

THE **NATURAL RESOURCES INVENTORY (NRI)** AND **FOREST STAND DELINEATION (FSD)** provide information about the environmental features of a tract. They are submitted in the form of a map of the tract and form the basis for choosing areas for forest retention, reforestation, and afforestation.

THE NATURAL RESOURCES INVENTORY AND FOREST stand delineation information should be submitted to the Planning Department before any site planning has been done for a development project or prior to application for a sediment control permit for a tract being developed.

Unless otherwise specified in this manual, the submission shall contain:

- Two copies of the Preliminary Mapping, which includes:
  - (a) Natural Resources Inventory
  - (b) Forest Stand Map
  - (c) Site Vicinity Map
- Two copies and one reproducible copy of the NRI/FSD Summary Map
- One copy of the Stand Condition Narrative
- One copy of the Field Data Sheets
- Qualifications of plan preparer (s)

***Standard  
Submittal  
Requirements***

**Modified  
Submittal  
Requirements  
For  
Smaller Tracts  
And  
Plans  
Subject  
To Tree  
Save Plans**

A simplified submittal package will be accepted for sediment control permits and applications for development on tracts less than 40,000 square feet in area, and for development applications which are subject to **tree save plans** approved pursuant to the 1989 county tree legislation. In these instances, the submittal must contain the natural resources inventory map and a description of forest stands that includes; dominant species, size classes, general health, and trees greater than or equal to 24" DBH. The field data sheets do not have to be submitted with the forest description. The Planning Department will generally accept submittal of the forest stand delineation map and the forest conservation plan at the same time for these projects.

**Planning  
Department Review  
And  
Approval**

REVIEW

An overview of NRI/FSD requirements is presented in Figure 2. Planning Department staff reviews the natural resources inventory and forest stand delineation and notifies the applicant whether it is complete and correct within 30 calendar days after receipt. If this notification is not given within 30 calendar days, the submittal will be considered complete and correct. The review and comment period may be extended by an additional 15 calendar days under extenuating circumstances. If plans are deemed to be incomplete or incorrect, the applicant will be notified that changes or additional information must be submitted. An additional review and comment period of up to 30 calendar days will begin when revised plans are logged in.

APPROVAL

Upon Planning Department staff finding that the requirements have been satisfactorily addressed, written approval of the NRI/FSD will be sent to the applicant. The NRI/FSD Summary Map will be signed and dated, and the reproducible copy will be returned to the applicant with the approval letter.

EXPIRATION OF  
INVENTORY/DELINEATION

Approval of the natural resources inventory and forest stand delineation will remain in effect for a period not longer than 2 years. Plans may be recertified after two years.

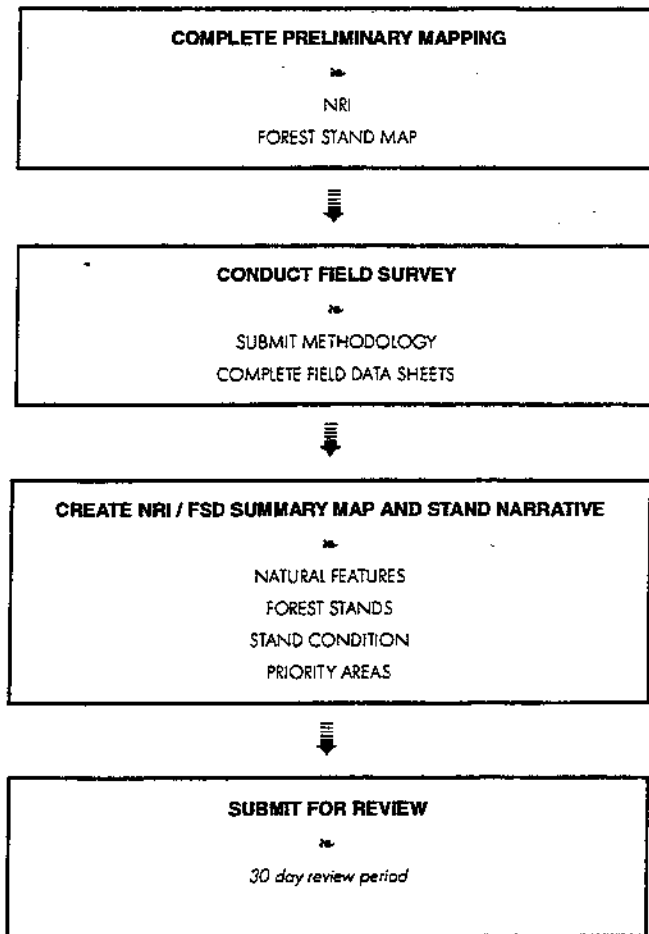


Figure 2  
OVERVIEW OF NATURAL  
RESOURCES INVENTORY  
(NRI)  
AND FOREST STAND  
DELINEATION  
(FSD)

## A. Natural Resource Inventory

A complete analysis of existing natural resources must be provided in the form of a natural resources inventory (NRI) (see Figure 3). Guidance for identification and delineation of the natural features to be included in the inventory, including calculation of buffers, can be found in the latest version of *Environmental Management of Development in Montgomery County* (MNCPPC).

The NRI must contain the following information (to cover the development site and first 100 feet of adjoining land around the perimeter or the width of adjoining lots, whichever is less). Table 1 lists typical sources of this data.

- Property boundaries
- Topography at a minimum scale of 1"=200' with contour intervals not more than 5 feet. Slopes 25% and greater, and slopes between 15% and 25% that are associated with **erodible soils** shall be identified.

- Location of perennial and intermittent streams and major drainage courses, 100- year ultimate floodplains and the 25' building restriction lines (BRL) related to them, and stream buffers.

*Note: All streams shown on USGS Quad sheets, FEMA maps, MNCPPC 1"=200' topographic maps, or the Montgomery County Soil Survey will be assumed to be perennial unless a field survey reveals otherwise.*

- Wetlands (including those of state concern, where applicable) and appropriate buffers, as defined by state regulations, identified by type and acreage.
- Soils and geologic conditions, as found in the most recent version of the Montgomery County Soil Survey, including soil type, structural limitations, soils that are hydric or have hydric inclusions, and **erodible soils** on slopes of 15% or more.
- Rare, threatened or endangered plants or animals and critical habitats observed in the field, and those documented by the MD Dept. of Natural Resources.
- Aerial extent of forest and tree cover which includes the outside perimeter of individual trees.
- Cultural features and historic sites.
- A site vicinity map at 1"=2000' which shows the location of the site within a square mile and indicates major roads and land uses.

Figure 3  
NATURAL  
RESOURCES  
INVENTORY

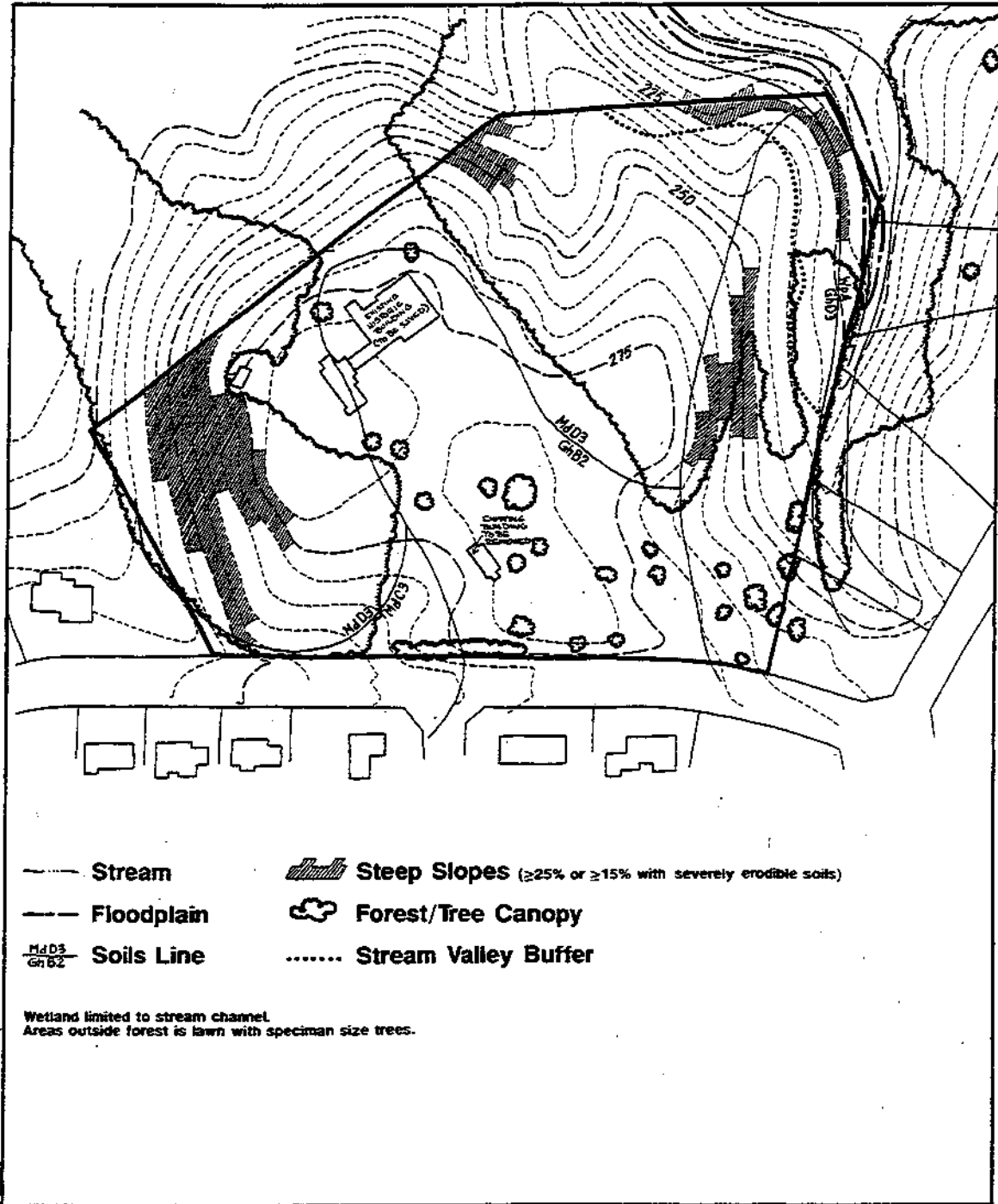


table 1

<sup>1,2</sup>

DATA SOURCES

PROPERTY BOUNDARIES	Record plats, tax maps or approved boundary surveys.
TOPOGRAPHY	M-NCPPC 1"=200' topographic maps or applicant surveys.
PERENNIAL / INTERMITTENT STREAMS	As noted on M-NCPPC 1"=200' topographic maps, USGS topographic maps, SCS soils maps, and by field verification.
SOILS	Latest version of the Montgomery County Soil Survey, Appendix E., and by field verification.
FORESTED AREAS	Most recent aerial photographs, Maryland Forest Resource Inventory maps (1992), or other M-NCPPC map sources that may be developed as part of area master plans or other studies.
STEEP SLOPES	Slopes 25% or greater or 15% or greater with erodible soils are measured off the approved topographic maps.
100-YEAR ULTIMATE FLOODPLAINS	M-NCPPC Floodplain Studies, Federal Emergency Mapping Agency maps, or approved developer studies (with computations).
STREAM BUFFERS	Calculated using <i>Environmental Management of Development in Montgomery County, MD</i> , M-NCPPC.
NON-TIDAL WETLANDS	U.S. Fish and Wildlife Service Wetlands Inventory Maps or Maryland Non-Tidal Wetlands maps, and field identification.
CRITICAL HABITATS <sup>3,4</sup>	To be identified on Maryland Forest Resource Map in 1992 or made available at the discretion of the Natural Heritage Program in consultation with MD Dept. of Natural Resources.
ADJACENT LAND	Local zoning maps or comprehensive plans.
HISTORIC SITES	Local, state or federal historic registers.
CHAMPION TREES	Local, state or federal lists of champions (State 1990 list is included in Appendix C).

<sup>1</sup> Many of these sources are updated continually. The most recent version shall be used by the applicant.

<sup>2</sup> Definitions of these terms can be found in the Glossary, Appendix A.

<sup>3</sup> List of rare species of concern in Maryland may be found in COMAR ...

<sup>4</sup> If rare, threatened or endangered species are identified on site, the Forest Stand Delineation shall be sent to the Md DNR for review.

## ***B. Forest Stand Delineation***

The forest stand delineation (*FSD*) is a detailed summary of existing forest and trees on a tract. It is prepared by identifying forest stands (*as described below*), and conducting field investigation to verify the information. The resulting information is then overlaid with the natural resources inventory on a map, and becomes the basis for determining priority areas for forest and tree retention. This map will also be used during preparation of the forest conservation plan to determine **priority areas** for necessary reforestation and afforestation.

Using the natural resources inventory information, the overall **forest cover** map should be subdivided into stands of trees with similar characteristics, such as upland versus bottom land areas, soil types, and northern versus southern aspects. This is the **forest stand map** (*see Figure 4*).

The forest stand map shall be used to conduct a **forest survey** to further characterize the forest. The inventory should be used to verify stand boundaries and complete a description of the condition of each stand. It must include:

- basal area
- dominant and codominant species (*scientific and common name*)
- size class by species (*scientific and common name*)
- specimen trees by size and species (*scientific and common name*)
- Champion trees and trees that have a diameter at 4.5 feet above the ground (*DBH*) that is 75% or more of the diameter of the current state champion for that species
- individual trees in good health that have a diameter at 4.5 feet above the ground (*DBH*) of 24" or greater by size and species

*NOTE: Individual 24" trees do not have to be identified within flood-plains, wetlands and stream valley buffers which are not being disturbed. Exceptions may also be made, on a case by case basis, for large parcels in rural or other zones where a majority of the property will remain undisturbed, or for parcels where the majority of the trees are 24" DBH and greater.*

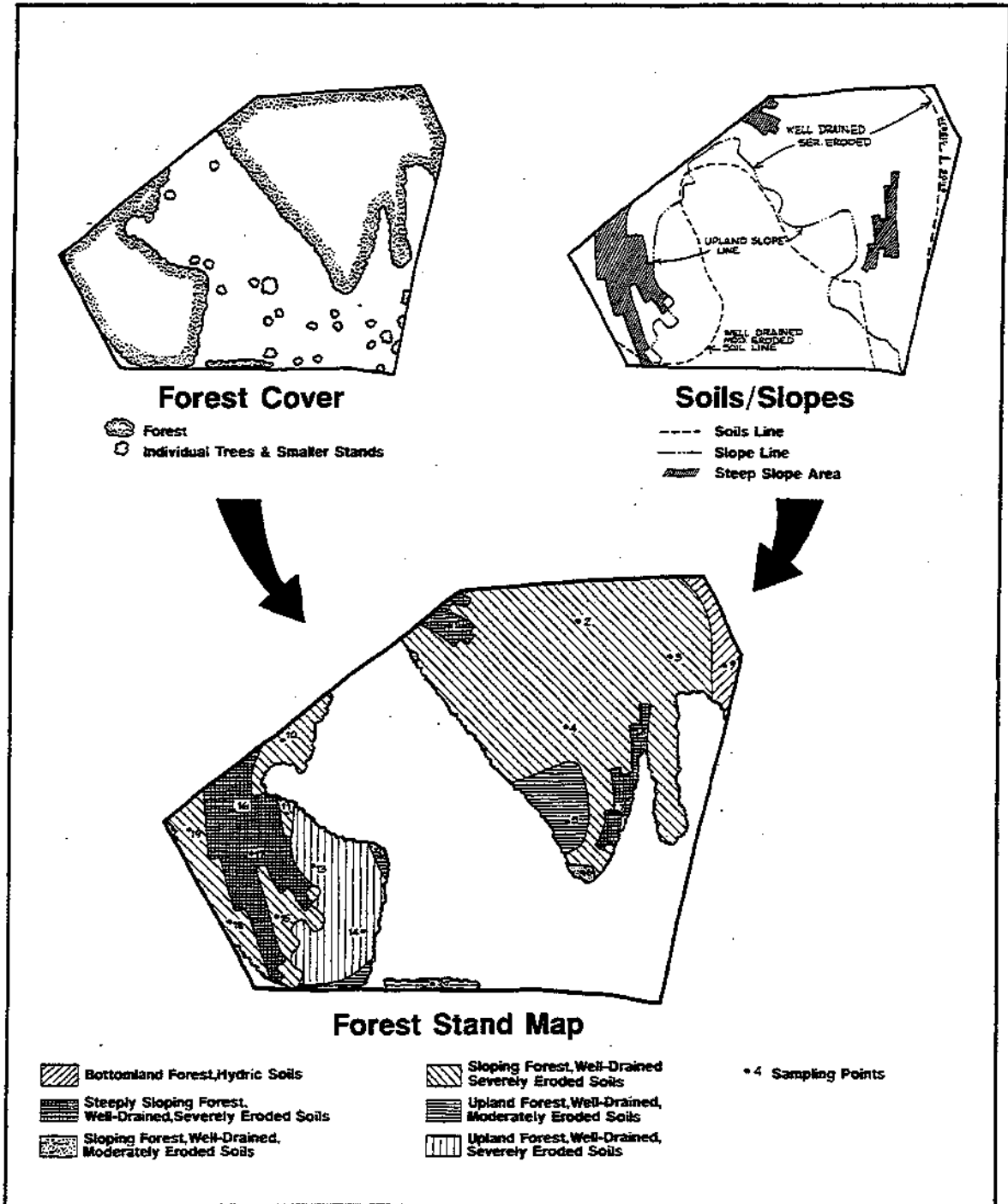
The following additional forest structure analysis must be done (*see Appendix G for methodology*):

- percent canopy closure

### ***1. Forest Stand Map***

### ***2. Forest Survey***

Figure 4  
FOREST  
STAND  
MAP





- number of canopy layers (*vertical structure*)
- percent of forest floor covered by herbaceous plants (*native species*), downed woody material, and exotic or invasive species (*see Appendix C for list*)

There are various methods which can be used for conducting forest sampling. The most appropriate methodology may vary according to the site. Therefore, this manual does not specify one option over another. Two of the most commonly used methods are fixed plot and variable plot sampling. Both involve establishing several random field sampling plots from which data are collected. A broader discussion of these methods is contained in the MD Department of Natural Resources *Forest Conservation Manual*. Specific details can be found in *Natural Resources Measurement*, Avery, 1975 and *Simplified Point Sample Cruising*, Ashley, 1991. Use of either of these methods is generally preferred. Alternatives may be approved by Planning Department staff provided they yield all the required information and it can be proven that a confidence interval of 67% is maintained. Complete details of alternative methodology must be submitted by the applicant. The location of the sampling points should be random and the number of sampling points should be based on the sampling method and minimum confidence interval. For forest structure analysis, at least one point must be sampled in each stand. Field data sheets and appropriate back-up information to support the forest inventory must be provided. (*See Appendix G for worksheets and summary tables*).

It is acceptable to conduct a generalized inventory in floodplains, wetlands and stream valley buffers if they will not be disturbed, and they will be protected under a long-term agreement. In these instances, specific field sampling points do not need to be established, but information on dominant species, size classes, and general health of the stand must be provided. The forest stand map should show the locations of these generalized surveys, and the field sampling points in all other areas.

The stand condition narrative is a brief description of the characteristics of each of the stands identified during the forest survey. The narrative shall include information on:

- condition classes - a rating of the condition of a tree or a stand of trees based on such parameters as: trunk condition, growth rate, structure, presence of insects or diseases, crown development, and life expectancy.

FOREST  
SAMPLING  
METHODS

UNDISTURBED  
AREAS

### **3. Stand Condition Narrative**

- 2a. stand structure - composition of the forest stand with reference to forest association (SAF cover type), dominant and co-dominant species, understory and herbaceous species (see Appendix G).
- 2a. forest structure - a measure of vertical and horizontal structural diversity within a stand; is related to stand age and habitat.
- 2a. retention potential
- 2a. transplant and regenerative potential
- 2a. comments on evidence of past management
- 2a. date of field work
- 2a. name, address, phone number and qualifications of the person(s) conducting the inventory

## ***C. Natural Resources Inventory/Forest Stand Delineation Summary Map***

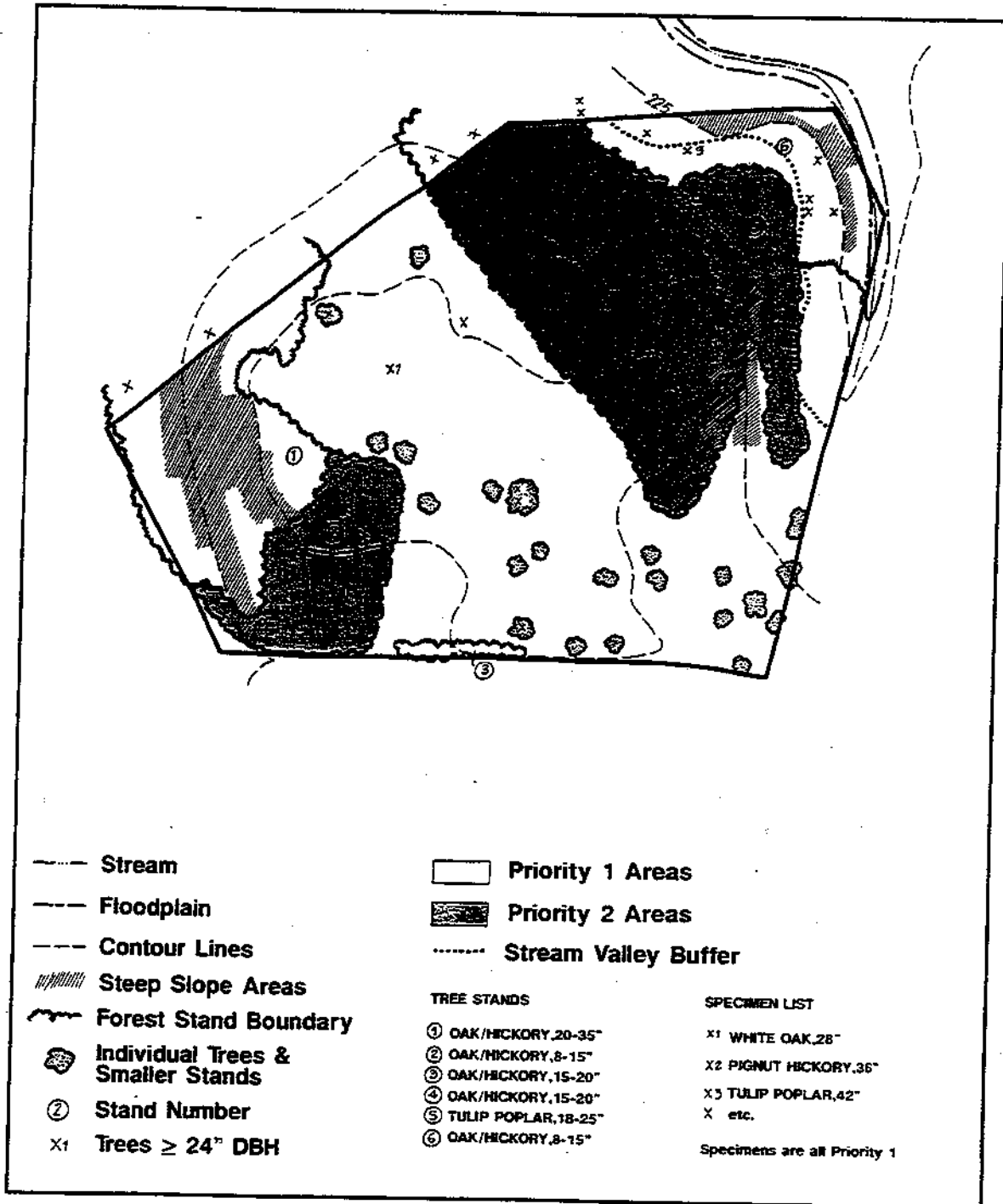
### ***1. Contents Of Summary Map***

The information gathered during the natural resources inventory and forest stand delineation should be compiled on the **NRI/FSD Summary Map** (Figure 5). In addition to streams, floodplain, topography, steep slopes and wetlands, it must show forest stands based on species, size classes, and condition. The forest stand information shall be based on the field data collected for each forest stand. Each stand should be numbered and individual trees which are greater than or equal to 24" DBH should be identified (except as noted in section B.2, above). Stands may be classified by forest association or similar method, but individuals must be identified by scientific and common name. Finally, the summary map shall show priority areas as described below.

### ***2. Identification Of Priority Areas***

Areas to be avoided wherever possible during the site planning process are in Priority Area 1. Consideration should be given to preserving Priority 2 areas as well. Priority 3 and 4 areas should be targeted for major construction activity. Priority areas should be identified on the NRI/FSD summary map according to the following criteria:

figure 5  
NRI/FSD  
SUMMARY  
MAP



## Priority Area 1: High

- trees, shrubs, or herbaceous plants associated with:
  - intermittent and perennial streams and their buffers
  - slopes over 25 percent
  - nontidal wetlands and their buffers
  - erodible soils on slopes of 15% or more
  - 100-year floodplains
- critical habitats of rare, threatened, or endangered species
- contiguous forest that connects the largest undeveloped or most vegetated tracts of land within and adjacent to the site
- individual trees with one or more of the following characteristics:
  - trees that are part of a historic site or associated with a historic structure
  - trees designated as a national, state, or local champion tree
  - trees measuring 75 percent or more of the DBH of the designated state champion tree
  - trees which are specimens of a species

## Priority Area 2: Moderate

- stands or portions of stands with good forest structural diversity (*see Appendix G*)
- forested areas which provide a corridor 300 feet wide or more of primarily native vegetation between two larger forested tracts
- forested stream buffers up to forest corridor width (*300 feet wide*)
- trees which act as buffers between incompatible land uses and between dwellings and roads
- specific trees with a DBH of 24" or greater on a site, which will significantly enhance the site through their preservation

## Priority Area 3: Low

- stands or portions of stands with poor forest structural diversity or areas with none of the characteristics mentioned in priority areas 1, 2, or 4 (*see Appendix G for description of forest structure analysis*)

## Priority Area 4: Disturbed

- approximately 40 percent of land covered with exotic or invasive species in the dominant layer of the canopy (*see Appendix C for list of exotic and invasive species*)

## ***D. Summary Of The Requirements***

### **STEP 1**

#### Do Preliminary Mapping

- Prepare Natural Resources Inventory
  - topography, including identification of steep slopes  
*(25% or 15% with soils with erodible soils)*
  - perennial and intermittent streams and buffers
  - 100-year ultimate floodplain & 25' BRL
  - wetlands and appropriate buffers
  - soil types and limitations
  - rare, threatened & endangered species and critical habitats
  - aerial extent of forest cover
  - cultural and historic features
- Prepare Forest Stand Map
  - upland versus bottom land areas
  - northern versus southern aspect
  - soil types
  - field sampling points

### **STEP 2**

#### Conduct Field Survey

- Overlay preliminary mapping
- Identify field sampling points
- Complete field data sheets for each sample point
  - tree species *(dominant/codominant)*
  - basal area
  - size class
  - number of trees
  - number of tree species
  - number of dead trees
  - presence of specimen/champion trees
  - rare, threatened and endangered species noted
- Finalize stand boundaries
- Locate trees greater than or equal to 24" DBH *(as noted on page 15 of this manual)*

**STEP 3**

Submit NRI/FSD  
Summary Map  
and  
Supporting Information

- NRI/FSD Summary Map (2 copies, 1 reproducible)
  - natural features
  - forest stands (by forest type and size class and acreage)
  - forest stand condition
  - specimen/champion trees
  - priority areas
- Stand Condition Narrative (1 copy)
- Field Data Sheets (1 copy)
- Preliminary Mapping (2 copies)
  - Natural Resources Inventory
  - Forest Stand Map
- Qualifications of the preparer(s)

