Blvd.
Sunrise Blvd
Tarpon River
Davie Blvd
Hollywood Blvd
Pembroke Rd
Miramar Pkwy
Hollywood Interchange #8
Miramar Interchange #4
Ft. Lauderdale North Interchange #20
Ft. Lauderdale South Interchange #12
Ft. Lauderdale Interchange
Pedestrian Underpass
Port Everglades
Port Laudania
Port of DAVIE
Pt. Everglades Jct.
Nova School
Dania
Hollywood
Sunrise
Miramar
Carol City
Sunny Isles
Aventura
Lake Lucerne
Andover Golf Estates
Andover Lakes Estates
Pembroke Park
Hallandale
Pembroke Pines
Cooper City
Plantation
Sunrise
Lauderhill
Tamarac
North Lauderdale
Oakland Park
Wilton Manors
Lauderdale Lakes
Lauderdale-by-the-Sea
Sea Ranch Lakes
Dania
Hollywood
Pembroke Pines
Miramar
Pembroke Park
Hallandale
Fort Lauderdale
Golden Beach
Sunny Isles
N
0 0.5 1.0 2.0 3.0 4.0 MILES
SCALE
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA
FIGURE 5
LOCATION MAP
POTENTIAL UPLAND SITES
SIZE F
SHEET

PORT EVERGLADES HARBOR DISPOSAL AREA STUDY

REAL ESTATE SECTION

ATTACHMENT A

PROJECT: Port Everglades Harbor Disposal Area Site Study (DAS)

PURPOSE AND FUNCTION OF THE REPORT

This report is in response to CESAJ-PD-PN memorandum dated 29 March 1994, requesting preliminary real estate values for 36 potential upland disposal sites to be utilized in conjunction with the Port Everglades Harbor Dredging project.

Twenty-two sites were selected as suitable upland disposal sites. Each site will be briefly outlined in an attempt to summarize important considerations to arrive at an estimate of value for each disposal site. The estimate will enable a comparison of cost between the use of upland sites and the offshore disposal option.

DATE OF INSPECTION AND REPORT

On 6-8 April 1994, the potential site areas were examined, evaluated, and inspected by Mr. Joseph M. Gentile, Civil Engineer CESAJ-PD-PN, and the appraiser. The date of this report is 8 April 1994.

ASSUMPTIONS AND LIMITING CONDITIONS

The estimates of value for the project area, as shown and contained in this report, were made subject to the following assumptions and limiting conditions

1. The land estimates provided by the appraiser in this report should be used only for planning purposes. Due to budget and time restrictions, the scope of the study is limited. Additionally, requirements of the Project are subject to change, which in turn could alter the values presented. Should the study reach a feasibility stage these values should be refined. A tract appraisal will be required for acquisition.

2. It is assumed that use of the subject sites as disposal sites would be approved by appropriate officials and all necessary permits and zoning variances could be secured.

3. Due to the passage of the State of Florida Growth Management Act, the reader must be cautioned that unimproved land may be subject to transitional land use plans or to mitigation. Due to the frequent changes, the effects of these conditions usually cannot be determined and changes in value may occur.

4. It is assumed that there are no hidden or unapparent conditions of the property, subsoil, or structures that render it more or less valuable. No responsibility is

5. Information, estimates and opinions furnished to the appraiser and contained in the report were obtained from sources considered reliable and believed to be true and correct. However, no responsibility for accuracy of such items furnished the appraiser can be assumed by the appraiser.

6. The appraiser assumes no responsibility for matters of a legal nature affecting the property appraised or the title thereto, nor does the appraiser render any opinion as to the title, which is assumed to be good and marketable. The property is appraised as if under responsible ownership.

7. Possession of this report, or a copy thereof, does not carry with it the right of publication, nor may it be used by anyone but the Government or its designee.

8. The maps, sketches, and aerial photographs used to assemble this report are not certified to be accurate, but are merely used to give the appraiser an indication of the general project area; therefore they will remain on file in CESAJ-RE-S.

9. Unless otherwise stated in this report, the existence of hazardous material, which may or may not be present on the property, was not observed by the appraiser. The appraiser has no knowledge of the existence of such materials on or in the property. The appraiser, however, is not qualified to detect such substances. The presence of substances such as asbestos, urea-formaldehyde foam insulation, or other potentially hazardous materials may affect the value of the property. The value estimate is predicated on the assumption that there is no such material on or in the property that would cause a loss in value. No responsibility is assumed for any such conditions, or for any expertise or engineering knowledge required to discover them.

10. The value conclusions expressed in this report are based on data found in Broward and Dade County's public records. Not all data has been verified.

11. There is no indication of mineral or petroleum activity in the area at this time. It is assumed that the value of subsurface rights is included in the sales price of the comparable sales.

12. To my knowledge, there are no cemeteries, cultural resources, or historical markers located on the subject sites.

13. It is assumed that the sites consist of vacant land only and that there are no improvements or structures which will be affected by the Project. It is also assumed that no damages resulting from the use of these sites as disposal sites would occur to surrounding properties.

14. The appraiser is relying on inspection of the subject site, tax records and/or other suitable information for descriptions of subject property. Legal descriptions were not provided and it was impractical to contact all the owners involved. Owner contact is not a requirement for gross appraisals as per Real Estate Policy Guidance Letter No. 3, dated 31 May 1991.

15. As per Real Estate Policy Guidance Letter No. 7, dated 5 October 1993, Reconnaissance scope estimates or initial cost estimates that are utilized for preliminary planning purposes do not require compliance with the Uniform Standards of Proffessional Appraisal Practice.

ESTATES APPRAISED

The estate appraised in each of the subject parcels is the fee simple title to each tract, subject, however, to existing easements for public utilities, railroads and pipelines. However, this is a preliminary value to be used for Project Planning purposes.

OWNERSHIPS

The estimated number of ownerships, based on personal cursory research of tax records with the Broward and Dade counties Property Appraisal office, is provided in Table I.

REGION AND AREA DATA

Port Everglades Harbor, initially named Hollywood Harbor, was originally constructed in 1925-1928, under agreement between the cities of Hollywood and Fort Lauderdale, Florida. Port Everglades is located in the southeastern portion of Broward County at the adjoining city limits of Fort Lauderdale, Hollywood, and Dania, 24 miles north of Miami and 323 miles south of Jacksonville. The total jurisdictional area of the port is approximately 2,100 acres of which 910 acres are owned by the Port Authority. Port Everglades is the state of Florida's deepest harbor and it is also the largest seaport in acreage on Florida's lower east coast.

The River and Harbor Act of 1930 authorized Federal maintenance of the locally constructed project. Subsequently, modifications authorized by Congress were constructed, such as the Southport navigation improvements which include the channel and turning notch. These improvements are eligible for inclusion

into the Federal project at Port Everglades. The Federal government proposes to assume maintenance responsibilities on these navigation works. Acquisition of upland areas is being considered so that these will be available within economical dredging distances when disposal of shoal material from maintenance is necessary. This is an alternative to an Offshore Dredging Material Dump Site (ODMDS). The cost estimates provided in this report will enable a comparison of cost between the use of upland sites and the Offshore Dredging Material Dump Site.

Port Everglades Harbor Project encompasses municipalities in Broward, Dade, and Palm Beach County. The subject sites are located in Broward and Dade counties. Broward County encompasses 1,211 square miles. Its county seat is Fort Lauderdale, with a 1992 population of 1,294,000. Dade County encompasses 1,955 square miles. Its county seat is Miami, with a 1992 population of 1,982,901. The counties' major industries are services, trade and government. Broward County, particularly west Broward, capitalizes on its position as a central distribution point for all of South Florida. Broward's housing market benefitted greatly from Hurricane Andrew, as many Dade residents opted to move north and build mostly in the area of southwest Broward, near the confluence of Interstates 75 and 595. In Dade County, Andrew ended what had been a tough recession (10% unemployment) creating some 30,000 construction jobs and 10,000 manufacturing jobs.

Potential disposal sites are located through the use of past studies, aerial photography, and geographical limitations. Each site must be open land with no dwellings, meet minimum size requirement of 10 acres, and be within limitations imposed by the geographical area. The limitations are generally related to pipeline access to the site. The maximum pumping distance is assumed to be approximately 10 - 15 miles from the hydraulic dredge or a pump-out plant location. The geographical area is roughly bounded by the Atlantic Ocean to the east, NE 191 Street to the south, Pine Island to the west, and NE 7th Street to the north. These restrictions and boundaries have limited the scope of the study. The overall area is urbanized, with a mix of residential, commercial, agricultural, and industrial land use.

The Corps of Engineers narrows down a list of "potential" upland sites to only those best suited for specific project requirements. As previously mentioned, the study area is subject to change.

DESCRIPTION OF THE SUBJECT

Acquisition of upland sites has been proposed as a possible alternative to offshore disposal. The subject sites under consideration consist mostly of unimproved vacant land, with some open areas. Except for some fencing, there were no improvements detected during the inspection of the sites. The location, zoning, and brief description of each site is found in the following Table I:

PROJECT: Port Everglades Harbor Disposal Area Site Study (DAS)

TABLE III. ESTIMATE OF REAL ESTATE LAND COSTS

Site	Use	Size (Acres)	Estimated Value per Acre	Total estimated Value
25	C	13	$ 130,000	$1,690,000
28	I	110	85,000	9,350,000
30	I	34	90,000	1,170,000
38	C	13	130,000	1,690,000
56	I	27	176,000	4,752,000
64	I	35	90,000	3,150,000
66	I	104	85,000	10,965,000[2]
69	I	15	90,000	1,350,000
70	I	25	90,000	2,250,000
72	C	25	130,000	3,250,000
76	I	11	90,000	990,000
77	AG	13	90,000	1,170,000
95	AG	41	90,000	3,690,000
105	AG	22	90,000	1,980,000
106	C	11	130,000	4,290,000
109	R	21	135,000	2,835,000
110	C	31	130,000	4,030,000
116	I	15	90,000	1,350,000
117	R,I	39	90,000	3,510,000
140	R	110	135,000	14,850,000
147	R	104	135,000	14,040,000
154	C	14	130,000	1,820,000
Estimated cost				$ 94,000,000 (R)
Contingencies (25%)				$ 24,000,000 (R)
Total estimated cost				$118,000,000 (R)

25 April 1994

ROSA G. CIENFUEGOS, Appraiser

[2]Included in total estimated value, is the amount of $2,125,000 in severance damage to the NE 100 ± acres of the parent tract, estimated at 25% of land value.