

Attachment H – TVA Analytical Methodologies

(For Key Impact Analysis)

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SENSITIVE SPECIES

In preparing a *National Environmental Policy Act* (NEPA) document for a project, each project is reviewed by technical specialists in the TVA's Natural Heritage Resources Program to identify natural resource issues that may occur in the vicinity of the proposed project site. Intensity of field investigations varies based upon the absence or presence of protected species or their habitat and habitat quality.

To begin an evaluation of a proposal, TVA biologists review TVA's Natural Heritage database to identify state- and federally listed animals or natural areas known to occur within the counties of the proposed project site and its surrounding areas. These databases are part of the NatureServe Network (www.Natureserve.org), comprised of state natural heritage programs throughout North America. The TVA Natural Heritage Resources Program is one of three regional natural heritage programs in this network. The TVA database contains records for protected plants, animals, caves, heronries, eagle nests, and natural areas known from within the 201-county TVA Power Service Area.

The TVA Natural Heritage database is dynamic, with updates and additions taking place throughout the year. Only credible records are included in the database, and sources include results of field surveys by TVA biologists, research publications, museum and herbarium specimens, unpublished reports from biologists outside TVA, data exchanges with the seven state heritage programs overlapped by TVA's coverage area (Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia), and data exchanges with five offices of the U.S. Fish and Wildlife Service (Cookeville, Tennessee; Asheville, North Carolina; Athens, Georgia; Daphne, Alabama; and Jackson, Mississippi). These databases are invaluable tools used at all levels of TVA's environmental reviews.

Once the database is reviewed and a potential species' list is developed, land use/land cover products and/or aerial photographs are examined to identify suitable habitat for listed species on the project site. Examining these products may also assist TVA biologists in identifying additional species and habitat that may exist on site but may not have been identified by the database review. Field investigations are initiated after these preliminary reviews are completed.

Multiple TVA biologists (botanists, terrestrial and aquatic ecologists, wetland scientists) or contractors visit the proposed project site to characterize habitat conditions and wildlife communities within the project area. Specific habitat features such as caves, bluffs, glades, and wetlands as well as overall habitat composition are noted. If rare species or their habitats are identified, further field investigations are performed, and mitigation to protect local populations of rare species are proposed.

TVA VISUAL RESOURCES
SCENIC VALUE CRITERIA
FOR SCENERY INVENTORY AND MANAGEMENT

The criteria for classifying the quality and value of scenery has been adapted from a scenic management system developed by the U.S. Forest Service and integrated with current planning methods used by the Tennessee Valley Authority. The classification process is also based on fundamental methodology and descriptions adapted from Landscape Aesthetics, A Handbook for Scenery Management, Agriculture Handbook Number 701, U.S. Forest Service, U.S.D.A. 1995.

The process and criteria are used to compare the value of scenery to other resource values during inventory and land planning tasks. They are also used to evaluate the extent and magnitude of visual changes that could result from proposed projects, as part of the environmental review required under NEPA. In addition they can be useful to help establish management objectives for improving or maintaining the scenic quality of managed lands.

Scenic Attractiveness - 3 levels

Attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. The combination of rock outcrops, water bodies, landforms, vegetation patterns, and other natural features that shape landscape character also help define scenic importance. The presence or absence of these features, along with valued attributes such as variety, uniqueness, mystery, pattern, order, vividness, harmony, and balance are used to classify the scenic attractiveness of a landscape.

Category 1: Distinctive - Areas where the variety of land forms, rock, vegetation patterns, water, and other features have outstanding or unique visual quality. These areas have strong, positive attributes that are relatively uncommon in the characteristic landscape. This category also includes areas in visually strategic locations that have somewhat more common attributes.

Category 2: Common - Areas where the land forms, rock, vegetation patterns, water, and other features have ordinary or common visual quality. These areas have generally positive but typical attributes, with a basic variety of forms, colors, and textures that are normally seen throughout the characteristic landscape.

Category 3: Minimal - Areas where the natural features have little change in form, line, color or texture resulting in low visual quality. Rock forms and vegetation patterns of any consequence are often not present, and these areas generally have weak or missing attributes. All areas not classified as 1 or 2 are included in this category.

Scenic Integrity - 4 levels

Integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. Human alteration can sometimes raise integrity, such as an impounded water body that unifies the landscape while adding variety, mystery, harmony, and balance. Most often scenic integrity is lowered by human alteration and the addition of visually disruptive elements. The presence and degree of discordant alteration is used to classify the scenic integrity of a landscape.

- High:** Areas where the valued landscape character appears to be intact and unaltered, with very minor deviation. Any deviation present must repeat the form, line, color, texture and pattern of the landscape so closely and at such a scale that they are not evident.
- Moderate:** Areas where the valued landscape character appears to be slightly altered. Noticeable deviations must be visually subordinate to the landscape being viewed, and borrow much of the natural form, line, color, texture and pattern.
- Low:** Areas where the valued landscape character appears to be modestly altered. Deviations begin to dominate the landscape being viewed, but the alterations should share natural color, shape, edge pattern, and vegetation characteristics in order to remain compatible or complimentary.
- Very Low:** Areas where the valued landscape character appears to be heavily altered. Deviations strongly dominate the landscape and may not share any of the visual attributes. The alterations may be visually disruptive and provide significant negative contrast to the natural landscape characteristics.

Scenic Visibility - 2 parts, 3 levels each

Landscape visibility is a measure of scenic importance based on several essential interrelated considerations which include viewer context and sensitivity, number of viewers, frequency and duration of view, level of detail seen, and seasonal variation. A large number of highly concerned viewers who view the landscape for a long time period may raise the scenic importance significantly. The importance may be much lower when only a few viewers with low concern see the landscape for a brief period. These considerations are combined in two parts which are used to classify the scenic visibility of a landscape.

Sensitivity : The level of scenic importance based on expressed human concern for the scenic quality of land areas viewed. Sensitivity may be derived/confirmed by resident and visitor surveys.

- Level 1:** Areas seen from the reservoir, lake shore residents, and lake view residents, where the number of viewers and concern for scenic quality are normally quite high.
- Level 2:** Areas seen from principle roadways, use areas, and other public viewing areas. Concern for scenic quality is generally high while the number of viewers, view frequency and duration are moderate.
- Level 3:** Areas seen from secondary travel routes, use areas, and any not included in the other levels. Concern may be high in some areas, but number of viewers is generally low.

View Distance: A principal indicator of scenic importance based on the distance an area can be seen by observers, and the degree of visible detail within that zone.

- Foreground:** From 0 feet to ½ mile. A distance zone where the individual details of specific objects are important and easily distinguished. Details are most significant within the immediate foreground, 0 - 300 feet.
- Middleground:** From ½ mile to 4 miles. The zone where most object characteristics are distinguishable, but their details are weak and they tend to merge into larger patterns. When landscapes are viewed in this zone they are seen in broader context. Human alteration may contrast strongly with the larger patterns and make some middleground landscapes more sensitive than the foreground.
- Background:** From 4 miles to the horizon. The distant landscape, where specific features are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. Details are generally not visible and colors are lighter.

Scenic Value Class - 4 levels

The value class of a landscape is determined by combining the levels of scenic attractiveness, scenic integrity and visibility. The table below shows the various combinations and the resulting scenic class. It is a general guide, and is intended to complement both a thorough field analysis and careful review of the visual absorption capacity.

- Excellent:** Areas with outstanding natural features that appear unaltered. Very minor deviations may be present but are generally unnoticeable even in the foreground. These areas are highly visible in the foreground and midground from both land and water. Unaltered areas that may be less outstanding but are in a visually strategic location also have excellent scenic value.
- Good:** Areas with attractive but common scenic quality and no distinctive natural features. Minor human alteration may be seen in the foreground but is barely noticeable in the midground. These areas have relatively high visibility from both land and water.
- Fair:** Areas of common or minimal scenic quality with little or no interesting features. Moderate human alteration is seen in the foreground but is less distinct in the midground due to compatible form and color. These areas have relatively high visibility from both land and water.
- Poor:** Areas that have very little scenic importance and/or visually significant disturbances resulting from human activity. The alterations provide discordant contrast in the natural landscape due to incompatible size, shape, color, and material. The areas are clearly visible in the foreground and midground, and have relatively high visibility from both land and water.

Scenic Value Class Selection Table													
Visibility Levels:	Sensitivity View Distance	1 foreground			1 midground			2 foreground			2 midground		
		1	2	3	1	2	3	1	2	3	1	2	3
Scenic Attractiveness Categories													
Scenic Integrity Levels	High	E	G	F	E	E	G	E	G	F	E	E	G
	Moderate	G	G	F	E	G	F	G	G	F	E	G	F
	Low	F	F	P	F	F	P	F	F	P	F	F	P
	Very low	P	P	P	F	P	P	P	P	P	F	P	P
Scenic Value Class: E = Excellent; G = Good; F = Fair; P = Poor													

Visual Absorption Capacity

Absorption capacity indicates the relative ability of a landscape to accept human alteration with the least loss of landscape character and scenic value. These indicators are useful to help predict potential difficulty or success with proposed development and scenic management. They are based on characteristics of the physical factors found in a landscape. Each characteristic has a capacity range from less to more, and the primary ones are shown in the list below. Visual absorption is also affected by the variety of landscape patterns, and the amount of screening provided by landforms, rock, water bodies, and vegetation.

<u>Factor</u>	<u>Least Capacity to Absorb Change</u>	<u>Greatest Capacity to Absorb Change</u>
Slope	Steep Unstable geology	Level Stable geology
Vegetation	Sparse cover Low cover, grasses and shrubs Few species, little or no pattern	Dense cover Tall cover, trees Multiple species, diverse pattern
Landforms	Simple shape	Diverse shapes, heavily dissected
Soils	Easily eroded Poor, slow revegetation	Erosion resistant Rich, fast revegetation
Shoreline	Simple line, little or no interruption	multiple interruptions, diverse features
Color	Narrow range of indigenous colors	Broad range of indigenous colors

Desired Landscape Character

Scenic attractiveness and the existing level of scenic integrity serve as the foundation for selecting the preferred landscape character. Lake adjacency and ecosystem trends should be considered along with the historic visual character to help any changes be more complete, attractive, and sustainable. Several types of landscape character and the related long range objectives for scenic integrity are described below.

Natural Evolving landscape character expressing the natural change in ecological features and processes with very limited human intervention.

Natural Appearing landscape character that expresses predominantly natural qualities but includes minor human interaction along with cultural features and processes that are relatively unobtrusive.

Pastoral landscape character expressing dominant human developed pasture, range, and meadow, along with associated structures, reflecting historic land uses, values, and lifestyles.

Rural landscape character that expresses sparse but dominant human residential and recreational development, along with associated structures and roadways that reflect current lifestyles.

Urban landscape character expressing concentrations of human activity in the form of commercial, residential, cultural, and transportation, facilities, along with supporting infrastructure.

Visual Management Objectives

Based on the scenic value class, management objectives may be developed to accomplish or maintain the visual character desired for each area.

Preservation:

Areas classified Excellent, and managed for a natural evolving landscape character. Only very low impact recreational and scientific activities are allowed, and no facilities are permitted.

Retention:

Areas classified Good, and managed for a natural appearing landscape character. Permitted activity or minor development should repeat the natural form, line, color, and texture of the area and remain visually subordinate to the surrounding landscape. Changes in the size, intensity, direction and pattern of activity should be unobtrusive and not readily evident.

Modification:

Areas classified Good or Fair, and managed for pastoral or rural landscape character. Permitted activity and development may dominate the original character but should remain visually compatible with the remaining natural landscape. Vegetation and landform alterations should repeat the natural edges, forms, color, and texture of the surrounding area. The scale and character of structures, roads, and other features should borrow naturally established forms, lines, lines, colors and patterns to provide the greatest possible visual harmony.

Maximum Modification:

Areas classified Fair or Poor, and managed for urban landscape character. Permitted activity and development generally dominates the original visual character. Vegetation and landform alterations should remain visually harmonious with the adjacent landscape. When seen in the foreground and middleground, they may not fully borrow the surrounding natural forms, lines, colors and textures. Likewise, development features seen from the same distances may be out of scale and have significant details that are discordant with the natural landscape character. Overall development should be directed toward achieving the greatest possible visual harmony.

Enhancement:

Any area classified less than Excellent, with a relatively short term management objective intended to restore and/or improve the desired scenic quality. Rehabilitation activities may include alteration, concealment, or removal of obtrusive and discordant elements. Enhancement activities may include addition or modification of natural elements and man-made features to increase the variety and attractiveness of spaces, edges, forms, colors, textures, and patterns.

Recreation Environmental Review Methodology

The recreation analysis identifies unmet recreation needs by looking at supply-side and demand-side data. The supply-side data include (1) TVA Recreation Inventory, (2) Capability/Suitability Analysis, and (3) Shoreline Development and Boating Density Data. The demand-side data include (1) National Survey on Recreation and the Environment (NSRE) Data, (2) Reservoir Operations Study (ROS) Recreation Survey Data, (3) State Comprehensive Outdoor Recreation Plans (SCORP), and (4) Creel Survey Data Parcels of TVA-managed public lands most capable and suitable of fulfilling the unmet recreation needs. These needs are identified as well as opportunities for partnerships and/or expansion of existing facilities to satisfy unmet or projected recreation needs.

Supply-Side - TVA's recreation inventory lists the available developed recreation facilities on the reservoir, including stream access sites. The facilities are listed for each reservoir and analyzed to gain an understanding of the types of facilities available to meet user needs. A capability/suitability analysis assessed Parcel 52 for various development alternatives. The analysis results determined the feasibility of the uncommitted parcel to support a variety of regional development needs, including infrastructure support, within the limits of TVA's policies. Shoreline development and boating density data were then synthesized to determine how trends in shoreline development may affect future boating density, and thus capacity issues, that may impact the need to establish additional developed recreation facilities. No boating density or capacity issues were identified for the Mountain Reservoirs Land Management Plan's scope of 10 years.

Demand-Side – Recreation demands in the Blue Ridge region were determined using NSRE data along with Woods and Pool population data. Recreation trends, projected population increases, recreation activity participation rates, and change in demographics in the Blue Ridge area were considered in order to project recreation demands within a 10-year planning horizon. The ROS Recreation Survey data, SCORP, and Creek Survey data were then used to further compare and contrast the recreation trends noted using NSRE data and Woods and Pool population data. ROS, SCORP, and Creel data did correlate with the results of the NSRE recreation trends.

Conclusion – High priority recreation needs were compared to current recreation opportunities on the reservoir. Based on the comparison results, the recommendation was to allocate the remainder of Parcel 52 for recreation purposes. Additionally, the recommendation included seeking partnerships to meet projected recreation demands, particularly for improved water access, picnic facilities in support of family gatherings, wildlife viewing (birding), and trails. The construction of the proposed substation and TL would neither preclude nor significantly affect potential recreational uses that would otherwise be considered by TVA on Parcel 52.

Socioeconomics Environmental Review Methodology

The most common economic and social impacts are changes in local or area population, employment, and income that could result directly or indirectly from the proposed action or policy. Whether such impacts would be noticeable is determined by analyzing the relative magnitude of the impacts on current or future population, employment, and income in the impacted area. This analysis requires a baseline that includes data on population (and in some cases projected population), employment and the industrial distribution of employment, and income data for the impact area and larger areas such as the state and the nation. These data are obtained from government agencies, primarily the U.S. Census Bureau and the U.S. Bureau of Economic Analysis. The impact area generally consists of counties that would be directly impacted; in some cases, the primary impact area may be defined in terms of subcounty areas such as Census tracts. If the direct effects are large enough, secondary (indirect and induced) effects may also be considered. Effects are quantified, if feasible, based on the level of knowledge about the effects at the time the analysis is done. If it is not feasible to quantify the effects, they are analyzed qualitatively.

Environmental justice is also part of the socioeconomic analysis. It is evaluated by analyzing whether the proposed action or policy would be likely to have disproportionate negative impacts on minority or low-income populations. The location and relative magnitude of any such populations within the impact area is determined. The impacts are then evaluated in terms of their geographic distribution, in order to determine whether they would be disproportionate with respect to disadvantaged populations.

Impacts to other resource areas may have secondary social and economic impacts, such as property values, quality of life, or nuisance and inconvenience. These impact concerns typically include transportation, noise, scenic, or air and water quality impacts. Analyses for these subject matter areas are reviewed to determine the need for analysis of related social and economic impacts. Analyses may include review of professional research articles, although articles relevant to these secondary social and economic impacts are limited.