TENNESSEE VALLEY AUTHORITY

GUIDELINES FOR CONDUCTING BIOLOGICAL AND CULTURAL SURVEYS AND IMPACT ANALYSES

January 2025

CONTENTS

EXECUTIVE SUMMARY

DISCIPLINE DESCRIPTION / OVERVIEW

As a federal entity, TVA is subject to the requirements of the National Environmental Policy Act (NEPA). And as a result, TVA must consider the impacts a proposed project may have on the human environment before taking an action. To assist the NEPA team in meeting the requirements of their reviews, TVA's Biological Compliance, Cultural Compliance, and Reservoir Operation teams work in concert to ensure TVA remains in compliance with a number of laws and regulations. TVA must also analyze impacts to a number of other resources. However, this document only describes the requirements of those three groups.

The Biological Compliance team works to ensure TVA remains in compliance with the Endangered Species Act (ESA), provisions in the Clean Water Act (CWA) around streams and wetlands, the Migratory Bird Treaty Act (MBTA), and various Executive Orders. The Biological Compliance team also performs reviews for impacts to natural areas and managed lands within the TVA Valley. The Biological team also houses the Natural Heritage Program, which includes TVA's database of over 40,000 element occurrences of rare and sensitive species. This program assists TVA in completing environmental reviews and in guiding conservation opportunities.

The Cultural Compliance team is responsible for ensuring compliance with a number of regulations including the National Historic Preservation Act (NHPA), the Native American Grave Repatriation Act (NAGPRA) and the Archaeological Resources Protection Act (ARPA). In addition to these regulations, the Cultural Compliance team also maintains the relationship and consultation responsibilities with the various sovereign tribal nations that historically called the Tennessee Valley their home.

The Reservoir Operations team is not only responsible for the management of the Tennessee River System, but also provides project reviews to ensure compliance with Executive Order 11988 which directs agencies to avoid taking actions which may adversely affect floodplains.

SAFETY AND PROPERTY ACCESS

Please see your environmental point of contact for PPE and property access on a project-to-project basis. Regulations and requirements vary across TVA depending on facility and what sort of environments may be encountered.

BIOLOGICAL COMPLIANCE

PROJECT FOOTPRINT

A project footprint (also known as Biological Project Area) is the area proposed to be surveyed for a given project. This footprint can vary greatly depending on the type of project. Below are some guidelines for developing project footprints on transmission projects.

- Buffer all work structures to include the full width of the open ROW based on transmission line voltage (see table), not to exceed 200 feet total width
- Buffer all work structures to ~100 feet on either side of the structure (along the length of the ROW)
- The entire span between contiguous work structures should be included in the project area where access roads are located on the ROW between structures

TL Buffer Distances	
TL KV	**Buffer Distance**
2, 4, 13, 26	75 ft total ROW buffer
46, 69	100 ft total ROW buffer
138,161	150 ft total ROW buffer
230	175 ft total ROW buffer
345, 500	200 ft total ROW buffer

- Transmission ROW (new construction)- The entire proposed ROW should be included in the Project Area
- Optical Ground Wire (OPWG) installation- Each structure with proposed fiber installation must be reviewed for presence of nesting birds on the structure even if there is no groundwork below it.
- Access Road
    - Off ROW - Buffer 12.5 feet on either side of line, 25 ft total road width
    - On ROW – Include the entire width of the open ROW based on transmission line voltage (see above)
- Other Polygon (substation, ash pond, land disposal, etc.) - Delineated as needed using project scope.
- Other Point - Buffer according to project specifics

GEODATABASE

A biological compliance specific geodatabase containing polygon/point/line feature classes will be used for all GIS related deliverables. The associated feature attributes will be completed as described in Attachment D-4 (Feature Class Attribute Key).

SECTION 7 USFWS ESA

Tennessee Valley Authority staff is responsible for all direct communication with the U.S. Fish and Wildlife Service (USFWS) related to Endangered Species Act compliance. Consultants may be tasked with collecting field data to support project-related consultations, but consultants should not directly communicate or correspond with the USFWS on behalf of the TVA on any project where the agency is subject to Section 7 of the Act unless explicitly requested to do so by TVA.

One notable exception is for consultants that must fulfill to Section 10 permit requirements related to bat handling permits (e.g. survey proposals and results of federally listed bat presence/absence surveys).

HERITAGE DATABASE INFORMATION

TVA's Natural Heritage database houses approximately 46,000 records of federal- and state-listed plant and animal species, formally managed natural areas, ecologically significant sites, wading bird colonies, some geologic features (i.e., caves and waterfalls), and rare plant communities. Records are added or updated to the database throughout the year using the results of TVA's endangered species monitoring, field surveys for environmental review projects, unpublished and published scientific literature, data from museums and herbaria, information from personal contacts in other agencies or academia, data from formal exchanges with heritage programs in the seven states overlapped by TVA's PSA, and data from formal exchanges with five FWS offices with regulatory authority in TVA's PSA. Data shared with external consultants is considered sensitive and is not to be re-distributed. When using TVA NHD data in reports limit tables to Species names and statuses, do not include EO data, EO directions, etc.

AQUATIC ECOLOGY

OVERVIEW

These guidelines are intended to prescribe the content of the aquatic ecology survey reports and will be used in the analysis and preparation of environmental documents. The guidelines shall be used as part of the environmental review process to meet TVA, state, and local requirements.

The intent of the aquatic survey is to identify aquatic resources within the project site, determine impacts, and recommend suitable mitigation measures.

PREPARER'S QUALIFICATIONS & CERTIFICATIONS

Persons preparing or responsible for aquatic ecology reports should have the following minimum qualifications:

- A Bachelor of Science degree from an accredited college or university in zoology, aquatic ecology, fisheries, conservation biology, or closely related field.
- Five years of experience conducting hydrologic determinations in any of the states within the TVA power service area (Kentucky, Virginia, Tennessee, North Carolina, Georgia, Alabama, or Mississippi).
- If working in Tennessee, the preparer must be certified with the Tennessee Department of Conservation (TDEC) as a Qualified Hydrologic Professional and provide TVA with his/her certification number.

SURVEY TECHNIQUES & TYPES OF SURVEY REPORTS

Field surveys should be conducted within the project action area. A sub-meter GPS must be used to record the location of all perennial, intermittent, ephemeral, wet weather conveyances (WWC), ponds, springs, and other aquatic features. A TDEC Hydrologic Determination Field Data sheet must be filled out for each aquatic feature and provided regardless of the state where the feature is located. Describe the suitability of all aquatic habitats for protected aquatic species that occur in the area.

There are instances where TVA biologists would conduct field surveys for aquatic T&E species, especially if there is a high potential for T&E species to occur in certain geographic regions. If this is the case, then

qualified consultants could carry out hydrologic determinations as planned but would not be responsible for T&E surveys unless that task has been explicitly contracted out to a designated consultant (See 'Aquatic T&E Surveys', below). This would be determined on a case-by-case basis during a project screening review performed by TVA biologists.

SUBMISSION REQUIREMENTS, REPORTING FORMS, REQUIRED CONTENT & FORMAT

The aquatic survey report shall contain the elements listed below and be presented in the following format.

A. TITLE PAGE
    a. Report Title
    b. Project Title
    c. Prepared for TVA
    d. Party preparing report
    e. Investigators
    f. Date
    g. Signature block of principal investigators
B. TABLE OF CONTENTS
    a. Major Report Sections
    b. Figures/Maps/Graphics etc.
C. Management Summary
D. TDEC Hydrologic Determination Forms
    a. Please provide HD forms as an editable version as well as a compiled non-editable PDF version.
    b. Please use the sequenced stream name (S001, S002, etc.) for the Site Name/Description category on HD forms. Personal Field IDs can be included in parentheses, or in the Notes section of HD forms.
    c. See below for guidance on stream labels and sequencing.
E. Geo-referenced Photographs
F. Field Notes
G. ArcGIS Data Post-Processing Requirements:
    a. All mapped aquatic features (streams, ponds, etc) should be included in a geodatabase following the template described in **Attachment D.3 - Geodatabase** and should have complete attribute tables as described in **Attachment D.4 - GDB Feature Class Attribute Key**.
    b. Aquatic features should be created as polylines in the BIOLOGICAL_POLYLINES data set:
        i. Streams < 10 feet wide should be depicted with a single polyline, preferably along the thalweg if possible.
        ii. Streams > 10 feet wide should be depicted by two polylines, one on either bank. This can include oxbows, abandoned floodplain channels, etc. The two polylines should then be merged using the Merge geoprocessing tool to represent one feature in the attribute table.

iii. Lakes, ponds, and other large bodies of water should be represented by a single polyline, creating a circle along the perimeter of the feature.

c. Stream Labeling and Sequencing:
   i. The sequenced stream name (S001, S002, etc.) will be used as the primary identifier on data forms and in stream tables. Please note that Streams (perennial and intermittent) are categorized by a prefix of "S," Ephemeral Streams and Wet Weather Conveyances are categorized by "E," and Ponds and categorized by "P." E.g., if the project had one perennial stream, one intermittent stream, one ephemeral stream, and one pond, the sequencing would be as follows: S001, S002, E001, P001.
   ii. For Transmission projects requiring subsequent Access Road surveys, water features encountered along Access Road routes should contain a suffix of "R." Sequencing for Access Road water features should begin where streams documented along the Transmission Line ended. E.g., if 23 streams were documented along a given Transmission Line survey, the first stream encountered during an Access Road survey would be labeled as S024R.

SURVEY RESULTS

A. Physical Characteristics
B. Flora – Fauna
C. T&E
D. Maps, etc.

PROJECT IMPACT ANALYSIS

Identify all potential impacts of the project (both on-site and off-site impacts) to aquatic ecology within a 10-mile radius of the proposed project boundaries. Species list will be generated from the TVA Regional Natural Heritage Database, the U.S. Fish and Wildlife Service (USFWS) list, and the state heritage programs species list. Species that are considered extirpated do not need to be included in the species tables but should be mentioned in the write up as historically occurring but now considered extirpated from the area. The report should evaluate the significance and quantify/qualify impacts. Impact assessments need to include analysis of direct impacts, indirect and cumulative impacts as appropriate.

MITIGATION AND MONITORING REQUIREMENTS (IF APPLICABLE)

The consultant will coordinate with the TVA Specialist for instances where impacts are unavoidable, and mitigation and monitoring would be coordinated with the appropriate state agency.

ATTACHMENTS

D.3 Geodatabase
D.4 Feature Class Attribute Key

AQUATIC T&E SURVEYS

For many geographic areas within the TVA power service area, it is not necessary to conduct aquatic T&E surveys due to a lack of suitable habitat for aquatic T&E species to persist in. If there is a high potential for T&E species to occur in certain geographic regions, then TVA biologists would likely conduct in-house field surveys for aquatic T&E species. However, if TVA does not have the capacity to conduct in-house aquatic T&E surveys, then this task can be contracted out to managed task contractors that meet the specific criteria below:

- M.S. degree or higher in aquatic or related field. (B.S. degree considered with appropriate experience.)
- Minimum of 5 years of experience focusing on aquatic ecology with an emphasis on field biology.
- Federally permitted biologist for aquatic T&E species in the TVA Power Service Area.
- State Scientific collection permit for aquatic species for the state where the action would occur.
- Working knowledge of aquatic biota in the TN Valley, with emphasis on species-level identification of whichever taxon is targeted (fish/mollusk/crayfish).
- Individual has contributed specimens to an actively curated natural history collection *or* rare aquatic animal records to a state Natural Heritage program within the last 5 years. Be prepared to list applicable institution(s).

In general, aquatic surveys should be conducted by sampling for aquatic biota in water bodies present within the project area. In many instances, aquatic T&E surveys are being conducted to target a specific taxon (fish/mollusk/crayfish) in a specific habitat type. For this reason, most surveys would be conducted by qualitatively sampling perennial streams within the proposed project footprint that would likely harbor the taxon being targeted. A sampling plan should be developed by consulting a TVA aquatic biologist to ascertain the most efficient way to survey for the taxon in question. Use general guidelines below for collecting field data.

- Delineate and categorize aquatic habitats using GPS and provide TVA with the resulting feature class.
- Systematically survey suitable habitat for the taxon you are targeting using predetermined sampling techniques (i.e. backpack shocking, seining, digging burrows, snorkeling, etc.)
- Identify any aquatic communities or unique habitats within areas that may be affected by the proposed project. Delineate these sites using GPS and document the occurrence with high quality digital photos. NatureServe (http://explorer.natureserve.org/) is the standard for rare aquatic community categorization.
- Document and map occurrences of federally and/or state-listed aquatic species. If a species is encountered, the occurrence should be documented with photos that support the

identification. Accurate GPS points should also be gathered. If no such species are encountered and no habitat is present, the surveyor must be able to provide documentation supporting this conclusion. The TVA aquatic biologist should be contacted if state or federally listed aquatic species are found during surveys.

WILDLIFE/TERRESTRIAL ZOOLOGY

OVERVIEW

These guidelines are intended to prescribe the content of the wildlife and Threatened & Endangered Species (T&E) survey reports and will be used in the analysis and preparation of environmental documents. The guidelines shall be used as part of the environmental review process to meet TVA, state and local requirements.

The intent of the wildlife and T&E survey is to identify the existing environment within the project site, as well as potential T&E resources within the project site, determine impacts, and recommend suitable mitigation measures.

This information provided must be of sufficient depth and quality that effects determinations can be made for impacts to wildlife communities, migratory birds, and caves.

PREPARER'S QUALIFICATIONS & CERTIFICATIONS

A qualified wildlife biologist should conduct all habitat surveys. Required qualifications include all of the following:

- M.S. degree or higher in ecology, wildlife, or related field. (B.S. degree considered with appropriate experience.)
- Minimum of 5 years of professional experience focusing on wildlife of the southeast including mammals, birds, invertebrates, and/or herpetofauna.
- State Scientific collection permit for terrestrial species for the state where the action would occur.
- Federally permitted biologist for bats and other T&E Species in the TVA Power Service Area

SURVEY TECHNIQUES & TYPES OF SURVEY REPORTS

Wildlife habitat surveys should be conducted throughout the entire footprint of the project action area. For large areas where it may not be practical to survey the entire area of effect, consult with the TVA Terrestrial Zoologist to develop a sampling protocol. Specific activities to be performed:

- Traverse project action area at a casual pace and record all wildlife habitat types observed (natural and man-made) and where they occur within the project action area. Also record any bird, mammal, amphibian, reptile, insect, or sign (visually or aurally) observed. Be sure to record in which habitat type this species was observed (e.g., planted pine forest, mixed

evergreen-deciduous forest, early successional field, mowed grass, stream, forested wetland, emergent wetland).
    - Take representative photographs of each habitat type observed.
- Record specific location (using GPS) of any large nests observed (e.g. heron or raptor nests) or any aggregations of smaller nests (e.g. swallow colony). Describe nests observed if bird is not present, how many, material, size. If bird is present, describe behavior of bird(s) (i.e. sitting on nest, perched above nest, flying nearby).
- Record location (using GPS) and write description of any caves or karst features observed. Photograph all karst features/cave openings. Important details to record include:
    - Are these cave/karst features associated with a spring? Are they moss covered with dripping water? Do they get solar exposure? How far underground do they appear to extend? Is there cool/warm air flowing from the cave? Do you see bat guano near the entrance? Is the cave/karst feature suitable for bats? Do you smell, hear, or see evidence of bats?
    - Does the karst feature fit any of the following criteria:
        - There is only one horizontal opening, and it is less than 6 inches (15.2 cm) in diameter
        - Vertical shafts are < 1 foot (0.3 m) in diameter
        - Passage continues < 50 feet (15.2 m) and terminates with no visible fissures that bats can access
        - Openings are prone to flooding, collapsed shut and completely sealed, or otherwise are inaccessible to bats
        - Openings that have occurred recently (i.e., within the past 12 months) due to human activity or subsidence. (Include written documentation verifying this determination)
    - If a karst feature that may provide habitat for bats is observed on or immediately adjacent to the project site, **contact TVA Terrestrial Zoology Staff as soon as possible** to determine whether or not internal surveys or emergence counts are warranted while you are still on site.
- Visually inspect the exterior and interior (where safe) of all buildings in a project footprint for presence of wildlife (whether or not the structure proposed for demolition). Look for signs of use or potential use by bats (bat guano, staining, adequate thermoregulation, wood vs metal areas to cling). Look for signs of use by birds or other small mammals (nests, scat, owl pellets, birds/mammals themselves). Record all findings and general species IDs based on observations (e.g. rat droppings, mice droppings, barn swallow nest, phoebe nest, bat guano, etc.). Photograph nests. Photograph buildings inside and out.
- Visually inspect all bridges within or immediately adjacent to project footprints regardless of actions occurring to the bridge itself. Look for signs of bat colonies or nesting birds (colonies of small birds or larger raptor nests). Pay particular attention to gaps in expansion joints, spaces between Jersey barriers, weep holes, spaces in concrete or wood underneath the bridge. Record all findings and general species IDs based on observations (e.g., bat guano, cliff swallow

nest, phoebe nest, etc.). Photograph nests. Photograph bridges on the top, sides, and under to show general construction and any potential cracks/crevices, weep holes available for use.

- Visually inspect all culverts (3 feet in diameter or greater) for signs of use by bats (bat guano, staining, bats themselves). Pay particular attention to weep holes and cracks/gaps in concrete. Note air movement or lack thereof, general air temperature (cool vs warm), and noise disturbance from roads, railroads above or nearby. Record all findings and general species IDs based on observations (e.g., bat guano, phoebe nest, etc.). Photograph nests. Photograph culverts from the outside and inside to show general construction and any potential cracks/crevices, weep holes available for use.
- Request a TVA Regional Natural Heritage Database extraction for all state or federally listed, federally protected, or candidate for listing terrestrial animal species found within three miles of the project action area AND all federally listed, federally protected or candidate for federal listing terrestrial animal species found within the county(ies) in which the project occurs (TVA Regional Natural Heritage Database). (Note: Species extracted that have no state status and no state rank should be excluded from the assessment.)
- Assess all habitats present on site and determine suitability for each listed species recovered from the database extraction. Use the USFWS IPaC system to search for additional T&E species within the project footprint that were not recovered from the TVA Natural Heritage Database extraction (see bullet above) and assess all habitat and suitability for each USFWS listed species from the IPaC search (including candidate species).
- Assess all forested habitat for suitability for Indiana bat, northern long-eared bats, and tricolored bats using habitat description found in the most recent version of the "Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines, US Fish and Wildlife Service."
    - For each tree identified as meeting the definition of Indiana bat, northern long-eared, or tricolored bat habitat supplied in the USFWS Guidelines do the following (*see alternative procedure below):
        - Photograph the tree making sure to capture the parts of the tree that are suitable for bat roosting
        - Take a GPS point of the tree
        - Mark the tree using flagging tape
        - Record the diameter at breast height (dbh)
        - Record the height of the tree
        - Record the health of the tree- alive, damaged, snag
        - Describe the solar exposure received by the tree
        - Record the percent of the bark that remains on the tree
        - Describe and enumerate the potential bat roosting characteristics of the tree
            - E.g., two cavities, one large piece of sloughing bark, or hollow trunk

      *If the quantity of suitable roosting trees is too large (>30 bat trees) to reasonably achieve this task in your survey time allotted, you may skip this step as long as you sufficiently document suitability of habitat using GIS polygon attribute tables, photos, or other notes provided in the Technical Survey Report.

- Break up the project area into polygons and assess suitability of habitat within each polygon for suitable summer roosting by Indiana bats, northern long-eared bats, and tricolored bats. Breaks may occur where habitat types change or along roads or water features. Use best judgement convey information.
- For all forested areas deemed suitable for Indiana, northern long-eared, or tricolored bat rank the quality of the roosting habitat as "low", "medium" or "high" quality habitat. Provide maps/polygons of these areas labeled as such with descriptions in a comment field. Provide a defensible description of how you determined habitat suitability for this particular project site.
    - An example of "Low Quality Habitat" would be even-aged or younger forest (trees smaller than 3 inches dbh), typically very dense forest that prevents easy flying by bats. This type of habitat may be suitable for foraging but is rarely suitable for roosting
    - An example of "Medium Quality Habitat" would be an area with several roosting trees present even if not exceptional, some diversity in age class of trees, trees typically 3-15 inches dbh, some pockets of dense understory may be present.
    - An example of "High Quality Habitat" would be a mature forest with some trees > 15 inches dbh, diverse age class of trees, low density understory for easy flying by bats, and ideally a body of water occurs nearby.
- Take representative photographs of the overall habitat deemed suitable for these bats (low, medium, high) as well as those forested areas deemed not suitable for federally listed bats.

- Describe the suitability of all aquatic habitats for foraging bats and T&E terrestrial wildlife species, and protected shorebirds/water birds/wading birds that occur in the area.

SUBMISSION REQUIREMENTS, REPORTING FORMS, REQUIRED CONTENT & FORMAT

The wildlife report shall contain the elements listed below and be presented in the following format. Do not provide an ESA impact assessment for federally listed species in the field report.

A. Report:
    a. Scope of Work
    b. Methods
    c. Description of habitats and list of any species observations within those habitats (table format preferred), See Survey Techniques above for detailed information on information to provide.
    d. Description of available habitat for each T&E species evaluated above including Indiana bat and northern long-eared bat.
    e. Figures/Maps of any identified T&E habitat.
    f. Photographs
B. Mapped points and/or polygons for suitable bat trees/habitat, nests, karst features, and/or suitable habitat boundaries for T&E species included in Geodatabase template. Provide descriptions in a comment field for each point/polygon. Refer to attachment D-4 (Feature Class Attribute Key).

SURVEY RESULTS

Survey results should be included in an environmental report/or NEPA document that includes the information listed above.

PROJECT IMPACT ANALYSIS

If NEPA documents are included in scope of work the wildlife and terrestrial animal T&E sections should include the following:

Affected Environment

- Terrestrial Ecology (Wildlife)
  - A summary of each type of wildlife habitat encountered and any species observed in each of these habitats during field reviews. If no species were observed, list a few species are likely to occur in the habitats and region where the project is located (include mammals, birds, and herps).
  - Section on Migratory Birds of Conservation Concern that may be found in the project action area (use USFWS IPaC to attain a list of these migratory birds likely to be found in the project area).
  - Mention any heronries or other aggregations of migratory birds known within three miles of the project or found during field reviews.
  - Mention number of caves within three miles of the project area and distance to closest cave.
- Threatened and Endangered Species (Animals)
  - Attain records of all state or federally listed, federally protected, or candidate for listing terrestrial animal species found within three miles of the project action area (TVA Regional Natural Heritage Database).
  - Attain records of all Indiana bats within 10 miles and northern long-eared bats within 5 miles of the project action area (TVA Regional Natural Heritage Database).
  - Attain records of any additional federally listed, protected, or candidate species found in the county where the project occurs (TVA Regional Natural Heritage Database).
  - Use USFWS IPaC to determine if there are more federally listed or candidate species that USFWS has determined may occur in the project area.
  - For all species determined above provide the following:
    - A brief description of the species habitat needs
    - If known, provide the distance to the closest record known of that species from the project footprint.
    - A logical explanation of your determination of whether or not habitat for that species is present in the project action area.

Environmental Consequences

- Terrestrial Ecology (Wildlife) – Address impacts to wildlife communities including removal of habitat, dispersal to adjacent lands, availability of habitat on adjacent lands. Frame impacts to address direct, indirect, and cumulative impacts to individuals and populations. Address direct, indirect, and cumulative impacts to migratory birds and caves (if applicable). Ensure statements are logical, clear, and defensible. Ensure all alternatives are thoroughly addressed.
- Threatened and Endangered Species (Animals) – Address direct, indirect, and cumulative impacts to individuals and populations of state and federally listed, protected, or candidate species. Provide clearly defensible arguments for impacts to each T&E species as well as their habitats. Ensure statements are logical, clear, and defensible. Ensure all alternatives are thoroughly addressed. Any impact (beneficial, significant, insignificant, or adverse) to a federally listed species (individual or population) will require consultation with USFWS under Section 7 of the Endangered Species Act. Even flushing of a mobile federally listed species is considered "Take" under ESA and could result in formal consultation. Any removal of potentially suitable bat habitat (even one tree) may trigger USFWS consultation. Be precise and deliberate in your word choice.

MITIGATION AND MONITORING REQUIREMENTS (IF APPLICABLE)

If state or federally listed animal species, will be impacted by the proposed actions, consult with the TVA terrestrial zoology staff to develop appropriate mitigation measures. Do not initiate communication with USFWS for any additional monitoring or consultation without talking to TVA terrestrial zoology staff first. Any Section 7 ESA consultation with USFWS will be performed by TVA.

ATTACHMENTS

D-3. Geodatabase including template point/polyline/polygon feature classes with correct attributes (Per request)

D-4. Feature Class Attribute Key

VEGETATION

OVERVIEW

To facilitate compliance with NEPA, ESA, and Executive Order 13571, detailed information on the composition and structure of plant communities should be collected from within the footprint of TVA projects. The data collected and subsequent reporting should be of sufficient depth and quality that effects determinations can withstand a potential legal challenge.

PREPARER'S QUALIFICATIONS & CERTIFICATIONS

A qualified botanist should conduct all vegetation surveys. Required qualifications include all of the

following:

- M.S. degree or higher in botany or related field. (B.S. degree considered with appropriate experience.)
- Minimum of 5 years of experience focusing on field botany and plant identification.
- Working knowledge of the flora, both common and T&E species in the TN Valley.
- Individual has contributed specimens to a herbarium or rare plant records to a state Natural Heritage program within the last 5 years. Be prepared to list applicable institution(s).

SURVEY TECHNIQUES & TYPES OF SURVEY REPORTS

In general, vegetation surveys should be conducted throughout the entire footprint of the project area. For large areas where it may not be practical to survey the entire area of effect, consult with the TVA botanist to develop a sampling protocol. If species of conservation concern are known from (or potentially occur in) the project area, seasonal surveys may be required to ascertain project effects. Communicate with TVA botanist if the project footprint contains natural vegetation capable of supporting listed plant species. Use guidelines below for collecting field data.

- Categorize all plant communities within the footprint of the project area (proposed ROW, access roads, and/or other proposed infrastructure) using the classification system outlined by Grossman et al. 1998*. Generally, the most common categories are deciduous forest, evergreen forest, mixed deciduous/evergreen forest, and herbaceous vegetation.
- Delineate plant communities within ArcGIS and calculate percentages of plant community type as well as total acreage. Provide TVA with the resulting shapefile/feature class.
- Identify any rare plant communities or unique habitats within areas that may be affected by the proposed project. Delineate these sites using GPS and document the occurrence with high quality digital photos. NatureServe (http://explorer.natureserve.org/) is the standard for rare community categorization.
- Document and map occurrences of federally and/or state-listed plant species. If a species is encountered, the occurrence should be documented with photos and specimens (if collection would not damage the population) that support the identification. Accurate GPS points should also be gathered. If no such species are encountered and no habitat is present, the surveyor must be able to provide documentation supporting this conclusion. The TVA botanist should be contacted if state or federally listed plants are found during surveys.
- Document the general location and abundance of non-native plants present within the project area. If federal noxious weeds are observed, these areas need to be documented with GPS points, photos, and specimens.

**Grossman, D. H., D. Faber-Langendoen, A. S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K. D. Patterson, M. Pyne, M. Reid, and L. Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume I. The National Vegetation Classification System: development, status, and applications. The Nature Conservancy, Arlington, Virginia. 139pp.*

SUBMISSION REQUIREMENTS, REPORTING FORMS, REQUIRED CONTENT & FORMAT

No specific forms are required, but a survey report should include all the information listed above and a copy of all field notes.

SURVEY RESULTS

Survey results should be included in an environmental report/or NEPA document that includes the information listed above.

DELIVERABLES

Project deliverables will generally be either a Technical Study Report, NEPA input for the Vegetation and T&E plants section of an Environmental Assessment or Environmental Impact Statement, or both. The survey results of Technical Survey Report will closely mirror the affected environment section for a NEPA document and should include a description of the vegetation within the study area. Technical study reports should not contain impacts analysis.

Survey Results (Technical Study Report)/Affected Environment (NEPA)

- Overview – Identify the EPA level 4 ecoregion where the project is located and briefly summarize the general characteristics and habitats that occur there.
- Plant Community - Describe each plant community found with the project area and include a brief list (10 or fewer) of common species found in each strata (overstory, midstory, shrub layer, herbaceous layer). Include average overstory size (diameter at breast height) of forest habitats and discuss whether or not the community is rare or common and well represented throughout the region. Note if old growth forest is present in the project area.
- Invasive species - Note the presence of federal noxious weeds and those invasive species listed by the state exotic plant pest council (if applicable). For NEPA input briefly discuss EO 13571.
- State and federally listed plants – Discuss the presence or absence of state listed plants known from a 5-mile vicinity of project area, federally listed and candidate plants known from within the county/IPaC list and designated critical habitat in the project area. If species are present, briefly describe the plant and include general life history, pertinent ecological information, and landscape context. Also include the population size and whether or not the plant was, or is likely to be, reproducing. If no habitat for listed species is present, this must be defended with a few sentences.

Environmental Consequences (NEPA)

- Terrestrial Ecology (Plants) – Address impacts to plant communities, including forest cover (clearing), invasive species, and effects to rare plant communities. This analysis should be done for both the Action and No Action Alternative(s). Direct, indirect, and cumulative impacts should be addressed. Make a clear NEPA determination.
- Threatened and Endangered Species (Plants) – Address impacts to state listed plants, federally listed plants (and candidates), and designated critical habitat. This analysis

should be done for both the Action and No Action Alternative(s). Direct, indirect, and cumulative impacts should be addressed. Make a clear NEPA and ESA determination.

MITIGATION AND MONITORING REQUIREMENTS (IF APPLICABLE)

If state or federally listed plant species, rare plant habitats as designated by NatureServe, or federal noxious weeds are present within a project area, consult with the TVA botanists to develop appropriate mitigation measures or monitoring plans.

ATTACHMENTS

D-3. Geodatabase including template point/polyline/polygon feature classes with correct attributes (Per request)

D-4. Feature Class Attribute Key

WETLANDS

OVERVIEW

These guidelines are intended to prescribe the content of the wetland reports and will be used in the analysis and preparation of environmental documents. The guidelines shall be used as part of TVA's the environmental review process to meet federal, state, and local requirements as well as EO 11990.

The intent of the wetland survey is to identify wetland resources within the project site, determine impacts, and recommend suitable mitigation measures.

PREPARER'S QUALIFICATIONS & CERTIFICATIONS

Persons preparing or responsible for wetland reports should have experience conducting scientifically accurate and legally defensible wetland delineations, mapping, and assessments. Indications of qualified individuals would include persons with advanced degrees, training, and/or experience in accurate identification and assessment of the following:

- wetland and upland vegetation species
- descriptive soil profile, taxonomy, and morphology
- hydrologic indicators resulting from hydrologic processes influencing wetland occurrence

Further pertinent knowledge/experience include:

- GIS/GPS fluency
- federal, state, and local wetland regulatory compliance obligations
- significance determinations under NEPA, implementing context and intensity assessments
- ecoregion/watershed scale analysis of wetland resources
- development of mitigation measures

SURVEY TECHNIQUES & TYPES OF SURVEY REPORTS

Identify and delineated all federal and/or state jurisdictional wetlands in the project footprint in accordance with the U. S. Army Corps of Engineers Wetland Delineation Manual (1987) and appropriate regional supplement based on location.

Score each delineated wetland using either the Tennessee Rapid Assessment Method (TRAM) for projects located in TN or the TVA Rapid Assessment Method (TVARAM) for projects outside of TN. These rapid assessment methods document quality, condition, and functional capacity per Ohio RAM protocol.

SUBMISSION REQUIREMENTS, REPORTING FORMS, REQUIRED CONTENT & FORMAT

The wetland delineation report and/or appropriate NEPA documents shall contain the elements listed below and be presented in the following format.

Technical Study / Wetland Delineation Report

A. Contents:
   a. Introduction
   b. Project Language
   c. Study Area Description
   d. Preliminary Wetland Review
   e. Wetland Determinations/Methods
   f. Wetland Descriptions
   g. Regulatory
   h. Conclusion
   i. Figures/Maps etc.
   j. USACE Forms per appropriate USACE Region and TRAM or TVARAM Forms. Please use the sequenced wetland name (W001, W002, etc.) as the Sampling Point on forms. On linear projects, start sequenced count starting at the low numbered transmission line structure. Please provide both forms as an editable version as well as a compiled non-editable PDF version.
   k. Geo-referenced Photographs and Photolog

B. Geodatabase with TVA Feature Classes of all mapped wetland boundaries and wetland/upland data points. Feature classes will have complete attribute tables as described in attachment D.4 – Feature Class Attribute Key

C. Shapefile of all point location for geo-referenced photographs

NEPA Documents (CEC/EA/EIS)

A. Contents:
   a. Scope of Work
   b. Regulations/Methods
   c. Discussion and Conclusion
      i. Affected Wetlands
      ii. Wetland Impacts -- direct, indirect, cumulative
      iii. Significance Assessment
   d. Figures/Maps etc.
   e. USACE Forms per appropriate USACE Region and TRAM or TVARAM Forms. Please use the

sequenced wetland name (W001, W002, etc.) as the Sampling Point on forms. On linear projects, start sequenced count starting at the low numbered transmission line structure. Please provide both forms as an editable version as well as a compiled non-editable PDF version.

f. Geo-referenced Photographs and Photolog

B. Geodatabase with TVA Feature Classes of all mapped wetland boundaries and wetland/upland data points. Feature Classes will have complete attribute tables as described in Attachment D.4 – GDB Feature Class Attribute Key.

C. Shapefile of all point location for geo-referenced photographs

MITIGATION AND MONITORING REQUIREMENTS (IF APPLICABLE)

For instances where impacts are unavoidable, the contractor will coordinate with the TVA Specialist to provide recommendations for mitigation and monitoring requirements.

ATTACHMENTS

D-3. Geodatabase including template point/polyline/polygon feature classes with correct attributes (Per request)

D-4. Feature Class Attribute Key

MANAGED AND NATURAL AREAS

OVERVIEW

These guidelines are intended to prescribe the content of the managed and natural areas reports and will be used in the analysis and preparation of environmental documents. The guidelines shall be used as part of TVA's environmental review process to meet federal, state, and local requirements.

The intent of natural areas analysis is to identify managed and natural areas within the project site and within a specific radius, determine impacts, recommend suitable mitigation measures, and provide managed or natural areas contact information when available.

PREPARER'S QUALIFICATIONS & CERTIFICATIONS

Persons preparing or responsible for managed and natural areas reports should have experience conducting analysis of environmental impacts typical to NEPA-level projects. Indications of qualified individuals would include persons with advanced degrees, training, and/or experience in land use/land cover analysis, natural resource management, and GIS technology.

METHODS

Managed and natural areas will be identified using TVA-provided data from the Regional Natural Heritage Database. Data will be provided in the form of ArcGIS Geodatabase. CEC, EA, and EIS-level NEPA input will include identification of managed or natural areas within the project area and within a 3-mile radius of the project area. Managed and natural areas identified as located within the proposed

project area or within 0.10 miles of the project area will be described and relevant contact information will be provided for project personnel. Managed and natural areas within the 3-mile radius will be briefly described and their distance from the proposed project area will be listed.

Where appropriate, mitigation measures will be developed to offset potential impacts to natural areas. Typically, TVA project managers establish contact with specific managed and natural area land managers to develop site-specific measures to minimize impacts.

SUBMISSION REQUIREMENTS, REPORTING FORMS, REQUIRED CONTENT & FORMAT

The managed and natural areas report shall contain the elements listed below and be presented in the following format.

A. Report:
   a. Scope of Work
   b. Methods
   c. Discussion
      - Identification of managed or natural areas within project area or within 0-3 miles of the study area
      - Description of these areas (size, management objectives, specific natural resources associated with the area, appropriate contact personnel etc.)
      - Identification of managed or natural areas within the 0-3 mile radius
      - A map of the managed or natural areas within and directly adjacent (up to 0.10 miles away) from the proposed project footprint. If there are no managed or natural areas within 0.10 miles or less, no map is necessary
      - Brief description of these areas (size, management objectives)
      - Managed and natural area Impacts -- direct, indirect, cumulative
      - Significance Assessment
      - Mitigation measures, if applicable
      - Contact information for managed or natural areas land manager or contact person whenever available (Name, position, e-mail, phone number(s))

CULTURAL COMPLIANCE

CULTURAL RESOURCES

OVERVIEW

The immediate goal of the identification level (or Phase I) survey will be to identify all archaeological sites and historic structures/sites/buildings/districts/landscapes (hereafter, referred to as historic structures) within the survey area; define their horizontal and vertical extents within the limitations of the selected survey techniques; provide recommendations with regard to the status of each site and

historic structure in terms of National Register of Historic Places (NRHP) eligibility; and apply the criteria of adverse effect if applicable. Ultimately, the purpose of this identification survey is to provide the initial data TVA needs in order to fulfil its obligation under section 106 of the National Historic Preservation Act to consider the possible adverse effects of undertakings on NRHP-eligible archaeological sites and historic structures and take that evaluation into account in its decision making. For solar projects, TVA develops identification efforts level efforts in consultation with consulting parties. Survey proposals need to be provided to TVA for review. TVA will provide the proposal to consulting properties for comment. No archaeological survey should be conducted until this consultation is complete. Below are TVA's general expectations for Phase I surveys. TVA will work with the contractor to modify the proposal based on past planning, research and studies and the likely nature and location of historic properties within the APE.

PREPARER'S QUALIFICATIONS & CERTIFICATIONS

Persons in general charge or in direct charge of cultural resources work must meet the minimum qualifications defined in the Secretary of the Interior's Professional Qualification Standards for the appropriate discipline (history, archaeology, architectural history, architecture, or historic architecture). Where applicable, these persons must also meet the state's minimum qualifications specific to the work being performed. TVA prefers that these persons also have previous professional experience conducting cultural resources surveys in the state or region in which the work is to be performed.

SURVEY TECHNIQUES & TYPES OF SURVEY REPORTS

A. Archaeological Survey The following survey techniques represent the most commonly used techniques and excludes specialized survey techniques which will require a unique scope of work.

Background research will need to be conducted prior to initiating field work. This research will include an examination of the state site files to determine if archaeological sites have been recorded previously within the project area. Additional background archaeological and historical data will be gathered from other sources such as historic maps and reports of previous surveys in the area. Surveys will meet the minimum requirements established by the state and will investigate archaeological sites at a level sufficient to recommend potential NRHP eligibility status.

(1) TVA shall provide maps and, if possible, ArcGis layers depicting the area(s) to be surveyed.

(2) Consultant will survey all areas within the survey area at a level sufficient to recommend potential eligibility. The entire survey area shall be visually inspected on foot either prior to or during the shovel testing in order to identify above-ground cultural features, disturbed soils, and high- and low-potential areas. Areas with less than 10 percent slope where ground visibility is less than 50 percent, with no indication of significant modern ground disturbance, will require subsurface testing involving both shovel testing and hand augering. Shovel tests (30-centimeter (cm) by 30-cm) should be conducted at 30-meter (m) intervals to a depth of 70 cm or upon encountering subsoil, the water table, or refusal. If background research established a potential for deeply buried cultural deposits within the survey area, one-half of the shovel test locations should be investigated an additional 1.0-1.5-m in depth via a hand auger (total depth of each

test location to be 2.5 m) in those areas where subsoil and refusal are not encountered. All deposits excavated via shovel testing and hand augering shall be screened through 0.25-inch mesh screen and artifacts shall be collected and placed in 5-ml plastic bags labelled in permanent ink with the provenience (shovel test identification number, date, and depth below surface). A log shall be kept of all shovel tests. In areas with less than 10 percent slope and ground visibility of greater than 50 percent, systematic pedestrian survey shall be conducted and the shovel test interval shall be increased to up to 60 m depending on survey conditions. Areas with greater than 10 percent slope shall be surveyed visually. The consultant shall have discretion to excavate a small number of shovel tests in sloped and disturbed areas to record soils and deposits, if appropriate.

(3) Any sites identified within the survey area (whether previously identified or newly identified) will be investigated and documented. The horizontal and vertical site boundaries, including buried deposits up to a depth of 2.2 m below ground surface, will be investigated using pedestrian survey and/or shovel tests and hand auguring depending on conditions, as described above in (2).

(4) An exception to (3) above shall be made in the case of previously recorded sites that have been determined eligible in a section 106 consultation, or for which there is other information showing that the state or another federal agency considers the site NRHP-eligible. No shovel or auger tests shall be conducted within any such sites unless TVA and the State Historic Preservation Officer (SHPO) (or federal agency or Indian tribe with jurisdiction) agree that such testing would be appropriate in that case. However, such sites shall be visually inspected and its condition recorded in notes and photographs.

(5) If it is determined during the survey that deeply buried archaeological deposits (deeper than the maximum depth attained by shovel and auger tests) are present within the survey area, the final report should include recommended techniques for determining the horizontal and vertical extent and the nature of buried deposits.

(6) The consultant shall keep detailed notes of the survey and shall record the survey area using digital photography. Field notes and photo logs shall be kept during the survey. Photographs shall be taken of overviews of the survey area, any sites or above-ground features encountered, and the general conditions and setting of the survey area.

Digital copies of the project shapefiles depicted with USGS 7.5' quadrangles and projected NAD 83 (feet) Tennessee State Plane will be submitted after completion of the survey. All maps will depict survey coverage and, if applicable, the locations of sites and the potential for buried deposits. Survey coverage will depict areas of pedestrian reconnaissance and/or individual locations of shovel tests.

Historic Structures Survey: Prior to conducting a survey, the consultant will conduct background research and a literature search for the survey area. Based on a combination of background research and visual survey along all accessible roads in the survey, the consultant will identify all historic structures with potential NRHP eligibility in the survey area. The survey will also document the project

viewshed (generally defined as areas within a .5-mile radius of the proposed project that would have unobstructed lines of sight to the project). A map (and shapefile) depicting the viewshed will be provided to TVA at the completion of the survey and will be included in the survey report. Potentially historic structures outside the viewshed shall be documented (photographically and in notes), but not evaluated for potential NRHP eligibility. The locations of previously inventoried structures that are no longer extant (based on field observations during the survey) shall be documented by photographs.

Each potentially historic structure within the viewshed will be described in detail. The description will include materials and methods of construction, age of construction and any later additions (as precisely as can be estimated or verified), and current condition. Information about the history of such structures shall be included in the report. Each potentially historic structure will be recorded by photographs, including at least two elevations, any architectural details that pertain the NRHP eligibility recommendation, and views of the setting. Historic structure locations will be plotted on the applicable USGS quadrangle map.

Recommendations of NRHP eligibility or ineligibility will be made in accordance with the criteria in 36 CFR 60.4. The findings of this analysis will be included in the historic structures survey section of the cultural resources report. Summary recommendations concerning project impact on any historic structure that is NRHP-listed, eligible, or recommended-eligible will be offered in the concluding chapter of the report and documented by the background research, field observations, and photographs.

SUBMISSION REQUIREMENTS, REPORTING FORMS, REQUIRED CONTENT & FORMAT

Archaeological Site and Historic Structures Forms: The Contractor will complete or update a state archaeological site survey form for each new or previously recorded archaeological site identified during the survey. The Contractor will obtain official state site numbers from the state site file for each site identified. A state historic structure form will be completed for each structures identified unless the State Historic Preservation Officer has indicated that certain types of historic structures may be exempted. These forms will be included in an appendix to the survey report.

Management Summary: The Contractor will submit a Management Summary within two (2) week of completion of the field investigation which describes, at a minimum, the number of archaeological sites and historic structures identified. The Management Summary will state the Contractor's opinion of the eligibility, potential eligibility, or non-eligibility for National Register listing of each historic property (archaeological site or structure) identified.

Report: The contractor will prepare a report of the survey. The survey report will incorporate the initial research design, a discussion of the field survey and modifications to the research design resulting from experiences in the field, descriptions of all areas surveyed including areas where no sites were found, and a statement of research potential for each site identified or other criteria for National Register of Historic Places eligibility. The report will include environmental, archaeological, and historical background of the area; the results of the literature search; and a description of the methods of survey and analysis. The report will be thorough and complete, sufficient to allow review and comment by the

reviewing agencies in compliance with the Section 106 process.

The report will clearly state the Contractor's opinion of the National Register eligibility of each archaeological site or historic structure identified. At the requested level of investigation, the eligibility of many sites may not be determinable. The Contractor's proposal will identify the criteria expected to be used to assess National Register eligibility. The Contractor will submit bound copies and electronic copies on CD in pdf format of the draft final report for review and approval. The report must meet accepted professional standards and state guidelines for survey reports and should be of publishable quality. After receipt of review comments, the Contractor will prepare a final report incorporating changes requested by TVA Cultural Resources. The Contractor will submit bound copies and electronic copies on CD in pdf format of the final report.

At a minimum, archaeological reports must meet the state guidelines. Where it is not stated in the state guidelines, the Draft and Final reports must include the following:

1. Overview Maps showing surveyed area with a USGS 7.5-minute quadrangle base map and archaeological sites identified if the scale allows.
2. Map showing the survey area within the ecoregion.
3. Map showing the bedrock geology underlying the project area.
4. Table of soils mapped by NRCS within the Survey Area.
5. Maps depicting previously recorded archaeological sites identified during background research in relation to the survey area.
6. Aerial/Satellite Photography base maps showing the survey area, survey transects, shovel tests, and archaeological findings for the entire project area or for each archaeological finding if the scale is too broad.
7. Each archaeological site in the project area must be labeled with its Smithsonian site number.
8. A clear and concise presentation of the NRHP eligibility recommendations for each identified resource. This will include a table listing, for each identified resource, whether it is recommended as eligible, not eligible, or potentially eligible, or whether its eligibility is unknown due to factors outside the control of the contractor.
9. For each identified archaeological site, a sketch map that includes at least one identifiable landmark and the boundaries of the resource.
10. A summary of the background information compiled and of the prehistoric and historic context of the study area.
11. A detailed description of the study methods and techniques.
12. The results of all laboratory analyses.
13. High-quality photographs showing conditions in the project area.
14. High-quality photographs of a representative sample of any features and artifacts and soil profiles recorded during the investigation.
15. Plans for curation of artifacts and documents, including the appropriate repository, curation methods and techniques, and a timeline.
16. A References Cited section that includes all cited works.

17. A table listing the investigation type, unique investigation type number, presence/absence status of artifacts, Northing and Easting in TN State Plane, Site Number if applicable, shovel test depth in centimeters below surface (cmbs), and the depth of auger testing if used at cmbs
18. State site forms or update forms, as appropriate, for each identified archaeological site (in an appendix).
19. Geographic Information System shapefiles and tabular data matching the fields in TVA's Integrated Cultural Database (geodatabase enclosed).

SURVEY RESULTS

See the previous sections for guidance about documenting and presenting survey results.

PROJECT IMPACT ANALYSIS

The reports and any NEPA documents will clearly apply the criteria of adverse effect and state the project's direct and indirect effects (as defined in 36 CFR 800) to each site or structure identified.

MITIGATION AND MONITORING REQUIREMENTS (IF APPLICABLE)

The report should clearly state the archaeological sites and/or historic structures recommended for monitoring to either ensure avoidance or evaluate indirect effects which may occur later in time.

FLOODPLAINS

OVERVIEW

These guidelines are intended to prescribe the content of the floodplains reports and will be used in the analysis and preparation of environmental documents. The guidelines shall be used as part of the environmental review process to meet TVA, state and local requirements as well as Presidential Executive Order 11988, Floodplain Management (EO 11988).

The intent of the floodplains report is to identify floodplain resources within the project site, determine impacts, and recommend suitable mitigation measures, consistent with the National Flood Insurance Program minimum standards at 44 CFR 60.3, TVA's 1981 Class Review of Repetitive Actions in the 100-year Floodplain, county or municipality floodplain regulations, and TVA Section 26a and/or Land Use requirements, as appropriate.

PREPARER'S QUALIFICATIONS & CERTIFICATIONS

Persons preparing or responsible for floodplain reports should have the following minimum qualifications:

- A Bachelor of Science degree from an accredited college or university in civil engineering, hydraulic engineering, or closely related field;
- Five years of experience conducting FEMA flood insurance studies and/or modeling in any of the states within the TVA power service area (Kentucky, Virginia, Tennessee, North Carolina, Georgia, Alabama, or Mississippi);

- Five years of experience conducting floodplains analyses in accordance with EO 11988;
- PE license in Civil Engineering a plus;
- Preparer should be a Certified Floodplain Manager.

SURVEY TECHNIQUES & TYPES OF SURVEY REPORTS

Desktop reviews will be conducted for the project action area and comprise the bulk of floodplain reviews. Project aerials and topographic maps will be compared to floodplain boundaries as depicted in the FEMA National Flood Hazard Layer.

SUBMISSION REQUIREMENTS, REPORTING FORMS, REQUIRED CONTENT & FORMAT

The floodplains report shall contain the elements listed below and be presented in the following format:

A. TITLE PAGE
   a. Report Title
   b. Project Title
   c. Prepared for TVA
   d. Party Preparing Report
   e. Investigators
   f. Date
   g. Signature block of principal investigators

B. TABLE OF CONTENTS
   a. Major Report Sections
      1) Project location by stream mile
      2) Table of 100- and 500-year flood elevations for each facility/structure
      3) Type of flood zone (Zone A, Zone AE no floodway, Zone AE with floodway, etc.)
      4) elevations of proposed facilities, including first-floor elevations of proposed enclosed structures
   b. FEMA Flood Insurance Rate Map
      1) FIRMette from FEMA Map Service Center website; or
      2) Map from ArcMap or some other mapping utility showing the National Flood Hazard Layer (NFHL) over an aerial image of the project site

PROJECT IMPACT ANALYSIS

Identify all potential impacts of the project (both direct and indirect impacts) to floodplains. The report should evaluate the significance and quantify/qualify impacts. Impact assessments need to include analysis of direct, indirect, and cumulative impacts.

Each facility and structure (including fill) will be analyzed in accordance with the floodplains review process outlined in the TVA memo CLASS REVIEW OF CERTAIN REPETITIVE ACTIONS IN THE 100-YEAR FLOODPLAIN (TVA 1981), and more broadly in the 8-step process as described in the Guidelines for Implementing Executive Order 11988, Floodplain Management.

For projects proposed across, along, or in TVA reservoirs, further review in accordance with the TVA

Flood Storage Loss Guideline is required.

MITIGATION AND MONITORING REQUIREMENTS (IF APPLICABLE)

The consultant will coordinate with the TVA Specialist in situations where impacts are unavoidable. Mitigation is common in floodplains reviews and is normally provided as a condition in CECs and mitigation measures in EAs and EISs.

ATTACHMENTS

F-1. TVA Flood Storage Loss Guideline
F-2. 1981 Class Review of Repetitive Actions in the 100