



U.S. NUCLEAR REGULATORY COMMISSION
**ENVIRONMENTAL STANDARD
 REVIEW PLAN**

4.3.1 TERRESTRIAL ECOSYSTEMS

REVIEW RESPONSIBILITIES

Primary— Organization responsible for the review of ecological information

Secondary— None

I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's description, quantification, and assessment of the impacts of construction on the terrestrial ecosystem. The scope of the review directed by this plan includes an assessment of both onsite and offsite construction, including transmission line and access corridor construction. The assessment should be in sufficient detail to (1) predict and evaluate the significance of potential impacts to the local terrestrial ecosystem (e.g., generic vegetation and wildlife), (2) predict and evaluate the significance of potential impacts to "important" species and their habitats, and (3) evaluate how these impacts should be considered in the licensing decision. If necessary, the reviewer should suggest consideration of alternative facility locations or construction practices, or licensee commitments to the Environmental Project Manager to mitigate the intensity of environmental impacts.

Review Interfaces

This section describes the types of interfaces needed with other staff. Interfaces require coordination primarily with the leads for aquatic ecology and land use, and to a lesser extent with the leads for socioeconomics, alternatives, and cumulative impacts. The reviewer for this ESRP should obtain input from and/or provide input to reviewers for the following ESRPs, as indicated:

- ESRP 2.4.1. Obtain descriptive material on the terrestrial ecology of the site and vicinity needed to support the analyses made in ESRP 4.3.1. Provide input on significant impacts of construction to the terrestrial environment to the reviewer of ESRP 2.4.1 so that a more detailed description of the part(s) of the terrestrial environment that will be significantly affected may be prepared.

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NUREG-1555

USNRC ENVIRONMENTAL STANDARD REVIEW PLAN

This Environmental Standard Review Plan has been prepared to establish guidance for the U.S. Nuclear Regulatory Commission staff responsible for environmental reviews for nuclear power plants. The Environmental Standard Review Plan is not a substitute for the NRC's regulations, and compliance with it is not required.

These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Individual sections of NUREG-1555 will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience. Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of New Reactors, Washington, D.C. 20555-0001.

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- ESRP 3.1. Obtain information about the proposed power plant's external appearance and layout in enough detail to support the analyses made in ESRP 4.3.1.
- ESRP 3.7. Obtain information about the power transmission system in enough detail to support the analyses made in ESRP 4.3.1.
- ESRP 4.1.1. Obtain information regarding impacts of construction on land use onsite and in the vicinity of the plant to complete the description of construction impacts on the terrestrial ecosystem.
- ESRP 4.1.2. Obtain information regarding impacts to land use in transmission corridors and offsite areas to complete the description of construction impacts on the terrestrial ecosystem.
- ESRP 4.2.2. Obtain information regarding impacts on water use to complete the description of construction impacts on the terrestrial ecosystem.
- ESRP 4.3.2. Obtain information from the reviewer of ESRP 4.3.2 to complete a description of construction impacts to terrestrial ecology at the land/water interface. Provide information to the reviewer of ESRP 4.3.2 to complete a description of construction impacts to aquatic ecology at the land/water interface.
- ESRP 4.4.1. Obtain information on construction noise levels from the reviewer of ESRP 4.4.1 to complete a description of construction impacts to terrestrial ecology.
- ESRP 4.6. Provide a list of applicant commitments and staff evaluations of practices to limit adverse environmental impacts of construction.
- ESRP 4.7. Provide a determination of the magnitude of construction impacts (i.e., SMALL, MODERATE, or LARGE) to the terrestrial ecosystem so that a description of cumulative impacts to the terrestrial ecosystem may be completed.
- ESRP 6.5.1. Provide information on construction impacts to terrestrial ecology in sufficient detail to permit evaluation of the applicant's proposed terrestrial ecology monitoring program.
- ESRPs 9.3 and 9.4. If the reviewer determines that a proposed construction activity would result in an adverse environmental impact that cannot be mitigated by alternative construction practices and procedures, then provide the reviewer(s) of ESRPs 9.3 and 9.4 with a notification that alternative facility locations and plant or component designs should be considered.
- ESRP 10.1. Provide a brief summary of the unavoidable impacts predicted to occur during construction. The summary should be limited to the more significant impacts, such as modification of habitat for "important" species.

- ESRP 10.2. Provide a brief summary of irreversible and irretrievable commitments of terrestrial resources predicted to occur during construction. For example, the summary could include permanent loss of terrestrial habitat or loss of wetlands.

Data and Information Needs

The type of data and information needed will be affected by site- and station-specific factors, and the degree of detail should be modified according to the anticipated magnitude of potential impacts. The following data or information describing the site, vicinity, and transmission corridors (in addition to that listed in ESRP 2.4.1) should be obtained from the sources indicated. Supporting information may be obtained from the literature.

- a map showing the site boundary and construction footprint, including locations of proposed structures, equipment storage and construction material laydown areas, borrow areas, haul roads, and waste disposal areas; and a map showing the locations of transmission corridors (from the environmental report [ER] and ESRP 3.1)
- information on the location and areal extent of terrestrial habitats/plant communities on the site and along the transmission corridors and at any other offsite areas where construction would occur (from the ER)
- information on the locations of “important” terrestrial species and the location and areal extent of “important” habitats (definition of “important” species and habitats is found in Table 2.4.1-1) in the vicinity of the site, transmission corridors, and any other offsite areas which would be affected by construction (from the State resource agency that houses the Natural Heritage Program office, consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service, and the ER)
- the total land area to be permanently disturbed on and in the vicinity of the site, such as for buildings, new ponds and reservoirs, etc., and along transmission corridors and at any other offsite areas (from the ER)
- the total land area to be temporarily disturbed during construction on and in the vicinity of the site and along transmission corridors and at any other offsite areas, such as equipment storage and construction material laydown areas, borrow areas, haul roads, waste disposal areas etc., and plans for its restoration (from the ER)
- the area of each plant community and habitat type (e.g., marshes, agricultural fields, and deciduous forests) to be cleared or disturbed, permanently or temporarily, on and in the vicinity of the site and along transmission corridors and at any other offsite areas, and how much is being disturbed relative to the total amount present in the region (from the ER)

- the area of any “important” habitat, particularly designated or proposed critical habitat for Federally threatened or endangered species, to be cleared, disturbed, or created, permanently or temporarily, on and in the vicinity of the site and along transmission corridors and at any other offsite areas, and how much is being disturbed relative to the total amount present in the region (from consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service, and the ER)
- a list of any “important” species that could be affected by construction, particularly Federally threatened or endangered species, on and in the vicinity of the site and along transmission corridors and at any other offsite areas, and information on the population size/stability of these species in the region (from consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service, and the ER).
- the clearing methods, temporary and permanent erosion, runoff, and siltation control methods, dust suppression methods, and other construction practices for control or suppression to be used on and in the vicinity of the site and along transmission corridors and at any other offsite areas (from the ER)
- the distance from the source beyond which construction noise levels would be expected to attenuate to below the 80- to 85-dBA threshold at which wildlife behavior is affected, and a comparison of that distance to the distance from the source of construction noise to locations of any Federally threatened or endangered species (from the ER)
- an estimate of the potential for bird collisions with elevated construction equipment (e.g., cranes) (from the ER)
- the proposed schedule of construction activities
- documentation that the applicant has consulted with the appropriate Federal, State, regional, local, and affected Native American tribal agencies, at a minimum the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service, and appropriate State resource agency (from the ER)
- identification of other projects within the region that affect or could potentially affect the same “important” terrestrial species and habitats, particularly Federally threatened or endangered species and/or designated or proposed critical habitat (from the ER and consultation with Federal and State resource agencies)

Additional background information about the terrestrial ecology of the site and vicinity and transmission corridors, necessary for this review of impacts on terrestrial resources from construction, is requested in ESRP 2.4.1 and can normally be found in the ER, from consultation with Federal, State, regional, local, and affected Native American tribal agencies, and the general literature.

II. ACCEPTANCE CRITERIA

The reviewer should become familiar with the provisions of standards, guides, and agreements that are pertinent to the construction of nuclear power stations. Acceptance criteria for the review of construction impacts on terrestrial ecology on and in the vicinity of the site and transmission corridors are based on the relevant requirements of the following:

- 10 CFR 51.71 with respect to including in the EIS information on impacts to the terrestrial environment due to construction
- 10 CFR 51.75 with respect to analysis of impacts to the terrestrial environment affected by the issuance of an early site permit, combined license, or construction permit
- Bald and Golden Eagle Protection Act with respect to the prohibition of taking, possessing, selling, transporting, importing, or exporting the bald or golden eagle, dead or alive, without a permit
- Clean Water Act with respect to dredging and filling, and avoiding/minimizing impacts to terrestrial resources in the vicinity of affected navigable waters, including wetlands
- Coastal Zone Management Act with respect to natural resources, and land or water use of the coastal zone
- Endangered Species Act with respect to identifying impacts to threatened or endangered species and/or designated critical habitat by means of informal and/or formal consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service
- Fish and Wildlife Coordination Act with respect to consideration of wildlife resources in the planning of development projects
- Migratory Bird Treaty Act with respect to declaring that it is unlawful to take, import, export, possess, buy, sell, purchase, or barter any migratory bird. Feathers or other parts of nests or eggs, and products made from migratory birds are also covered by the Act. "Take" is defined as pursuing, hunting, shooting, poisoning, wounding, killing, capturing, trapping, or collecting.

Regulatory positions and specific criteria necessary to meet the regulations and other statutory requirements identified above are as follows:

- LIC-203, Revision 1, Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Impacts (NRC 2004), with respect to NRC compliance with the Endangered Species Act.
- The "Second Memorandum of Understanding and Policy Statement Regarding Implementation of Certain NRC and EPA Responsibilities," serves as the legal basis for NRC decisionmaking concerning licensing matters covered by NEPA and Section 511 of the Federal Water Pollution Control Act (FWPCA), commonly referred to as the Clean Water Act (CWA).

- The “Memorandum of Understanding between the Corps of Engineers, U.S. Army, and the NRC for the Regulation of Nuclear Power Plants,” 40 FR 60115, provides guidance with respect to the NRC exercising the primary responsibility in conducting environmental reviews and in preparing EISs for nuclear power stations. The Corps of Engineers should be consulted regarding (1) coastal erosion and other shoreline modifications, (2) siltation and sedimentation processes, (3) dredging activities and disposal of dredged materials, and (4) location of structures affecting navigable waters.
- Regulatory Guide 4.7, Rev. 2, *General Site Suitability for Nuclear Power Stations* (1998), contains guidance that the ecological systems and biota at potential sites and their environs should be sufficiently well known to allow reasonably certain predictions of impacts that there would be no unacceptable or unnecessary deleterious impacts on populations of important species or on ecological systems from the construction of a nuclear power station.
- Regulatory Guide 4.11, Rev. 1, *Terrestrial Environmental Studies for Nuclear Power Stations* (1977), contains technical information for the design and execution of terrestrial environmental studies, the results of which should be included in the applicant’s ER.

Technical Rationale

The technical rationale for evaluating the applicant’s potential construction or refurbishment impacts on terrestrial ecosystems is discussed in the following paragraph:

Construction of a nuclear power facility will directly impact the terrestrial environment. Therefore, the EIS should include an analysis of the effects of construction of the proposed facility on terrestrial ecology and the alternatives available for reducing or avoiding adverse effects, as well as the environmental benefits of the proposed action. Following the acceptance criteria listed above will help ensure that the environmental impact of the proposed action is considered with respect to matters covered by such standards and requirements.

III. REVIEW PROCEDURES

When evaluating the data and information acquired under “Data and Information Needs,” which is necessary to determine the impacts on terrestrial ecology from station construction, the reviewer should take the following steps:

- (1) Identify the construction activities that could affect terrestrial ecology and the types of impacts that could result. This may be done by comparing the construction footprint on and in the vicinity of the site and along transmission corridors and at any other offsite areas, relative to the location and areal extent of terrestrial habitats/plant communities, including occurrences of “important” terrestrial species and habitats (definitions of “important” species and habitats are in Table 2.4.1-1). The following steps should be useful:
 - Prepare a map superimposing construction areas on and in the vicinity of the site and along transmission corridors and at any other offsite areas over terrestrial habitats/plant communities, including occurrences of “important” terrestrial species and habitats (from the ER).

- During the site visit, inspect construction areas, emphasizing those where alteration of the terrestrial environment is expected to be greatest due to construction (e.g., sites proposed for facilities or new water bodies for plant cooling, etc.), and where construction activities and occurrences of “important” terrestrial species and habitats are closely juxtaposed or intersect.
- Supplement activities conducted under the above two bullets with information obtained from consultations with Federal, State, regional, local, and affected Native American tribal agencies (at a minimum the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service and appropriate State resource agency).
- Consider how construction activities would affect terrestrial habitats/plant communities and associated wildlife, including occurrences of “important” terrestrial species and habitats (e.g., consider the spatial extent and functional loss of modified habitat, the effects on critical species life stages, etc.) (from the ER)

(2) Determine the magnitude of the types of impacts identified in (1) above, which may include, but are not limited to, the following:

- the area of each generic terrestrial habitat/plant community type, including “important” habitats, that would be permanently or temporarily disturbed, relative to the abundance of these habitats/plant community types in the region. This includes de-watering or filling of wetlands, ponds, or seepages, or altered surface drainage patterns that support “important” habitats, and changes in terrestrial habitat resulting from creating new water bodies to provide cooling water. Consider relation of activities to introduction and/or spread of invasive and/or exotic species. Consider the nature and duration of function lost for habitats/plant communities that would be temporarily disturbed (e.g., wetlands), and evaluate the efficacy of plans to restore these in light of recognized “best management practices.” Consider the adequacy of plans to prevent soil erosion in light of recognized “best management practices.” Based on all the above, estimate the overall magnitude of habitat impacts.
- estimate the magnitude of construction impacts to general wildlife, including State-listed species, based on habitat disturbance (e.g., tree removal), effects on critical life stages (e.g., migratory bird nesting), impediments to migrations/dispersal/movements, noise, avian collisions with elevated structures (e.g., cranes), etc.
- estimate the magnitude of construction impacts for Federally listed threatened or endangered species, and/or Federally designated critical habitat. This should be done based on the factors specified in the above two bullets for estimating the magnitude of impacts to habitats and species.
- if Federally threatened endangered species and/or Federally designated critical habitat occur in the project area, and the proposed project could adversely affect the species or habitat, prepare a biological assessment and consult with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service, as applicable, under Section 7 of the Endangered Species Act. The results of the biological assessment should be used to estimate the magnitude of construction impacts for Federally listed threatened or endangered species, and/or Federally designated critical habitat, noted in the preceding bullet. Note that under an Early Site Permit, adverse impacts can result only with a Limited Work Authorization, and a biological

assessment should be prepared if Federally protected species and/or habitats could be affected. If a Limited Work Authorization is not being sought under an Early Site Permit, construction is not authorized, no impacts to the terrestrial ecosystem would be possible, and thus a biological assessment should not be prepared. Note that because construction is inherent in an application for a COL, a biological assessment should always be prepared if Federally protected species and/or habitats could be affected.

IV. EVALUATION FINDINGS

Input to the EIS should include (1) the impacts of construction to terrestrial ecosystems, (2) the impacts for which there are measures or controls to limit adverse effects and the associated measures and controls, (3) the applicant's commitments to limit adverse impacts, and (4) the staff's evaluation of the adequacy of the applicant's measures and controls to limit adverse impacts. This information should be summarized and provided to the reviewer of ESRP Section 4.6.

Any construction activity that should receive mitigative action should be described by the staff. Where mitigation is an option, the reviewer should evaluate appropriate measures, which could include alternative placement of structures, alternative schedules, or alternative construction practices. The reviewer should also evaluate alternatives for any proposed construction activity that is predicted to result in an adverse impact that cannot be mitigated. Practices proposed by the applicant for the protection of the environment should be described if the reviewer determines that they are necessary.

The depth and extent of the input to the EIS should be governed by the attributes of the terrestrial ecological resources that could be affected by plant construction, and by the nature and magnitude of the expected impacts to those resources. Text supporting the identification of impacts and the determination of the magnitude of those impacts, as specified in (1) and (2) of "REVIEW PROCEDURES," should be included in the EIS. The following should also be considered by the reviewer for inclusion in the EIS:

- the clearing of vegetation from stream banks, making certain that it is limited to that necessary for placement of structures
- the Federal Water Pollution Control Act, the Coastal Zone Management Act of 1972, and the Marine Protection, Research, and Sanctuaries Act of 1972. Guidelines under the Acts should be followed in evaluating the significance of dewatering, dredging or filling wetlands. Because of the importance of wetlands, any unavoidable impact to this habitat must be considered in the overall benefit-cost balancing.
- the intrusion on or destruction of terrestrial plant communities that are regarded as representative of natural, undisturbed, or remnant communities or that show unusual ecological or geographical distributions, and the loss of fragile or sensitive habitat (these may be regarded as "important" habitats)
- the proposed procedures for compliance with EPA guidelines for drainage from dredge spoil. Filling of biologically productive wetlands is generally to be avoided. Plans for dumping of dredge spoils must be approved by the EPA and the District Office of the US Army Corps of Engineers.

- where cooling reservoirs are to be constructed, the potential beneficial impacts (e.g., provision of water for irrigation, livestock watering, or the creation of riparian habitat) should be considered and balanced against the ecological losses associated with inundation of the land area by the reservoir.
- the applicant's commitment to the use of **best management** practices
- the reviewer should screen each predicted impact using criteria appropriate to the affected segment of the ecosystem. For example, loss of more than a few percent of the habitat available in the region for an "important" species could be considered of sufficient importance to consider mitigating action.

If the reviewer verifies that sufficient information has been provided in accordance with the requirements of this ESRP section, then the evaluation supports the following type of concluding statement to be included in the EIS:

The staff reviewed the available information relative to impacts to general terrestrial ecology and Federally protected species and designated critical habitat on and in the vicinity of the site and along the transmission corridors. The staff concludes that the description of impacts is adequate to comply with **10 CFR 51 and 52.**

V. IMPLEMENTATION

The method described in this ESRP should be used by the staff in evaluating conformance with NRC requirements, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the requirements.

VI. REFERENCES

10 CFR 51.71, "Draft environmental impact statement—contents."

10 CFR 51.75, "Draft environmental impact statement—construction permit."

10 CFR 52, Subpart A, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants"

Bald and Golden Eagle Protection Act of 1940, as amended, 16 USC 668 et. seq.

Coastal Zone Management Act, as amended, 16 USC 1451 et seq.

Endangered Species Act, as amended, 16 USC 1531 et seq.

Federal Water Pollution Control Act (FWPCA), as amended, 33 USC 1251 et seq. (also known as Clean Water Act).

Fish and Wildlife Coordination Act Amendment, 16 USC 661 et seq.

Golden, J., R.P. Ouellette, S. Saari, and P.N. Cheremisinoff. 1980. Environmental Impact Data Book. Ann Arbor, Science Publishers, Inc. Ann Arbor, Michigan.

Marine Protection, Research, and Sanctuaries Act, as amended, 33 USC 1401 et seq.

“Memorandum of Understanding between the Corps of Engineers, U.S. Army, and the U.S. Nuclear Regulatory Commission for the Regulation of Nuclear Power Plants.” 40 *Federal Register* 60115, August 25, 1975.

Migratory Bird Treaty Act, as amended, 16 USC 703 et seq.

“Second Memorandum of Understanding and Policy Statement Regarding Implementation of Certain NRC and EPA Responsibilities,” 40 *Federal Register* 60115, December 31, 1975.

U.S. Nuclear Regulatory Commission (NRC). 1998. *General Site Suitability for Nuclear Power Stations*. Regulatory Guide 4.7, Rev. 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1977. *Terrestrial Environmental Studies for Nuclear Power Stations*. Regulatory Guide 4.11, Rev. 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2004. *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues*. LIC-203, Revision 1, Washington, D.C.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the Environmental Standard Review Plan are covered by the requirements of 10 CFR Part 51, and were approved by the Office of Management and Budget, approval number 3150-0021.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.
