TABLE OF CONTENTS
MATRIX EVALUATION CRITERIA
APPENDIX D

MATRIX EVALUATION CRITERIA
APPENDIX D

A. GENERAL

A matrix is used by the St. Paul District, Corps of Engineers (CENCS) to evaluate the various dredged material placement alternatives proposed for the various site plans. The development of the criteria used is an on-going process that began with the preparation of the first channel maintenance plan report for GREAT implementation. The matrix used here was developed from the matrix originally used by CENCS in the Dredged Material Placement Reconnaissance Reports, from the mid-1980's, and modified by the matrix developed by the Rock Island District, Corps of Engineers (CENCR) for their dredged material placement program.

The CENCS matrix uses index values to score the dredged material placement alternatives in six different categories: dredging and material placement cost, impacts to natural resources, beneficial use, impacts to cultural resources, social impacts, and impacts to recreation. Index values used for evaluating placement alternatives range from 0 (least desirable) to 10 (most desirable).

The resulting index values, scored for the various categories, are then adjusted by multiplying them by a weight factor which is assigned to each category. The weight factor determines the relative importance of each category in the dredged material placement alternative evaluation process. The dredging and material placement cost and impacts to the natural resources categories were assigned the highest weight factors. Both are assigned a weight factor of 30. Beneficial use and cultural resources are equally weighted at 10. Social impacts are weighted at 15 because the experience CENCS has had with implementing plans has indicated that there are significant local concerns related to operating placement sites near developed areas. These concerns can have a significant effect on how or whether a plan can be implemented. The remaining category of recreation has been set at 5 because CENCS does not believe that it will have as much of an impact on implementing placement plans as the other categories. Recreational beach planning is being conducted independent of the long term placement site planning.

Finally, the index values, multiplied by their appropriate weight factor, are totaled. The dredged material placement alternative with the highest total points becomes the preferred dredging and material placement alternative.

Following are the criteria used to assign index values in the various evaluation categories.

B. DREDGING AND MATERIAL PLACEMENT COSTS (Weight Factor = 30)

The cost to dredge is partially dependent on the dredged material placement alternative selected. The dredging and Material Placement Cost Matrix ranks the dredged material placement alternatives by the estimated cost to dredge and place the dredged material. This section describes the process which will be used to estimate the cost to dredge, transport, and place the dredged material for the placement site alternatives being evaluated in the site plans. The estimated costs may lack refinement, but they are considered to be reliable for their intended use for alternative comparison.

The estimated costs will be converted to cost per cubic yard units. Index values are then assigned to ranges of cost per cubic yard values. The index values for ranges of cost per cubic yard are shown in TABLE D-1.

TABLE D-1

Dredging and Material Placement Cost Index Values

Value	Criteria
10	\$0.0 - \$2.50 per cu. yd.
9	\$2.51 - \$3.75 per cu. yd.
8	\$3.76 - \$5.00 per cu. yd.
7	\$5.01 - \$6.25 per cu. yd.
6	\$6.26 - \$7.50 per cu. yd.
5	\$7.51 - \$8.75 per cu. yd.
4	\$8.76 - \$10.00 per cu. yd.
3	\$10.01 - \$11.25 per cu. yd.
2	\$11.26 - \$12.50 per cu. yd.
1	\$12.51 + per cu. yd.

The cost per cubic yard of material dredged is calculated by dividing the estimated total cost to perform the dredging and placement operation by the estimated long-term dredging quantities for the site plan.

The dredging and material placement costs do not include mobilization costs to place the dredge and its normal attendant plant on site. Such costs are not usually affected by the placement alternative. Rather, mobilization costs are affected by factors that cannot be predicted, such as distance from the previous job, direction the dredge has to travel, dredge and equipment readiness, and river conditions. Thus, the calculated costs used to determine index values are less than the dredging costs that the St. Paul District uses for other purposes and reports.

Two types of dredging are usually considered for channel maintenance dredging in the St. Paul District: hydraulic dredging and mechanical dredging. Placement site requirements for the dredged material resulting from the different types of dredging are also different. Thus, a different methodology is used to estimate the costs of performing the two different types of dredging and dredged material placement.

Following is an explanation of how the costs are estimated to dredge and implement the various dredged material placement alternatives being evaluated in the site plans.

1. Hydraulic Dredging: It is assumed that all hydraulic dredging will be performed by the Government-owned Dredge THOMPSON. The cost to hydraulically dredge and place the material is calculated from the rental cost of the dredge and its attendant plant, the time required to complete the job, and the cost and time needed to implement other requirements for placing dredged material.

a. Dredge and Plant Rental Cost: A plant rental rate has been given to the Dredge THOMPSON and its attendant plant. The rent pays for the operation and maintenance of the dredge and its attendant plant. For the purpose of the cost estimates, a rate $21,000 per day, or $875 per hour, has been adopted. This rate is an average over the last few years and can reasonably be expected for the Dredge THOMPSON in the near future. To compute the cost, the hourly rental rate is multiplied by the estimated hours required to complete the job.

b. Time Required to Complete a Job: A dredging operation is divided into "effective" pumping and "noneffective" time. The effective pumping time is the time during which the dredge is excavating and pumping the material to the placement site. Examples of noneffective time are the time required to pass a tow, the time to perform minor repairs, the time required to move the "end" of the discharge line, or the time required for other work related to the material placement operation.

A production rate is used to determine the effective pumping time required for the dredge at a specific job. A production rate is the average number of cubic yards per hour dredged when the dredge is effectively pumping. For example, if, from historical data, it is known that the dredge's production rate is 1,000 cubic yards per hour for a given set-up and material type, to determine the effective pumping time required to dredge 10,000 cubic yards, divide the dredge's production rate into the quantity to determine that it will require 10 hours of effective pumping time.

As alluded to in the preceding paragraph, the production rate as affected by the dredge equipment being used(set up) and the type of material being dredged. Technically, the production rate is affected by the discharge pipe diameter, the velocity of the discharge flow, and the concentration of the dredged material in the discharge slurry. The Dredge THOMPSON'S discharge pipe diameter is a constant 20 inches. (This is true whether or not the booster barge MULLEN is being used.)

The velocity of the flow in the discharge pipeline is primarily dependent on discharge pipe length (assuming that all of the available horsepower of the dredge and booster pumps are being used). As more pipeline is added, increasing the length of the discharge pipeline, the flow velocity of the discharge is reduced, thereby reducing the production rate.

The concentration of dredged material in the discharge slurry is affected by the type of material being dredged, Heavy material (coarse sand or gravel) requires higher flow velocity in the pipeline than light material. Higher velocities prevent the material from settling out in the pipeline. However, as the concentration of material in the slurry increases, the velocity decreases. Thus, the heavier the material, the higher the velocity requirements, and the lower the slurry's concentration of material can be to maintain the required velocity. For light river channel sand, concentrations as high as 20 percent may be realized by the dredge THOMPSON. For coarse gravel material, concentrations as low as 5 percent may be realized by the Dredge THOMPSON.

The concentration of dredged material in the discharge slurry also is affected by the height of the face of the dredge cut. If the material is not available to dredge, more water is pumped, A dredge is usually more efficient when dredging a cut with a large face.

In summary, the Dredge THOMPSON can dredge more material per unit of time when a job requires a short pipeline to reach the placement site and the material to be dredged is light sand with a large average face. The production rate is decreased as the distance to the placement site is increased (necessitating a longer discharge pipeline), the material to be dredged becomes coarser, or the average face of the dredge cut becomes smaller.

The production rate for a historical dredge cut on the UMR in CENCS is estimated from historical data. Specifically, the production rate is calculated from the Dredge THOMPSON'S daily logs. For a given recurring dredge cut, it is usually correct to assume that the material type is the same from event to event and that the shoaling patterns are similar, resulting in similar average face, from event to event. (The type of material to be dredged and the shoaling patterns for a given dredge cut are usually characteristic of the dredge cut.) The one variable is the length of the discharge pipeline. This length is determined by the location of the placement site. Enough information is available in the daily logs to develop relationships between production rate and pumping distance for various types of material and various average faces. Thus, the effective pumping time for a given site plan can be estimated from historical data. This is the approach used in the site plans to estimate effective pumping time.

The noneffective time accounts for the time spent on activities to support the dredging and material placement operation. Included in the noneffective time are the time spent to perform routine maintenance and minor repairs to the dredge, the time spent to advance the dredge and make adjustments to the discharge pipeline, the time spent to "break" the pipeline and move the dredge out of the way to pass tows, and the time spent to set up and tear down the job.

The placement site, or alternative, also may have some requirements or conditions that must be met or complied with which increase the time required to complete the job. An example would be a requirement to shape the material during placement which necessitates frequently moving the discharge pipe. The placement alternative may require site preparations such as berming to control the return water and to contain the dredged material or adjustments may be required to a drop structure. These activities normally are performed by the dredge's crew and are also considered noneffective time.

The noneffective time also will be estimated from historical data (daily logs). For placement alternatives where no historical information exists, noneffective time will be estimated using conventional construction estimating methods.

c. Other Costs: Other costs such as land acquisition, site preparation, and site management, or any activity performed to implement the dredged material placement alternative not accomplished with the dredge's plant, will increase the cost per cubic yard and thereby reduce the index value. These other costs will be calculated as cost per cubic yard by spreading the cost over the alternative's estimated capacity.

In summary, for channel maintenance dredging using a hydraulic dredge, the estimated cost of the dredging and dredged material placement will be based on a dredge plant rental rate of $21,000 per day, the time estimated to complete the operation, and the cost to perform other activities in support of the dredged material placement alternative. The plant rental of $21,000 per day is the rate that reasonably can be expected for the Dredge THOMPSON in the near future. The estimated time to complete the operation will be the sum of the effective pumping and noneffective time. Both the effective and noneffective time will be estimated from historical data. The other activities that need to be performed in support of the placement alternative also will be estimated from historical data. The other activities that need to be performed in support of the placement alternative also will be estimated from historical data, if such data exist. If the data does not exist, conventional estimating methods will be used to estimate the cost. All cost estimates used to determine cost index values for the various dredged material placement alternatives will be fully documented in the individual site plan reports.

2. Mechanical Dredging: Most mechanical dredging in the St. Paul District will be conducted by contract. The cost to mechanically dredge and place material is calculated from the per cubic yard unit cost and the transportation of dredged material by barge to a placement site in the current contract and the cost and time needed to implement other requirements for placing dredged material.

a. Per Cubic Yard Unit Cost: The St. Paul District awards a mechanical dredging contract for each year in which the contractor bids a price for dredging per cubic yard and miscellaneous mobilization and other contract costs. The price has varied over the years and has been going up. For the purpose of estimating costs of the alternatives, a per cubic yard unit cost of $5.32 will be used which is the average 1994-1996 contract price. To compute the cost, the per cubic yard unit cost is added to any additional costs for transportation of material and other costs required for placement of dredged material.

b. Transportation of Dredged Material: There will be no extra costs associated with transportation of dredged material if the placement site is located within four river miles of the dredge cut. The transportation distance is measured from the center of the dredge cut along the midchannel sailing line (as detailed on the Upper Mississippi River Navigation Charts) to the center of the navigation channel at a point perpendicular to the center of the placement site, to the nearest tenth of a mile. If transportation is between four and eight miles, a cost of $0.25 per cubic yard, per mile is added to the cost of dredging. If transportation is over eight miles, a cost of $0.85 per cubic yard, per mile is added to the cost of dredging. These transportation costs are the averages taken from the 1994-1996 mechanical dredging contract.

c. Other Costs: Other costs such as land acquisition, site preparation, and site management, or any activity performed to implement the dredged material placement alternative not accomplished with the mechanical contractor's equipment, will increase the cost per cubic yard and thereby reduce the index value. These other costs will be calculated as cost per cubic yard by spreading the cost over the alternative's estimated capacity.

In summary, for channel maintenance dredging using a mechanical dredge, the estimated cost of the dredging and dredged material placement will be based on a per cubic yard dredging cost of $5.32, plus transportation of dredged material costs if the distance is greater than 4 miles, plus the cost to perform other activities in support of the dredged material placement alternative.

The per cubic yard dredging cost and the transportation costs were taken from the 1994 mechanical dredging contract. These prices can reasonably be expected for mechanical dredging in the near future. The other activities that need to be performed in support of the placement alternative also will be estimated from historical data, if such data exist. If the data does not exist, conventional estimating methods will be used to estimate the cost. All cost estimates used to determine cost index values for the various dredged material placement alternatives will be fully documented in the individual site plan reports.

C. NATURAL RESOURCES (Weight Factor = 30)

Within the Natural Resources Matrix, there are two broad categories for evaluation: water quality and the aquatic and terrestrial ecosystem. Of the possible 30 points for the natural resources weight factor, 8 are designated for water quality, 22 to the aquatic and terrestrial ecosystem. Following is a description of both.

1. Water Quality: The basic assumption with the following worksheet is that the dredged material being considered is uncontaminated sand typical of the majority of dredge cuts on the Upper Mississippi River within the St. Paul District. When the dredged material is contaminated, the worksheet would not be used, and the impact values will be assigned without the use of pre-established criteria.

In addition to the effects on the water column, the physical effects on the aquatic ecosystem of in-water rehandling or effluent from disposal areas are included in the evaluation provided the integrity of site is not significantly altered or the disruptions would not occur over long periods. If a site would be dramatically altered, or there would be long-term disruptions, the evaluation of impact would be included in the ecosystem worksheet.

Impact Considerations

Discharge Type			
1. Confined disposal with adequate retention		1	______
2. Confined disposal without adequate retention		0.5	______
3. Unconfined disposal	0.5	______	
4. Direct open water		0.1	______
Discharge Area Characteristics			
1. Non-sensitive area with adequate mixing		1	______
2. Non-sensitive area without adequate mixing		0.5	______
3. Sensitive area with adequate mixing		0.5	______
4. Sensitive area without adequate mixing		0.1	______
Nature of Discharge (check 2)			
1. Short duration (<1 week)		1	______
2. Long duration (>1 week)		0.5	______
3. Infrequent		1	______
4. Frequent		0.5	______
Other ______________________________		____	______
	TOTAL		______

2. Aquatic and Terrestrial: Index values assigned to natural resource impacts from the dredged material placement alternatives will be calculated by the procedure developed by Wege and Palesh (1982, 1983). The 1982 procedure was generally accepted at the Channel Maintenance Forum in 1983 for its use in pool 4 of the Upper Mississippi River. Wege and Palesh (1983) was a later accepted procedure with the St. Paul District. These procedures quantify the relative impacts and benefits of dredged material placement to the natural resources. HEP was initially developed to compensate habitat losses associated with development plans, but has since been useful as a planning tool to evaluate project alternatives during early planning stages.

The proposed HEP methodology involves five steps:

1. Identification of habitat types to be affected by the project.

2. Assigning numerical habitat values to each habitat type.

3. Estimating habitat losses or gains in acres over the project life.

4. Performing a trade-off analysis to compare different habitat types.

5. Quantifying habitat losses in terms of relative habitat units.

a. Identification of Habitats Impacted: The disposal alternatives selected for evaluation could impact the ten different habitat types listed below.

Old Dredged Material - Old disposal site habitats on the river can vary greatly. The typical old disposal site habitat is a mosaic of sand deposits in early stages of revegetation and pockets of trees and shrubs that were able to withstand the dredged material deposition. It is expected through succession this habitat would return to a condition similar to bottomland forest habitat.

Brush and Willow. Areas dominated by dense shrub growth, mostly willows, are included in this habitat type.

Sand. These are areas dominated by bare sand with little or no vegetation. This habitat type would be also be created by dredged material placement.

Bottomland Forest. This habitat type is undisturbed bottomland forest areas with mature trees. The habitat type is assumed to be a climax community.

Marshes - Wetland areas characterized by dense stands persistent emergent vegetation such as sedges, cattails, bur reed, common reed, etc.

Shallow Aquatic - Shallow water areas generally less than four feet deep characterized by abundant floating-leaved or submerged vegetation such as coontail, white water lily, and pondweeds.

Terrestrial Herbaceous - Upland sites generally dominated by herbaceous vegetation. Some scattered shrub and young tree growth may be present.

Terrestrial Woody - Upland sites dominated by woody vegetation. It is expected that most high disposal sites would eventually evolve into this habitat type in 40+ years.

Cropland - Actively farmed areas.

Deep Aquatic - Water areas generally deeper than four feet such submergent aquatic vegetation is not common.

b. Determination of Habitat Unit Values (HUV): Habitat types have been evaluated for terrestrial and aquatic species. Ten evaluation species were selected for each habitat type and combined to evaluate those habitats providing both the terrestrial and aquatic benefits (Table 5-2). The evaluation species were selected by an evaluation team and were a representation of an ecological cross-section of the fish and wildlife community of each habitat type. The habitats were evaluated by identifying the existing characteristics of the habitat at each location and determining by consensus of the team how well those characteristics fulfilled the habitat requirements of the selected evaluation species. Numerical ratings for each evaluation species were based on a scale of 0-10, and since 10 species were used to evaluate each habitat, HUV from 0-100 were possible.

c. Estimation of Habitat Losses over the Project Life: The HEP evaluation quantifies habitat losses or gains over the project life in terms of habitat units (HU) by multiplying habitat quality (or HUV) by the change in habitat quantity (acres). It compares habitat impacts of dredged material disposal to habitat changes occurring over the project life in the absence of any disposal. A prediction of future habitat changes due to natural succession or anticipated developments must be made for the 40-year time period for each habitat type. This results in a gradual change in habitat values over 40 years. Since bottomland forest was considered to be at a climax stage of succession, no change in habitat value was anticipated over the project life. Target years are selected representing important time periods when significant changes in habitat quantity occur. For many projects, losses occur at one point in time (e.g. wetland filling), while others occur gradually from disposal over a 40-year period. Target year zero represents the exiting or baseline conditions for each habitat. Target year 1 is the start of dredged material disposal.

d. Trade-off Analysis: Evaluating dredged material disposal alternatives often involve losses of dissimilar habitats making it difficult to compare losses between habitat types and alternatives. The first step in the trade-off analysis is to develop Relative Value Criteria (RVC) used to determine the intrinsic values of habitats. The following criteria were selected:

Scarcity - The abundance of the habitat.
Diversity - The ability of the habitat to support a diverse fauna.
Manageability - Whether or not the habitat can be managed given its nature and location.
Replaceability - Whether or not the habitat can be replaced either by natural succession or by man.
Productivity - The primary productivity of the habitat.

A pairwise comparison of each of the above criteria was performed to rank their importance to each other. Scarcity, diversity, and productivity were considered equally important and received a relative weight of 0.27. Manageability and replaceability were considered equal and received a relative weight of 0.10.

The next step is to compare habitats selected for the project site to the RVC. These values need to be determined for each project area based on the quality and quantity of habitat types. Habitats are ranked against the criteria on a 0.1 to 1.0 scale as follows:

0.1 --------------**Scarcity**-------------- 1.0
common rare

0.1 --------------**Diversity**------------- 1.0
low high

0.1 ----------**Manageability**---------- 1.0
difficult easy

0.1 ----------**Replaceability**---------- 1.0
easy impossible

0.1 ------------**Productivity**----------- 1.0
low high

The value chosen for the RVC is then multiplied by the relative weight. For example, a habitat type with a diversity RVC of 0.4 would be multiplied by 0.27 for a index value of 0.108. The index values are added together within each habitat type, and their totals are divided by the largest summation of the habitat types to determine the Relative Value Indices (RVI). If, for example the shallow aquatic habitat type has the highest sum of index values of 0.6. The RVI for this habitat type would be 1.0 (0.6/0.6=1). If the sum for another habitat type is 0.3, its RVI would be 0.5 (0.3/0.6=0.5). This ranks the relative value of each habitat type on a 0-1 scale.

d. Quantify Habitat Impacts: The final step in the HEP is to quantify habitat impacts in terms of Habitat Units (HU) by multiplying the HUV for the habitat types by the impact area. Since it is a trade-off analysis, relative habitat units (RHU) are calculated by multiplying HU by RVI. To display project benefits and costs, HU displayed are then annualized over the project life. For each alternative, the RHU is calculated to determine the gain or loss for each habitat type. To display project benefits and costs, HU displayed are annualized over the project life.

e. Literature Cited

Wege, G.L., and G.D. Palesh. 1982. Habitat evaluation of dredged material disposal alternatives using the habitat evaluation procedures (HEP). U.S. Fish and Wildlife Service, Twin Cities Field Office. 28pp.

Wege, G.L., and G.D. Palesh. 1983. Standards for use with the habitat evaluation procedures (HEP) to evaluate dredged material disposal alternatives on the Upper Mississippi River (GREAT-I). U.S. Fish and Wildlife Service, Twin Cities Field Office. 11pp.

D. BENEFICIAL USE (Weight Factor = 10)

Generally defined, beneficial use of dredged material is the productive use of the material by the public or private sectors. Examples of common beneficial uses of dredged material in the St. Paul District are upland habitat development, wetland creation, aquatic habitat enhancement, creation of areas for bird nesting, beach nourishment, winter road maintenance, levee repair and improvement, aggregate for concrete, lining flyash pits, bank protection, and general purpose fill. Placing dredged material at locations where it could or would be used beneficially was a planning objective of the GREAT I study and is an objective of the Corps of Engineers.

A market survey was conducted in 1977-1978 to determine the demand for dredged material as part of the GREAT I study. In 1982, the Wisconsin Department of Natural Resources under contract by the St. Paul District Corps of Engineers completed a report titled Demands, Productive Uses And Economic Impacts Of The Beneficial Use Of Dredged Material On The Upper Mississippi River. This report updated the GREAT I information and in addition to this report, there have been and there will continue to be supplemental reports for specific areas depending on how current the data is. These reports will serve as the basis for identifying potential users of dredged material and in developing the site plans. During the development of the site plans, all known potential beneficial users in the area will be contacted, and a plan for beneficial use will be formulated for each site plan where it is operationally feasible.

The dredged material placement alternatives that provide beneficial use potential for the dredged material will be considered in evaluating the alternatives using the matrix. Those alternatives with beneficial use potential will be assigned index values ranging from 0 (no beneficial use potential) to 10 (active beneficial use). The index value will then be adjusted by the weight factor and incorporated into the matrix. The beneficial use index values and the corresponding criteria are shown in TABLE D-2.

TABLE D-2

Beneficial Use Index Values

Value	Criteria
10	The alternative placement site would be actively used as a beneficial use site for dredged material outside the floodplain and provide local economic benefits.
8	The alternative placement site would be actively used as a beneficial use site for dredged material within the floodplain and provide environmental or recreational benefits.
6	The alternative placement site has **high** potential for use of the dredged material. Criteria considered: a) The site is located in an area where identified potential users of the dredged material have indicated high demand. b) Good access to the site is available or a local sponsor or benefactor is willing to develop access to the site.
4	The alternative placement site has **moderate** potential for use of the dredged material. Criteria considered: a) The site is located in an area where identified potential users of the dredged material have indicated moderate demand. b) Existing access is poor and there is a moderate potential for improvement of access.
2	The alternative placement site has **low** potential use of the dredged material. Criteria considered: a) The site is located in an area where identified potential users of the dredged material have indicated low demand. b) Access to the site is not available and no local sponsor or benefactor can be identified to develop access to the site.
0	The alternative placement site has no potential for beneficial use of dredged material.

E. CULTURAL RESOURCES (Weight Factor = 10)

Comprehensive archeological and historic surveys have not been completed for the entire Upper Mississippi River. Some pools within the St. Paul District have detailed information on cultural resources while others have little current survey information. In addition, some pools have an existing body of landform data on which more scientific predictions of site locations can be made. Some dredge disposal sites have been intensively surveyed for cultural resources, others will require survey before being used and yet others will not need any further survey efforts.

The following matrix follows the matrices completed for the Dredge Material Placement Reconnaissance Reports by the St. Paul District in the early 1980's and that done by the Rock Island District in their Long-Term Management Strategy for Dredge Material Placement. While the criteria remain basically the same as those used in the 1980's by St. Paul, like the more recent efforts by Rock Island, we have attempted to use all existing data on known and predicted resource locations, and their association with changing landform information when this information was available.

Coordination with the State Historic Preservation Officers, the State Archeologists and the National Park Service has been completed for a large majority of the disposal sites and will be completed for all new sites added as a result of this study.

Points	Criteria
10	*No potential* for impact to cultural resources based on recent age of landform or negative survey results.
8	*Negligible potential* for cultural resources impacts based on knowledge of surveys in similar physiographic settings or avoidance of impacts on known resources.
6	*Low potential* for impacts to cultural resources based on knowledge of surveys in similar physiographic settings or no knowledge of known properties from historic records in the vicinity of the disposal area.
4	*Moderate potential* for impacts to cultural resources based on knowledge of surveys in similar physiographic settings or knowledge of known properties in the vicinity of the disposal area.
2	*High potential* for cultural resources located in the disposal area or cultural resources exist at the placement site which have not been evaluated against the criteria of the National Register of Historic Places.
0	*Extreme potential* for properties listed on or determined eligible for the National Register of Historic Places to be effected by placement.

F. SOCIAL IMPACTS (Weight Factor = 15)

Socioeconomic criteria will be utilized to evaluate dredged material placement site alternatives in terms of social impacts. These evaluation criteria will account for the positive and negative impacts for the following categories:

(1) business and industrial activity and employment
(2) community cohesion
(3) public services and facilities
(4) property values and tax revenues
(5) life, health, and safety
(6) aesthetic values and noise levels

The evaluation process for social impacts is similar to process used to evaluate the recreational use potential. The social impacts of the dredged material placement alternatives will be evaluated based on a point system. The maximum amount of points any one alternative can attain will be

100. Points will be given by assessing the alternative in the six socioeconomic categories listed previously. The maximum amount of points that can be scored in any category is based on the overall importance of the category relative to the other socioeconomic categories.

Point values and criteria for assessing social impacts are shown in the following tables.

Category 1 - Business and Industrial Activity and Employment

Maximum Points - 30

Criteria	Qualifier	Points
Dredged material demand	High demand	8
	High potential use	6
	Potential use	4
	No known potential use	2
	No potential use	0
Supply of existing material	Inadequate supply	8
	Significant supply	4
	Many local sources of supply	0
Impacts on competing firms	No adverse impacts	7
	Possible adverse impacts	5
	Probable adverse impacts	3
	Competing firms expressing opposition	1
Impacts on area employment	No adverse impacts	7
	No expected impacts	4
	Possible adverse impacts	1

Category 2 - Community Cohesion

Maximum points - 20

Criteria	Qualifier	Points
Residential development	None within one mile of site	5
	None within 1/2 mile of site	4
	Limited development (rural)	3
	Moderate development	2
	High development	1
	Dense development	0
Land availability	Willing seller (no condemnation)	5
	Unknown if willing seller	3
	No willing seller	0
Public opposition	No potential opposition	5
	No opposition expressed	3
	Possible opposition	2
	Opposition from some businesses and residents	1
	Large public opposition	0
Adjacent land use	Compatible	5
	Mixed, some compatible	2
	Incompatible	0

Category 3 - Public Services and Facilities

Maximum points - 20

Criteria	Qualifier	Points
Existing public facilities	Improve facilities	5
	Maintain facilities	4
	No change	3
	Slight adverse impact	2
	Adverse impacts	1
	Detrimental impacts	0
Planned public facilities	Provide additional needed facilities	5
	Provide new but unneeded facilities	3
	Slight adverse impacts	2
	Adverse impacts	1
	Detrimental impacts	0
Public Safety	No resulting safety threat	5
	Slight safety threat	3
	Resulting safety threat	1
	Public attraction with significant safety threat	0
Maintenance costs	No change	5
	Some increase	2
	Significant increase	0

Category 4 - Property Values and Tax Revenues

Maximum points - 10

Criteria	Qualifier	Points
Property values and tax revenues of placement site or adjacent land	Improves and increases	10
	Slight improvement and increase	8
	No impacts	6
	Slight decrease	4
	Decrease	2
	Severe decrease	0

Category 5 - Life, Health, and Safety

Maximum points - 10

Criteria	Qualifier	Points
Life, health, and safety	Improves current conditions	10
	No adverse impacts	8
	No change to current conditions	6
	No improvements to current risky conditions	4
	Adverse impacts	2
	Unacceptable creation of dangerous conditions	0

Category 6 - Aesthetic Values and Noise Levels
part 1

Criteria	Qualifier	Points
Aesthetic Values	Enhanced aesthetics due to use of material to replenish an existing beach; no impacts due to replenishing local existing material stockpile	5
	No significant impact due to material being placed on an existing placement site	4
	Minimal impacts due to the creation of a new beach area in area of sparse vegetation	3
	Moderate impact due to the creation of a new beach in area of heavy vegetation	2
	Adverse impact due to creation of an emerged island in the river	1
	Adverse impact due to creation of new non-beach placement site within viewing distance of residential area	0

Category 6 - Aesthetics and Noise Levels
part 2

Criteria	Qualifier	Points
Noise levels	No permanent impacts; no significant temporary impacts during material placement	5
	No significant permanent impacts; no significant temporary impacts during material placement	4
	No significant permanent impacts; adverse temporary impacts during material placement	3
	Adverse permanent impacts due to recreation beach activities (rural area); adverse temporary impacts during material placement	2
	Adverse permanent impacts due to recreation beach activities (urban area); adverse temporary impacts during material placement	1
	Permanent adverse impacts due to beneficial use activities; adverse temporary impacts due to material placement	0

G. RECREATION (Weight Factor = 5)

Category 1 - Existing Recreation Facilities

Maximum 5 points

Qualifier	Points
Improve Facilities	5
Maintain Facilities	4
No Change	3
Slight adverse impact	2
Adverse impacts	1
Detrimental impacts	0

Category 2 - Recreation Opportunities

Maximum 5 points

Qualifier	Points
Provide additional needed facilities (Demand exceeds supply)	5
Provide new facilities/low demand (Supply exceeds demand)	4
No affect	3
Slight adverse impact	2
Adverse impacts	1
Detrimental impacts	0