



King County

ENVIRONMENTAL CHECKLIST

Lower Bear Creek Natural Area Habitat Enhancement Project

Purpose of the Checklist:

The State Environmental Policy Act (SEPA), Chapter 43.21 RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write “**do not know**” or “**does not apply**.” Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be a significant adverse impact.

Use of Checklist for Nonproject Proposals:

Complete this checklist for nonproject proposals, even though questions may be answered “**does not apply**.” In addition, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (PART D).

For nonproject actions, the references in the checklist to the words “**project**,” “**applicant**,” and “**property or site**” should be read as “**proposal**,” “**proposer**,” and “**affected geographic area**,” respectively.

A. BACKGROUND

1. *Name of the proposed project, if applicable:*

Lower Bear Creek Natural Area Habitat Enhancement Project

2. *Name of Applicant:*

King County Department of Natural Resources and Parks
Water and Land Resources Division

3. *Address and phone number of applicant and contact person:*

Wm. Laird O'Rollins, Senior Ecologist
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4. *Date checklist prepared:*

February, 2011

5. *Agency requesting checklist:*

King County Department of Natural Resources and Parks
Water and Land Resources Division (WLRD)

6. *Proposed timing or schedule (include phasing, if applicable):*

Construction will take place during the summer of 2011

7. *Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.*

No

8. *List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.*

Lower Bear Creek Natural Area Site Management Guidelines (King Co. WLRD, 2006)

9. *Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.*

None are known.

10. *List any government approvals or permits that will be needed for your proposal, if known.*

- Hydraulic Project Approval (HPA) from Washington Dept. of Fish and Wildlife

- Clearing and Grading Permit from King County Dept. of Development and Environmental Services
- Special Use Permit from King County Parks and Recreation Division

11. *Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on the project description.)*

King County Water and Land Resources Division (WLRD) proposes to enhance in-stream habitat and habitat-forming processes by placing 12 trees into a reach of Bear Creek located within the Lower Bear Creek Natural Area (LBCNA). The trees will add instream structure notably absent in this reach, provide instream cover and promote pool formation and gravel substrate sorting. The trees will be cut on-site from a dense, 5.5-acre forest stand that contains several hundred trees. The trees selected are all Douglas firs less than 20" in diameter at breast height (DBH) and all located in close proximity to other trees so that their removal will have minimal effect on canopy coverage or ecological functions. The specific trees to be cut were selected in consultation with a King County staff Forester.

Trees will be dragged to the stream channel over distances ranging from 150 to 400 feet. The trees will be dragged to the channel using winches and pulleys to avoid impacts from heavy equipment use in wetlands and riparian areas adjacent to the channel.

12. *Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity plan, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.*

The project is located within the Lower Bear Creek Natural Area (LBCNA), which is an 11.4 acre property owned and maintained by King County. The LBCNA is located immediately east of Avondale Road NE a short distance north of its intersection with NE Novelty Hill Road. The site can also be accessed from the east at the dead-end of NE 103rd Street. The site is within the SW ¼ of Section 31, Township 26N, Range 6E and is shown on Thomas Brothers Maps page 537, E-2.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. *General description of the site (underline one): flat, rolling, hilly, steep slopes, mountainous, other.*

The site is mostly flat with only minor topographic relief.

- b. *What is the steepest slope on the site (approximate percent slope)?*

The embankment between Bear Creek and Avondale Road NE approaches 50% slope in a few small areas, but slopes on the site are otherwise flat (<5%).

- c. *What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.*

Soils found on site are mostly sand, silt and alluvial deposits. The US Dept. of Agriculture soil survey classifies soils on the site as Kitsap and Briscot silt loams and Indianola fine loamy sand. The Briscot silt loam, which occupies the bottomland near the stream channel, is classified as hydric. None of the area is prime farmland.

- d. *Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.*

There are no indications of unstable soils on-site. There is evidence of bank erosion just downstream of the project site where the channel of Bear Creek runs against the embankment of Avondale Road NE. This area has obviously been repaired in the past with angular rock (quarry spalls) to prevent further erosion of the road embankment.

- e. *Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate the source of fill.*

No filling or grading is proposed as part of this project.

- f. *Could erosion occur as a result of clearing, construction, or use? If so, generally describe.*

Bear Creek runs through the site in an actively meandering channel. Placement of logs in the channel may affect rates of channel migration and encourage local scour and/or channel avulsions. These processes are expected in a low-gradient channel and are beneficial to instream fish habitat. Analysis of historic channel paths through the site show that the channel stays within the wet bottomlands adjacent to the present channel. It is unlikely that the channel will move outside these areas or threaten infrastructure or private properties.

- g. *About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?*

None.

- h. *Proposed measures to reduce or control erosion, or other impacts to the earth, if any:*

The project will be constructed during the summer low-flow season to minimize sediment mobilization.

2. Air

- a. *What types of emissions to the air would result from the proposal (for example, dust, automobile, odors, industrial wood smoke, greenhouse gases) during construction and when the project is completed? If any, generally describe and give approximate quantities, if known.*

The proposed project, once construction is complete, will emit no gasses with the potential to negatively affect climate change.

Various vehicles and equipment that emit gasses will be used during construction. These gasses include carbon dioxide (CO₂), methane and nitrous oxide, as well as others in much smaller amounts. The global warming potential (GWP) of these compounds is measured in “carbon dioxide equivalents,” or CO₂e, which converts the GWP of various gasses into their equivalent in CO₂. The amount of CO₂e that may be emitted as a result of constructing the proposed project has been estimated by computing the amount of fuel to be consumed by equipment used to construct the project or by estimating their hourly output of various greenhouse gases. Fuel consumed or hourly output is then converted into CO₂e emitted using formulae developed by the Energy Information Administration (EIA) of the U.S. Department of Energy.

Construction of the proposed project will likely result in the discharge of approximately 11.21 tons of CO₂e to the atmosphere.

- b. *Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.*

No.

- c. *Proposed measures to reduce or control emissions or other impacts to the air, if any:*

Engines will not idle unnecessarily and will be kept in proper working order with all filters and other emission control devices functional.

3. Water

- a. *Surface:*

- 1) *Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe the type and provide names. If appropriate, state what stream or river it flows into.*

Yes. Bear Creek, a King County Type S Aquatic Area, flows through the site. Bear Creek flows south and into the Sammamish River about three miles downstream of the project site. Many areas within the site and to the east of the main creek channel are wetlands that are directly connected to the channel at most flows. The wetland area, combined with the stream channel, comprises about 7.5 acres. A small (King County Type F) tributary stream also flows into

the wetland from the east, apparently originating in drainage facilities east of the site.

- 2) *Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.*

Yes. Trees harvested from the upland portion of the site will be dragged across portions of the wetland and into the Bear Creek channel (see Conceptual Plan attached to this checklist). This will be accomplished using winches and pulleys located outside the wetland and stream channel. No heavy equipment will enter the wetland or the stream channels.

- 3) *Estimate the amount of fill and dredge material that could be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.*

No fill or dredge material will be placed as part of this project.

- 4) *Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities, if known.*

No.

- 5) *Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.*

Yes. Trees will be placed in the stream channel and wetland that are within the 100-year floodplain. (See Conceptual Plan attached to this checklist.)

- 6) *Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.*

No.

b. Ground:

- 1) *Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities, if known.*

No.

- 2) *Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: domestic sewage; industrial containing the following chemicals...; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.*

No waste materials will be discharged to the ground.

c. *Water Runoff (including storm water):*

1) *Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.*

No runoff will be generated by this project, nor will it affect runoff from other sources.

2) *Could waste materials enter ground or surface waters? If so, generally describe.*

It is highly unlikely that waste materials could enter ground or surface waters as a result of this project. All equipment will be kept outside of stream channels and wetlands.

d. *Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:*

All equipment will be kept outside of stream channels and wetlands. All machinery used will be checked for leaks prior to their entrance to the site.

4. Plants

a. *Check or underline types of vegetation found on the site:*

- Deciduous trees: alder, maple, aspen, other: cherry
- Evergreen trees: fir, cedar, pine, other
- Shrubs
- Grass
- Pasture
- Crop or grain
- Wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
- Water plants: water lily, eelgrass, milfoil, other
- Other types of vegetation: Japanese knotweed, Himalayan blackberry, holly

b. *What kind and amount of vegetation will be removed or altered?*

Twelve Douglas fir trees, all less than 20" in diameter at breast height (DBH) will be cut from the upland forested portion of the site and placed in the stream channel and adjacent wetland. These trees have been selected under the guidance of a King County staff forester using criteria to minimize the impact of their removal on ecological functions of the forest. All selected trees are located in close proximity to other trees. Their removal will have minimal effect on canopy coverage or unique ecological functions. The forest stand from which the trees will be taken is approximately 5.5 acres in size and contains several hundred trees, so the twelve to be taken constitute a small percentage of the total trees in the stand. All of these trees will be used on site to enhance the ecological functions of the stream channel.

The trees, once cut, will be dragged to their final placement using winches and pulleys. This may cause some short-term impacts to wetland shrubs (willows, red-

osier dogwoods) through which the trees are dragged. However, these shrubs recover quickly. Any damage from dragging trees through the wetland areas should be short in duration and should not significantly affect their ecological function.

It is possible that some forest understory vegetation may be affected by equipment ingress and egress from the site. Any shrubs or trees damaged by equipment accessing the site will be replanted with appropriate native species the following autumn or winter.

- c. *List threatened or endangered species known to be on or near the site.*

No threatened or endangered plant species are known to be on the site.

- d. *Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:*

Any shrubs or trees damaged by equipment accessing the site will be replanted with appropriate native species the following autumn or winter.

5. Animals

- a. *Check or underline any birds or animals that have been observed on or near the site, or are known to be on or near the site:*

- Birds: hawk, heron, eagle, songbirds, other
 Mammals: deer, bear, elk, beaver, other: possibly river otters
 Fish: bass, salmon, trout, herring, shellfish, other

Lower Bear Creek is among the most productive salmon streams in the area and is used by fall Chinook, Kokanee, sockeye and coho salmon, winter steelhead and resident cutthroat trout. Some reaches of Bear Creek also support freshwater mussels and, while they have not been observed on this site, they may be present as well.

- b. *List any threatened or endangered species known to be on or near the site.*

Puget Sound populations of both Chinook salmon and steelhead trout have been listed as “threatened” under the Endangered Species Act (ESA). Puget Sound populations of coho salmon have been listed as “species of concern” under the ESA. Petitions to list Lake Sammamish Basin Kokanee salmon, but no decision to list them has yet been issued.

- c. *Is the site part of a migration route? If so, explain.*

Yes, all of the above-listed species of salmon and trout use Bear Creek as a migration route to and from spawning and rearing habitats.

- d. *Proposed measures to preserve or enhance wildlife, if any:*

The goal of this project is to enhance both rearing and spawning habitat for salmon and trout. This will be accomplished by providing additional instream structure and

cover. Adding structure and hard points to the stream channel will also cause local hydraulics that create pools, sort gravels and sands, and increase spawning habitat for salmon and trout.

6. Energy and Natural Resources

- a. *What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.*

The finished project will require no energy.

- b. *Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.*

No.

- c. *What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:*

None.

7. Environmental Health

- a. *Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.*

Construction equipment could leak diesel gas, oil, or hydraulic fluid onto the site.

- 1) *Describe special emergency services that might be required.*

None.

- 2) *Proposed measures to reduce or control environmental health hazards, if any:*

All machinery will be inspected for leaks prior to entering the site. An emergency spill kit will be kept on the site at all times to respond to the potential loss of diesel gas, oil, or hydraulic fluid from construction machinery.

All construction equipment will be refueled at a designated fueling area on the levee road. All equipment will be inspected on a daily basis to determine if there are leaking seals or gaskets that require replacement. Best Management Practices (BMPs) such as fuel containment and a spill response plan will be used during construction to reduce and control environmental health hazards.

b. Noise:

- 1) *What types of noise exist in the area that may affect your project (for example, traffic, equipment, operation, other)?*

Traffic noise is prevalent at the site due to the proximity of Avondale Road NE. However, noise should have no effect on the finished project.

- 2) *What types and levels of noise would be created by or associated with the project on a short-term or long-term basis (for example, traffic construction, equipment operation, other)? Indicate what hours noise would come from the site.*

Construction of the project will generate some noise due to the use of chainsaws and other machinery. Construction of the project will likely take only two to three days and construction activities will be limited to hours between 7:00am and 7:00pm, between Monday and Friday.

- 3) *Proposed measures to reduce or control noise impacts, if any:*

Construction noise will be limited to 7:00am to 7:00pm, Monday through Friday.

8. Land and Shoreline Use

- a. *What is the current use of the site and adjacent properties?*

The site itself is a designated King County Natural Area managed by King County Parks and Recreation Division for its ecological values and functions.

Avondale Road NE forms the western border of the site. The Little Bit Therapeutic Riding Center borders the site to the north. To the south, the site is bordered by a retirement home/facility and private property that is mostly undeveloped. Several private residences and a stormwater detention facility border the site to the east.

The project site is located near the border between unincorporated King County and the City of Redmond. The City of Redmond has jurisdiction over areas immediately west and south of the site.

- b. *Has the site been used for agriculture? If so, describe.*

Aerial photographs taken in 1936 show the site mostly cleared and likely used for grazing. However, most of the site is now covered in mature conifers, so any agricultural activities ceased shortly after the 1936 photo were taken.

- c. *Describe any structures on the site.*

There are no structures on the site.

- d. *Will any structures be demolished? If so, what?*

No.

e. *What is the current zoning classification of the site?*

Most of the site is zoned RA-2.5; the area between Bear Creek and Avondale Road NE is zoned RA-2.5P.

f. *What is the current comprehensive plan designation of the site?*

The area east of Bear Creek is designated “King County Open Space” (OS) and the area between Bear Creek and Avondale Road NE is designated “Rural Area (2.5-10 du/ac)” (RA).

g. *If applicable, what is the current shoreline master program designation of the site?*

The east bank of Bear Creek is designated “Natural Shoreline,” while the west bank of the creek is designated “Aquatic Shoreline.”

h. *Has any part of the site been classified as an “environmentally sensitive” area? If so, specify.*

Yes. Bear Creek is a King County Type S Aquatic Area. A small tributary to Bear Creek flows across part of the site as well and would be classified as a King County Type F Aquatic Area. A large portion of the site (about 7.5 acres) is an unclassified wetland.

i. *Approximately how many people would reside or work in the completed project?*

None.

j. *Approximately how many people would the completed project displace?*

None.

k. *Proposed measures to avoid or reduce displacement impacts, if any:*

Not applicable.

l. *Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:*

Site Management Guidelines were established for the Lower Bear Creek Natural Area in 2006. Management goals for the area set in those guidelines are to:

- conserve and restore ecological value; and
- accommodate appropriate public use that does not harm the ecological value of the site.

The proposed project is consistent with these goals. The proposed project will not inhibit any appropriate public use of the site.

9. Housing

- a. *Approximately how many units would be provided, if any? Indicate whether high-, middle-, or low-income housing.*

None.

- b. *Approximately how many units, if any, would be eliminated? Indicate whether high-, middle-, or low-income housing.*

Not applicable.

- c. *Proposed measures to reduce or control housing impacts, if any:*

Not applicable.

10. Aesthetics

- a. *What is the tallest height of any proposed structure(s), not including antennas? What is the principal exterior building material(s) proposed?*

No conventional structures will be constructed for this project. Downed trees placed in the channel will rise only as high as the diameter of the logs/trees (<20”).

- b. *What views in the immediate vicinity would be altered or obstructed?*

None.

- c. *Proposed measures to reduce or control aesthetic impacts, if any:*

Most disturbances to the area caused by the project will be temporary and will naturally heal in a short time (less than one year). Any unanticipated impacts that would be likely to persist for longer than one year will be mitigated with plantings of appropriate native species.

11. Light and Glare

- a. *What type of light or glare will the proposal produce? During what time of day would it mainly occur?*

None.

- b. *Could light or glare from the finished project be a safety hazard or interfere with views?*

No.

- c. *What existing off-site sources of light or glare may affect your proposal?*

Aquatic areas and the understories of forests can be negatively affected by excessive sunlight.

- d. *Describe proposed measures to reduce or control light and glare impacts, if any.*

Extensive loss of tree canopy could affect understory plants and wetland and stream species. Strict guidelines were followed to select donor trees in order to reduce this potential effect.

12. Recreation

- a. *What designated and informal recreational opportunities are in the immediate vicinity?*

The site is used for informal, passive recreation, such as hiking, bird watching and fish viewing. The site is surrounded by private properties and a public road right-of-way.

- b. *Would the proposed project displace any existing recreational uses? If so, describe.*

Public use of the site would be restricted during construction (probably about three days). No recreational uses would be restricted or displaced in the long term.

- c. *Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:*

The project will improve fish habitat which should improve opportunities for viewing of fish at the site.

13. Historical and Cultural Preservation

- a. *Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.*

No.

- b. *Generally describe any landmarks or evidence of historical, archaeological, scientific, or cultural importance known to be on or next to the site.*

No landmarks or evidence of historical, archaeological, scientific or cultural importance are known to be on or next to the site. All of the properties adjacent to the site have been developed in the relatively recent past (<50 years).

- c. *Proposed measures to reduce or control impacts, if any:*

No native soils will be disturbed for this project, so there is little or no chance of disturbing buried artifacts or other cultural resources. If any significant disturbance of native soils is deemed necessary during construction, a trained archaeological observer will be present to identify any potential artifacts. There is otherwise little chance of encountering undisturbed archaeological or cultural resources during construction of this project; therefore, no mitigation is proposed at this time.

In the unlikely event that cultural or archaeological resources are uncovered or encountered during project construction, work will cease immediately and appropriate steps necessary to protect those resources will be taken prior to resumption of

construction. If resources are discovered, the Washington State Department of Archaeology and Historic Preservation, the King County Historic Preservation Program, and any affected tribal groups will be notified immediately, and an on-site inspection will be conducted by a professional archaeologist or other qualified resource professionals. A mitigation plan will be prepared prior to construction resuming at the site.

14. Transportation

- a. *Identify public streets and highways serving the site and describe proposed access to the existing street system. Show on-site plans, if any.*

Avondale Road NE runs along the western edge of the site, but there are no nearby parking or pull-off areas along Avondale Road NE to use for site access. The site is best accessed from the dead end of NE 103rd Street, which is adjacent to the eastern edge of the site.

- b. *Is the site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?*

King County Metro Transit runs buses along Avondale Road NE past the site and there is a bus stop immediately adjacent to the site.

- c. *How many parking spaces would the completed project have? How many would the project eliminate?*

The project will neither produce nor eliminate any parking spaces.

- d. *Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).*

No.

- e. *Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.*

No.

- f. *How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.*

None.

- g. *Proposed measures to reduce or control transportation impacts, if any:*

None.

15. Public Services

a. *Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.*

No.

b. *Proposed measures to reduce or control direct impacts on public services, if any:*

None.

16. Utilities

a. *Underline utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.*

None.

b. *Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity that might be needed.*

None.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature:

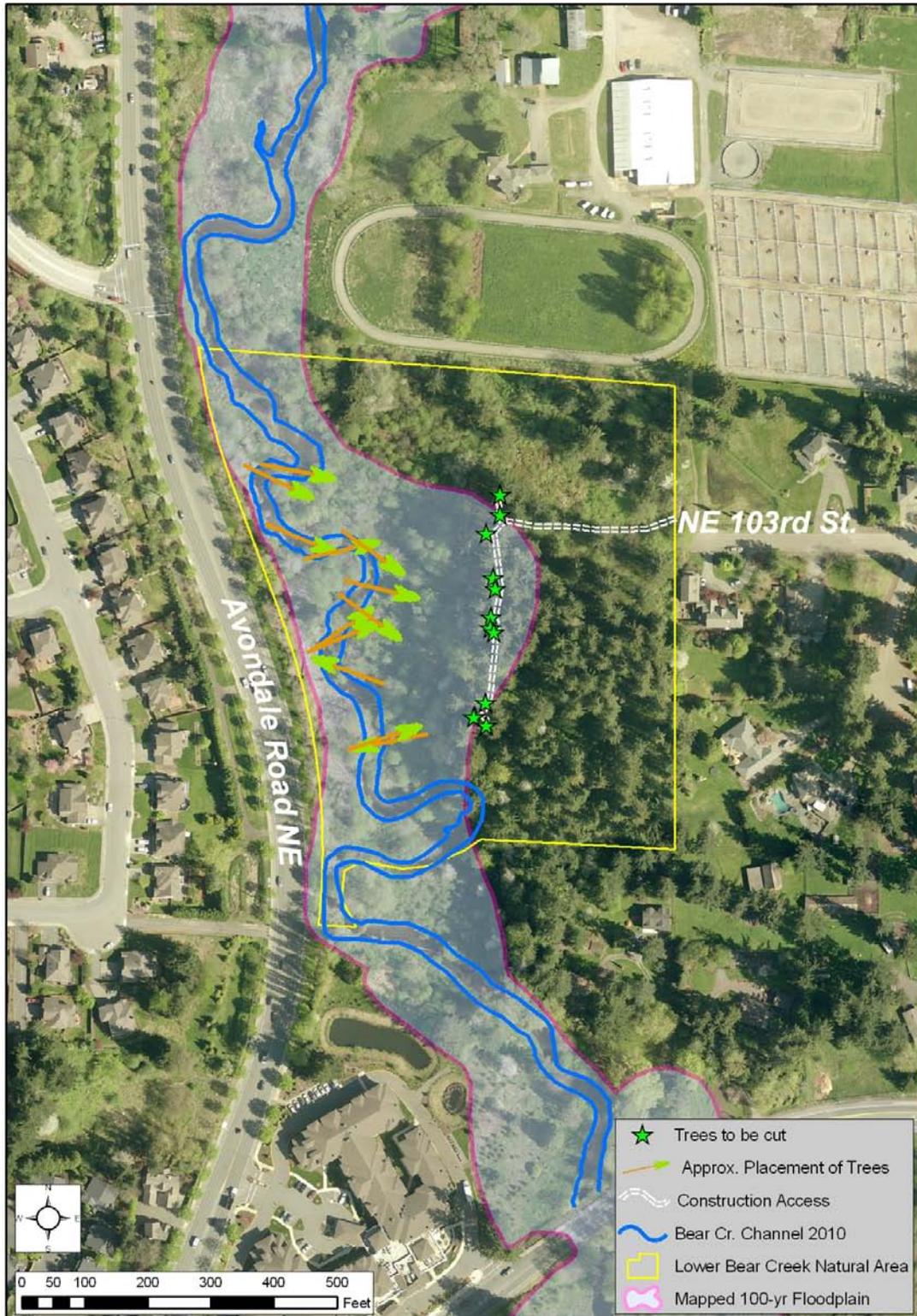


Title:

Environmental Scientist III

Date Submitted:

Feb 22, 2011



Lower Bear Creek Natural Area
Habitat Enhancement Project



Greenhouse Gas (GHG) Emissions Worksheet

Lower Bear Creek Natural Area Habitat Enhancement Project

Note: The finished project will emit no GHGs aside from those occurring in the environment by natural processes. All emissions are therefore related to construction of the proposed project.

The project will be constructed by a contractor who has yet to be selected, so daily driving distances and specific equipment to be used are not known at this time. Calculations below are therefore gross estimates using assumptions of equipment and fuel types.

Estimated days of construction activity: 3

Vehicle	Miles/ hours	Rate (mpg or gal/hr*)	fuel used	Fuel Type	Em. Coef. (lbs CO ₂ e/ gal)	Emissions (lbs or Kg CO ₂ e)	Tons (US) CO ₂ e
chainsaw	1	NA	NA	NA	1972 kg CO ₂ e/hr	1972	2.17
Winch (Honda (12 Hp), OHV 4-stroke Pickups	12 90	NA 20.7	NA 4.3	gasoline Gasoline	681 kg CO ₂ e/hr 19.564	8172 85.06	9.00 0.04
TOTAL:						10229.06	11.21

11.21 Total CO₂e released (tons)