

## Appendix: The King County Suitability and Sensitivity approach.

### Suitability (Limitations) and Sensitivity Analysis: A Framework for the Choice of Best Management Practices for Landowners

*R. Fuerstenberg and K. Gellenbeck*  
*King County Department of Natural Resources and Parks*  
*Seattle, Washington*

#### Why Suitability and Sensitivity<sup>1</sup> Analysis?

In order that we choose appropriate Best Management Practices (BMPs) and apply them effectively, we must derive the BMPs as directly as we can from the likely effects of the landowner's actions on the set of environmental conditions or features we are attempting to conserve or protect. For our purposes, the environmental conditions and features of concern (ECFCs) are:

- Water Quality
- Hydrology
- Fish and wildlife habitats (includes aquatic wetland, and upland habitats)
- Particular species of fish and wildlife
- Forests/native vegetation
- Soils

Our tasks are threefold: Assuming the landowner's goals and objectives for his or her tract of land can be known, **derive the activities necessary to realize those goals and objectives**, and **evaluate the impact of the activities on the ECFCs**. Having accomplished these tasks, **develop management practices to alleviate any harmful effects** (of the activities) to the ECFCs. Management actions should be thought of broadly here and may range from modification of the landowner's objectives to avoid an effect, to modification of the activity necessary to reach the objective, to remediation of the effect once the activities are carried out. It is the second task that is most crucial. Without a clear idea of the effects of the actions on the ECFCs, we cannot specify effective BMPs with any confidence. But this task is also the most difficult and perplexing, and is where suitability and sensitivity analyses can provide the framework to evaluate effects and therefore craft appropriate BMPs.

Both suitability and sensitivity analyses make use of biophysical and sociocultural information collected at the site level and at larger scales, in order to place the actions in the context of the

---

<sup>1</sup> We define **suitability** as *the fitness of a tract of land for a defined use* and **sensitivity** as *the responsiveness of an attribute (of the site of larger landscape) to an action or activity*.

surrounding area and at the proper scale(s) of the ECFCs. This context is particularly important for wildlife and hydrologic effects. **Suitability analysis** seeks to determine the fitness or appropriateness of a tract of land for a particular use or objective, for example, forestry or agriculture, and may even assist in determining the most appropriate tree species and crop types and where on the site they should be grown. This is often done by examining soil characteristics, slope and aspect, climatic factors such as rainfall and seasonal temperature, and the management history of the site. **Sensitivity analysis** attempts to determine the responsiveness of the same tract of land or of selected attributes to the actions and activities of the landowner. A tract of land may be sensitive to vegetation removal because it possesses a combination of soils and slopes that are easily eroded when exposed to wind or water. As in suitability, areas of a tract may differ in their sensitivity (responsiveness) to a particular action. Generally, the greater the responsiveness of an attribute, the greater the sensitivity. Again, this analysis examines attributes of soils, slopes, vegetation, fish and wildlife, and hydrology, together with management history, to determine sensitivity.

In many cases, sensitivity will be the inverse to suitability; a tract with soils highly suitable for agriculture may be relatively insensitive in some ways to agricultural operations. This is not always the case, however, and we often find that soils suitable for some objectives—soils highly suited for forestry, for example—may still be quite sensitive to the operations and actions associated with reaching the objective. The very same attributes that make a soil well-suited to growing trees—porosity, a deep surface organic layer (duff)—also make the soil highly sensitive to compression and rutting from vehicles.

This suitability/sensitivity approach to the evaluation of a tract of land (or even a landscape) is a central method in ecological planning which, itself, began in earnest in the United States during the late 1960s with the writings of landscape architects Philip Lewis and Ian McHarg (see especially *Design With Nature*). Advances in ecological planning continued throughout the 1980s with Anne Spirn, Jon Berger, John Tillman Lyle, and French geographer Jean Tarlet; most recently, Fredrick Steiner has championed this approach in his excellent book *The Living Landscape*. Christopher Alexander has defined this same ecological approach for human landscapes in two works entitled *A Pattern Language*, and *A Timeless Way of Building*, and in his most recent four volume work called *The Nature of Order*.

The ecological planning method, according to Steiner, “is primarily a procedure for studying the biophysical and sociocultural systems of a place to reveal where specific land uses may best be practiced”. Suitability and sensitivity analyses provide the basic information to link the attributes of the landscape to the objectives of the landowner (or planning entity) and to the limitations the landscape imposes on those objectives. Although usually carried out at large scales (many 10s of square miles), the concepts of ecological planning are applicable at multiple scales. Arthur Johnson (1981) explains:

*“Such an approach is not limited by scale. It may be applied to locating plants within a garden as well as to development of a nation.”*

Our purpose is fundamentally no different than either McHarg’s or Steiner’s in that we are attempting to find, on a tract of land, the areas of suitability for the landowner’s goals while

protecting the sensitivities of the environmental attributes on the tract and in the adjacent landscape should they be interrelated. Suitability and sensitivity analysis allows us to examine the landscape and more directly link management to the environmental attributes of the landscape at multiple scales.

## **Suitability Analysis**

“Consult the genius of the place in all”

--*Alexander Pope*

Once we have obtained some basic information about the site or tract from the survey work, placed the site in a larger context of the basin or landscape, and assessed the landowner's objectives, we can determine the “fitness” of the site for the intended use. To do this, we will use a system similar to the one developed by the NRCS to characterize capabilities and limitations of soil types and attributes for particular uses. The NRCS system applies to soils only but the methods can be adapted for examining other attributes of a site as well. The suitability analysis is divided into the ECFC categories:

Soils

Water Quality

Hydrology

Forests and other Native vegetation

Fish and wildlife habitats

For each of these categories, we will examine the limitations imposed on a proposed use by the properties of the physical and biological environment. In addition, it is worthwhile to examine issues of compatibility with surrounding uses, zoning, and infrastructure. An example of an incompatible use might be forestry in a largely residential setting; zoning incompatibilities can be found in the KC Comprehensive Plan; an example of an infrastructure incompatibility might be the lack of economically viable markets for an intended cash crop. Using Soils as an example, we can build the suitability analysis for the other ECFC categories in a like fashion. Essentially, the fewer limitations imposed on a use by the site properties, and the fewer sociocultural incompatibilities, the greater the suitability of the site for the intended use. With soils, we can also glean information from the capability groupings, keeping in mind that these groupings were developed for crop production and care should be taken in extending the classes to other uses.

For ease of analysis, we can classify the intended uses into a few general ones. Keep in mind the activities associated with the intended use when determining suitability: such as soils suitability for septic drainfields if the desired use is residential or erodibility if the intended use is woodlot management and slopes are steep.

## **General Use Categories:**

- Residential (includes provisions for water supply, septic drain fields, foundations, driveways, etc.)
- Horticulture (gardens, row crops, pastures)
- Animal husbandry (horses, cattle, sheep, llamas, alpacas, poultry, etc)
- Woodlot management (felling, hauling and skidding, re-planting)
- Fish and wildlife habitat management (includes protection, enhancement, and restoration)
- Recreation (includes active recreation, horse trails, picnic areas, etc.)

*Residential use* combines the various activities associated with the development of a site for a house or other living quarters. This will include site preparation, excavation, construction of foundations, slabs, buildings, drives, yards and gardens, wells, septic systems and drainfields, etc.;

*Horticultural use* includes the various activities associated with the raising of plants for commercial or non-commercial purposes, or in support of other uses such as pastures for livestock;

*Animal husbandry* combines the activities associated with the raising of livestock or other animals that is not incidental to other uses. Raising chickens, horses, sheep, goats, llamas, the breeding, training, and kenneling of dogs and horses, catteries, aviaries, or apiaries, etc. are all included;

*Woodlot management* combines the activities associated with small wooded areas for personal use and includes felling, thinning, coppicing, re-planting, removal of diseased trees, etc.;

*Fish and wildlife habitat management* combines the activities associated with managing lands and waters—woodlots, fields and meadows, streams, ponds, wetlands—for the benefit of native wildlife. This includes activities such as felling, re-vegetation, removal of non-native plants, stream and wetland enhancement, pond construction and management, nest boxes and nest holes, re-introductions of native species, etc.;

*Recreation use* includes both active and passive activities: trails for horseback riding, cycling, and walking; camping and picnic areas, wildlife observation, etc.

## **Sensitivity Analysis**

Sensitivity can be defined as the degree of response of a site or of an environmental characteristic to a use or activity. In this case, we use the five attributes listed above as indicators of overall site sensitivity: Soils, Water Quality, Hydrology, Forests and other Native vegetation, and Fish and wildlife habitats. Our task is to evaluate the response of each of these attributes in reference to the proposed use of a site. Once we know the type of response and the magnitude of the response, we can implement management practices to reduce or eliminate the response. Since the sensitivities of the attributes vary within and across sites, and may even vary over time, our management will necessarily vary as well. A site may reveal some sensitivities to particular uses that are so great that they cannot be overcome with current management practices; other use/sensitivity combinations may require little management intervention. Our management options, therefore, comprise a gradient from precluding a certain use to allowing that same use but managing its effects of the sensitive attribute. Combining the suitability of a site with its sensitivity can help choose both the allowable uses and the necessary management techniques to avoid environmental degradation.

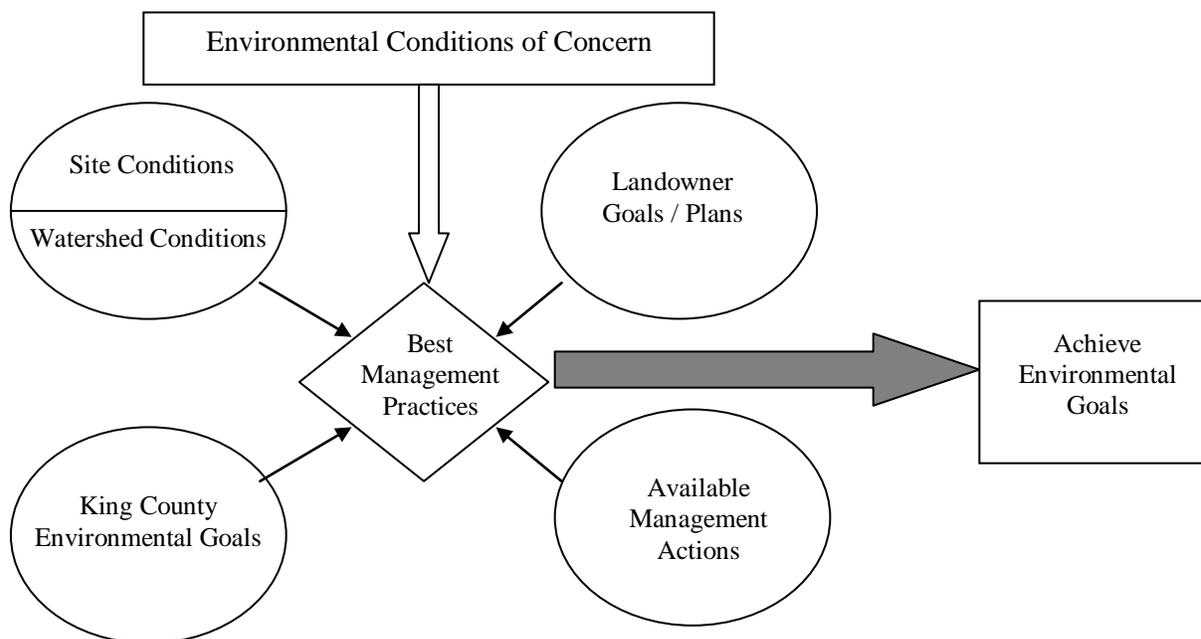
Limitations and Sensitivity Analysis:  
A Decision Framework for Determining Best Management Practices for Rural Property Owners

**What is a Limitations and Sensitivity Analysis?**

The limitations and sensitivity analysis is a framework for assessing both biophysical and sociocultural information collected at multiple scales to determine the likely effects of the landowner's actions on a set of environmental conditions. The King County Rural Stewardship Program (RSP) has identified five environmental conditions of concern (ECOC) to evaluate and to derive the most appropriate best management practices (BMPs). The ECOCs are:

- Water Quality defined as the chemical, physical, and biological characteristics of water.
- Hydrology defined as the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.
- Soils defined as the top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter
- Fish and Wildlife Habitats defined as physical and biological components of the land that support populations of plants and animals.
- Native Vegetation defined as those plants that occur naturally in the Pacific Northwest.

BMPs are actions that can reduce an activity's impacts on the environment. BMPs may range from modification of the landowner's objectives to avoid an effect, to modification of the activity necessary to reach the objective, to remediation of the effect once the activities are carried out.



**Figure 1:** Illustrates the relationship between the various environmental conditions and management actions that are integrated into the best management practices decision framework.

### **Why perform a Limitations and Sensitivity Analysis?**

The Limitations and Sensitivity Analysis will provide land managers a consistent and repeatable framework to evaluate effects and to determine the most appropriate best management practices (BMPs) to avoid or remediate potential impacts. By identifying the degree and kind of limitations of a site, we are also determining the suitability of the land for a proposed activity. In most cases, the more severe the limitation(s), the less suitable the site is for the intended use and the greater the need for BMPs. The evaluation of sensitivity assists land managers with predicting the responsiveness of the same tract of land to the actions and activities of the landowner as it relates to its environmental conditions. In general, the greater the responsiveness of a condition, the greater its sensitivity

### **How to conduct the Limitations and Sensitivity Analysis?**

Once we have obtained some basic information about the site or tract from the survey work, placed the site in a larger context of the basin or landscape, and assessed the landowner's objectives, we can determine the "fitness" of the site for the intended use. To do this, we will use a system similar to the one developed by the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS) to characterize limitations for certain land use activities according to soil types suitability.

The types of land use activities that may occur on a residential property are grouped into five general categories. Land use categories are:

- Residential (includes provisions for water supply, septic drain fields, foundations, driveways, etc.)
- Horticulture (includes gardening, gardens, row crops, pastures)
- Livestock management (horses, cattle, sheep, llamas, alpacas, poultry, etc)
- Woodlot management
- Fish and wildlife habitat management (includes protection, enhancement, and restoration)
- Recreation (includes active and passive recreation, horse trails, picnic areas, etc.)

For each of these categories, we will examine the limitations imposed on a proposed use by the properties of the physical and biological environment. In addition, we will examine issues of compatibility with surrounding uses, zoning, and infrastructure. An example of an incompatible use might be forestry in a largely residential setting; zoning incompatibilities can be found in the KC Comprehensive Plan. An example of an infrastructure incompatibility might be the lack of economically viable markets for an intended cash crop. Essentially, the fewer limitations imposed on a use by the site properties, and the fewer sociocultural incompatibilities, the greater the suitability of the site for the intended use, and the greater the likelihood of success for the landowner.

### **Part I: Determine soil limitations for the proposed land use**

For this part of the analysis, you will be assessing the proposed land use limitations based on the soil type and capability unit. The U.S.D.A. Soil Conservation Services Soil Surveys for King County Area or Snoqualmie Pass Area will be the primary sources for this information. These reports have ranked the limitation of the soils according to land use. Fish and wildlife habitat management also includes an examination of the surrounding landscape. It is only necessary to

determine the limitation ratings for those land use categories being proposed by the RSP applicant.

**Step 1:** Compile maps showing soils, slope, rare/unique plants, and critical areas. Overlay the general area for each of the proposed land use category.

**Step 2: Identify all Soil/slope types present and the capability unit for each type.**

Use the U.S.D.A. Soil Conservation Services Soil Survey for King County Area or Snoqualmie Pass Area to identify the soil/slope types and the capability unit for each type found on the site unless site-specific information is available. See box below on how to use the soil type and capability unit to determine limitations.

**How to read the a soil type and capability unit**

The first two letters are the soil type; the third capital letter denotes the slope, as in AgD which is Alderwood gravelly, sandy loam on slopes from 15 to 30%. In newer soil surveys, this three letter designation has given way to a numbering system (see the Snoqualmie Pass survey, for example). Reading the capability unit is straightforward also: it is a combination of numbers (Arabic or Roman) and letters that denote the severity of limitations, the nature of the limitations, and the soil groups that are included in the class. For example, a soil type may be in the IVe-2 (or 4e-2) capability unit. Class IV soils have very severe limitations; the e tells us that the limitations are mainly due to erosion (other limitations are due to (w)ater; (s)tony or shallow soils, or (c)limate). The numeral 2 is a group of soils within a class that are similar to each other and require similar management.

**Step 3:** Using the U.S.D.A. Soil Conservation Services Soil Survey for King County Area or Snoqualmie Pass Area, determine the level of limitations for the following land use categories: residential, recreational, woodlot management, horticulture, and livestock management.

1. **Residential:** Rate the limitation from none to severe using **Table 4** (town and country planning) in the King County Area Soil Survey or **Table 10** (building site development) and **Table 11** (sanitary facilities) in Snoqualmie Pass Area Soil Survey.
  - a. Dwelling (foundations) Limitations
  - b. Shallow Excavation Limitations
  - c. Septic Tank and Filter Field Limitations
  - d. Lawn and Playground Limitations (*Rate the limitation from none to severe using **Table 5** of the King County Area Soil Survey or **Table 8** of the Snoqualmie Pass Area Soil Survey*)
  - e. Equipment Limitation(*Rate the limitation from none to severe using **Table 6** of the King County Area Soil Survey or **Table 7** of the Snoqualmie Pass Area Soil Survey*)
  - f. Erosion Hazard (*Use **Table 6** or **Table 7** as mentioned above*)

2. **Recreational:** Rate the limitation from none to severe using **Table 5** of the King County Area Soil Survey or **Table 8** of the Snoqualmie Pass Area Soil Survey
  - a. Playgrounds Limitations
  - b. Camp Areas Limitations
  - c. Picnic Areas Limitations
  - d. Paths and Trails Limitations
  
3. **Woodlot Management:** Rate the limitation from none to severe using **Table 6** of the King County Area Soil Survey or **Table 7** of the Snoqualmie Pass Area Soil Survey.
  - a. Seedling mortality
  - b. Plant competition
  - c. Equipment Limitations
  - d. Erosion hazard
  - e. Windthrow hazard
  - f. Preferred species for planting:
  
4. **Horticulture:** Identify the capability unit for each soil type found on the site by looking in the soil descriptions beginning on page 8 of the KC Soil Survey and on page 14 of the Snoqualmie Pass Soil Survey. For the elements below, rate the limitations of the soil from none to very severe using the Capability Grouping descriptions found on pages 74-79 of the KC Soil Survey. Using Table H1, rate the limitations to productivity for the soil type. If a limitation is not mentioned in the soil type description or capability subclass, then it receives a limitations rating of none.
  - a. Erosion Hazards
  - b. Water Limitations (includes flooding, ponding, or saturation; if any are severe, then water limitations are severe)
  - c. Shallow, Droughty, or Stony Soils Limitations (likely only applies to eastern King County)
  - d. Climate Limitations (too cold or too dry)
  - e. Rooting Depth Limitations: *If rooting depth is described as restricted or limited, or less than 24 inches, rate limitation as SEVERE; if rooting depth is between 24 and 42 inches, rate as MODERATE; if between 42 and 60 inches, rate SLIGHT; if 60 inches or greater, rate as NONE.)*
  - f. Water Capacity Limitations: *If available water capacity is low, rate limitation as SEVERE; if moderate, rate as MODERATE; if moderately high to high, rate as SLIGHT.*
  - g. Productivity Limitations: *For a particular soil type use Table 7 in the KC Soil Survey to find the productivity value for the three crop types. Next use Table H1 to determine the overall productivity. Rate the productivity limitation SLIGHT if 2 of 3 values fall into the SLIGHT category; MODERATE if 2 of 3 values fall into MODERATE, and SEVERE if 2 of 3 values fall into the SEVERE category. If the soil type is not found in the table, rate the limitation SEVERE).*

**Table H1:** These crop types are considered representative of most horticultural crops grown in King County. The yields are a useful measure of native soil productivity.

Limitation to Productivity	Pasture grass	Corn	Grass and hay
SLIGHT	12 - 15 AUM	12 – 15 tons/acre	5 – 6 tons/acre
MODERATE	8 – 11 AUM	8 - 11 tons/acre	3 - 4 tons/acre
SEVERE	4 – 7 AUM	4 – 7 tons/acre	1 -2 tons/acre

5. **Livestock Management:** : Identify the capability unit for each soil type found on the site by looking in the soil descriptions beginning on page 8 of the KC Soil Survey and on page 14 of the Snoqualmie Pass Soil Survey. For the elements below, rate the limitations of the soil from none to very severe using the Capability Grouping descriptions found on pages 74-79 of the KC Soil Survey. If a limitation is not mentioned in the soil type description or capability subclass, then it receives a limitations rating of none.

a. Erosion Hazards

b. Compaction Limitations: *Use the narrative descriptions below to arrive at the degree of limitation.*

SLIGHT: The soil is coarse in texture, with little or no clay, well-drained to moderately well-drained, and not seasonally saturated;

MODERATE: Soil is poorly drained, coarse to sandy with little or no clay, and not seasonally saturated;

SEVERE: The soil is seasonally saturated and has one of the following characteristics: the soil has a high clay or organic content in the A or B horizon; or the soil is a fine silt or fine to very fine silty sand;

c. Seasonal Water Table Limitations

SLIGHT: If water table is > 4 feet from the surface

MODERATE: If within 2-4 feet of the surface,

SEVERE: If within 1-2 feet of the surface; and

VERY SEVERE: If at the surface

d. Flooding Hazards

e. **Sewage Lagoons Limitations** (*Rate the limitation from none to severe using **Table 4** (town and country planning) in the King County Area Soil Survey or **Table 10** (building site development) and **Table 11** (sanitary facilities) in Snoqualmie Pass Area Soil Survey*)

f. Productivity: Use Table L1 (below) to determine the limitation for productivity.

**Table L1:** Soil Limitation for Livestock Grass Productivity

Productivity Limitation	Pasture grass	Grass and hay
-------------------------	---------------	---------------

SLIGHT	12 - 15 AUM	5 – 6 tons/acre
MODERATE	8 – 11 AUM	3 - 4 tons/acre
SEVERE	4 – 7 AUM	1 -2 tons/acre

6. **Fish and Wildlife Habitat Management:** Circle the appropriate answer to the following questions using the site assessment and GIS. Use key below to determine limitations.

a. What is the matrix within 0.8 miles from the site in all directions?

- Mostly forest or native plant communities (>50%) = slight limitations
- Mostly farms and other fields (> 50%) = moderate limitations
- Mostly developed urban or suburban (>50%) = severe limitations

A **matrix** is the 'most extensive and most connected landscape element type, and therefore plays the dominant role in the landscape's functioning.

b. Is there a continuous connection between the site and the surrounding landscape?

- Unbroken native (characteristic for the condition of the site) vegetation or if interrupted openings simulate natural disturbances; without barriers = slight limitations
- Fragmented but stepping stones present = moderate limitations
- Fragmented with no obvious connections = severe limitations

A **Stepping Stone** is a species-specific separate stopover area, of similar vegetative composition to breeding, rearing and feeding habitat, where migrating and dispersing individuals rest, feed and otherwise replenish energy while moving through heterogeneous landscapes. Stepping stones are a minimum of one acre in area; within 0.6 miles (1K) of similar, larger habitats; and more or less square to round in shape (i.e., exhibiting maximum interior area).  
**Note-** *specific species include those listed by county*

c. What are the conditions of the adjacent parcels?

- Mostly native plant communities (>50%) = slight limitations
- Mostly farms and other fields (>50%) = moderate limitations
- Mostly developed urban or suburban (>50%) = severe limitations

d. Are the intended wildlife habitat management goals ecologically feasible for the site based on its and the surrounding landscape conditions? *For eastern King County, use site assessment form and Snoqualmie Pass Area Soil Survey Table 9 pp. 431-443 (wildlife habitat).*

- All habitat elements present or supportable (good only) = slight limitations

- Some elements present or supportable (fair) = moderate limitations
- No elements present or not supportable (poor or very poor) = severe limitations

**Part II: Determine sensitivity for each environmental conditions of concern**

For this part of the analysis, you will answer a set of questions for each environmental condition of concern to determine how it may be affected by the proposed or existing land use. This part of the analysis assists with identifying the types of BMPs that may be needed to prevent or remediate the potential impacts by rating its sensitivity with the different land use.

**A. Soils**

Answer the questions below with a “yes” or “no” based on your site assessment, then use the table below to arrive at the sensitivity rating.

**Erodibility:**

1. Is the soil on the site classified as either fine or very fine sandy loam, silty loam, sandy silt, fine or very fine silty sands?
2. Does the slope on the site exceed 12%?
3. Is the permeability of the soil less than 2 inches per hour?

**Compaction:**

4. Is the soil seasonally saturated? (i.e. topography, impervious layer, hydric)
5. Does the soil have a high clay or organic content in the A or B horizon?
6. Is the soil a fine silt or fine to very fine silty sand?

**Acidification:**

7. Is the soil coarse, granular and porous in the upper layers but weakly permeable or impermeable in the substratum?
8. Is there a high seasonal water table?
9. Is the soil weakly buffered; upper limit of pH range is less than 6.0?

**Contamination:**

10. Is there a history of intensive horticultural or livestock use on the site (nitrates/pesticides)?
11. Is the soil coarse-textured and well-drained (leaching)?
12. Are clay and/or organic content high in the surface layer or substratum (pesticides persistence)?

	<b>Low Sensitivity</b>	<b>Moderate Sensitivity</b>	<b>High Sensitivity</b>
<b>Residential</b>	NO to all or yes to any one except #2 or #4	Yes to any two (not in the same category) or YES to #2 or #4	Yes to any three; or any two within a single category
<b>Horticulture</b>	NO to all or YES to any one except # 10	Yes to any two (not in the same category) or YES to #10	Yes to any three; or any two within a single category
<b>Livestock Management</b>	NO to all or YES to any one except # 10	Yes to any two (not in the same category) or YES to #10	Yes to any three; or any two within a single category

<b>Woodlot Management (Use only Qs 1-9)</b>	NO to all or YES to any one	Yes to any two (not in the same category)	Yes to any three; or any two within a single category
<b>Fish and wildlife management (Use only Qs 1-9)</b>	NO to all, or YES to any two (not in the same category)	Yes to any three (not all in the same category)	Yes to any four; or any three in the same category
<b>Recreation (Use only Qs 1-9)</b>	NO to all or YES to any one	Yes to any two (not in the same category)	Yes to any three or two in the same category

## B. Water Quality

Answer the questions below with a “yes” or “no” based on your site assessment, then use the table below to arrive at the sensitivity rating.

### Current condition

1. Are there any DOE 303(d)-listed water bodies or reaches in the watershed “downstream” of this site?
  - a. If yes, identify the geographic extent: (a) immediate sub-basin, (b) basin, or (c) WRIA watershed.
  - b. If yes, describe reason

### Sedimentation

2. Is the soil/slope combination for erosion hazard on the site listed as severe or very severe in the soil description?
3. Is there evidence of current erosion due to human-induced alterations?
4. Does the site (or portion of) contain, or border on, an aquatic conservation area (wetland, lake, stream, or marine shoreline)?

### Contamination

5. Is the soil type well-drained or excessively well-drained?
6. Does the site or portion of the site have drain tile or ditches?
7. Has recent (past 5 years) management involved applications of fertilizers, pesticides or herbicides?
8. Is the site (or portion of) located in a Category I or Category II Critical Aquifer Recharge Areas or groundwater/wellhead protection area?

	<b>Low Sensitivity</b>	<b>Moderate Sensitivity</b>	<b>High Sensitivity</b>
<b>Residential</b>	NO to all	Yes to 1 (b) or (c); or to any other one or two (not in a single category)	Yes to 1 (a) or any two in a single category
<b>Horticulture</b>	NO to all	Yes to 1 (b) or (c) or to any other one or two (not in a single category)	Yes to 1 (a) or any two in a single category
<b>Livestock Management</b>	NO to all	Yes to 1 (b) or (c) or to any other one or two (not in a single category)	Yes to 1 (a) or any two in a single category
<b>Woodlot Management (Use Qs 2, 3, 4, 5, and 7 only)</b>	NO to all	Yes to any one of 2, 3, 4, 5, or 7	Yes to any two
<b>Fish and wildlife management (Use Qs 2, 4, 5, and 7 only)</b>	NO to all	Yes to any of 2, 4, 5, 7	Yes to any two of 2, 4, 5, 7
<b>Recreation (Use Qs 1 a or b, 2, 3, 4 only)</b>	NO to all	Yes to any one	Yes to any two

### **C. Hydrology**

Answer the questions below with a “yes” or “no” based on your site assessment, then use the table below to arrive at the sensitivity rating.

Current land use effects/background conditions

1. Does the sub-basin in which the site is located exhibit observable increases in the volume, duration, or frequency of peak flow (i.e. gage data, basin plans, models)?
  - Unknown may be a response

Geography

2. Is the site (or portion of) located in the upper portion of a sub-basin?

Interception/infiltration

3. Is less than 65% of the site forested?
4. Have past management practices reduced the porosity of the soil (via compression or tilling)?
5. Are the soils on the site poorly drained or hydric?

Runoff/conveyance

6. Are the soils on the site seasonally saturated?
7. Does the site (or portion of) have drainage tiles or ditches to convey water from the site?

	<b>Low Sensitivity</b>	<b>Moderate Sensitivity</b>	<b>High Sensitivity</b>
<b>Residential</b>	NO to all	Yes to any one or two	Yes to any three
<b>Horticulture</b>	NO to all	Yes to any one or two	Yes to any three
<b>Livestock Management</b>	NO to all	Yes to any one or two	Yes to any three
<b>Woodlot Management (Use Qs 2, 3, 4, 5 &amp; 6 only)</b>	NO to all	YES to any one	YES to any two
<b>Fish and wildlife management (Use Qs 3, 4, 5, &amp; 6 only)</b>	No to all	YES to any one	YES to any two
<b>Recreation (Use Qs 2, 3, 4, 5, &amp; 6 only)</b>	No to all	YES to any one	YES to any two

#### **D. Forest and Native Vegetation**

Answer the questions below with a “yes” or “no” based on your site assessment, then use the table below to arrive at the sensitivity rating.

##### Forest structure and composition

1. Is the forest on the site (or portion of) considered “structurally mature” (vegetation at full development stages), whether coniferous (190 -250 yrs) or deciduous (75 -100 yrs.)?
2. If the forest is deciduous, is it dominated by a species other than Red Alder?
3. Does the forest possess complete vertical structure including ground layer (lichens & mosses), understory (herb layer), midstory (shrub layer), and overstory (tree layer)?
4. Does the forest consist of multiple tree species with multiple age classes represented?
5. Is a well developed duff layer (comprised of litter and humus) or organic layer exceeding 12 inches present in the forest; or a well-developed organic layer in other vegetation communities (especially grasslands or oak savannahs)?

##### Connectivity

6. Is the forest or native vegetation type contiguous with similar areas off-site?

##### Rarity

7. Does the site (or portion of) contain a forest or vegetation community or plant species, considered rare or unique by King County or other federal, state, or tribal authority?

8. Is the forest or native vegetation community type poorly represented in the landscape surrounding the site (consider the surrounding 4-5 square miles)?

	<b>Low Sensitivity</b>	<b>Moderate Sensitivity</b>	<b>High Sensitivity</b>
<b>Residential</b>	NO to all	Yes to any one	Yes to any two
<b>Horticultural</b>	NO to all	Yes to any one	Yes to any two
<b>Livestock Management</b>	NO to all	Yes to any one	Yes to any two
<b>Woodlot Management</b>	NO to all	Yes to #1 or any two (not in a single category)	Yes to any two in a single category or any other three
<b>Fish and Wildlife habitat management</b>	NO to all or YES to any one of 2-8	YES to # 1 or any two (not in a single category)	Yes to any two in a single category or any other three
<b>Recreation</b>	NO to all or yes to any one of 2, 4, 6, or 8	YES to 1, 3, 5 or 7, or any two	YES to any two of 1, 3, 5, or 7 or any three

### E. Fish and Wildlife Habitat

Answer the questions below with a “yes” or “no” based on your site assessment, then use the table below to arrive at the sensitivity rating.

#### Protected Resources

1. Does the site (or portion of) contain a designated Wildlife Habitat Conservation Area?
2. Does the site (or portion of) contain a Designated Wildlife Network (as listed in the King County Comprehensive Plan) or recognized migratory route for a species listed by the ESA (as listed by Washington Department of Fish and Wildlife)?

#### Rarity

3. Does the site (or portion of) contain a listed habitat type or feature that is considered rare or unique in the King County Comprehensive Plan or by federal, state or tribal authorities?
4. Does the site (or portion of) contain a native habitat type or feature that is poorly represented in the watershed or landscape surrounding the site (4-5 square miles)?

**A Wildlife Habitat Conservation Area** is an area for a species whose habitat the King County Comprehensive Plan requires the county to protect including an active breeding site and the area surrounding the breeding site that is necessary to protect breeding activity. Nine species of birds and one bat species have been identified as having habitat to protect. They include the bald eagle, great blue heron, marbled murrelet, northern goshawk, osprey, peregrine falcon, spotted owl, Red-tailed Hawk, and Townsend’s big-eared bat.

#### Connectivity

5. Is the habitat type contiguous with similar or complementary (stream and riparian habitats, for example) habitat types off-site?

6. Is the habitat on the site a “stepping stone” for migrating native species, and thus important for landscape connectivity?

	<b>Low Sensitivity</b>	<b>Moderate Sensitivity</b>	<b>High Sensitivity</b>
<b>Residential</b>	NO to all or YES to one of #s 2, 3, 4, 5 or 6.	YES to #1 or any two of #2, #3, #4, #5, #6	YES to #1 and any other one
<b>Horticulture</b>	NO to all or YES to one of #s 2, 3, 4, 5 or 6.	YES to # 1 or any two of #2, #3, #4, #5, #6	YES to #1 and any other one
<b>Livestock Management</b>	NO to all or YES to one of #s 2, 3, 4, 5 or 6.	YES to #1 or any two of #2, 3#, #4, #5, #6	YES to #1 and any other one
<b>Woodlot Management</b>	NO to all or YES to one of #s 2, 3, 4, 5 or 6.	YES to #1 or any two of #2, 3#, #4, #5, #6	YES to #1 and any other one
<b>Fish and Wildlife Management</b>	YES to any one or NO to all	YES to any two	YES to any three
<b>Recreation</b>	NO to all	YES to #1 or any two of #2, #3, #4, #5, #6	YES to #1 and any other one