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ENVIRONMENTAL

IMPACT

STATEMENT

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PROPOSED
LAKE ST. CROIX MARINA

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PREPARED BY
MINNESOTA DEPARTMENT OF NATURAL RESOURCES
MARCH, 1976

 STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
CENTENNIAL OFFICE BUILDING • ST. PAUL, MINNESOTA • 55155

Date: March 11, 1976

To: WHOM IT MAY CONCERN

Re: LAKE ST. CROIX MARINA DRAFT ENVIRONMENTAL IMPACT STATEMENT
NOTICE OF COMPLETION AND
NOTICE OF PUBLIC MEETING

Enclosed please find the Lake St. Croix Marina Draft Environmental Impact Statement proposed by Williams/O'Brien Associates, Inc., and located in Washington County, Minnesota.

A public meeting on the Draft Environmental Impact Statement will be held in the Denmark Town Hall at 90th and Oakgreen in the Town of Denmark, Minnesota, on March 31, 1976, at 7:30 p.m., at which time both oral and written comments on the adequacy of the Draft Environmental Impact Statement will be received. Written comments on the Draft Environmental Impact Statement should be addressed to John Clausen, Division of Waters, Minnesota Department of Natural Resources. The public record for receiving comment will close on April 30, 1976.

Thank you for your cooperation.

Sincerely,

Robert L. Herbst, Commissioner
Department of Natural Resources

by


C.B. Buckman
Deputy Commissioner

RLH:JC:al

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LAKE ST. CROIX MARINA

DRAFT ENVIRONMENTAL IMPACT STATEMENT

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STATE OF MINNESOTA

Prepared by:

Minnesota Department of Natural Resources

March, 1976

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I. DESCRIPTION OF PROPOSED ACTION

The proposed project involves the excavation and construction of a 50-slip marina connected to Lake St. Croix located in Section 34, Township 27 North, Range 20 West, Washington County, Minnesota. This site, located on the west bank of Lake St. Croix approximately 2.5 miles north of Point Douglas, Minnesota, is within the boundaries of the Lower St. Croix National Scenic Riverway and the Lower St. Croix Critical Area (Figure 1).

The proposed development site is a triangular-shaped 30 acre (12 ha.) tract which is separated from Lake St. Croix by a 100 foot right-of-way with elevated railroad tracks owned by the Chicago, Milwaukee, St. Paul, and Pacific Railroad. The proposed marina site is not riparian to Lake St. Croix. The terrain of the proposed site is characteristically rugged with a maximum relief of 135 feet from blufftop to river bottom. Average grade of the access road from Washington Co. Rd. 78 to the marina would be 13 percent (Figure 2).

The marina is designed for cruisers over fifty feet in length (Class D, greater than 40 hp) and would provide such service facilities as refueling and sewage pumpout. Mooring facilities would be floating docks with covers and individual outlets for electricity and water. Boat slips would be owned by condominium-type agreements. Parking lots rimming the marina would provide 1.5 parking spaces per slip for a total of 75 spaces. Use of the marina and ancillary facilities by the general public would not be encouraged and public launching facilities would not be available.

The construction of the marina would require the excavation of approximately 120,000 cubic yards of bottomland soils to a depth of eight feet below the normal water level of Lake St. Croix. Spoils would be placed around the marina to create parking lots and further used as a road base. Connection to Lake St. Croix would require the excavation of a 20 foot wide channel and modification to the existing railroad bridge.

The eight lot subdivision, although a component of the total development plan, was considered separate from the marina for the purposes of this impact statement by the Environmental Quality Council at the request of the proposer. Therefore, direct environmental impacts of the subdivision have not been evaluated herein.

II. ENVIRONMENTAL IMPACT OF PROPOSED ACTION

A. NATURAL ENVIRONMENT

1. Geology

The bedrock geology of the Lower St. Croix region is dominated

BASE MAP
COURTESY OF
METROPOLITAN COUNCIL

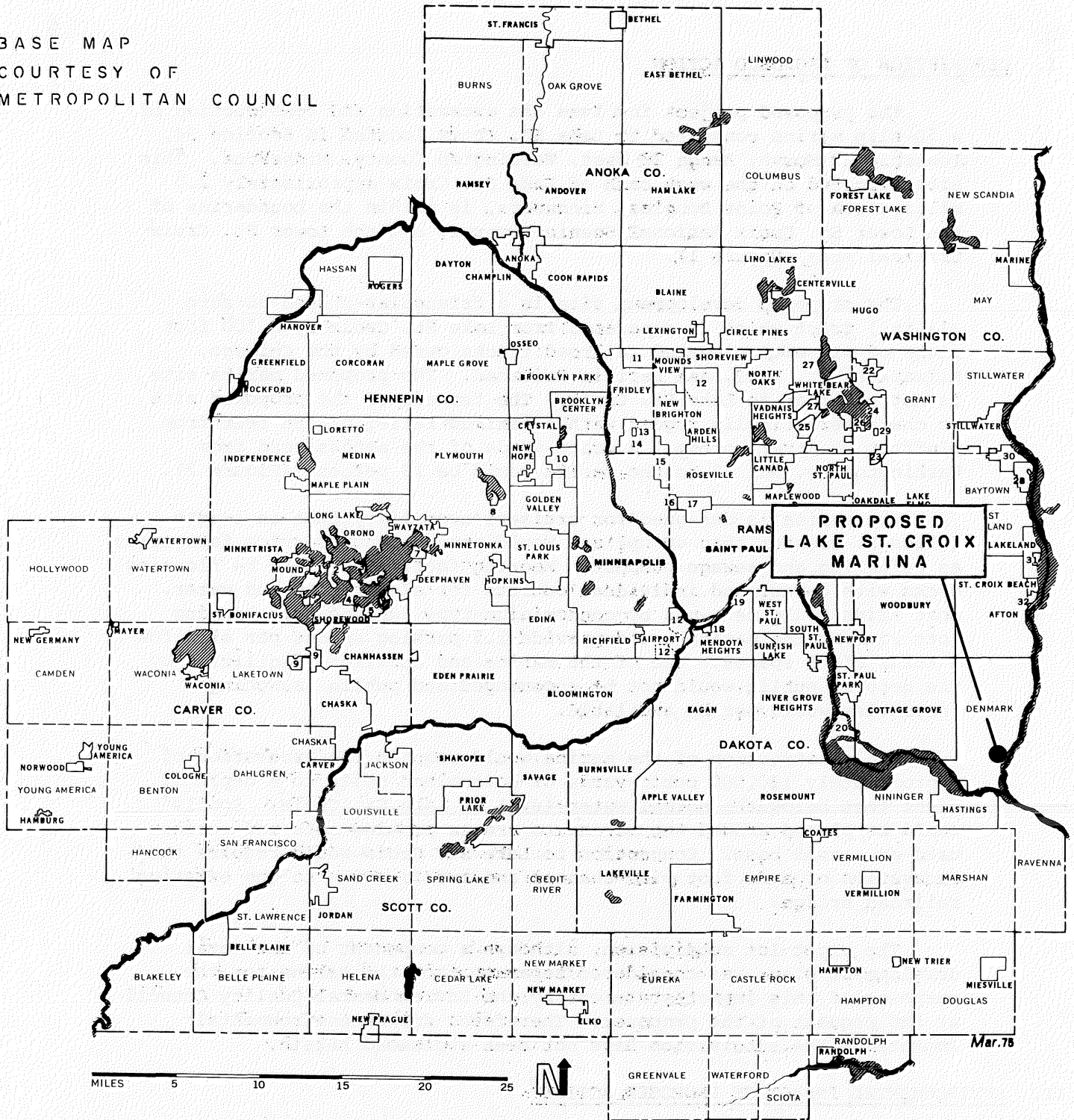


FIGURE I. REGIONAL LOCATION OF PROPOSED
LAKE ST. CROIX MARINA.

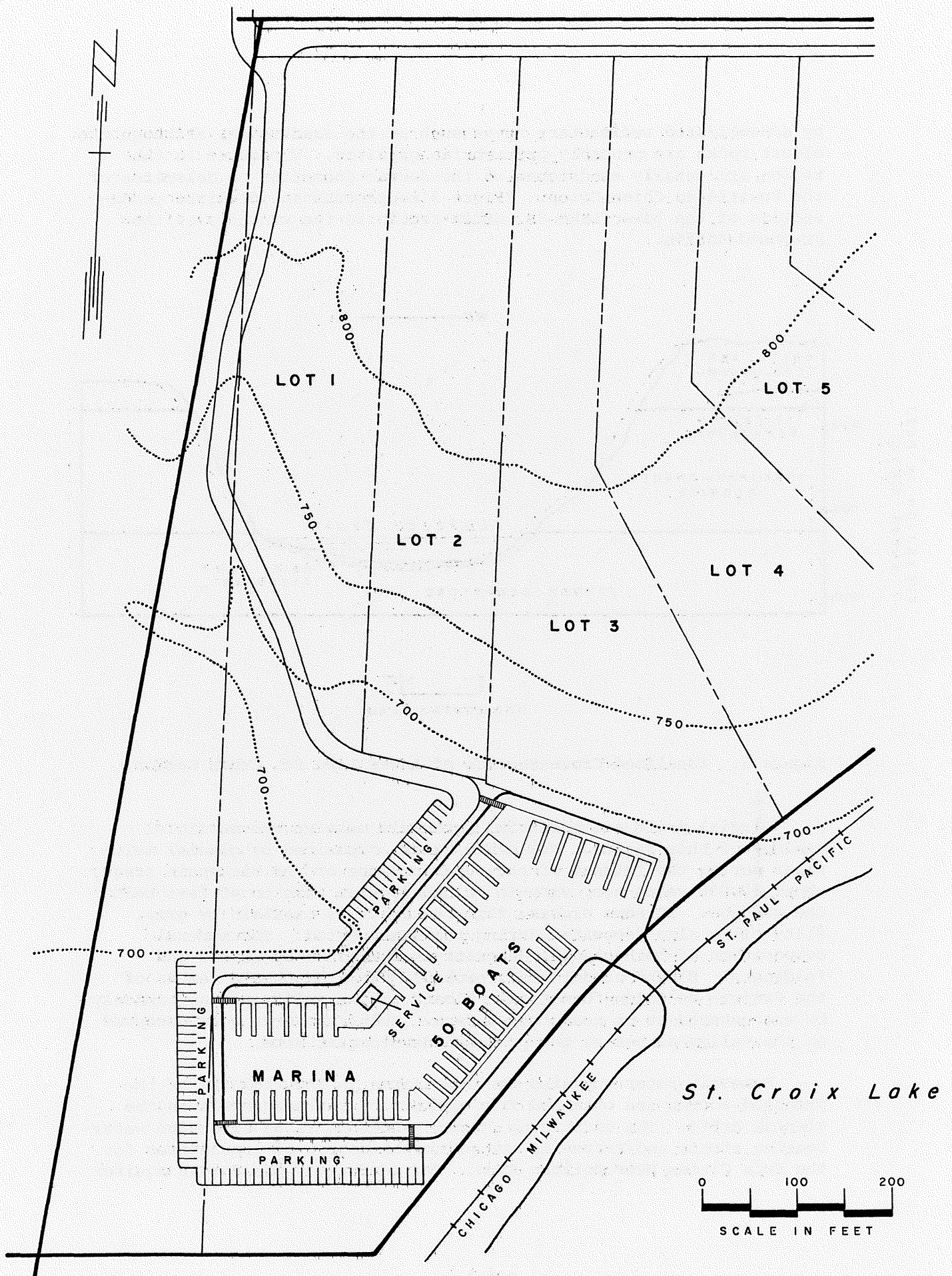


FIGURE 2. SITE PLAN FOR PROPOSED LAKE ST. CROIX MARINA.

by consolidated sedimentary types such as the sandstones, although the oldest rocks are probably precambrian granites. Exposures in the region are usually sandstones of the Jordan formation or dolomites of the Prairie du Chien Group. Figure 3 represents an idealized cross-section of the Lower Lake St. Croix region in the vicinity of the proposed action.

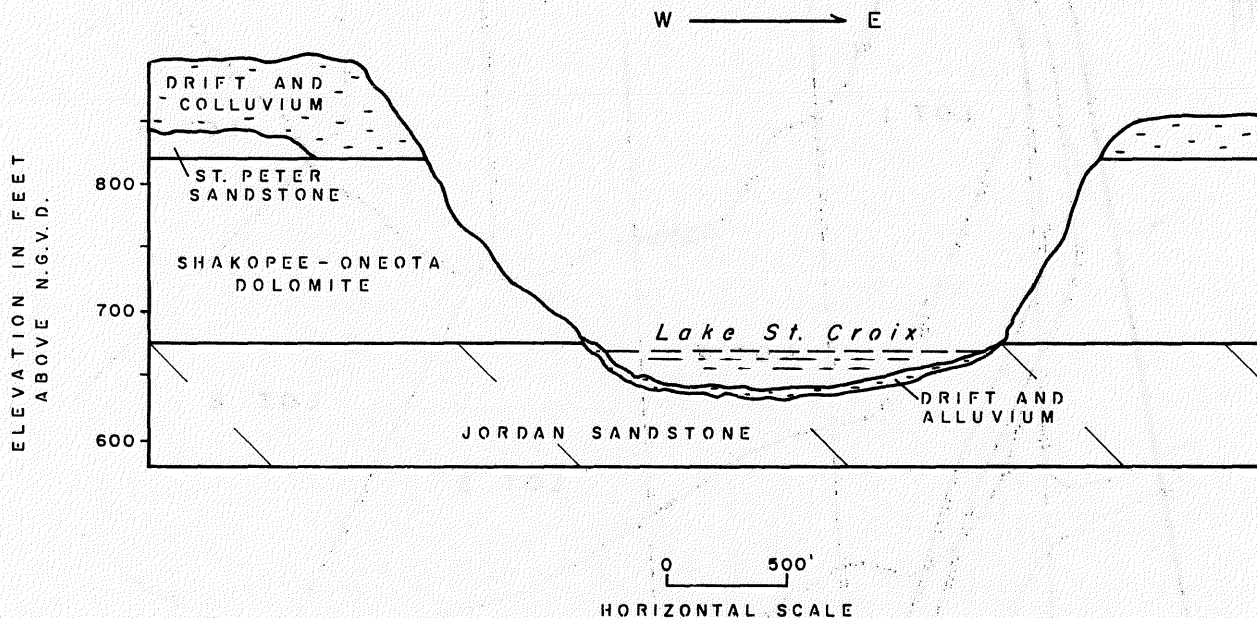


Figure 3: Idealized Cross-Section of Lower Lake St. Croix Region.

Glacial drift and colluvial materials make up the surficial geology of this region. Red drift sands, deposited by glacial melt-water during the retreat of the Superior Lobe of the Wisconsin stage, about 40,000 years ago, vary in thickness from zero to 40 feet below the surface. In some places, this red drift is overlain by grey, silty till, also deposited during the same period. The mineral composition of both glacial deposits is dominated by quartz and feldspars. Blocks of dolomite, probably from the Oneota member of the Prairie du Chien formation, "float" in the drift and may commonly be encountered at or near the surface. Such exposures were observed on the valley slopes at the proposed development site.

Domestic water supplies for some farms in the vicinity of the proposed action are obtained from pockets of coarse gravels in the glacial drift. The underlying Jordan Sandstone is an extensive water-bearing strata and serves as the principal source of groundwater for the Twin Cities Metropolitan Area. The surface of the Jordan Aquifer

at Lake St. Croix is normally found between 650 to 680 feet above mean sea level.

The St. Croix River Valley was formed by a series of glacial events. Ice gouging and planation by early Pleistocene glaciation enlarged the existing St. Croix River Valley. During this period the more erodible rocks, particularly the St. Peter Sandstone, were removed from extensive areas of the landscape. Meltwaters originating from glacial Lake Grantsburg also deepened and enlarged the St. Croix Valley to about 200 feet below the adjacent uplands. Centuries later, glacial Lake Duluth also partially drained through the St. Croix River.

Lake St. Croix was formed by two different damming processes: one natural and one man-made. The natural formation of Lake St. Croix occurred because of bed load deposition by the Mississippi River at the confluence with the St. Croix River, thereby creating an underwater dam. Lock and Dam No. 3, placed below the confluence of the two rivers in 1938, raised the elevation of Lake St. Croix approximately six feet.

Impact

The proposed excavation will remove glacial materials that have eroded from upland areas and been deposited in the river bottomland. The proposer does not anticipate that any hard rock excavation will be necessary. Therefore, there are no anticipated direct or indirect impacts on geology that would result from the proposed project.

2. Soils

Soils of the Lower St. Croix area may be divided into three groups on the basis of topographical position. Upland soils are found on the gently rolling plains above the St. Croix Valley. Valley slope soils are found on the hillsides and streambanks of the small tributary drainage. Bottomland soils are derived from the alluvial and colluvial material accumulated in the floodplain areas along Lake St. Croix. The watershed above the site of the proposed action is 317 acres (125 ha.) in area and contains a combination of these soils. Upland soils are gently sloping and include Waukegan and Dakota silt loams that are underlain by sandy substratum or bedrock. These soils cover approximately 83 percent of the watershed and have been used primarily for agriculture.

Valley slope soils include Edith sand although most are sandy or silt loams derived from outwash and lacustrine deposits. These soils have steep slopes, commonly greater than 30 percent, and show moderate to severe surface erosion (See Figure 4). Bedrock outcrops, usually dolomites of the Prairie du Chien formation, are common. Valley slope soils cover about 15 percent of the watershed area and support a woodland type cover.

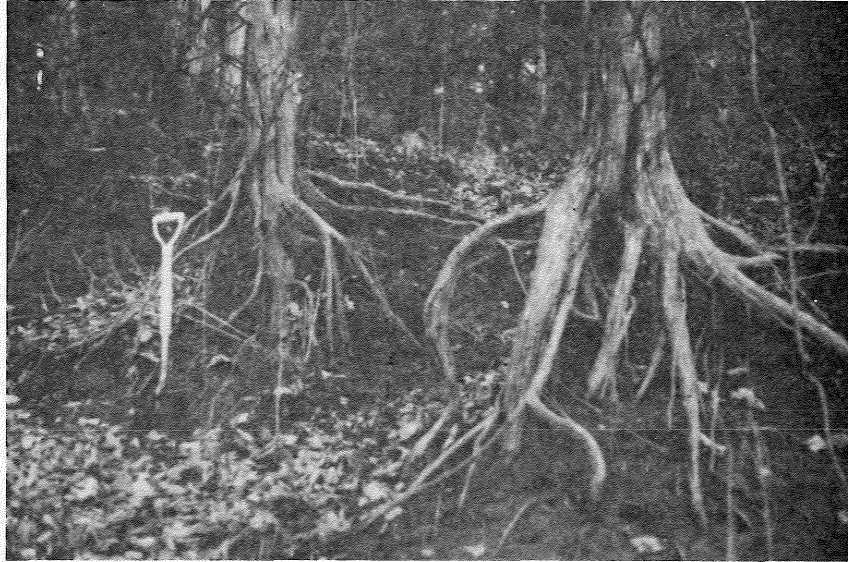


Figure 4: The Effects of Sheet Erosion and Topsoil Removal Near the Proposed Site.

Bottomland soils were derived from recent deposits of alluvial materials and cover about 2 percent of the watershed. Six soil borings ranging in depth from 17 to 51 feet were conducted by consultants to the proposer within the area to be excavated. These borings indicated that bottomland soils are silty clays over sand or sands over deep silty clays. The ground water table was found to be sloping toward Lake St. Croix at a gradient of 0.02 ft/ft (2 percent slope). Bottomland soils are productive and support a developing stand of hardwoods even though most of the area is subject to periodic flooding (Figure 5).



Figure 5: Bottomland Soils are Productive and Support a Developing Stand of Hardwoods.

Natural Erosion

The rates of soil erosion and sediment transport by water in the area of the proposed action are a function of the naturally steep slopes, unstable soils and rapid hydrologic response under favorable circumstances. Valley slope soils, with slopes up to 80 percent, are the most heavily eroded in the watershed.

Three major intermittent streams terminate at the marina site. The north tributary is the site of the proposed access road. Maximum gradient for this tributary is 25 percent where the channel has down-cut to bedrock. The middle tributary also intersects bedrock and contains a rapidly advancing gully that, according to field measurements, has contributed over 430 tons of soil to downstream channels in the last one or two years. The characteristically steep slopes and unstable soils allow rapid rates of gully growth once the process is initiated. The south tributary branches with the main channel continuing off the property owned by the proposer at a relatively moderate slope. The smaller branch appears to be an old road. All three channels, except the branch leaving the property, have average gradients of about 13 percent until the bottomland is reached, where gradients average 5 percent. Therefore, the bottomland area serves as an area of aggradation and deposition of materials transported from upstream areas. In the past, intensive grazing by livestock on adjacent properties within the watershed has compacted soils on steep slopes, created numerous livestock paths and generally accelerated erosion.

In addition to erosion by water, other mechanisms contributing to erosion include wind and gravity. Wind erosion is evident on the upland agricultural soils. However, sediment transported by wind does not appear to contribute to sediment yields for the watershed due to the filtering effect of the wooded valley slopes. Gravitational erosion is evidenced by the numerous bank slumps along stream channels. These slumps indicate the presence of highly unstable soils and critical slopes.

Due to the evidence that there is severe erosion on the proposed site and since the proposed marina is essentially the terminus of the eroded material and would act as a sediment trap, it is useful to determine the amount of annual erosion. Average annual soil loss from the watershed may be determined by the Universal Soil Loss Equation as follows:

$$A = R \cdot K \cdot L \cdot S \cdot C \cdot P$$

where: A = Average annual soil loss (tons/acre)

R = Rainfall-erosion index

K = Soil erodibility index

L & S = Topographical factors

C & P = Crop management and erosion control practices

Table 1 shows the values used in solving the equation for upland, valley slope and bottomland areas.

Table 1: Determination of Average Annual Erosion from Upland, Valley Slope and Bottomland Areas.

Area	Average Slope (%)	Slope Length (ft)	R	K	L	S	C	P	A tons/ac
Upland	5	100	100	.08	1.18	1.52	.17	.60	1.46
Valley Slope	40	200	100	.10	1.66	11.32	.007	-	1.32
Bottomland ¹	3	100	100	.50	1.18	0.97	.40	-	22.9

¹ K adjusted for non-cohesive sandy deposits

Utilizing the product of tons per acre times the respective acreages, the annual soil loss would be 385.2 tons from the upland, 126 tons from the valley slopes, and 145.2 tons from the bottomland. Total annual soil loss for the watershed would be 656.4 tons; however, not all of this eroded material would reach the marina. The percent of material eroded that would be delivered to the marina is termed the sediment delivery ratio. Selecting a delivery ratio of 15 percent for the upland and 33 percent for valley slopes results in an annual yield to the proposed marina site of approximately 245 tons. For these sediments, one ton is approximately equivalent to one cubic yard (1.3 cu. m.).

Using Soil Conservation Service curves developed for study of the Upper Mississippi River, a similar sediment yield of 495 tons per year was determined for the proposed site. A third estimate of 178 tons per year was obtained from Corps of Engineers curves used to evaluate the environmental impact of the 9-foot navigation channel for the Mississippi River. A final estimate and probably the least accurate utilized the average of 650 annual sediment production rates reported in Chow's: Handbook of Hydrology and yielded about 3,037 tons per year for watersheds of a comparable size.

It should be mentioned that soil loss estimates are annual averages and actual amounts could and probably would vary greatly from year to year. Field investigations indicate that much of the eroded material from valley slope areas is being stored within the tributary channels, i.e., the supply to the channel exceeds transport, especially in the middle tributary. Given the critical runoff event, large quantities of sediment may be transported to downstream areas and could easily exceed average annual gross erosion. When these

sediments are ultimately deposited in the marina, maintenance dredging will be necessary.

The proposed access road to the marina generally follows the drainage course of the north tributary. The proposed centerline gradient would average 13 percent. Present road construction plans are insufficient in detail to estimate the accelerated erosion resulting from road construction. Needed information would include locations and dimensions of cut and fill slopes together with an analysis of subgrade soil classifications. The existing natural topography would dictate backslope angles exceeding 40 percent in some areas of road excavation. Soil Conservation Service Interpretation Sheets indicate slight limitations for road construction on the upland soils. No interpretations exist for valley slope and bottomland areas.

An additional problem encountered with marina excavation and the deposition of sediment into relatively placid marina waters is suspended materials and turbidity. Table 2 shows the suspension time or settling velocity for the various fractions of a silty clay soil utilizing Stokes' Law.

Table 2: Settling Velocities for Fractions of a Silty Clay Soil.

Soil Type	Texture	Composition	8-foot Settling Velocity
Silty Clay	Sand	0-20%	3 hours
	Silt	40-60%	3.5 days
	Clay	40-60%	29 days

The proposed depth of excavation is eight feet below the normal pool elevation of 675 feet. The U.S. Army Corps of Engineers recommends that a marina depth should be approximately two feet below the keel of the deepest draft boat. Since the deepest draft of 40 to 60 foot long boats is four feet, the recommended design depth would be six feet.

Impact

Construction of the access road can be expected to accelerate erosion as well as alter natural drainage patterns, since the road crosses and follows the channel bed. Backslope and fill areas for the proposed road will expose large areas of mineral soil as prime sites for erosion. Additional accelerated erosion may occur from bank slumps that could be initiated by road stresses. Estimates of the amount of accelerated erosion can not be made until engineering plans are completed. Although the proposer has indicated that the access road to the marina will meet Washington County road

specifications, this may not be possible. Requirements for a maximum centerline gradient of 8 percent, a minimum width of 32 feet, and maximum backslopes of 30 percent apparently are not met. Also, present plans do not address road drainage or runoff collection.

The marina may actually provide a beneficial impact on sediment yield in that its still waters will increase sediment trap efficiency and prevent sediments from reaching Lake St. Croix. The existing railroad berm accomplished the same task. However, unless erosion protection measures are taken, maintenance dredging will be necessary and additional on-land disposal areas, which may not be available on the site, will be needed.

The proposed eight foot excavation depth appears to be greater than necessary. During marina excavation, resuspension of sediments will occur and several days would be needed to allow adequate settling of fine particles. If allowed to mix with Lake St. Croix, these turbid waters could reduce the quality of St. Croix waters in the vicinity of the harbor mouth until settling occurs. This adverse impact on water quality could also occur every time maintenance dredging is necessary.

3. Climate

The climate of Minnesota is of the continental type with moderate annual precipitation, cold winters, and warm summers. The major source of precipitation for Minnesota is the warm moist air from the Gulf of Mexico with over a third of that precipitation occurring during the months of June, July and August. The normal annual precipitation of 27 inches is very similar to the average for Minnesota. Sixty-six percent of this precipitation falls during the growing season of May to September. A 24-hour storm, expected to occur once every 100 years, would result in six inches of rainfall. A one-year 30-minute rainfall would have a maximum intensity of 1.8 inches per hour.

The dominant wind directions encountered in Minnesota usually vary with season. The St. Croix Valley alters regional wind patterns by its funnelling effect. Explosive winds in the form of tornadoes also occur in Minnesota, primarily in June. The proposed action is located within the LeSueur-to-Washington County tornado belt. This belt is not as well defined as the primary one crossing the northwestern metropolitan area although it received nine touchdowns from 1959 to 1972.

The average annual snowfall for the proposed site is 40 inches (102 cm) which is equivalent to about four inches (10.2 cm) of rain. Average annual snowfall for Minnesota ranges from 30 to 70 inches (76 to 178 cm). A snow cover of 1 inch (2.54 cm) or more can be found on the site an average of 97 days per year.

The mean annual temperature for the proposed marina site is 42.6°F (5.9°C). Temperature extremes measured at nearby Cambridge range from a maximum of 109°F (43°C) to a minimum of -42°F (-41°C) for 31 years of record. Temperature inversions are more common within the St. Croix Valley than on adjacent bluffs.

Impact

There are no anticipated adverse impacts on the macroclimate resulting from the proposed marina.

4. Hydrology

Lake St. Croix is a river-lake formed both by Mississippi River sediment deposition at the confluence of the Mississippi and St. Croix Rivers and by Lock and Dam No. 3. This 8,209 acre (3,322 ha.) lake extends from its confluence with the Mississippi to Stillwater, Minnesota, a distance of about 25 miles. The lake averages 29 feet (9 m) deep and 3,000 feet (914 m) wide.

The normal pool elevation of Lake St. Croix is 675 feet (206 m) above mean sea level. The 100-year flood elevation at the proposed site is 17 feet above normal pool at elevation 692 feet. The 1965 flood is the historical flood of record and was slightly greater than the 100-year flood, being at elevation 692.7 feet. Most floods occur during the spring snowmelt period of March through May, although high streamflow may occur in the summer or fall as a result of thunderstorms.

Three intermittent stream channels terminate in the vicinity of the proposed marina and provide drainage for the 317 acre (125 ha.) watershed. These streams respond quickly to storm events due to their steep slopes. The average annual runoff for this site is 6 inches (15 cm). The proposed road and parking lots will alter the runoff patterns from 6.7 percent of the area. Since the road and parking areas are to be paved, runoff will more quickly reach the marina.

Surveys conducted by the Environmental Protection Agency in 1972 indicated that Lake St. Croix is eutrophic, based on nitrogen and phosphorous loading. Approximately 88 percent of the phosphorous loading was estimated to come from non-point sources. Primary point sources were sewage treatment plants.

Lake St. Croix is not typical of other large eutrophic lakes in Minnesota since the St. Croix is more of a wide spot in the river and has a very short retention time of 34 days. The study also indicated that diatoms are the dominant phytoplankton during the late summer and fall, which is also not characteristic of eutrophic bodies of water. Although the nutrient loading into Lake St. Croix is above limits which normally cause excessive algal growths, no aquatic nuisance problems apparently exist.

Impact

The 2 acres (0.8 ha.) of road and parking areas will increase the amount of runoff from the watershed. The magnitude of increase would depend on specific road design features such as ditching and drainage.

Oils, fuel spills, and bilge water create adverse impacts on water quality in any marina. In addition, runoff waters from roads and parking areas will contribute grease and oils into the waters of the excavated harbor unless diverted elsewhere. This is especially true for the proposed project since parking areas rim the harbor. Unless the harbor experiences flushing by surface or ground water, or by mixing with Lake St. Croix, the stagnant waters in the harbor will result in deteriorated water quality within the marina. The proposed culvert connecting the harbor with Lake St. Croix is not expected to alleviate water stagnancy and would provide an avenue for sediment transport into Lake St. Croix.

5. Vegetation

Two distinct vegetative types can be observed at the site of the proposed project. The upland type, primarily bur oak and red cedar, occurs on the bluff tops and valley slopes. The bottomland type, dominated by American elm, cottonwood, and boxelder, occurs on the floodplain of Lake St. Croix. A list of tree and brush species observed on the site is given in Table 3.

Table 3: Vegetation Observed at the Site of Proposed Lake St. Croix Marina.

bur oak	silver maple	apple
red oak	butternut	plum
red cedar	hackberry	prickly ash
American elm	aspen	sumac
slippery elm	black cherry	hazel
boxelder	paper birch	raspberry
basswood	river birch	gooseberry
green ash	cottonwood	

The upland areas are not highly productive for forest management due to shallow soils. Also, the steep hillsides have numerous rock outcrops. The condition of dominant species on the uplands is generally good with bur oak frequently reaching 40 feet in height. Bottomland areas are more productive than uplands because the soils are more fertile due to periodic flooding and the deposition of nutrient-laden materials from the uplands. The dominant species in the bottomlands, most commonly American elm, are also in good condition.

At present, the forest species found on the site of the proposed action have little commercial value. Most of the timber affected by the project is too small for sawlogs and the pulpwood market in the metropolitan area is limited. Firewood is not a feasible product because most species are poorly suited for fuelwood usage. Regeneration of forest species has been limited by extensive grazing in the past. Raspberry and prickly ash are common in heavily grazed areas.

Originally, white pine were probably quite common on the site, together with a mixture of the species existing today. Presently, the vegetative types are in an intermediate stage of succession and, if left undisturbed, the uplands will eventually become oak types and the bottomlands will become basswood types. These climax types would be relatively stable and self-sustaining.

River birch, which was found in the bottomland area, is considered to be an unusual species in Washington County because this site is located at the northern extreme of the range for river birch.

The 22-foot high elevated railroad berm and the tree and brush vegetation growing on it effectively screens the proposed marina from Lake St. Croix except at the opening to the harbor (see Figure 2).

Impact

The construction of the marina will eliminate the vegetation on 6.7 percent of the area owned by the developer. Additionally, the road and parking areas will require the permanent removal of 6.7 percent of the site's vegetation for a total impact on 13.4 percent of the tract (4 acres). Additional areas may disturb or eliminate vegetation, especially along the proposed access road. Generally, disturbance areas are concentrated and vegetation on the remainder of the tract, especially sensitive steep slope areas, will remain relatively undisturbed. The unusual river birch will be reduced to only one or two individuals.

6. Wildlife

Three major wildlife habitat types and their associated wildlife species may be found on the site of the proposed action:

1. Open Field Adjacent to Brush Row:

Game species:

ringnecked pheasant
cottontail rabbit
grey squirrel
white-tailed deer

Birds:

meadowlark
lark bunting
mourning dove
blackbird
savannah sparrow

Non-game species:

many small rodents

Raptors:

marsh hawk
red-tailed hawk

2. Upland Wooded Area:

Game species:

ruffed grouse
grey squirrel
cottontail rabbit
raccoon
white-tailed deer

Birds:

woodpecker
chickadee
nuthatch
thrush
warblers
blue jay

Non-game species:

red fox
chipmunk

Raptors:

great horned owl
rough-legged hawk
red-tailed hawk

3. River Bottomlands:

Game species:

muskrat
mink
same as 2 above

Birds:

snipe
sandpiper
gull
heron
egret

Non-game species:

same as 2 above

Waterfowl:

mallard
wood duck
blue-winged teal

Large game animals use the site only occasionally. Most small mammals and birds are abundant, although there is little use of the site by waterfowl. The site of the proposed marina contained water as recently as 30 years ago and only since then has been completely filled by sediment. Thus, limited use of the marina site by waterfowl probably only occurs during flood periods. Lake St. Croix itself provides the only area available to waterfowl in the vicinity of the proposed marina.

There are no known rare or endangered species of wildlife that utilize the site although the bald eagle can be found along the St. Croix River. No eagle nests on or near the site have been observed.

Impact

The proposed project will reduce some of the available wildlife habitat by direct removal of vegetation on 13.4 percent of the area. Habitat losses will be greatest in the river bottomlands where approximately 31.6 percent of the available habitat will be removed. Indirect adverse impacts on wildlife due to on-site human disturbances

and recreational use of the St. Croix River, especially in the vicinity of the proposed marina, will also occur.

7. Fisheries

Lake St. Croix has a diverse fisheries population typical of river-lakes of this type. Table 4 contains a list of 63 species known to exist in Lake St. Croix.

Table 4: Fish Species Known to Exist in Lake St. Croix.

1. Silver lamprey	22. Northern hog sucker	43. Trout perch
2. Paddlefish	23. Spotted sucker	44. White bass
3. Lake sturgeon	24. Greater redhorse	45. Yellow perch
4. Shovelnose sturgeon	25. Golden redhorse	46. Sauger
5. Shortnose gar	26. Silver redhorse	47. Walleye
6. Longnose gar	27. Shorthead redhorse	48. River darter
7. Bowfin	28. River redhorse	49. Log perch
8. Mooneye	29. Carp	50. Western sand darter
9. Goldeye	30. Silver chub	51. Johnny darter
10. Gizzard shad	31. Emerald shiner	52. Iowa darter
11. Lake whitefish	32. Spottail shiner	53. Smallmouth bass
12. Brown trout	33. Blacknose shiner	54. Largemouth bass
13. Brook trout	34. Channel catfish	55. Green sunfish
14. Bigmouth buffalo	35. Black bullhead	56. Pumpkinseed
15. Smallmouth buffalo	36. Brown bullhead	57. Bluegill
16. Quillback	37. Yellow bullhead	58. Rock bass
17. Plains carpsucker	38. Flathead catfish	59. White crappie
18. River carpsucker	39. Stonecat	60. Black crappie
19. Highfin carpsucker	40. Northern pike	61. Freshwater drum
20. Blue sucker	41. Muskellunge	62. Burbot
21. White sucker	42. American eel	63. Hybrid sunfish

The major gamefish found in Lake St. Croix are: walleye, sauger, black crappie, white crappie, white bass, and smallmouth bass. Other gamefish include: largemouth bass, bluegill, channel catfish, flat-head catfish, lake sturgeon, and northern pike. The more common rough fish include: carp, freshwater drum, gizzard shad, shorthead redhorse, and silver redhorse.

Of the major gamefish, the two species of crappie are probably the most abundant in Lake St. Croix. Walleye and sauger are the most sought after gamefish in the lake with saugers being about twice as abundant as walleyes, although saugers are somewhat less abundant than in other state waters. White bass populations compare favorably to statewide medians while smallmouth bass are less abundant than in other Minnesota waters.

Concerning other gamefish, northern pike are not abundant in Lake St. Croix although many are of large size. Channel catfish are present in fair numbers while flathead catfish, although large, are uncommon. Bluegill, largemouth bass, and lake sturgeon are all present in fairly low numbers and are of minor importance to the sport fishery of Lake St. Croix at the present time.

Carp appear to be the most abundant rough fish in the St. Croix and are more abundant than in most other waters of the state. Lake St. Croix contains four species of redhorse suckers of which the short-head and silver redhorse are by far the most abundant. These species are also more abundant than statewide medians. The population of gizzard shad fluctuates greatly from year to year due to spawning success which is probably a function of water levels. These fish are unable to withstand cold waters and are at the northern extent of their range in Minnesota.

The diversity and abundance of fish populations indicate the amount and type of spawning habitat available for various gamefish. A river-lake system exemplified by Lake St. Croix offers a wide variety of spawning habitats. Surveys have indicated that the beds of upstream reaches of the St. Croix are higher in rubble and lower in sand than downstream areas as would be expected by comparing the high velocity river flows upstream to the relatively placid waters of Lake St. Croix. An exception to habitat variety is that marsh areas necessary for successful northern pike and largemouth bass spawning are very limited along Lake St. Croix.

The proposed marina site presently has little potential for northern pike spawning, even though periodically inundated by flood waters, since water on the site does not remain deep enough for a sufficient time (past June 1st).

Impact

Due to the diverse fishery and habitats available in Lake St. Croix, no adverse or beneficial impact on the fisheries resource is anticipated as the result of the proposed action.

B. HUMAN ENVIRONMENT

1. Socioeconomic

Washington County, in which the proposed project is located, is one of Minnesota's rapidly growing metropolitan counties. From 1960 to 1970 the population of Washington County grew twice as fast as the Twin City Metropolitan Area (TCMA). Population forecasts, based upon Metropolitan Council Development Framework Policies, are provided in

Table 5¹. These forecasts indicate that the population of Washington County is expected to triple within the next 30 years. The anticipated growth for Denmark Township, consistent with Met Council policies, is much less.

Table 5: Population Forecasts for the Years 1970 to 2000.

Unit	Year			
	1970	1974	1980	2000
TCMA	1,874,612	2,026,771	2,195,000	2,888,000
Washington Co.	83,003	100,842	126,550	245,550
Denmark Twp.	923	1,129	1,250	1,550

Denmark Township, the smallest unit of government in which the proposed marina lies, is characteristically both suburban and highly agricultural. Only 3.6 percent of Denmark's employed population works in the township. The importance of agriculture is reflected in Table 6 which shows the proportions of employment by industry.

Table 6: Employment by Industry for Denmark Township (1970, Bureau of the Census).

Industry	Percent of Total
Agriculture, Forestry, Fisheries	21.2
Construction	1.8
Manufacturing	27.2
Wholesale trade	1.8
Retail trade	7.6
Transportation, Communications, Utilities	9.0
Finance, Insurance, Real Estate	6.1
Hospitals, Medical	5.8
Education and Kindred Services	5.1
Personal Service, Entertainment, Recreation	6.5
Welfare, Religious, Non-profit	4.0
Public Administration	4.0

The City of Hastings is the closest major industrial center to the proposed action and provides the fire protection and schools for Denmark Township. As of 1975, the Hastings elementary school was at

¹ See Land Use section for explanation of policies.

capacity; the junior high was over capacity; and the senior high was below capacity. Denmark Township does not have a full time police force and police protection is provided by the Washington County Sheriff.

According to the proposer, the proposed marina is expected to require two or three full or part-time employees.

Impact

The proposed marina is not expected to generate large economic benefits for Denmark Township or Washington County. Costs to the township or county will primarily include road maintenance during the winter and summer since the upper end of the access road also serves a proposed eight-lot subdivision. Some short-term beneficial economic impacts may be realized by providing for employment during construction and purchasing necessary materials and equipment. However, due to the proximity of the Twin Cities, these economic benefits could be felt by any city or county and not necessarily Washington County. Spending by marina users for goods and services in the local area would provide additional benefits.

The proposed marina could result in increased residential development of the surrounding agricultural land since a reasonable convenient access to Lake St. Croix could be provided for 50 families.

2. Land Use

The proposed marina would be subject to a number of land use policies and controls that include:

- a. Critical Area and Lower St. Croix National Scenic Riverway (Federal-State)
- b. Proposed Water Surface Use Regulations (State)
- c. State and Federal Agency Regulatory Controls
- d. Washington County Regulations
- e. Metropolitan Council Policies
- f. Denmark Township Controls

Each level of land use control will be discussed separately to fully understand the attention that has been given to the Lower St. Croix River.

- a. Critical Area and Lower St. Croix National Scenic Riverway.

Since the St. Croix River has been designated both a Critical Area and a National Scenic Riverway, a brief historical summary should help to avoid confusion. In 1968, Congress enacted the Wild and Scenic Rivers Act (PL90-542) which authorized a national system of wild and scenic rivers and provided for the designation of

several specific rivers including the St. Croix above Taylors Falls, Minnesota. The Act further listed other rivers, including the St. Croix below Taylors Falls, for additional study to determine whether these rivers were suitable for designation.

In 1972, Public Law 92-560 was enacted which amended the Wild and Scenic Rivers Act and designated the Lower St. Croix as a component of the National System. The Act specified that the Secretary of Interior was to administer the upper 27 miles of the Lower St. Croix and designate the lower 25 miles upon application by the Governors of Minnesota and Wisconsin. Furthermore, the states of Minnesota and Wisconsin, together with the Secretary of Interior, were required to prepare a master plan and establish boundaries for the riverway.

The State of Minnesota responded to PL 92-560 in 1973 by amending Minnesota Statutes, Section 104, thereby concurring with the designation of the Lower St. Croix. This designation is not to be confused with the State's Wild and Scenic River program.

On June 29, 1974, Governor Wendell R. Anderson designated the Lower St. Croix National Scenic Riverway as a Critical Area pursuant to the Critical Areas Act of 1973, Minnesota Statutes, Section 116g.01 and furthermore adopted Interim Development Regulations until final rules and regulations are adopted pursuant to Minnesota Statutes, Section 104.25.

The final *Standards and Criteria for the Lower St. Croix National Scenic Riverway in Minnesota* are expected to be promulgated by the Commissioner of Natural Resources in March, 1976. Local units of government, including Washington County, will then have 90 days to amend or adopt ordinances that are in compliance with these regulations.

The Lower St. Croix Standards and Criteria contain special provisions concerning marinas. These regulations prohibit additional new marinas in rural areas except where water permits are pending and/or environmental assessments or impact statements have been ordered. The proposed marina falls within the latter category. These regulations further state that a marina is a conditional use and permits are required for grading and filling and vegetative cutting within 200 feet of the river. A setback of 200 feet from the river is required for structures, roads, parking areas, and sewage disposal systems.

The Master Plan developed for the Lower St. Croix contained the following overall goal to:

Preserve the existing scenic and recreational resources of the Lower St. Croix River through controlled development.

This plan recommends a scenic easement at the site of the proposed

marina; although obtaining this easement is not a first or second priority. A scenic easement, once obtained, prohibits new development. The proposed riverway classification is Recreational which is the least strict of available classifications.

b. Proposed Water Surface Use Regulations.

As provided in Minnesota Statutes, Section 361.26, Washington County and the City of Marine-on-St. Croix requested the Department of Natural Resources to establish regulations governing the use of watercraft on the Lower St. Croix River. Such regulations may restrict any or all of the following:

- 1) The type and size of watercraft including motor size.
- 2) The area of water that may be used.
- 3) The speed of watercraft.
- 4) The times permitted for use by watercraft.
- 5) The minimum distance between watercraft.

The subsequently proposed Rules for Operation of Watercraft on the Lower St. Croix River contain the following provisions that would affect watercraft use in the vicinity of the proposed marina:

- 1) *No watercraft towing a person on water skis, aquaplane, or similar device shall be operated from sunset to sunrise.*
- 2) *No watercraft shall be operated in excess of a slow speed (the slowest speed possible while maintaining steering control and headway) within 100 feet of shore (including the shores of islands), swimmers and other watercraft.*

The hearing for these proposed regulations was conducted in December, 1975; however, the proposed rules are not yet promulgated and thus not in effect.

c. State and Federal Agency Regulatory Controls.

Both the Department of Natural Resources and the U.S. Army Corps of Engineers require permits for construction of the marina. A permit from the Commissioner of Natural Resources can only be issued if the Commissioner concludes that the proposed work is reasonable, practical, and will adequately protect public safety and promote the public welfare. Marinas authorized by the Corps of Engineers must meet design criteria. At present, permit applications have not been filed.

In addition to state and federal permits for the proposed marina, the Pollution Control Agency regulates fuel storage tanks and the Department of Health must approve the sewage pumpout station.

d. Washington County Regulations

Washington County regulates zoning, the development of shorelands and floodplains, sewage disposal and the subdivision of land. The general requirements of each regulatory program, as it affects the proposed action, are presented below:

1) Zoning

The proposed marina is located in a R-1 Residential district and requires a special use permit. In Washington County, a special use permit is issued by the Planning Advisory Commission. Minimum lot sizes in a R-1 district are 2.5 acres with a minimum lot width of 160 feet.

2) Shoreland Management

Chapter 2 of the Washington County Development Code is the Shoreland Management Ordinance. Shoreland zoning districts in Washington County are overlay districts which means that the dimensional requirements of the shoreland ordinance together with the permitted uses of the underlying zoning district apply to the proposed site. Lake St. Croix (82-1) has been classified as a Natural Environment Lake and the minimum dimensional requirements of the overlay district include:

Lot size	= 80,000 sq. ft.
Lot width	= 200 feet
Structural setback	= 200 feet

The shoreland ordinance requires permits for vegetation removal, grading and filling, and excavations on shorelines connected to public waters. Also, the lowest floor of any structure shall be placed at least three feet above the highest known water level. The highest known water level of Lake St. Croix at the proposed marina location is elevation 692.7 feet which occurred during the 1965 flood. Therefore, proposed structures should be at elevation 695.7 feet.

3) Flood Plain Management

Chapter 3 of the Washington County Development Code is the Flood Plain Ordinance. This ordinance requires that the proposed services building be elevated or otherwise protected against floods to the flood protection elevation of 693.5 feet. Note that elevation 695.7 feet mentioned above is more restrictive and therefore should apply.

4) Sanitary Regulations

The proposed holding tank sewage pumpout station must meet

applicable provisions of Washington County's sanitary regulations. Presently, Washington County is developing a holding tank ordinance that would eliminate many of the problems associated with this type of disposal. The ultimate disposal point of sewage wastes is presently unknown. Since the proposed marina is also a commercial venture, the Department of Health must approve sewage disposal plans.

5) Subdivision Regulations

The proposer has indicated that the access road to the marina would meet county road specifications. To meet these specifications, soil testing of base materials is necessary. Some of the requirements for marginal access streets include: a minimum roadway width of 32 feet, a maximum centerline gradient of 8 percent, and provisions for roadside drainage.

e. Metropolitan Council Policies

The policies of the Metropolitan Council for the orderly development of the seven county metropolitan area are expressed in the Development Framework chapter of the Metropolitan Development Guide. According to this guide, the proposed marina is located in the General Rural Use Region of the Rural Service Area. The Met Council policies for orderly development in this region recognizes that the primary uses are recreation, conservation, agriculture, hobby farms and residences. These policies further state that agriculture should be given first priority and residential subdivisions are encouraged to locate in Freestanding Growth Centers, such as Hastings, Minnesota. The Council will discourage the subdivision of land for residential and commercial uses unless; on-site sewage disposal is satisfactory, access roads are capable of serving the project without detriment to public safety or traffic flow, law enforcement and fire fighting services are available, and schools are or will be adequate.

The Council further believes that land in this region is not needed for intense urban development before 1990 and additional metropolitan services should not be provided until then. Population densities should remain low so that additional services are not needed. Finally, land should remain in large parcels with large open spaces.

f. Denmark Township Controls

Denmark Township has adopted the Washington County Development Code and has a contractual agreement with the county to enforce and administer the Code within township boundaries. The two codes are identical except that Denmark Township requires a minimum lot size of three acres in R-1 districts.

g. Summary of Permit Requirements

The permit requirements of the various elements of the proposed marina, together with the agency that must give approval, are listed in Table 7 below. Conditional use permits required by the County may be combined.

Table 7: Permits Required for Various Elements of Proposed Marina.

Action	Permit Type	Authority
Marina	Special use	County
Excavation	Work in public waters	MDNR and USCE
	Excavation permit	County
Grading & Filling	Grading & Filling permit	County
Roads & Parking	With building permit	County
Access to Co. Rd.	Road access permit	County
Vegetative Removal	Conditional use permit	County
Service Building	Building permit	County
Sewage Disposal	Sanitary permit	MDOH & County
Fuel Storage	Above ground	MPCA

Impact

The proposed marina appears to be in conflict with the goals and objectives for preserving the Lower St. Croix National Scenic Riverway as set forth in the Master Plan. The Standards and Criteria for the Lower St. Croix National Scenic Riverway prohibit new marinas in rural areas except where water permits are pending and/or environmental impact statements have been ordered. The proposed action is also contrary to Metropolitan Council policies for development in General Rural Use Regions. Minimum setback requirements for the proposed service building, roads, and parking areas would not be met. The location of the proposed services building is also inconsistent with shoreland and floodplain requirements concerning the highest known water level and flood protection elevations.

3. Transportation

A well designed road system provides easy motoring from the Twin Cities to the area of the proposed marina. U.S. Route 10 runs southeasterly from St. Paul to Point Douglas and Interstate Highway 94 extends east from St. Paul to Hudson, Wisconsin. Both major highways intersect county roads that run parallel to Lake St. Croix.

Primary access to the proposed marina would occur from County Road 21 although alternative County Roads 20, 76, and 78 are also

possible routes. According to the Minnesota Department of Highways, County Road 21 currently receives light to moderate traffic pressure varying from 300 to 500 vehicles per day. The 20-year design traffic projection for this road is 2.5 times the current traffic.

The Chicago, Milwaukee, St. Paul and Pacific Railroad maintains trackage along the western shore of Lake St. Croix from Hastings to Stillwater. The company discontinued passenger service years ago but continues to run one freight train past the site and back again during the week.

Impact

During peak use periods, the proposed marina could increase traffic on County Road 21 by about 75 vehicles per day. This increase would be a 20 percent increase in current traffic volume and would represent about 10 percent of the design capacity. Additional surfacing of existing roads should not be required. The proposed marina is not expected to cause adverse impacts on transportation.

4. Recreation

The Minnesota-Wisconsin Boundary Area Commission conducted recreational use studies of the St. Croix River during the years 1970, 1971, and 1972. Both aerial photography (16 flights) and questionnaires were used. The study limits included the St. Croix River from Taylors Falls to Prescott, a distance of 52 miles. Ten traffic zones within the study area were recognized with the proposed action lying within Zone 10 extending from the south boundary of Kinnickinnic State Park to the Prescott Bridge.

Results of the 1970 study indicate that about 800 watercraft can be found on the river during peak use periods at any time.¹ Zone 10 received about seven percent of the total river use. Half of the boats observed by aerial photos were found beached on the shores of banks and islands. Over 80 percent of the watercraft on a St. Croix River trip use the shore. Table 8 lists access points for users of the St. Croix.

Table 8: Access Points for Users of St. Croix River.

<u>Launch Point</u>	<u>Percent of Total</u>
Marina or livery	60
Launch Ramp	25
Mississippi River	10
Private docks	5

¹ Peak use period - noon to sundown on weekend days and holidays.

There are presently 16 marinas with a total capacity of about 1,900 slips that provide mooring for users of Lake St. Croix. Six of these marinas are above Stillwater and five are on the Mississippi. Ten sewage pumpout facilities for watercraft presently exist along the St. Croix between Stillwater and Hastings.

Over two-thirds of the St. Croix users come from the Twin City area and over 90 percent from within 25 miles of the river. Marina operators indicated that 70 to 99 percent of their permanent clientele are Twin City residents.

A wide variety of watercraft types utilize the St. Croix River, as shown in Table 9. This information suggests that Lake St. Croix, in the vicinity of the proposed marina, has a higher proportion of use by large powerboats and fewer small boats than the entire St. Croix River. In addition to recreational use, barges carrying coal make one tow past the site and back again each weekday during the navigation season. No barge traffic occurs on weekends or holidays during the summer recreation season.

Table 9: Types of Watercraft Using St. Croix River During Peak Periods.

Type	St. Croix River %	Zone 10 %
Runabouts	43.8	48.3
Pontoon or Houseboats	20.6	18.7
Medium to Large Cruisers	15.1	25.3
Canoes	14.3	0.3
Fishing Boats	2.8	2.2
Sailboats	1.9	0.7
Waterskiiers	1.5	3.9

In 1971, the user study was expanded to include boater attitudes. Users were first asked why they chose the St. Croix River over other bodies of water for recreation. Thirty-two percent indicated that they chose the St. Croix due to the beauty and scenery; 22 percent due to clean water or land; and 21 percent because of accessibility. Users were also asked to describe the amount of traffic encountered on the river and indicate how they enjoyed the river. These results are presented in Table 10 below. Although moderate to heavy traffic was encountered by almost three-quarters of the users, 90 percent indicated that their river experience was either very enjoyable or pleasurable.

Table 10: Traffic Pressure Encountered and Experience Enjoyment for Watercraft Users of the St. Croix River.

Traffic Encountered	%	Enjoyment of Experience	%
No traffic	0.5	Very enjoyable	72.9
Light traffic	25.2	Pleasurable	20.9
Moderate traffic	47.6	Satisfactory	4.8
Heavy traffic	26.2	Unpleasant	0.9

Another boater attitude question asked in 1971 was, "What was the most critical problem to overcome in order to preserve or improve the recreational and/or aesthetic qualities of the area?" The dominant preservation challenges are presented in Table 11.

Table 11: Dominant Preservation Challenge for Users of the St. Croix River.

Problem	Percent of Total
Stop pollution	20
Stop riverside development	19
Limit traffic	15
Litter	9

The proposed marina would be well screened from the open waters of Lake St. Croix by a 22 foot high, vegetated railroad berm. The proposed 20 foot wide opening to the marina would be the only visual corridor for boaters passing the site. As shown in Figure 2, a portion of the mooring facility would be visible through the marina opening. It is probable that floodlights would be placed around the marina and, depending upon design, could be visible from the St. Croix.

Impact

The Minnesota-Wisconsin Boundary Area Commission believes that the capacity for safe watercraft use has been exceeded on three reaches of the St. Croix River during peak use periods; the closest being at the Kinnickinnic narrows. The portion of Lake St. Croix adjacent to the proposed marina is also said to be approaching capacity. The proposed 50-slip marina has the potential of increasing watercraft use on the St. Croix and will thus create a negative impact, especially in crowded areas.

In addition, a small portion of the marina facility will be visible from the St. Croix through the harbor opening resulting in an adverse aesthetic impact. Night lighting for the marina may also create adverse impacts, depending upon lamp design and intensity.

5. Noise

Sources of noise during construction would include heavy machinery for marina excavation and road building. Examples of the equipment that would be used include draglines, bulldozers, a pile driver, and possibly a backhoe or front-end loader. Other sources of noise may include power saws during vegetative removal and possibly blasting for hardrock excavation for both the marina and road.

Operational noises would be contributed by automobiles and watercraft. Some of these noises would be buffered by the railroad berm and existing vegetation. Table 12 lists the average sound levels for noise sources associated with the proposed action.

Table 12: Sound Levels for Select Noise Sources Associated with Proposed Marina.

Source	Average Sound Level dBA at 50 ft.
Construction:	
Dozers (Wheel & Track)	87
Loaders (Wheel & Track)	79
Chain saws	83
Pile Drivers	101
Rock Drills	98
Operation:	
Automobiles	73
Watercraft: Inboards	74-110
Outboards (> 25 hp)	75-90

For comparative purposes, one of the existing on-site noises occurs from the infrequent passing of railroad trains. The average noise level for a locomotive is 94 dBA at 50 feet. General on-site noises associated with human activity would also occur, in addition to the anticipated noises mentioned above.

Impact

Environmental impact of noises associated with this project would vary depending on whether they are stationary or mobile. Construction noises would be stationary and sustained, creating short-term adverse impacts on recreational users of the St. Croix River.

Operational noises would be largely mobile and periodic, creating long-term negative impacts.

6. Historical

Daniel Greysolon, Sieur du Lhut (Duluth) journeyed into what is now called the St. Croix River Valley and claimed the surrounding territory for France in 1680. Pierre Charles Le Sueur also traveled the St. Croix and later organized a fur trade route which continued until the mid-nineteenth century. As fur suppliers dwindled, logging interests grew in the valley.

William Dibble was one of the first timber cruisers to survey land along the western shores of the St. Croix. He built the first lumber mill in the area in 1837 and homesteaded land directly above the proposed marina site. A brick house that he constructed still stands on the homestead. The first fort built along the St. Croix was erected at Point Prescott roughly two miles downstream from the Dibble farm.

Indians occupied the St. Croix Valley for centuries. The Dakota (Sioux) were the early recorded inhabitants until the Ojibwa (Chippewa) began to move in during the 16th century. Numerous battles were fought between the two tribes until the Sioux were forced to move southwest. Indian parties traveled up and down the river and camped along the shores. William Dibble kept a barrel of salt meat especially for visiting Indians and apparently remained on good terms with the Sioux.

The Historic Preservation Office for Minnesota has listed 15 known archeological sites along the western shores of the St. Croix. These sites are the remains of Indian mounds, campfires, and village locations. There are no known sites of architectural, cultural, or historic significance recorded in the immediate area.

Impact

There is little doubt that Indians once travelled around the proposed site of development. The archeology section of the Minnesota Historical Society believes that the area has potential as an archeological site.

III. UNAVOIDABLE EFFECTS AND THEIR MITIGATION

A. NATURAL ENVIRONMENT

1. Soils

Average annual sediment yield for the site is currently 245 tons. The proposed road construction is expected to accelerate erosion in

the watershed and increase the annual sediment yield until the disturbed areas stabilize. Mitigation of accelerated erosion can be accomplished by either selecting a more desirable road location or applying very intensive erosion control measures. A suitable alternative road location may be the south tributary although additional property would have to be purchased. Sediment yield from the road may be effectively reduced by leaving a vegetated buffer strip between the road bed and any established drainage channels.

The excavated marina would provide a trap for sediment currently deposited on the bottomlands and maintenance dredging with associated adverse impacts would be necessary. Suitable sites for placement of maintenance dredge spoils are probably lacking. Sediment deposition in the marina could be reduced by development and implementation of an Erosion and Sedimentation Control Plan in cooperation with the Soil Conservation Service. Sediment traps in the tributary streams could decrease the frequency of maintenance dredging.

2. Hydrology

The marina excavation process would result in the resuspension of fine sediments from bottomland soils. The introduction of these sediments into Lake St. Croix could be avoided by excavating the connection to the lake last and only after settling has occurred within the excavated harbor. Partial mitigation of adverse impacts associated with the proposed excavation could be achieved by reducing excavation depths from eight to six feet.

The adverse impacts of oils, fuel spills and bilge water on water quality can be mitigated by providing a surface skimmer at the mouth of the marina. The adverse effects of catastrophic spills could be avoided by immediately placing any surface water obstruction at the harbor mouth, such as a log, until mop-up operations could commence. Procedures for emergency spills could be established.

The adverse impacts on water quality from road and parking area runoff could be avoided by diverting runoff away from the marina into areas where soil filtration and percolation may occur. Parking areas could be designed to minimize runoff or could be separated from the marina by a vegetated buffer strip. If water stagnation occurs within the excavated harbor, methods of inducing water circulation would have to be used, such as pumping. Any culvert connecting the proposed marina to Lake St. Croix is not expected to eliminate water stagnancy problems and may allow sediments to reach the St. Croix.

3. Vegetation

The proposed action would permanently remove vegetation from 13.4 percent of the area owned by the developer. In addition, the unusual river birch would be reduced to one or two individuals. While back-

slopes and fillslopes may be revegetated, other lost areas could not. Impacts on vegetation could only be mitigated by reducing marina size or by no action.

4. Wildlife

Vegetation removal and soil excavation would reduce the area of available wildlife habitat by four acres which is 13.4 percent of the tract owned by the developer. Wildlife species utilizing the disturbed areas will be displaced. Mitigation of these losses could only occur by establishing additional habitat elsewhere. Revegetation of temporarily disturbed areas, such as road sideslopes, would slightly reduce habitat losses.

B. HUMAN ENVIRONMENT

1. Land Use

The proposed marina appears to be in conflict with the goals and objectives of the Lower St. Croix National Scenic Riverway as well as Metropolitan Council policies for the development of General Use Regions.

The proposed service buildings, roads, and parking areas would not meet the minimum setbacks required by the Washington County Shoreland Management Ordinance and the Standards and Criteria for the Lower St. Croix National Scenic Riverway. The service building would be built below the flood protection elevation for the St. Croix River. Mitigation of inconsistent setbacks and elevations could be achieved by requiring the services building, roads, and parking areas to meet minimum standards.

2. Noise

Stationary and sustained noise impacts would result from the excavation and construction of the marina, parking lot, and road. Mobile and periodic noises due to automobile and boating traffic would occur during summer months. The long-term impact of these noises could be mitigated by technical changes in the equipment used. In addition, existing vegetation buffers between the marina and Lake St. Croix could be retained and enhanced.

3. Recreation

The proposed marina represents another contribution to watercraft use in an area already considered by the Minn/Wisc Boundary Area Commission to be approaching capacity for safe watercraft use. Visual impacts on lake users include the harbor area as seen through the access channel and night lighting as seen over the railroad berm. Adverse impacts on use of the St. Croix could be mitigated by

reducing marina capacity. The visual impact of the marina through the access channel to Lake St. Croix could be reduced by modifying the design of the marina. The impact of possible night lighting can be reduced by utilizing low elevation and intensity lamps.

4. Historical

Potential adverse impacts on the historical and archeological resources of the site can be mitigated before and after construction begins. Should any previously unrecorded cultural resources be encountered during construction of the project, the work can be suspended until the State Historic Preservation Officer can be notified.

IV. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed development would change the present woodland character of the valley slope and bottomland areas to that of a paved road, parking lot, and marina. The current land use pattern of the site would change from a practically unused natural area to that of a private boating and recreational facility.

Changes in the physical character of the site would include permanent vegetation removal, loss of wildlife habitat, and soil erosion. The small stand of unusual river birch trees now growing in the bottomland area would be diminished. Complete vegetation removal and loss of wildlife habitat would also occur on roughly 4 acres in the watershed. Road construction would increase natural rates of erosion on the steep slopes of the north tributary and excavation and inundation of the bottomland area may result in a permanent loss of nonrenewable archeological or historical resources. Development of a private recreational boating facility in this watershed along Lake St. Croix precludes any future public development on the site. Public access to the lake shore would not be available at the marina site and public use of the harbor and boating services would not be encouraged.

V. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed private marina on Lake St. Croix would provide a recreational experience for a select number of people boating in a National Scenic Riverway. Short-term economic gains for nearby communities may be realized through employment of skilled workers and purchase of materials during construction. Short-term environmental losses would occur through visual and noise impacts related to the construction period.

Long-term environmental losses include; permanent vegetation removal, loss of wildlife habitat, soil erosion, and potential degradation of water quality. Accelerated erosion from the intermittent streams due to road construction may not be reflected in

increased sediment yields for several years. Oil and fuel spills at the marina are another potential contribution to decreased water quality in the lake.

The proposed development may contribute to establishing a pattern of private development and land use on Lake St. Croix that precludes some public use of a great scenic resource. The marina would further contribute to boating congestion on the lake and may encourage greater residential development in the vicinity.

VI. ALTERNATIVES TO THE PROPOSED ACTION

A. ALTERNATIVES

The developer has consistently indicated that he does not believe there are any economical alternatives to the proposed project. Reasonable alternatives to the proposed development, however, may be addressed in light of their respective environmental impacts. These include; construction of a small harbor to accommodate only the proposed eight lot subdivision, an open-water marina, and no action.

1. Small Harbor

One reasonable alternative to the proposed action would be construction of a small harbor to provide mooring for the proposed eight residences. A much smaller area of the bottomland would be excavated to accommodate approximately eight boat slips. The unusual river birch trees could be avoided and the remainder of the bottomland area would continue to trap and retain the sediment before it reaches Lake St. Croix.

Primary access could be from the river and both the steep access road and parking lots would not be necessary. A footpath could provide access from the subdivision to the harbor. Such a path would easily conform to the naturally scenic topography, require little or no vegetation removal, and cause virtually no additional erosion in the watershed. This alternative has been rejected for economical reasons, especially since the railroad bridge would still need to be modified.

2. Open-water Marina

For this alternative, the docks and boat slips would be built to extend out from the shoreline of Lake St. Croix. The inland bottomland area would not be excavated and an access channel would not have to be dredged. Some of the bottomland area would be cleared and paved over for parking facilities and automobile access would still require a steep, paved road through the valley slope areas.

Construction and operation of a marina facility would create a negative visual impact on recreational users of the lake. The potential for adverse impacts on the water quality of Lake St. Croix would be substantially increased. The concept of an open-water marina is in conflict with the Standards and Criteria for the Lower St. Croix National Scenic Riverway.

3. No Action

This alternative would mitigate all adverse environmental impacts but would also negate the short-term economic gains of temporary employment and purchase of construction materials. Since Lake St. Croix has been designated a National Scenic Riverway, other marina developments in rural areas along the shore would not be allowed.

B. MODIFICATION OF THE PROPOSED ACTION

The following modifications are offered to reduce unavoidable adverse environmental impacts:

1. The proposed access road located in the north tributary valley slope area should be redesigned so that anticipated accelerated erosion would be minimized. A survey of soil and sub-soil conditions should be made before the road is designed. The south tributary area could be more suitable for road development.
2. Any access road should be constructed in late summer since precipitation and runoff are low and erosion and sedimentation would be less.
3. The proposer should develop an Erosion and Sedimentation Control Plan in cooperation with the Soil Conservation Service in order to reduce sediment yield and the frequency and amount of maintenance dredging that would be necessary. The depth of excavation should be six feet rather than eight feet as proposed.
4. The marina should be excavated during low flow periods of the St. Croix River in order to minimize the effects of sediment resuspension. Also, the mouth of the harbor should be the last area excavated and should follow adequate settling of fine sediments.
5. A skimmer or other device should be placed at the harbor mouth to reduce the impacts of fuel and oil spills on the water quality of Lake St. Croix. Procedures and methods for containing emergency spills should be established.
6. Parking lots should be designed to prevent direct runoff of contaminated waters into the harbor. This may be accomplished

by diversion of runoff or by parking areas meeting minimum setback requirements. A vegetated buffer strip should separate parking areas from the harbor.

7. Methods should be employed to provide for water circulation in the harbor in order to prevent water stagnancy and deteriorated water quality. The proposed culvert connecting the harbor to Lake St. Croix is not recommended.
8. Backslope and fillslope areas together with any other disturbed areas should be revegetated immediately and maintained thereafter.
9. The proposed service building, parking lots, and road should meet the minimum setback requirements of at least 200 feet from the shore of the excavated harbor. The service building should also be placed above the regulation flood protection elevation or otherwise protected against flood damage.
10. If blasting is necessary for hardrock excavation, no explosives should be used during peak recreational use periods on Lake St. Croix.
11. The marina design should be modified so that no mooring facilities are visible through the entrance to Lake St. Croix.
12. If night lighting is necessary, low height and intensity lamps should be used.
13. Should any previously unrecorded cultural resources be encountered during construction of the project, the work should be suspended until the State Historic Preservation Officer can be notified.

VII. THE IMPACT ON STATE GOVERNMENT OF ANY FEDERAL CONTROLS ASSOCIATED WITH THE PROPOSED ACTION

The proposed marina is located within the federally designated Lower St. Croix National Scenic Riverway. Although primary responsibilities for administering land use controls lie with the state, all proposed actions must be approved in compliance with the intent of the Wild and Scenic Rivers Act (PL 90-542).

In addition, the U.S. Army Corps of Engineers must grant a permit for the proposed marina before construction can occur.

VIII. THE MULTI-STATE RESPONSIBILITIES ASSOCIATED WITH THE PROPOSED ACTION

The designated Lower St. Croix National Scenic Riverway is to be administered by both Minnesota and Wisconsin since Lake St. Croix is a boundary water between the two states. Generally, any development on the shore of one state affects the other state in that recreational

use and boating pressures for the joint waters will be affected.

The Minnesota-Wisconsin Boundary Area Commission has shown considerable interest in the proposed action.

IX. ORGANIZATIONS AND PERSONS CONSULTED

Federal

1. U.S. Department of Agriculture
Soil Conservation Service
2. U.S. Army Corps of Engineers

State

1. University of Minnesota
Department of Geology
2. Department of Highways
3. Historical Society
4. Minnesota Geological Survey

Local

1. Metropolitan Council
2. Washington County Planning Office
3. Washington County Highway Department

Other Individuals

1. Lorenzo D. Williams
Williams/O'Brien Associates, Inc.
2. John Boulware

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