

## Chapter 3

### 3.0 Affected Environment and Environmental Consequences

#### 3.1 Visual Resources

##### 3.1.1 Affected Environment

The site proposed for marina development lies on the inside bend of the Tennessee River at its confluence with the Clinch River. The adjacent landbase supports an 18-hole golf course which is seen by lake users and highway travelers along State Route (SR) 58. The topography of these shoreline lands is gently rolling to low lying with scattered tree cover, composed of a mix of hardwoods and evergreens. A heavily vegetated barrier island lies to the upstream end of the proposed development. The site is visible from a number of vantage points along SR 58 and US 70 as one passes through Kingston. Generally, views of the marina would be from 1.5 to 2 miles away. A heavily used walking trail also parallels these roadways. Southwest Point Park with its ball fields, picnicking facilities, and historic fort restoration also lies just upstream of the site, but is screened from most views of the site by wooded topography.

##### 3.1.2 Environmental Consequences of Each Alternative

The proposed development would be most visible to lake boaters and from the 25 residences that are located slightly over a quarter mile away along the opposite shoreline. Most of the residents living in these homes would have only partial views of the site during summer months but direct views during the winter season. Year around views of the site would exist from the docks associated with these residences and from two or three of the homes that have cleared down the steep shoreline to the lake. Other features that are visible from this portion of the reservoir are the smoke stacks at the Kingston Fossil Plant; the SR 58 bridge; numerous homes and buildings in the town of Kingston; associated lake use by boaters and fishermen; and occasional barge and other commercial river traffic.

##### **Alternative A - The No Action Alternative**

The no action alternative would result in no changes to the visual resource from those already established.

##### **Alternative B - The Applicant's Proposal**

Alternative B, the original proposal for 812 slips, would likely create the following visual/aesthetic impacts. Water depths would not allow the use of a large number of the proposed slips. Some boats and slips would likely become grounded at winter lake levels causing damage to slips and property. Some boats would not have

enough water to operate potentially creating unpleasant customer relations. Damaged slips that might fall into disrepair could be abandoned or otherwise remain within the area in an unsightly condition. While the addition of 812 boatslips to this portion of the reservoir would create some visual impacts, when visible to some of the residents living across the lake, overall impacts would be minor when all viewers are considered. Marinas are generally an acceptable sight to the lake user, as they provide needed services. The views of this alternative from passers-by on surrounding highways and from various points in the Kingston area would be insignificant, as they would be at distances exceeding one mile.

### **Alternative C - The Modified Proposal**

If only boatslips serviceable at all lake elevations are proposed, visual impacts could be reduced for the residents on the opposite shoreline of the reservoir. Water depths indicate that 254 slips would likely be the maximum usable at this location. The use of blue or green metal roofing on covered slips will be required to reduce visual impacts to these viewers. Visual/aesthetic impacts would remain insignificant to lake users and from other vantage points in the surrounding area if this alternative with a reduced number of facilities is chosen.

## **3.2 Cultural Resources**

### **3.2.1 Affected Environment**

For at least 12,000 years, the Tennessee River Valley has been an area for intense human occupation. In the East Tennessee area, archaeological investigations have demonstrated that Tennessee and its eastern Ridge and Valley region were the setting for each one of these cultural/temporal traditions, from the Paleo-Indian (11,000-8000 BC), the Archaic (8000-1200 BC), the Woodland (1200 BC-AD 1000), the Mississippian (AD 1000-1500), to the Protohistoric-Contact Period (AD 1500-1750). In addition, historic era cultural traditions have included the Cherokee (AD 1700-present), European- and African-American (AD 1750-present) occupations. Moreover, these investigations have provided additional details about the changing environments, shifting subsistence strategies and settlement patterns, and variations in the cultural material associated with each major period.

TVA is mandated under the National Historic Preservation Act of 1966 (NHPA) and the Archaeological Resources Protection Act of 1979 to protect significant archaeological resources or historic properties located on TVA lands or affected by TVA undertakings. In response to this federal legislation, TVA conducts surveys to record historic properties.

The area of potential effect (APE) for the Savannah Harbor Marina was determined, in consultation with the Tennessee State Historic Preservation Officer (SHPO), to be the 22.5 acres indicated in the 26a application and proposed license agreement.

A Phase I archaeological survey was conducted by The University of Tennessee (Ahlman and Frankenberg 1999) in the APE. State site files were reviewed and two resources were recorded in the APE. A field investigation was conducted and consisted of combined systematic pedestrian survey and shallow subsurface testing. Five cultural resources were newly identified and two previously identified resources were revisited. Four of the sites were recommend for further testing. The remaining three sites were recommended as ineligible for listing in the National Register of Historic Places (NRHP) because they would not be able to provide additional data to the archaeological record.

### **3.2.2 Environmental Consequences of Each Alternative**

The survey report was reviewed and the SHPO supplied comments on the report. Of the seven resources identified in the APE, four were determined to be potentially eligible for listing in the National Register of Historic Places. The remaining three sites were determined to be ineligible for listing in the NRHP. The SHPO concurred, on May 24, 1999 (see Appendix C), with TVA's findings that no historic properties eligible or potentially eligible for listing in the National Register of Historic Places will be affected if the following requirements are met.

1. Avoidance of any archaeological sites within the proposed land use license and 26a permit areas (area of potential effect).
2. Any future ground modifications within the proposed land use license and 26a permit areas not reviewed and/or cleared under this agreement would require written notification to and approval by TVA.
3. A silt barrier fence will be placed around the boundary of any of the archaeological sites that are present within the work area. The silt fence must be in place prior to work starting (TVA requires an archaeologist to mark the boundaries of the sites prior to placement of the silt barrier fencing), and which can be removed when all work is completed.
4. If the above conditions cannot be met, the applicant will be required to enter into consultation with TVA and the SHPO (pursuant to the requirements of Section 106 of the National Historic Preservation Act and its implementing regulations at 36 CFR Part 800.4), regarding the evaluation and treatment of the archaeological site or sites.

Under all alternatives, all four historic properties potentially eligible for listing in the NRHP will be avoided. All facilities proposed can be built without affecting the resources. Based on the requirements set forth by TVA and the SHPO, Alternatives A, B, or C will have no effect on historic properties listed or potentially eligible for listing to the National Register of Historic Places.

### 3.3 Threatened and Endangered Species

#### 3.3.1 Affected Environment

No extant federally-listed threatened or endangered plant or animal species (terrestrial or aquatic) are known to occur on or immediately adjacent to the 22.5-acre parcel proposed for the commercial recreation license and Section 26a permit. Bald eagles (*Haliaeetus leucocephalus*), currently listed as Federally Threatened, are known to nest approximately nine miles upstream near Tennessee River Mile (TRM) 576.5. Occasionally, wintering bald eagles are observed, both immediately upstream and downstream of the proposed marina location. However, the existing narrow riparian habitat along this shoreline section, coupled with the existing backlying land use (golf course), prevents much use by wintering bald eagles. Transient gray bats (*Myotis grisescens*), currently listed as Federally Endangered, are known to sporadically use Marble Bluff Cave located approximately 11 river miles upstream on the Tennessee River and may occasionally forage along this portion of the reservoir shoreline. Other Federally-listed plant and animal species known to occur within a 10-mile radius of the proposed project area include Cumberland rosemary (*Conradina verticillata*), spottfin chub (*Cyprinella monacha*), and Virginia spiraea (*Spiraea virginiana*). However, none of these species nor the habitats for these species occur on the proposed project area.

Osprey (*Pandion haliaetus*), currently listed as threatened in Tennessee, commonly nest throughout this section of Watts Bar Reservoir, both upstream and downstream of the proposed project site. Several heron nesting colonies, including both great blue (*Ardea herodias*) and black-crowned night-herons (*Nycticorax nycticorax*) are located on island situations, both upstream and downstream of the project location. Neither of these species is currently on the Federal or Tennessee list of endangered or threatened species. Several other Tennessee state listed animal species including; Tennessee cave salamander (*Gyrinophilus palleucus*) (Threatened), flame chub (*Hemitremia flammea*) (In Need of Management), and tangerine darter (*Percina aurantiaca*) (In Need of Management) are known to occur within a 10-mile radius of the proposed project. However, none are known to occur on the project site nor is suitable habitat for these species available.

Several state listed plant species occur within a 10-mile radius of the project location and include; earleaf foxglove (*Agalinis auriculata*), false foxglove (*Aureolaria patula*), bugbane (*Cimicifuga rubifolia*), tall larkspur (*Delphinium exaltatum*), bush honeysuckle (*Diervilla lonicera*), riverbank bush honeysuckle (*Diervilla rivularis*), goldenseal (*Hydrastis canadensis*), Canada lilly (*Lilium canadense*), smoothleaf honeysuckle (*Lonicera dioica*), ginseng (*Panax quinquefolius*), saxifrage (*Saxifraga careyana*), and goldenrod (*Solidago ptarmicoides* false foxglove, bugbane, bush honeysuckle, and riverbank bush honeysuckle are known to occur on primarily limestone bluff habitat within a 2-mile radius of the proposed project site). However, none of these species or their habitats are known to occur on the proposed project site.

### **3.3.2 Environmental Consequences of Each Alternative**

The U.S. Fish and Wildlife Service responded by letter to the Public Notice on July 30, 1998, stating that based on their records, it is their belief that there are no federally-listed or proposed endangered or threatened plant or animal species in the impact area of the project, and that requirements of Section 7(c) of the Endangered Species Act of 1973, as amended, are fulfilled (see Appendix C).

#### **Alternative A - The No Action Alternative**

Under the No Action Alternative, current land use would remain unchanged. Since no federal or state-listed threatened and endangered species or habitat to support such species was identified onsite, negative impacts to these resources are not anticipated. Sporadic or transient gray bat use along this shoreline section would be expected to continue.

#### **Alternative B - The Applicant's Proposal**

Under this alternative the 26a permit and commercial recreation license requested by the applicant would be issued, allowing construction of the commercial facility as proposed. Since no threatened and endangered species or habitat to support such species was identified onsite, direct negative impacts to these resources is not anticipated. While some open water foraging habitat preferred by gray bats would be lost due to construction of the commercial facility, sporadic gray bat use along this shoreline section would be expected to continue with no effects to this species expected on a local, reservoir, and regional basis (Henry, personal communication). Impacts to other state listed rare plant and animal species located up and downstream of the site associated with the construction and operation of the proposed facility are expected to be minor and insignificant on a local, reservoir, and regional basis.

#### **Alternative C - The Modified Proposal**

Impacts on federal threatened and endangered species and state listed rare species would be similar to those described for Alternative B. The reduction in the overall size of the facility would maintain more open water habitat unobstructed by docking facilities and boats. This open water could be sporadically used by foraging gray bats as previously described; however, since this use is considered so negligible, no effects to this species is expected on a local, reservoir, and regional basis.

### **3.4 Property Values**

#### **3.4.1 Affected Environment**

The site for the proposed marina is on the inside bend of the Tennessee River at its confluence with the Clinch River in Roane County. Landward the proposed site is bordered by an 18-hole golf course on the east and residential property to the south. The topography of these shoreline lands is gently rolling to low lying with scattered tree cover composed of a mix of hardwoods and evergreens. A heavily vegetated barrier island upstream of the proposed development is TVA property. The proposed site is in the view shed of some 25 residences westward across the river and from SR 58 to the east. Southwest Point, an historic and recreation area, is also in the vicinity across the river but not in the direct view shed. No residences are immediately adjacent upstream.

#### **3.4.2 Environmental Consequences of Each Alternative**

Residential property values can be affected by many diverse factors or values such as; supply and demand, view, water frontage, accessibility, availability of shopping and services, economic conditions, and a vast number of others. It is difficult to isolate the effect of any single variable. In addition, the relative importance of each of these factors or values may be unique to each individual property and can reflect the personal values of the purchaser or seller.

Even though property values by their nature can be speculative, it is often possible to establish relative value trends through the principle of substitution. For example, a residential property in proximity to lakes and streams with recreation potential has more potential customers than property with identical attributes elsewhere, and therefore being in greater demand is likely to have a greater value.

In general, the proposed marina site appears to be conducive to the proposed use and would not affect a vast number of residential properties. About five properties directly adjacent to the site downstream may be affected. Other residential properties which are not adjacent to the proposed marina or those across the lake would be effected less as the distance increases.

#### **Alternative A - The No Action Alternative**

Under this alternative the marina would not be constructed and the surrounding property values would not be effected.

#### **Alternative B - The Applicant's Proposal**

A group of selected marina owners, developers, lake lot owners, real estate agents, and appraisers were asked their perception of the effects a new marina with 812 slips might have on surrounding residential properties. In general, most thought a

new marina would increase the value of the majority of any surrounding lots (especially interior lots), while negatively affecting a few specific properties in close proximity to the marina. The negative impacts to affected properties would be primarily due to view loss, increased boat traffic, and new environmental concerns.

Most surrounding residential property values would benefit from a first class marina operation. Some lake properties in close proximity immediately downstream or directly across the lake could become less marketable, based on the numerous variables such as, the economy, supply and demand, view, water frontage, access, or lot characteristics. However, as the value of more properties are likely to be increased than decreased by the presence of the proposed marina, there would be a net insignificant effect to property values.

### **Alternative C - The Modified Proposal**

Once the size of a full service marina becomes greater than a threshold of 200 or more boatslips the effect on residential property values would likely not increase proportionately to any further increase in marina size, as long as it occurred at the same site covering the same area. Therefore, because the number of boatslips are reduced from 812 to 254 in Alternative C, but still greater than the 200 threshold the affect on property values for the Modified Proposal, 254 would be less, but not greatly different from the Applicant's Proposal (Alternative B). Similar to Alternative B but to a lesser degree, the value of more properties are likely to be increased than decreased by the presence of the proposed marina, resulting in a net insignificant effect to the areas property values.

## **3.5 Wetlands, Riparian, and Terrestrial Ecology**

### **3.5.1 Affected Environment**

About half of the 22.5-acre area proposed for commercial recreation license is typical and relatively common riparian habitat that was created following closure of Watts Bar Dam in 1942 and the subsequent operation of the reservoir water levels by TVA (Amundsen, 1994). The other approximate half of the area has been operated and managed as Southwest Point Golf Course for many years. Riparian habitat fronting the majority of the proposed commercial license area is comprised of a narrow band of typical shoreline upland and bottomland tree and shrub species. Common overstory species include hackberry, silver maple, American and slippery elm, yellow poplar, sycamore, black cherry, red maple, dogwood, boxelder, river birch, black gum, and green ash. The area furthest downstream also contains a mixture of small Virginia pine and some scattered planted loblolly pine mixed with typical upland hardwoods. The understory is comprised of spicebush, dogwood, ironwood, grapes, and greenbrier. Backlying property is predominantly golf course fairways and greens with scattered planted loblolly pines and hardwoods.

A peninsular island of TVA land (Tract No. XWBR-118PT) lies immediately adjacent to the proposed commercial site and was allocated for Visual and Wildlife Management in the Watts Bar Reservoir Land Management Plan. This approximate 4-acre island is predominantly forested with planted loblolly pine comprising the middle with a fringe of typical shoreline-riparian trees including sycamore, green ash, river birch, black willow, and silver maple on the upper and lower ends. The shoreline of the island supports a substantial amount of fringe wetlands. These wetlands are a result of the gentle slope of the shoreline and the water level fluctuations in the reservoir. Dominant wetland vegetation includes silky dogwood, indigo bush, brookside alder, black willow, buttonbush, water willow, and smartweeds. There are scattered pockets of exotic Chinese privet and Japanese honeysuckle present along portions of the island and mainland shoreline area.

Wildlife utilization of the mainland shoreline of the site is limited because of the narrow, linear nature of the existing riparian vegetation and management of the backlying land as golf course. Mammals expected to use the site for foraging and/or cover include white-tailed deer, mink, muskrat, gray fox, gray squirrel, raccoon, opossum, striped skunk, Eastern chipmunk, short-tailed shrew, and eastern red bat. Common amphibians and reptiles using the site include Cope's gray treefrog, American toad, Eastern garter snake, five-lined skink, and Eastern box turtle. Common birds observed or expected to use the site include Canada goose, Eastern bluebird, barn and rough-winged swallows, Carolina chickadee, Carolina wren, red-bellied woodpecker, tufted titmouse, Northern cardinal, blue-gray gnatcatcher, rufous-sided towhee, great crested flycatcher, Eastern kingbird, yellow-billed cuckoo, and yellow warbler.

The adjacent island and associated wetland fringe habitat is utilized by many of the above mentioned species in addition to numerous waterfowl and wading birds, including great blue and black-crowned night-herons, and wood ducks. Blue-winged teal occasionally use the shallow water habitat behind the island and osprey and belted kingfishers use shoreline trees as perch sites.

### **3.5.2 Environmental Consequences of Each Alternative**

#### **Alternative A - The No Action Alternative**

Wetlands, Riparian and Terrestrial ecological resources would largely remain unchanged under this alternative. As sediment continues to accumulate around the island, more shallow water and fringe wetland habitat will develop with an accompanying increase in use by waterfowl and other wetland wildlife species. Wildlife use on the mainland portion is expected to remain largely unchanged with wildlife species adapted to human disturbance continuing to utilize the area.



## **Alternative B - The Applicant's Proposal**

Under this alternative, the 26a permit and commercial recreation license would be issued to the applicant allowing for development of the proposed marina and associated facilities on the mainland. Most of the mainland development (parking lots and other infrastructure) would occur on areas currently managed as golf course (open, mowed fairways). Very little existing riparian vegetation would be affected by this development. Wildlife resources currently using this portion of the area are well adapted to human disturbance; therefore, impacts to these resources would be considered minor and insignificant on a local, reservoir, and regional basis. The peninsular island would not be directly affected by the proposed development. Since most of the wetlands and associated wetland wildlife and waterfowl resource utilization of the area occurs adjacent to this island, impacts to these resources would be considered minor and insignificant on a local, reservoir, and regional basis.

## **Alternative C - The Modified Proposal**

Impacts to wetlands, riparian and terrestrial resources would be similar to those described for Alternative B. The reduction in the overall size of the facility would maintain more open water unobstructed by docking facilities and boats. This size reduction could also minimize the amount of human disturbance associated with operation of the facility. However, since the wildlife resources that utilize the available habitats in this area are well adapted to the existing disturbance factors, impacts are considered minor and insignificant on a local, reservoir, and regional basis.

### **3.6 Recreation and Land Use**

#### **3.6.1 Affected Environment**

Watts Bar Reservoir consists of 39,000 acres of water surface and 95 miles of navigable waterway, including portions of the Clinch, Emory, and Tennessee Rivers. The width of the lake at the proposed marina location is over 1,500 linear feet and supports various levels of recreational and commercial boating. Fishing tournaments occur frequently in the area, as well as other recreational boating activities. There are currently active 11 full service marinas on Watts Bar Reservoir offering wet and dry slip storage. Two additional marinas are closed. All of the existing marinas, except one, are located within the 37 river miles downstream from the proposed development. There is one marina within the 35-mile upstream segment on the Tennessee River, and none on the Emory or Clinch Rivers. Typically, slip rental peaks during the summer recreation season and falls off during the winter non-recreation season. Based on telephone conversations and inspections, there are approximately 1,200 wet and dry slips available on Watts Bar. The typical peak recreation season occupancy is about 85 percent for all marinas. About half of the marinas experience 100 percent occupancy and several have waiting lists.

The applicant has requested a license for commercial recreation use of 22.5 acres of TVA land. The affected land base consists of Tract No. XWBR-117PT (18.2 acres) which was allocated for commercial recreation use and visual management in the 1988 TVA Watts Bar Reservoir Land Management Plan. An additional 4.3 acres of adjoining TVA shoreland (Tract No. XWBR-614) with landrights existing for private water use facilities are included in the license request. Currently, 13.3 acres of Tract No. XWBR-117PT are licensed for commercial use and a letter permit was issued in 1997 for golf course purposes to control vegetation on the 22.5 acres. The commercial recreation allocation in TVA's Watts Bar Reservoir Land Management Plan permits consideration of land uses associated with marinas, golf courses, and restaurants. Landward access to TVA's 22.5 acres is across private property associated with Southwest Point Golf Course.

### **3.6.2 Environmental Consequences of Each Alternative**

The trend in recreational boat registrations continues to increase nationally and in the State of Tennessee. According to the Tennessee Wildlife Resources Agency, boat registrations in Tennessee have increased 29 percent since 1990, up from 241,632 to 312,030 in 1998, an annual average of 3.6 percent. The proposed marina is anticipated to draw customers from eight surrounding counties within one hour's drive which include Anderson, Cumberland, Knox, Loudon, Meigs, Morgan, Rhea, and Roane. This area has experienced an average annual increase of 6.6 percent in boat registrations from 1993-1998, having increased from 31,869 in 1993 to 42,399 in 1998. Knox County has the highest number at 20,358, followed by Anderson County with 5,672, and Roane County with 4,691.

Based on observations and historical knowledge, recreational boating appears to follow traditional patterns (i.e., weekend traffic is typically greater than weekday traffic) and traffic patterns are dispersed throughout the day. Two boat counts were made on Saturdays, May 1 and 8, 1999, to estimate boat traffic in the immediate area of the proposed marina and are reflected in Table 3.6-1. The counts were 195 and 131, respectively, for the time period of 6 a.m. to 7 p.m. These were all recreational boats except for one commercial craft on May 1, 1999. Since this was not the peak boating summer season, an estimate of peak use was made by doubling the high two-hour average (1-3 p.m.) from the 2-day counts to produce an average peak rate of 51 boats.

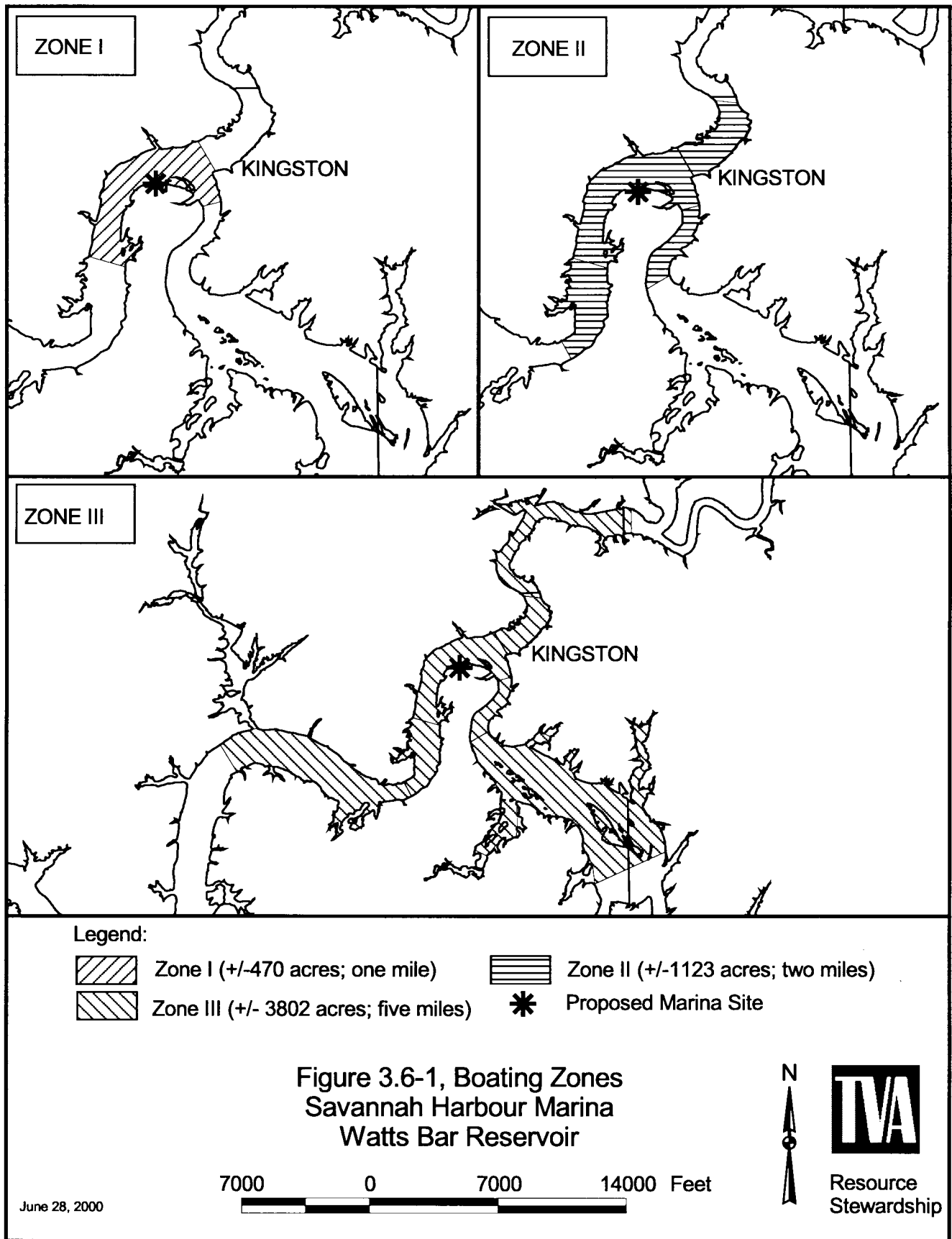
To estimate potential boating congestion impacts, the following criteria were used.

1. Based on conversations with six large marinas across the Valley and observations of marina usage on area reservoirs, a range of 25-50 percent of slips may be vacated during peak periods. A boat usage rate of 33 percent was used to estimate the traffic flow in and out of the proposed marina during peak periods between 1-3 p.m., during June, July, and August.

<b>Table 3.6-1 Boat Traffic Counts</b>				
<b>Hours</b>	<b>5/1/99</b>	<b>5/8/99</b>	<b>Avg./Hr.</b>	<b>Estimated Peak</b>
6-7 am	22	2	12	24
7-8	4	4	4	8
8-9	12	3	7.5	15
9-10	7	10	8.5	17
10-11	8	9	8.5	17
11-12	12	8	10	20
12-1 pm	14	6	10	20
1-2	30	22	26	52
2-3	32	18	25	50
3-4	12	9	10.5	21
4-5	12	14	13	26
5-6	22	14	18	36
6-7 pm	8	12	10	20
<b>Totals</b>	<b>195</b>	<b>131</b>		

2. The potential water surface areas of effect include three zones (Figure 3.6-1) extending from the proposed marina upstream and downstream in respective increments of one mile (Zone I - 470 acres), two miles (Zone II - 1,123 acres), and five miles (Zone III - 3,804 acres).
3. Boat usage will disperse within these zones or even greater distances.
4. An average peak rate is 51 boats per hour for the high 2-hour period.
5. An acceptable range for power boating activities (URDC, 1977) is 5-10 acres of water surface area per boat to provide safe and satisfactory boating.

For Alternative B, a boat usage rate of 268 (33 percent x 812) additional boats could be produced, and for Alternative C, 85 (33 percent x 254) additional boats. Adding these to existing estimated peak use of 51 boats for Alternative A, potentially produces 319 boats for Alternative B and 136 boats for Alternative C. Table 3.6-2 compares water surface area and potential acres per boat for Alternatives A, B, and C.



<b>Table 3.6-2 Comparison of Water Surface Area During Peak Boat Use</b>				
	Acres Per Boat			
	Acres	ALT. A (51 boats)	ALT. B (319 boats)	ALT. C (136 boats)
Zone I	470	9.2	1.5	3.5
Zone II	1123	22	3.5	8.3
Zone III	3804	75	12	28

Following are estimated boat usage levels for each Alternative by Zone.

- The estimated current level of boats during peak hours for Alternative A is well within or better than the acceptable range in Zones I, II, and III.
- The number of potential boats during peak hours for Alternative B is below the range for Zone I, slightly below the recommended acceptable range for Zone II, and better than the acceptable range for Zone III.
- The number of potential boats during peak hours for Alternative C is slightly below the recommended acceptable range in Zone I, and well within or better than the acceptable range in Zones II and III.

#### **Alternative A - No Action Alternative**

Existing land rights could continue on the affected tract, marina services would not be provided at this location, and development of restaurant services may not result. Other commercial recreation uses of the property could be considered.

#### **Alternative B - The Applicant's Proposal**

The proposed marina is an acceptable commercial recreation use of the TVA land and associated water surface area. This area of the reservoir is large enough to accommodate additional boating without affecting swimming opportunities. Development of the 812-slip marina would be accomplished in phases and land rights would be issued in the form of a license. Based on available plans/information and inspections of the proposed harbor area, the proposed alignment of 812-slips could create the potential for limited year-round mooring because of placement of slips in shallow winter water and the potential for some boats to run aground.

Based on a comparison of potential congestion within the three boating zones, if all boaters stayed within Zones I or II, they could experience some crowding during peak periods and require changes in boating use patterns. However, it is assumed that boaters would use the marina as a point of ingress and egress to Watts Bar

Reservoir and the vast majority would travel to other parts of the reservoir, upstream and downstream, resulting in more dispersed use of other boating zones. The licensed area would encompass 22.5 acres fronting the existing golf course.

### **Alternative C - The Modified Proposal**

The proposed use, land rights, and phasing would be the same as Alternative B. Like Alternative B, this area of the reservoir is large enough to accommodate additional boating without affecting swimming opportunities. However, it would result in the number of boatslips being reduced to 254, with the marina redesigned to better suit year-round water depths. With this reduction in slips, there is also a commensurate 68 percent (268 down to 85) reduction in potential boat usage associated with the marina.

Based on a comparison of potential congestion within the three boating zones, if all boaters stayed within Zone I they might experience some crowding during peak periods. However, the 3.5 acres per boat is only slightly below the recommended low end (5 acres per boat) of the range. During peak hours, the number of potential boats is well within or better than the acceptable range in Zones II and III. It is assumed that boaters would use the marina as a point of ingress and egress to Watts Bar Reservoir and the vast majority would travel to other parts of the lake, upstream and downstream, also resulting in more dispersed use of other boating zones. The licensed area would encompass 22.5 acres fronting the existing golf course.

The combined effects for Alternative C are insignificant with the commitment in Chapter 4 to limit the size of the marina to a maximum of 254 boats, whether stored in the water or on land.

## **3.7 Water Quality**

### **3.7.1 Affected Environment**

Watts Bar Reservoir flows through portions of four counties and drains an area of about 17,310 square miles. The reservoir has a surface area of 39,000 acres, is 95 miles long, and has 771 miles of shoreline. The average annual discharge is approximately 27,000 cubic feet per second (cfs), providing an average hydraulic retention time of about 19 days. Water entering Watts Bar from Fort Loudoun Dam is usually warmer and lower in dissolved oxygen (DO) during summer months than water entering from Melton Hill Dam (TVA 1997).

TVA initiated its Vital Signs Monitoring Program in 1990 to systematically monitor the ecological conditions of run-of-the-river (mainstream) and tributary storage reservoirs using indicator parameters to judge overall ecological "health." At Watts Bar, samples have been taken from the forebay (the area immediately above the dam) at a transition zone site located at TRM 560.8 (about seven miles below the

marina site), and at inflow areas below Melton Hill and Fort Loudoun Dams. Parameters used as indicators were DO, chlorophyll, sediment quality (sediment toxicity tests and/or sediment chemical analyses including heavy metals, pesticides, and polychlorinated biphenyls [PCBs]), and benthic macroinvertebrate and fish communities. Based on these parameters, Watts Bar had an overall “fair” ecological condition rating in fall 1998 sampling, compared to other run-of-river reservoirs (TVA 1999b). The reservoir-wide rating was also “fair” in samples taken in fall 1996 (Watts Bar was not sampled in 1997), but had been “good” in previous years (TVA 1997). The ecological indicator that has changed the most over time is chlorophyll, levels of which have nearly doubled over the last five years. The chlorophyll rating has changed from good at the forebay and transition zone sites in 1992 and 1993 to poor in 1996 and 1998. Extensive sampling on Watts Bar in 1998 found fecal coliform bacteria levels at all locations well within state guidelines for water contact, except at Roane County Park, which had high levels during and after rain events (TVA 1999b).

Contaminated sediments, which can directly impact bottom fauna and can be long-term sources of toxic substances in the aquatic environment, have been a source of concern for area residents and reservoir users. Fall 1998 testing by TVA of sediments from the river channel for levels of heavy metals, PCBs, and organochlorine pesticides found PCBs above guideline levels at the transition zone station (TRM 560.8). Chlordane was detected above guideline levels at the forebay. The U.S. Department of Energy (USDOE) tested sediment radioactivity levels at several locations in the vicinity of the proposed marina in June 1999. Results indicate that sediment radioactivity in all samples was essentially at background levels, and well below the established risk level (Jason Darby, USDOE, personal communication, and USDOE October 15, 1999, letter, see Appendix B).

Due to PCB contamination, the State of Tennessee has issued advisories against eating several species of fish from various areas of Watts Bar. “Do not consume” advisories have been issued for all striped bass, striped bass/white bass hybrids, and catfish from the Tennessee River arm of the lake. Precautionary advisories directed to pregnant women, nursing mothers, children, and others have been issued for largemouth bass, white bass, sauger, carp, and smallmouth buffalo from the Tennessee River arm, and for catfish and sauger from the Clinch River arm.

Eroded soil or sediment is the most prevalent pollutant associated with construction activities. The erosion process begins with the dislodgment of soil particles. These particles are then transported as sediment to areas of deposition. Free-falling raindrops impact the soil with much greater energy than does an equal amount of flowing water. If land surfaces have no vegetative cover or other protective debris to cushion the impact, the total energy of falling rain is expended on dislodging soil particles. Loose particles are easily moved and, under certain conditions, carried away by overland water flow. The volume of overland flow that develops from a given rainstorm is related to a soil’s physical factors that influence the infiltration and movement of water through the soil.

In reservoir shoreline settings, this process is accelerated. As the energy in the water (waves, generated by wind, personal and commercial watercraft, etc.) comes in contact with the shoreline, the erosion process begins. In shoreline erosion and associated bank failure; however, the sediment is immediately deposited in the reservoir, where it can adversely impact water quality, aquatic organisms, and detract from the natural appearance and value of shoreline properties.

Many factors influence the rate and amount of soil loss. In general terms, areas with highly erodible soils, sparse vegetation, steep topography, and occasional intense storms will exhibit the highest erosion levels (Gray and Sotir 1996). Human activity can frequently intensify or accelerate erosion rates particularly if they entail vegetation removal, grading, concentrating runoff, or soil disturbance (Federal Interagency Stream Restoration Working Group 1998). In reservoir areas available to recreational boating, the shoreline is also vulnerable to higher wave energy levels associated with propeller wash.

### **3.7.2 Environmental Consequences of Each Alternative**

#### **Alternative A - The No Action Alternative**

Since no actions would be undertaken under Alternative A, water quality and the other parameters mentioned above would not be impacted.

#### **Alternative B - The Applicant's Proposal**

Best Management Practices (BMPs) are practices chosen to minimize soil erosion and prevent or control water pollution resulting from land disturbances such as construction sites (Muncy 1992). If properly applied, BMPs will help protect the quality of receiving waters by keeping the sediment onsite. BMP's can be tailored to a site, and modified if necessary as the project progresses. The proposed level of land construction is similar to other existing and proposed development projects throughout the Tennessee River system. Thus, soil erosion and sedimentation would be minimized if strict adherence to the selection, installation, and maintenance of the required BMPs in Chapter 4 are undertaken. Further, a pre-construction plan that outlines soil erosion and sediment control measures is not required but recommended to provide guidance during construction.

The proposed development of an 812-slip, full service marina would require construction activity to take place along the shoreline. During this construction phase, turbidity levels would likely be elevated locally. The proposal would install rock riprap hard armoring along the shoreline to reduce the impacts of construction, current wave action, and future watercraft traffic. Following construction activities, turbidity levels and sedimentation into the reservoir originating from the marina site should return to preconstruction levels or below, due to the stabilization of the currently unprotected shoreline. Stormwater runoff from roads, parking areas, the fuel storage area, and roofs will not significantly impact reservoir water quality.



Construction of the proposed marina would concentrate boat traffic, which could increase local wave energy levels. However, installation of the riprap, should be sufficient to protect the immediate harbor area from further erosion. The higher concentration of watercraft around the proposed marina will likely contribute to a marginal acceleration of erosion of surrounding areas of unprotected shoreline which would diminish with increasing distance from the marina.

The temporary, localized increases in turbidity would not result in significant adverse impacts to water quality in the area during marina construction or operation. Activities associated with the marina, including most boat traffic, will take place in the shallower overbank area and therefore unlikely to re-suspend any contaminated sediments that occur in deep water areas. Since no dredging is included in marina plans, disturbance of sediments in shallow waters near the marina would be minimal. Proper treatment of wastewater in accordance with state and local requirements would reduce impacts resulting from sewage and other liquid wastes to insignificant levels. Treatment consistent with these requirements would ensure that the proposed marina development would not result in an undue increase in reservoir nutrient or fecal coliform bacteria levels. The Kingston water system municipal water intake, located at TRM 568.2R, would not be adversely impacted because of the low volume of effluent from the marina site which will be largely stormwater runoff. Overall, water quality impacts would be insignificant with implementation of the commitments listed in Chapter 4.

### **Alternative C - The Modified Proposal**

Alternative C soil erosion and subsequent sedimentation concerns from land construction activities are the same as noted above for Alternative B. The proposed reduction in marina boatslips from 812 to 254 would decrease watercraft wave energy that accelerates shoreline erosion from any concentration of watercraft. The concentration of watercraft traffic at the marina will likely contribute to the acceleration of some of the erosion of surrounding areas of unprotected shoreline. However, the installation of riprap would minimize this effect and the extent of the erosion will be less than the erosion under Alternative B. Stormwater runoff from roads, parking areas, the fuel storage area, and roofs will not significantly impact reservoir water quality.

Similar to Alternative B, the temporary, localized increases in turbidity would not result in significant adverse impacts to water quality in the area during marina construction or operation. Activities associated with the marina, including most boat traffic, will take place in the shallower overbank area and therefore unlikely to resuspend any contaminated sediments that occur in deep water areas. Since no dredging is included in marina plans, disturbance of sediments in shallow waters near the marina would be minimal, and further reduced with the smaller scope of activities under Alternative C. Proper treatment of wastewater in accordance with state and local requirements would reduce any impacts resulting from sewage and other liquid wastes to insignificant levels. Treatment consistent with these

requirements would ensure that the proposed marina development would not result in an undue increase in reservoir nutrient levels. The Kingston water system municipal water intake would not be adversely impacted. Overall, water quality impacts would be insignificant with implementation of the commitments listed in Chapter 4.

### **3.8 Aquatic Ecology**

#### **3.8.1 Affected Environment**

Aquatic communities in adjacent areas of Watts Bar Reservoir may be impacted by activities undertaken in riparian zones which change the topography of the shoreline, reduce the usefulness of shoreline areas for spawning and feeding, or alter shoreline vegetation, particularly the loss of a wooded shoreline. Overall, Watts Bar had a “fair” ecological condition rating in fall 1998 reservoir monitoring sampling of chlorophyll levels, dissolved oxygen, fish, benthic animals (worms and insect larvae living on the reservoir bottom), and sediment quality (TVA 1999b). TVA’s Vital Signs Monitoring Program samples some reservoirs annually, but Watts Bar has been sampled biannually since 1994. TVA monitoring in the fall of 1998 rated the fish community “good” at a sampling station located at TRM 560.8, compared to similar sampling localities in other run-of-river reservoirs. The fish assemblage at the transition sampling site has rated “good” in all years sampled, with the exception of 1993, when it rated “excellent” (TVA 1999b). Factors contributing to this “good” rating were species diversity, the number of piscivore and sunfish species in the sample, and very low occurrence of fish with obvious external anomalies such as deformities, lesions, or disease (Table B-1, Appendix B).

Benthic macroinvertebrates (small worms, insect larvae, and other small animals living on the lake bottom) are included in aquatic monitoring programs because of their importance to the aquatic food chain, and because they have limited capability of movement, thereby preventing them from avoiding undesirable conditions. Sampling and data analysis were based on seven parameters (eight parameters prior to 1995) that indicate species diversity, abundance of selected species that are indicative of good (and poor) water quality, an abundance of all species except those indicative of poor water quality, and the frequency of occurrence of samples with no organisms present. The benthic macroinvertebrate community at the sampling station at 560.8 rated “good” in 1998 samples (TVA 1999b).

#### **3.8.2 Environmental Consequences of Each Alternative**

##### **Alternative A - The No Action Alternative**

Since no actions would be undertaken, aquatic communities would not be impacted.

## **Alternative B - The Applicant's Proposal**

Since the proposed action would impact the shoreline and backlying land, aquatic habitat at the edge of shoreline to be altered as a result of building marina facilities could potentially be impacted. Backlying lands that are cleared or otherwise disturbed could experience temporary increases in runoff resulting in temporary increases in turbidity. Construction that would result in the removal of trees from the shoreline would result in a loss of shade and woody aquatic habitat resulting from their falling into the water due to natural events. Overall, aquatic ecology impacts would be insignificant with implementation of the commitments listed in Chapter 4.

## **Alternative C - The Modified Proposal**

The types of impacts noted above for Alternative B would also occur for Alternative C. However, impacts would probably occur at a somewhat reduced level proportional to the reduction in land disturbance and alteration of shoreline aquatic habitat resulting from the construction of a smaller marina.

### **3.9 Land Traffic**

For the purpose of this document, land traffic is considered to be licensed motorized land transportation such as automobiles, trucks, and minor other vehicles which utilize local, state, or federal public roads.

#### **3.9.1 Affected Environment**

The primary road, SR 58, in the vicinity of the proposed Savannah Harbour Marina, is a 2-lane highway with a posted speed limit of 55 MPH. Immediately south of the development, a third lane (truck climbing) is added for the benefit of southbound traffic. North of the intersection with SR 1/US 70, SR 58, becomes a 4-lane facility through the central business district of Kingston, Tennessee.

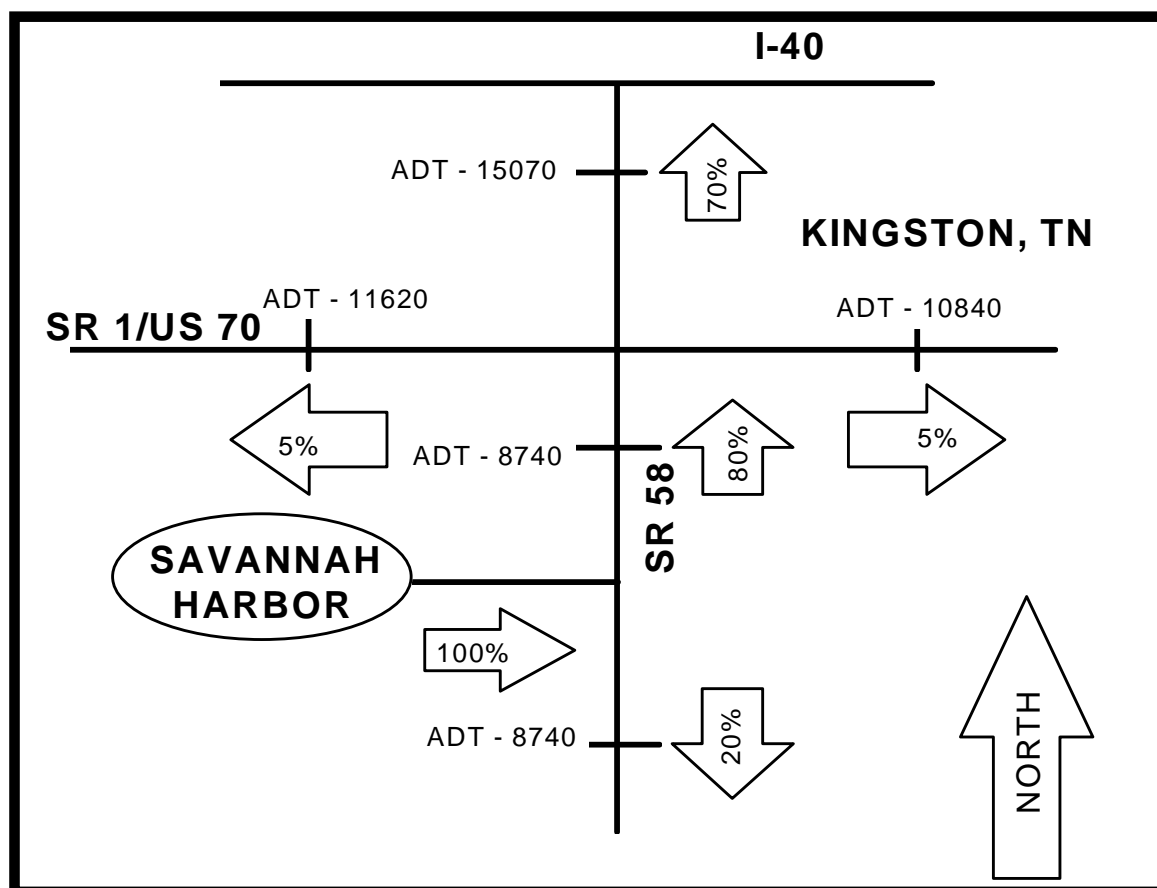
The existing Average Daily Traffic (ADT), obtained from the Tennessee Department of Transportation, is shown in the first columns of Tables 3.9-1 and 3.9-2. These indicate that SR 58 in front of the proposal facility has 8,740 vehicles per day, SR 1/US70 has 10,840 vehicles per day, east, and 11,620 vehicles per day, west, and SR 58 through Kingston has 15,070 vehicles per day.

#### **3.9.2 Environmental Consequences of Each Alternative**

To analyze land traffic, the methodology to predict Trip Generation given by the Institute of Traffic Engineers (ITE - Trip Generation 6<sup>th</sup> Edition), was used. This method uses measurable criteria of similar facilities as a variable and published existing traffic counts for those facilities. The methodology applies those counts using the variable to the proposed facility to predict trip generation. In this case, the addition of the proposed restaurant and marina were studied for each alternative.

Figure 3.9-1 is a nodal map showing the expected directional distribution of the future traffic associated with the proposed Savannah Harbour Development. It is assumed that the majority of traffic (80 percent) would be associated with origins and destinations north of the development. This is heavily influenced with the proximity of I-40 north of the site. Some traffic would use SR 1/US 70. Figure 3.9-1 also shows the percentages as if traffic were leaving the proposed development. Also, the existing ADT, obtained from the Tennessee Department of Transportation, is shown for each of the roadway segments represented.

**Figure 3.9-1 Average Daily Traffic**



**Alternative A - The No Action Alternative**

Under this alternative, the facilities would not be built and there would be no increase or impacts to existing land traffic.

### Alternative B - The Applicant's Proposal

Under the full build-out of a marina with 812 slips and a restaurant, up to 2,400 vehicles per day (VPD) would be added to the local road network. Table 3.9-1 shows the predicted additional traffic and the percentage increase in ADT.

<b>Table 3.9-1 Applicant's Proposal - Traffic Impact (Adds 2,400 VPD to the Local Road Network)</b>					
	<b>Existing ADT</b>	<b>Directional Percentage</b>	<b>Added Vehicles</b>	<b>Future ADT</b>	<b>Percentage Increase (ADT)</b>
SR 58 South of Savannah Harbour	8,740	20%	480	9,220	5.5%
SR 58 North of Savannah Harbour	8,740	80%	1,920	10,660	22.0%
SR 1/ US 70 (East)	10,840	5%	120	10,960	1.1%
SR1/ US 70 (West)	11,620	5%	120	11,740	1.0%
SR 58 through Kingston, TN	15,070	70%	1,680	16,750	11.1%

The highest percentage increase in traffic takes place on that portion of SR 58 immediately north of the proposed development. Sufficient capacity remains in all the roadway segments to accept the percentages increase for the proposed development. The SR 58 bridge over the Tennessee River, though restrictive with little to no shoulders, is in tangent alignment and offers excellent visibility. No significant safety issues exist at this location provided the existing rules of the road are followed.

A proposed access road into the development intersects at the apex of an existing curve in SR 58. Sight distance in this location is somewhat restricted. Passing travelers on SR 58 may be affected by slowly accelerating vehicles (towing boats) leaving the development. The addition of warning signs, turn lanes, and acceleration lanes should be considered in the final design of this intersection.

### Alternative C - The Modified Proposal

Under Alternative C, the reduced number of boatslips would generate up to 1,130 VPD (see Table 3.9-2). The SR 58 bridge and access road intersection concerns are the same as Alternative B. All other impacts would be similar to Alternative B, but to a lesser degree.

<b>Table 3.9-2 Modified Proposal - Traffic Impacts (Adds 1,130 VPD to the Local Road Network)</b>					
	<b>Existing ADT</b>	<b>Directional Percentage</b>	<b>Added Vehicles</b>	<b>Future ADT</b>	<b>Percentage Increase (ADT)</b>
SR 58 South of Savannah Harbour	8,740	20%	226	8966	2.6%
SR 58 North of Savannah Harbour	8,740	80%	904	9644	10.3%
SR 1/ US 70 (East)	10,840	5%	57	10,897	0.5%
SR1/ US 70 (West)	11,620	5%	57	11,677	0.5%
SR 58 thru Kingston, TN	15,070	70%	791	15,861	5.2%

### 3.10 Navigation/Transportation

#### 3.10.1 Affected Environment

The applicant has submitted plans to construct a commercial marina at Tennessee River Mile 567.0L on Watts Bar Reservoir. This site is along an inside bend of the river where there are several small islands between the proposed marina and the marked navigable channel.

#### 3.10.2 Environmental Consequences of Each Alternative

Harbor limits for the proposed facility would be located a minimum of 100 feet landward of the buoyed commercial navigation channel. The proposed facilities will front a commercial navigation channel where the exposed facilities and any moored boats will be vulnerable to wave wash and possible collision damage from passing vessels.

Because of the proximity to the commercial channel at this location, a “no wake” zone would not be possible. However, the proposed floating breakwater would help to reduce the impact of wave wash actions.

#### Alternative A - The No Action Alternative

Under this alternative, the facilities would not be built and there would be no impact to existing water transportation and navigation.

## **Alternative B - The Applicant's Proposal**

Under Alternative B, the impacts to water transportation and navigation are insignificant based on the location on an inside bend of the river and the presence of several islands between the channel and portions of the marina.

This conclusion is based on the implementation of the conditions as described in Chapter 4, which include the 100-foot navigation buffer requirement, prohibition of a "no wake" zone outside the established breakwater, and notification of possible collision and wake wash damage.

## **Alternative C - The Modified Proposal**

Under Alternative C the impacts to navigation would be less than those for Alternative B, because of the smaller effect from the reduced number of boats. Provide the same conditions as Alternative B were implemented the impact would still be insignificant.

### **3.11 Noise**

#### **3.11.1 Affected Environment**

The area that is potentially affected by the operations of the proposed Savannah Harbor Marina includes the areas upstream, downstream, and across the river from the marina site. Land uses for these areas range from sparsely developed shoreline to City of Kingston waterfront. Some of the current noise sources include highway traffic over the Tennessee River Bridge, traffic and other activities in the City of Kingston, and residential activities from the shoreline houses. The other important source of noise is the activity stemming from recreational and commercial boat usage.

#### **3.11.2 Environmental Consequences of Each Alternative**

The potential noise impact to the surrounding community is not an increase in the sound level from the boats, but a potential increase in the number of boat-noise exposures. To quantify the present boat usage in the immediate area of the proposed marina, two boat counts were made on consecutive Saturdays, May 1 and 8, 1999 (see Table 3.6-1). These counts were 195 and 131 observed boats, respectively, for the time period of 6 a.m. to 7 p.m. All of these were recreational boats except for one commercial craft on May 1.

The owners or managers at six large marinas across the Valley were surveyed to help determine the rate of usage for boats moored at marinas. They estimated a 25 to 50 percent usage for the busiest weekend day in the summer, and from 10 to 40 percent for typical summer weekend days. An average estimated boat usage rate from all of those surveyed would be about one-third, or 33 percent.

Noise associated with the behavior of patrons at boat parties and other social gatherings at the proposed marina is already limited by local civil statues and likely to be controlled by the marina operator. Therefore, it is not likely to have an effect on the surrounding community or environmental resources.

### **Alternative A - The No Action Alternative**

Under alternative A, the marina would not be constructed and there would not be an impact from additional noise.

### **Alternative B - The Applicant's Proposal**

The increase in boat traffic caused by the marina's operation is a function of marina size and boat usage rate. Upon completion of the final phase of the proposed marina its capacity would be 812 boatslips. Based on the average usage rate from the marina operators, the number of boats used from the proposed marina would be about 268 during a typical weekend day in the summer.

For this review, this number is compared to boat usage if the marina was not operating. The survey of current boat usage counted 195 and 131 boats on successive Saturdays in May. Use on weekend days in the summer would be greatly increased. There was no data found that indicates how much summer use would increase. For this comparison an estimated 100 percent increase (doubling) is used for weekend days in the summer. The estimated boat-count range would be projected to be from 262 to 390. Adding 268 boats from the proposed marina to the estimated 262 to 390 boats already using this part of the river would result in an increase of 69 to 102 percent.

The potential increase in cumulative sound level exposure from the additional boats may not be discernible over a full day; however, shoreline residents in the vicinity of the marina would likely experience an increase in the number of boat-exposure episodes.

### **Alternative C - The Modified Proposal**

Most residents along the shoreline in the affected environment already hear substantial boat noise as part of their daily lives. A reasonable increase in the number of boats using the river in the affected environment areas would not cause the cumulative impact to be significant.

Limiting the increase to about one-third of the current estimated usage rate would produce about 86 to 129 additional boats which would result in insignificant impacts. Using the average marina use rate (33 percent), a marina of about 254 to 387 boats would be an insignificant impact on the community noise environment.



Boat usage rates are expected to be higher during certain periods such as summer weekends and holidays. However, even during such periods, the usage rate is expected to be less than the 33 percent used for this evaluation and the potential impact would therefore not be significant.

### **3.12 Cumulative Impacts**

Cumulative impacts is the net impact that results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions (CEQ Regulations, Section 1508.7). Commercialization of the shoreline, the effect on existing marinas, and litter were identified in scoping as having a potential for causing cumulative impacts by the proposed marina and are analyzed below.

Other trends identified through the analysis of environmental consequences (Chapter 3) are that the Watts Bar area is one of the fastest growing areas in Tennessee (TVA, 1999). In particular, both Meigs and Loudon Counties, which have large parts of the reservoir in their boundaries, had over a 20 percent increase in population from 1980 to 1994. Also, the Watts Bar Reservoir Water Quality ecological indicator for chlorophyll levels have nearly doubled over the last five years (see Section 3.7) changing the rating from good to poor. The construction of the marina is not expected to have any effect on chlorophyll levels.

#### **3.12.1 Commercialization of the Shoreline**

Watts Bar Reservoir has 771 miles of shoreline of which 159 miles or 21 percent has been developed. The reservoir has 27 commercial recreation areas (TVA, 1988), 22 of these are located on the lower quarter of the lake below river mile 552. There are six active barge terminals on Watts Bar Reservoir; two on the lower half, one on the upper half and three on the Emory River. The reservoir carries a relatively small portion of the tonnage shipped (3-4 percent) on the Tennessee River. Most of the shoreline development on Watts Bar Reservoir has been residential. Overall, the addition of the proposed marina in the selected location would not have significant cumulative impacts to the commercialization of the shoreline.

#### **3.12.2 Effect on Existing Marinas**

An increase in the use of Watts Bar Reservoir for water-related recreation is expected in the future, as boat ownership continues to grow. Currently, there are approximately 1,200 commercial boatslips on Watts Bar Reservoir, with an average peak seasonal occupancy of 85 percent. Alternatives B and C could eventually add 812 or 254 boatslips, respectively, above those currently existing. Although either alternative is an increase to the existing number of boatslips, they are proposed to be located near the upper reaches of the lake where few commercial boatslips are currently available. The increased availability would be beneficial to users near the upper reaches. The effect of increased competition on other existing marinas would be temporary and diminish as the distance from the proposed marina increases.

This is expected to have an insignificant cumulative effect as other marina facilities on Watts Bar or nearby Fort Loudoun or Tellico Reservoirs reach capacity and the number of boat owners continues to increase.

### **3.12.3 Litter**

Litter is a continuous concern wherever there is human activity. Refuse disposed in or near recreation areas is not desired, and often accumulates in places convenient for discarding or at locations transported by wind and water. The proposed marina may concentrate more boats in the area which could result in the appearance of more litter in the immediate vicinity. However, this impact is expected to be minimal; moreover, TVA contract conditions requiring a licensee to maintain the property in good condition to control all pollutants into the air, streams, lakes, groundwater, and onto the land would further mitigate this impact.

### **3.13 Unavoidable Adverse Effects**

Alternatives B or C would likely result in the following impacts. Existing opportunities for informal recreation on the tract would be eliminated as the entire shoreline tract would be managed for commercial recreation purposes. There would be temporary impacts creating some turbidity and erosion as a result of the construction. The character of the existing natural shoreline would change as a result of the riprap stabilization. Some additional background noise will be added to the marina's vicinity as a result of the marina operation.

### **3.14 Relationship of Short-Term Uses and Long-Term Productivity**

The site would continue to provide limited riparian habitat for wildlife only in those areas where vegetation would be left in place. Also the site would not provide a natural shoreline condition while it is being used as a marina. Long-term productivity resulting from the proposed marina would include the additional capacity for year-round boat mooring.

### **3.15 Irreversible and Irretrievable Commitments of Resources**

The proposed marina would not represent an irreversible commitment of land or water resources. Resource uses have changed in the past and could continue to change in the future. If the site were abandoned, it could revert to natural riparian habitat, either by restorative efforts or through natural succession.