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Vegetation Management Plan for Sensitive Areas in Innis Arden

A Framework Under Which Specific Work May be Proposed

prepared by

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Introduction

This plan is for a 10-year period ending May 31, 2007 and provides a framework and performance standards for vegetation management in all *sensitive areas* in Innis Arden. These are areas subject to the City of Shoreline Sensitive Areas Ordinance (SAO) because of slopes of 40 percent or more, wetlands, and streams. Included are (1) all Innis Arden reserves (forested ravines under the jurisdiction of the Innis Arden Club, Inc.), (2) sensitive areas on residential lots abutting these reserves, and (3) sensitive areas on residential lots abutting Boeing Creek upstream from the Boeing Creek Reserve (fig. 1). Any specific work under this plan must be covered by a *supplement* that has been approved by the Innis Arden Board (Board) after being advised by the Innis Arden Reserves Committee and that is then approved by the Development Services Group of the City of Shoreline (City). (Individual property owners, however, are not precluded from the more laborious path of submitting vegetation management plans and their required SEPA checklist detail directly to the City, as provided for in the SAO.)

Each supplement for proposed work will be submitted with a grading/clearing permit and will require individual approval and permitting by the City. Also, as specified below in Standard 12, each supplement for proposed work must be accompanied by an evaluation by a certified arborist (or other expert) who is acceptable to both the Board and the City.

No supplement for proposed work will be required to continue the rehabilitation work for the Grouse Reserve begun in 1992 and approved by King County. Also, no approval is required to remove non-native invasive species from sensitive areas or to plant shrubs and herbaceous species native to the Puget Sound Basin in these areas,

provided that such work conforms to Performance Standards Eight, Nine, and Ten below.

Nothing in this plan is to be construed as authorizing the application of the Innis Arden *view covenant* to the reserves; the reserves were not included in this covenant. It should be noted, however, that, if a portion of the tree canopy in any reserve is lowered, trees on private property that were not previously at issue because of screening by the reserve could in some cases become view blocking. In making its decision to approve or not approve an application to modify vegetation in a reserve, the Reserves Committee and the Board will take into consideration the possible adverse effect on those property owners who have trees that could become view blocking and thus subject to the view covenant.

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Sensitive Areas in Innis Arden

Most of the sensitive areas in Innis Arden are in the reserves, which comprise approximately 55 acres of forested ravines in seven tracts. From north to south these are Eagle, Blue Heron, Running Water, Grouse, Bear Trail, Coyote, and Boeing Creek Reserves (fig. 1). The reserves differ in terms of size, geology, presence of streams, and forest composition. Boeing Creek, after which our most southerly reserve is named, once again supported a few salmon in its lower reaches as a result of salmon eggs planted within this reserve, the return of spawning salmon, and partial control of stormwater surges by detention ponds constructed upstream of Innis Arden. However, extreme runoff and failure of a detention pond and intersection on January 1, 1997 silted most of the stream. Running Water, Blue Heron and Eagle Reserves have class 2 streams. The Coyote, Bear Trail, and Grouse Reserves have no streams, but the latter receives runoff and sediment from Ridgefield Road during heavy storms.

(FIG. 1 HERE)

All reserves are in early stages of forest succession following commercial clear-cutting in the 1920s and 1930s and subsequent tree loss from a variety of causes. With the exception of Bear Trail Reserve and portions of Eagle and Boeing Creek Reserves, which have a number of large conifers, hardwoods predominate, including red alder, bigleaf maple, madrone, and bitter cherry. From 1978 to 1984 nearly all major trees were removed from Grouse Reserve, and extensive plantings to restore it have been made since 1992. All of the reserves have gaps in their tree canopies that have permitted masses of blackberry vines to thrive.

The forest reserves in Innis Arden are a very valuable asset for the community. Each reserve is different in terms of its stream, where present, its degree of recent disturbance, and its topographical and biological characteristics. Thus each requires an individual management design. These reserves are on lands owned in common by the Innis Arden community and are not intended for use by the general public. They are all located within landscapes that fall under the SAO because of steep slopes (40 percent or greater), wetlands, or streams.

In many cases, steep slopes and thus sensitive areas extend from the reserves onto adjacent residential lots. Also, residential lots on NW 166th Street and 10th Avenue NW have sensitive areas on steep slopes adjacent to Boeing Creek (hachured portion of fig. 1). Vegetation on these slopes is similar to that within the reserves, but the stream banks are more subject to erosion than is the case in the reserves.

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Goals and Objectives

Our three broad goals for managing sensitive areas in Innis Arden are (1) to provide visual attractiveness, soil stability, water quality, and habitat for native plant and wildlife species by maintaining a forest canopy in all reserves, with some emergent trees that stand above and are in addition to the general canopy, (2) to provide some view corridors, thus limiting the average height of the canopy in some places, and (3) where possible to maintain a trail through each reserve to provide access through it by Innis Arden residents.

Ecologically, the most critical, least contentious, and most easily achieved goal is to hold the soil in place by keeping it fully occupied by the live roots of woody species. Our most contentious challenge is to maintain or improve habitat for diverse species while maintaining some view corridors, a challenge that necessarily entails the pruning and removal of some trees. Conflicts can be substantially reduced, however, by how trees are arranged, not only within each area but among them. Thus most tall trees in the Boeing Creek Reserve have little impact on views, and these help maintain a range of habitat niches. Further, tall trees have fewer disadvantages if located near the lower rather than upper slopes of ravines. Throughout all of the reserves, it is desirable to have a few tall *emergent* trees per acre to provide habitat for raptors and other species that require large trees. (*Emergent* is defined below under Performance Standard Four.)

The Blue Heron Reserve was chosen as a starting location because its trees directly impact more people than those of any other reserve. Under Supplement Number 1 to this plan, initial work involving trees will be limited to a small 100- by 200-ft

portion of this reserve (fig. 2), allowing results to be evaluated before additional areas are addressed. However, as soon as the Board and the City are comfortable with procedures and results, we wish to repeat the pattern in additional sensitive areas within Innis Arden, with each project required to be covered by a separate supplement and requiring approval by both the Board and the City.

FIG. 2 HERE

Management of our sensitive areas is intended to create and maintain multi-storied stands that include (1) a few emergent trees per acre, primarily Douglas-firs and western hemlocks, that will serve as perches and nesting sites for raptors; (2) a general canopy lying below many people's views and comprised of Oregon ash, Oregon white oak, and shore pine as well as young western red-cedar, red alder, western hemlock, bigleaf maple, bitter cherry, and Scouler willow; (3) a lower story of western hazelnut, vine maple, pacific yew, ocean spray, and other small trees and tall shrubs; (4) a ground cover layer that includes sword fern, Oregon grape, salal, and Indian plum; and (5) coarse woody debris in the form of snags that provide habitat for cavity-nesting birds and downed logs that are massive enough to last for some years and provide habitat for amphibians and other species as well as contribute to soil stability and fertility. As mentioned, some emergent trees will be maintained at all times, as specified in the *Performance Standard Four* below.

On a longer time scale, spanning perhaps 2 or 3 decades, we will need every few years to remove some trees that extend above the main canopy, retaining a few emergent trees per acre but controlling the overall height of the canopy. Maintaining a multi-aged as well as multi-storied stand will assure that replacements for any trees removed will already have grown above the main canopy.

A challenge related to but separate from managing existing tree canopies is to remove blackberry vines and other invasive species and to establish native trees and shrubs in their place, returning these areas to intermediate stages of forest succession that will lead toward complex multi-storied stands and provide niches for diverse species. Although this effort will begin in the Blue Heron Reserve, we will extend it to other sensitive areas as rapidly as resources permit.

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General Approach to Management

Under this general vegetation management plan and subsequent supplements for proposed work we plan to remove noxious species, plant native trees and shrubs, limb some existing trees and remove some trees over a period of time to allow for healthier growth of the remaining and newly planted trees, and to prune or top some of the trees that are intended for eventual removal in order to facilitate the growth of the new plantings and the understory. The intent is to maintain the reserves as forested lands with varied habitat and multistoried canopies, yet lower the canopy in some parts of the reserves for view corridors. At the same time, tall emergent trees will be retained, rising above and in addition to the general forest canopy, for the role they play in maintaining various bird and wildlife species. No cutting will be allowed that would damage streams, increase erosion, adversely affect stability of slopes, produce significant additional surface water runoff, or create wind or other hazards for remaining trees due to reduction of mutual support.

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General Performance Standards

As agreed with the Shoreline Development Services Group during meetings on July 19 and October 18, 1996, all management of tree canopies in the sensitive areas of Innis Arden will be guided by biologically-based performance standards rather than a detailed time schedule. Thus, after initial work in any area, appropriate timing of any further pruning or removal of trees will depend upon the growth of existing and newly planted material. Growth rates will differ substantially from situation to situation and thus an appropriate time schedule is not readily predictable.

Note that the following performance standards are to be *jointly* applicable so that no one standard can be pursued to the extent results would violate another standard. Note also that Standards One to Four define minimums and safeguards and not necessarily desired end points.

To govern the pruning and removal of trees, the first three standards are defined in terms of basal area, which is the cross-sectional area of tree trunks measured at "breast height" (4.5 feet above the ground). Basal area is a good index to root abundance and is discussed more fully in Appendix A. Because roots are opportunistic and soon grow into any soil suitable for their development, these standards for basal area and its distribution will assure soil stability by keeping the soil fully occupied by live roots of woody species.

Standard One. The total abundance of trees will not be reduced below a basal area minimum of 125 sq ft/acre. Further, if a tree has been pruned or otherwise modified, only half of its basal area shall be counted toward the total used to meet this minimum. Such reduction is justified by the fact that extreme pruning, while not affecting basal area, would reduce photosynthetic capacity and invite wood-rotting diseases, insect attacks, and other stresses that reduce a tree's functional integrity, including the mass and vigor of its roots and thus its effectiveness in holding soil in place. Although pruning can in some cases actually *improve* a tree's vigor, a conservative and unambiguous standard seems desirable at this point and will avoid excesses in either pruning or tree removal. Appendix A provides examples for visualizing what this basal area standard means.

Standard Two. Trees will be distributed so as to avoid openings that are large, relative to the size of nearby trees. As discussed in Appendix A, this distribution can be achieved by ensuring that no point within an opening is more than 15 diameters from at least one tree or more than 20 diameters from at least two trees, with trees more than 40 feet away not considered. Any point meeting this standard would be influenced by trees having an effect equivalent to at least 48 sq ft/acre of basal area. For example, if the two most influential trees near an opening had diameters of 0.5 ft and 1.0 ft, the opening would be acceptable if no point within it was more than 15 diameters from *either* of the two trees (i.e., 7.5 and 15 feet, respectively) or if no point was farther than 20 diameters (10 and 20 feet, respectively) from *both* trees.

Near the top of slopes it may be acceptable, where consistent with the provisions for sensitive area protection adopted by the City, to replace some existing trees with such native shrubs as ocean spray, red osier dogwood, tall Oregon grape, snowberry, baldhip rose, hardhack spirea, serviceberry, and vine maple.

Standard Three. No more than 30 sq ft of basal area per acre will be removed in any 5-year period. As in Standard One, if any tree being removed has previously been pruned or otherwise modified, only half its basal area will be counted. The 5-year time frame allows efficient contracting while avoiding excessive removals. Note further that when existing trees are removed and replaced with smaller trees, the requirement for maintaining a basal area of at least 125 sq ft/acre (Standard One) increasingly constrains any further removal; many young trees are required to equal the basal area of a few older and larger trees, as illustrated in Appendix A. By limiting the size of permissible openings, Standard Two also constrains the removal of trees.

Standard Four. If no *emergent* trees exist (i.e., trees at least 60 feet tall and having at least 15 percent of their height above the general canopy of nearby trees), protect or plant at least 12 young trees per acre so at least 6 per acre can be expected to grow into emergent trees. Protect these trees until they are at least 60 feet tall, after which the following rule prevails: Where emergent trees exist, credit each with influencing an area equal to a circle having a radius equal to 0.8 times the tree's height, and maintain enough emergent trees of sufficient heights that the combined area credited to their influence equals or exceeds the area in which vegetation is being managed. This rule creates a bias toward leaving tall trees. For example, by this rule each 60-ft tree would earn a credit of 7,238 sq ft, requiring 6 such trees to be left per acre ($43560/7238 = 6.02$). A 100-ft tree would earn a credit of 20,106 sq ft and require 2.2 such trees per acre. Note that emergent trees are trees that stand above and are in addition to the surrounding canopy.

Standard Five. Trees that are felled will be left in place, to the extent possible in long lengths and parallel to contours. The resulting logs will provide the coarse woody debris needed by some species and will reduce surface erosion. To reduce fire hazard and unsightliness, branches will be chipped or cut to lie close to the ground, where they will soon decay.

Standard Six. Records will be maintained of all work accomplished, including dates and names of coordinators or contractors, with before-and-after photographs used to show any modifications of tree crowns.

Standard Seven. For each area in which vegetation management is approved, a progress report will be submitted to the City 5 years after work is undertaken, or sooner if requested by the City. To permit comparison with initial conditions, each such report will include an updated list of trees by species, diameter, and whether or not pruned. After each report is submitted, progress and possible modification of the plan and standards will be reviewed with the City.

Standard Eight. No constraints shall be imposed on removing invasive species and planting native species, provided that bare soil is not left exposed and work takes place when soils are not wet and easily damaged. Invasive species (including Himalayan and evergreen blackberry, Scotch broom, English ivy, morning glory, and any species on the Washington state noxious weed list, WAC 16-750) may be removed at any time that soils are not saturated, provided that any bare soil is

protected within 30 days by a *temporary* mulch such as wood chips or excelsior matting or by seeding to grasses and legumes.

Standard Nine. Native species may be planted at any time in scalped spots of up to 3 feet in diameter provided that the soil is not saturated and that any bare soil resulting is protected within 30 days by a temporary mulch.

Standard Ten. Permanent mulching to inhibit ground-cover vegetation, such as the beauty bark and weed-control fabric used in many landscapes, is not permitted.

Standard Eleven. The work area will be identified by corner stakes and tape along the boundaries, and the trees proposed for modification and removal will be tagged. The area and work to be accomplished will then be announced in the Innis Arden Bulletin.

Standard Twelve. Each application for a grading/clearing permit shall specifically identify the trees to be modified or removed. The application shall be accompanied by a report from a certified arborist or other expert that includes an opinion on the effects that removal and modification of those trees would have on the surrounding area. Any healthy tree with a diameter of over 4 inches and proposed for removal under the provisions of this plan shall be individually evaluated by the expert and will require a separate grading/clearing permit from the City. The expert who evaluates trees and prepares applicable reports must be acceptable to both the Board and the City. Any tree removal or modification will be consistent with the basal area and replacement standards of this plan.

Standard Thirteen. Any resident of Innis Arden who observes illegal tree cutting within our sensitive areas (on private land as well as reserves) should report it to the Reserves Committee for investigation. If the illegal cutting is confirmed, the Chair of the Reserves Committee shall notify the City and request enforcement under the SAO.

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New Projects and Maintenance

Only owners of residential lots in Innis Arden or representatives of the Board shall have the right to apply to the Board to request any work under this vegetation management plan.

All plans for new projects within the sensitive areas of Innis Arden will be drafted or examined by the Reserves Committee and presented for approval to the Board as supplements to this plan, after which they must be approved by the City before any work is undertaken. Future Boards that do not have an ecologist or biologist must seek professional biological and ecological guidance in the development of plans for any modification of the reserves.

Each supplement will include a topographic map; a detailed plan of action similar to Supplement Number 1 to this plan; and a current list of trees by species, diameter, and the extent to which each has previously been pruned. Such supplements will not be considered for approval until initial tree removal, pruning, and planting in the 100- by 200-ft test area of Blue Heron Reserve have been completed and evaluated by the Board and the City. A goal, however, is to initiate work within additional sensitive areas within 1 year of the initial planting in the 100- by 200-ft test area.

We want to make it very clear that the reserves are a separate entity under the sole control of the Board, as distinguished from private residences. Those residents of Innis Arden whose lots abut a reserve or whose lots abut Boeing Creek upstream from the Boeing Creek Reserve have no right to alter vegetation within any sensitive area without first obtaining the explicit approval and a grading/clearing permit from the City. If they wish, such owners may develop a supplement to this plan rather than submitting an entire and independent vegetation management plan and its required SEPA checklist detail to the City. However, any supplement to the *Innis Arden* plan requires approval by both the Board and the City.

Owners of residential lots who apply to the Board seeking approval to modify vegetation shall be required to bear all costs for such modification unless the Board, in its sole discretion, agrees to have Innis Arden Club, Inc. share these costs.

Once approval has been given for a project in any sensitive area of Innis Arden, subsequent maintenance in conformance with an approved supplement to this plan and the Performance Standards herein shall not require further application to the Board and the City. All maintenance, however, shall be subject to periodic review by the Board and City.

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Amendment of Performance Standards

After having been applied and evaluated, the *Performance Standards* specified herein may be amended with the approval of both the Board and the City.

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Termination of the Vegetation Management Plan

The Board and the City each reserve the right to revoke at any time their approval of this vegetation management plan and supplements to it; provided, however, that work specified by supplements that have been approved by the Board and the City shall be allowed to be completed.

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Appendix A

As shown in figure A-1, typical Douglas-fir stands can range widely in basal area per acre. Only below curve AA is the land so understocked that the soil is not fully utilized (and thus unoccupied by roots. Substantial mortality from competition among trees can be expected at basal areas above the central curve BB. With many small trees per acre, as in a new plantation, full stocking is accomplished at low basal areas. A recommended minimum basal area of 125 sq ft/acre was taken from curve BB at 600 trees per acre (which is 8.5- by 8.5-ft spacing).

To visualize 125 sq ft of basal area per acre, note that this standard would be met by a 20- by 20-ft rectangle having one tree 14.5 inches in diameter or four trees each 7.25 inches in diameter. This value is quite conservative in that much lower stockings will fully occupy a site and in that Douglas-fir supports higher basal areas per acre than most other species. Dr. Chadwick D. Oliver, University of Washington Professor of Silviculture, indicates that the curves for Douglas-fir are reasonable to use for red alder. The 125 sq ft value is made even more conservative by counting only half the basal area of any tree that has been reshaped. Such provision seems appropriate where large trees are being reshaped, perhaps with substantial compromising of their functioning. If small trees are trained by periodic pruning and their pruning wounds completely heal over, their basal areas should be an appropriate measure of their contribution to rooting and other functions, and the City may wish to allow full counting of their basal areas without deduction. As an additional basis for comparison, the 100- by 200-foot area selected for initial work in

the Blue Heron Reserve had, when measured in 1992, a basal area of 119 sq ft, a fifth of which was in one maple 72.4 inches in diameter. The value for this work area converts to 261 sq ft/acre. When adjusted for trees that have been topped in past years, the figure drops to 164 sq ft/acre.

After some trees have been removed to provide space for species with lower mature heights, the standard of requiring basal area of at least 125 sq ft/acre will, as it should, create a growing constraint on further removals. The younger replacement trees will have far less basal area than the older trees that have been removed and will have to grow for some years before contributing substantially to basal area. Figure A-2 illustrates the pattern.

Because one large tree at the corner of a small area could contribute substantial basal area per acre while leaving excessive openings in which soils might be inadequately protected by live roots, provisions are needed to insure that trees are well distributed over an area. The attached item on plotless sampling summarizes principles that provide a rationale for achieving this distribution, developed as follows:

A standard of requiring that no point be farther than 15 diameters from at least one tree or no farther than 20 diameters from at least 2 trees provides for an influence equivalent to at least 48 sq ft/acre of basal area. To illustrate, a tree with a diameter of 1 foot has .785 sq ft of basal area, and a circle with radius of 15 feet (i.e., 15 times the diameter of the 1-ft tree) has an area of 706.86, approximately 1/62 acre ($43560/706.86 = 61.62$). Therefore, because of constant proportionality of circles, we can expect *any* point within 15 diameters of a tree to be influenced by that tree to the extent of at least $.785 \times 61.62 = 48.38$ sq ft of basal acre. A circle with 20-ft radius (20 times the diameter of the 1-ft tree) has an area of 1256.64 sq ft or approximately 1/35 acre ($43560 / 1256.64 = 34.66$). Thus a point within 20 diameters of a tree would be influenced by at least $34.66 \times .785 = 27.21$ sq ft of basal area per acre. A point within 20 diameters of two trees would be influenced by at least $2 \times 27.21 = 54.42$ sq ft of basal area. A further constraint that these trees be no farther than 40 feet from the point under consideration insures that undue influence is not attributed to a large but distant tree.

FIGS. A-1 & A-2. A 2-PAGE INSERT ON "PLOTLESS SAMPLING," AND THE TABLE THAT COMPRISES APPENDIX B NEED TO GO HERE

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