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WASHINGTON STATE COUNTY AUDITOR/RECORDER'S
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Document Title(s) (or transactions contained therein): Wildlife and Habitat Assessment Report

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Additional reference #'s on page _____ of document.

Grantor(s) (Last name first, then first name and initials):

NEIMER, JOHN; NEIMER, LAURIN; FORTIN, MIKE; SAUER, ~~JAY~~ Connie; LARSON, CLIFF; TAYLOR, RENE; YELA, FRANK; YELA, CARROLYN; DALE, DENNIS; CREAGAN DAVE; SAUER, JERRY

Additional names on page _____ of document.

Grantee(s) (Last name first, then first name and initials):

Public

Additional names on page _____ of document.

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range): LOT 23 & 24, T7N R6E WM

Additional legal is on page _____ of document.

Assessor's Property Tax Parcel/Account Number:
7-6-23-1101 7-6-23-1105 THRU 1126
7-6-23-1103 7-6-24-100
Assessor Tax # not yet assigned. J.M. 7-6-24-200, 300, 400, 500, 600, 700

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The undersigned, being the legal owners of the real property described as Section 23 & 24, T7N R6E WM hereby consent and approve the recording of this Wildlife and Habitat Report to assist the same in the development of their real property.

Dated: 7/27/05 — JOHN NEIMER

Dated: 7/27/05 — LAURIN NEIMER

Dated: 7-27-05 — MIKE FORTIN

Dated: 7/27/06 — ~~JAY SAURS~~ CONNIE G. SAUERS

Dated: 7/27/05 — CLIFF LARSON

Dated: 7/27/05 — ~~RENE~~ TAYLOR

Dated: 7/27/05 — FRANK YELA

Dated: 7/27/05 — CARROLYN YELA

Dated: 9/2/05 — DENNIS DALE

Dated: 8-29-05 — DAVE CREAGAN

Dated: 8-31-05 — ~~JERRY SAUER~~ GERALD SAUER

STATE OF WASHINGTON)
) ss.
County of Clark)

I certify that JOHN NEIMER appeared personally before me and that I know or have satisfactory evidence that he signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 7/27/05

TANYA M. ANTELL NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 2-19-07

NOTARY PUBLIC FOR WASHINGTON
My Commission Expires: 2/19/07

STATE OF WASHINGTON)
County of Clark) ss.

I certify that LAURIN NEIMELA appeared personally before me and that I know or have satisfactory evidence that she signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 7/27/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 2/19/07

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that MIKE FORTIN appeared personally before me and that I know or have satisfactory evidence that he signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 7/27/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 2/19/07

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that ~~JAY SAURS~~ Connie Sauers appeared personally before me and that I know or have satisfactory evidence that he signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 7/27/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 2/19/07

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that CLIFF LARSON appeared personally before me and that I know or have satisfactory evidence that he signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 7/27/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 2/19/07

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that RENE TAYLOR appeared personally before me and that I know or have satisfactory evidence that she signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 7/27/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 1/27/05

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that FRANK YELK appeared personally before me and that I know or have satisfactory evidence that he signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 7/27/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 7/27/05

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that CARROLYN YELK appeared personally before me and that I know or have satisfactory evidence that she signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 7/27/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 2/19/07

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that DENNIS DALE appeared personally before me and that I know or have satisfactory evidence that he signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 9/2/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 2/19/07

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that DAVE CREAGAN appeared personally before me and that I know or have satisfactory evidence that he signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 8/29/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 2/19/07

TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

STATE OF WASHINGTON)
County of Clark) ss.

I certify that JERRY SAUER appeared personally before me and that I know or have satisfactory evidence that he signed this instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: 8/31/05

Tanya M Antell

NOTARY PUBLIC FOR WASHINGTON

My Commission Expires: 2/19/07

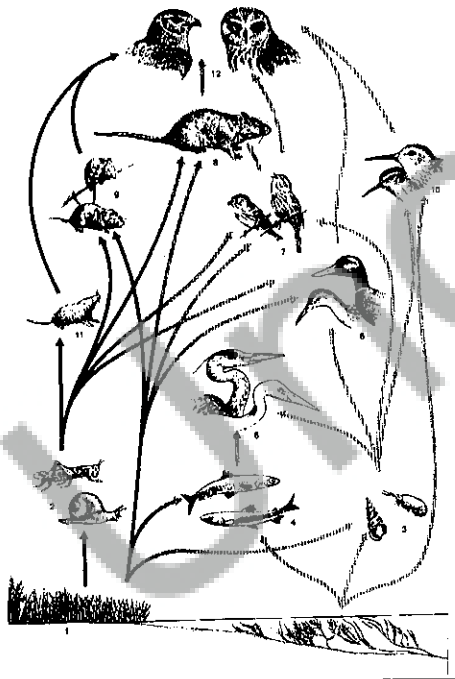
TANYA M. ANTELL NOTARY PUBLIC COMMISSION EXPIRES 2-19-07 STATE OF WASHINGTON

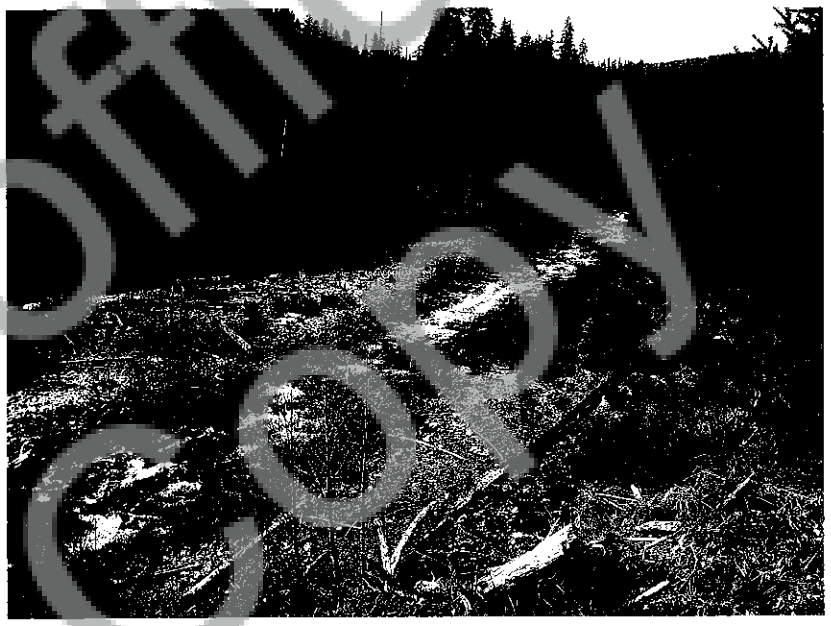
Wildlife and Habitat Assessment Report

PREPARED FOR

THREE RIVERS RECREATION AREA
INTERSECTION OF FOREST ROAD 25 & LOOWIT LANE
SKAMANIA COUNTY, WA.

JUNE 14, 2005





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1924 Broadway, Suite A Vancouver, WA 98663
Phone: (360) 696-4403 FAX: (360) 696-4089 e-mail: etc-vancouver@qwest.net

Wildlife and Habitat Assessment Report

For
Three Rivers Recreation Area
Forest Road 25, Loowit Road
Skamania County, WA

Prepared for:
Three Rivers Home Owners Association
19707 NE 105th Avenue
Battle Ground, WA. 98604

June 14, 2005

Environmental Technology Consultants
1924 Broadway, Suite A Vancouver, WA 98663
(360) 696-4403 FAX (360) 696-4089
E-mail: etc-vancouver@qwest.net

Table of Contents

PROJECT AND SITE DATA SUMMARY

Site: Three Rivers Recreation Area

ETC Project Number: EVA05-013

Project Staff: Anna Martin, Richard Bublitz

Applicant / Owner:
Dave Creagan
19707 NE 105th AVE
Battle Ground, WA. 98604

Jerry Sauer
26300 NE 16th
Camas, WA 98607

Site Location: The subject site is located off of Forest Road 25 where Pine Creek, Muddy River, and Lewis River join together. Some of the primary roads off Forest Road 25 are Loowit Lane, Lodgepole Lane, and Sasquatch Way. Legal Description: Section 23 & 24, T7N, R6E. W.M.

Acreage: The scope of our study area is approximately 700 acres.

Topography: The topography of the site varies throughout the acreage, but typically there is a plateau on top of slopes at approximately 40%. Between the top of the bluff and the bottom of the slope there are generally broad benches.

Land Use History: The land has previously been used for timber harvests. Old timber roads and stumps are located throughout the property to indicate past use.

Adjacent Usage: The property along the east and west boundary is private timberland. The property is bounded by the Gifford Pinchot National Forest on the north, with the Muddy River, Lewis River and the Gifford Pinchot NF to the south.

Waterways: Pine Creek, Muddy River, and Lewis River

Floodway: Pine Creek, Muddy River, and Lewis River

Priority Habitats and Species: This site is documented to be within Elk winter range, contain stream habitat for Bull Trout, and be adjacent to a Bald Eagle communal roost and Osprey nest sites.

INTRODUCTION

The subject property is located on approximately 700 acres of privately owned forest land, which has been legally harvested by both the past and current owners. The project is a low-density recreational residential development, with a future build out potential of 500 1 acre lots. There are a total of (68) platted land divisions in the current development application, and an estimated (75) 20 acre short plats in the "Purchase in Progress" site. Under new ownership the land is now in the process of being developed into building lots. This habitat assessment report and wildlife management plan was prepared to address the specific concerns with any creek, river, slope stability, wildlife, wildlife habitat, and vegetation found within the subject site.

Environmental Technology Consultants (ETC) was contracted to perform the necessary investigations to assess the habitat in the scope of the concerns brought forth by Washington Department of Fish and Wildlife (WDFW) and Skamania County. A formal field investigation was performed on April 14, 2005 with follow up visits to address issues that required more in depth analysis. In order to complete the habitat survey the subject site was investigated to the best extent possible by observing the presence of wildlife species and critical habitats, using both visual and auditory methods.

This report is designed to address the impacts and mitigation for the Three Rivers Recreation Area short plats, containing a possible total of approximately 500 lots upon completion. Further land division beyond the 500 lots is unknown and not within the scope of this study. Future short plats will be considered on their own through the Skamania County Planning Department. Impacts will be determined at that time based on scope and any potential additional impacts to the ecosystem as it exists at the time of the application.

This report documents the investigation, best professional judgement and conclusions of the investigators. It is correct and complete to the best of our knowledge. It should be considered a Preliminary Habitat Determination and used at your own risk unless it has been reviewed and approved in writing from Skamania County.

EXISTING CONDITIONS

The site currently is under development, therefore the existing conditions that are reported were determined from our field investigation April 14, 2005. As per the scope of the contract the existing conditions that were investigated were associated with Pine Creek, The Lewis and Muddy River, elk winter range, eagle communal roosts and osprey nest sites. The details of the investigation are described in the categories below.

SOILS

The Soil Conservation Service Soil Survey of Skamania County identifies five major soil units on the site: Bonneville stony sandy loam (map unit 17), Pinchot cindery sandy loam (map unit 84), Pinchot cindery sandy loam (map unit 85), Pinoty sandy loam (map unit 86), and Yalelake sandy loam (map unit 162).

Bonneville stony sandy loam is a very deep, somewhat excessively drained soil that is on river terraces. It formed in alluvial sand and gravel derived from basalt and andesite. The permeability

of the soil is very rapid (more than 20 inches) and the runoff is slow. Hazard of water erosion is slight.

Pinchot cindery sandy loam series (Map Units 84, 85, 86) is very similar in characteristics. It is a very deep, well drained soil that is on terraces and terrace escarpments. It formed on deposited volcanic ash and pumice over lahar and alluvial sand and gravel. Permeability of this Pinchot soil is moderate (0.6 inches to 2.0 inches) in the subsoil and rapid (6.0 to 20 inches) in the substratum. Runoff is slow and the hazard of water erosion is slight. Pinchot cindery sandy loam 50-90% slopes has rapid runoff and the hazard of water erosion is severe.

Pinoty sandy loam is a deep, well drained soil on terraces. It is formed in volcanic ash and pumice over lahar material and alluvial sand and gravel. Permeability of Pinoty soil is moderate (0.6 inches to 2.0 inches) in the upper part of the substratum and rapid (6.0 to 20 inches) in the lower part. Runoff is slow and the hazard of water erosion is slight.

Yalelake sandy loam is a very deep, well drained soil that is located on terraces. It was formed in volcanic ash and pumice over pyroclastic deposits. Permeability of this soil is moderate (6.0 inches to 2.0 inches). Runoff is slow and the hazard of water erosion is slight. (Appendix A, SCS Soil Survey Map)

**Note: All infiltration rates are saturated hydraulic conductivity.*

VEGETATION

ETC determined the dominant plant species that could be expected to be found on, and in the immediate area. of the site. Based on the scope of the area investigated ETC took note of the dominant species observed. The primary invasive species found on the site was *Cytisus scoparius* (Scotch Broom). Scotch Broom was mainly found along old logging roads and were logging had been done. Table 1 below lists all the plants identified on the site or that are expected to be found in the area.

Table 1. Vegetation

Genus species	Common name	Genus species	Common name
Abies grandis	Grand Fir	*Oplopanax horridus*	Devil's-club
Pseudotsuga menziessi	Douglas-fir	*Ribes sp.*	Currents
Tsuga heterophylla	Western Hemlock	*Symphoricarpos albus*	Snowberry
Abies lasiocarpa	Subalpine Fir	*Gaultheria shallon*	Salal
Abies procera	Noble Fir	*Mahonia nervosa*	Dull Oregon-grape
Pinus contorta	Lodgepole Pine	*Athyrium filix-femina*	Lady Fern
Thuja plicata	Western Redcedar	*Luzula glabrata*	Smooth Woodrush
Acer circinatum	Vine Maple	*Oxalis sp.*	Woodsorrel
Rhamnus purshiana	Pursh's Buckthorn	*Lupinus sp.*	Lupine
Vaccinium ovalifolium	Oval-leaf Huckleberry	*Polystichum munitum*	Sword Fern
Vaccinium membranaceum	Big Huckleberry	*Chimaphila umbellata*	Prince's Pine
Vaccinium parvifolium	Red Huckleberry	*Maianthemum dilatatum*	False Lily-of-the-valley
Cornus unalaschkensis	Western Bunchberry	*Valeriana sitchensis*	Sitka Valerian
Streptopus roseus	Twisted-stalk	*Festuca sp.*	Fescue
Blechnum spicant	Deerfern	*Trillium ovatum*	Pacific Trillium

Pine Creek and the Muddy River originate from Shoestring Glacier on Mount St. Helens, and the Lewis River originates from Pinnacle Glacier on Mount Adams.

The North Fork of the Lewis River traverses from Mount Adams in Yakima County to Skamania County. The majority of the North Fork of the river resides in the Gifford Pinchot National Forest, with the exception of the headwaters that originate in the Yakima Indian Reservation. The Lewis River basin has a drainage area of 1,046 square miles. The headwaters of several tributaries to the Lewis River are on Mount St. Helens. Two tributaries, the Muddy River and Pine Creek, were inundated by mudflows during the May 18, 1980 eruption. Annual suspended-sediment yields for the Muddy River, Pine Creek, and other Lewis River tributaries increased from pre-eruption levels. The Muddy River and Pine Creek are fast flowing watercourses with low water temperatures, and low woody debris. The regeneration of the riparian areas is currently in natural stages of succession. Swift Reservoir, on the Lewis River, is downstream from these tributaries, and most of the mudflow sediment was deposited there.

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STREAM AND RIPARIAN HABITATS

PINE CREEK

Pine Creek was investigated on April 14, 2005 by traversing the subject site on foot and observing the site visually and by reviewing available maps. We reviewed the survey maps provided by Hagedorn Engineering to determine the distance from the ordinary high water mark (OHWM) of Pine Creek to the cabin sites, measured horizontally. (Figure 3) The condition of the creek and the riparian corridor appear to be the result of the catastrophic eruption of Mount Saint Helen's in 1980. The creek is in the normal stages of revegetation and acclimation. The investigators, based on published information and personal observations, consider Pine Creek a naturally acclimating and dynamic system. Not all streams are created equal or exactly alike and this makes ecosystems diverse. Diversity in watercourses is very important in habitat ecology especially in relevance to the utilization of fish during spawning and different life stages. Certain fish require different river habitats for different stages in their life phases (Existing Conditions, Bull Trout/Salmonids).

Habitat deficiencies were noted by WDF&W, however, "It is suspected that temperatures in Pine Creek are due to channel widening from timber harvest and vegetation removal as a result of the 1980 Mount St. Helens eruption". "The USFS gauges habitat fragmentation by calculating the amount of road crossings over streams per lineal mile of stream segment. Using this approach, the lower Pine Creek basin is classified as having "extreme" fragmentation (> 2.26 road crossings/stream mile) and the upper Pine Creek basin has "high" fragmentation (> 1.5 road crossings/stream mile)"; "woody debris concentrations in Pine Creek are low (<40 pieces/mile). Pine Creek also has low recruitment potential due to logging and effects of the 1980 eruption of Mount Saint Helens." These statements were all made concerning Pine Creek in the Subbasin Plan, but the following statement was also included in Priority Areas, Limiting Factors and Threats section. " The recovery emphasis in the Pine Creek system is preservation; therefore no limiting factors and threats are specified. Pine Creek is believed to have historically provided habitat primarily for winter steelhead. This system was impacted by the 1980 Mount St. Helens eruption but has recovered rapidly. Although there has been considerable timber harvest and roading in this system, including some riparian timber harvests, stream conditions are currently good for winter steelhead." (Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan, 2004)

The majority of the slopes along Pine Creek appear to be stable, as all of the trees and shrubs are standing erect with a few exceptions (Photo 13, 15). No exposed tree roots, no undermining of tree roots, and no recent sloughing was collected at the bottom of the slopes. There is the exception of a few trees that were growing at a slight to low angle. Large trees falling on other trees and resting against them caused unnatural growth (leans, crooks) on some of these trees, probably a result of logging operations. A professional geotechnical engineer, Scott Hardman conducted a thorough reconnaissance of the subject property on February 2, 2005, and stated "Based on review of site conditions and available geotechnical information, the subject site is considered to have a low susceptibility to potential landslide hazards, provided that the project is constructed in accordance with applicable building codes and geotechnical recommendations," and "Our reconnaissance indicates that native slopes on the property are generally smooth and uniform, consistent with stable slope conditions."(Appendix B, Landslide Hazard Study)

The primary soils mapped throughout the site by *The Soil Conservation Services of Skamania County* are highly permeable, runoff slow, and the hazard of water erosion slight (see Geology section). There is an area that is mapped by the SCS with soils having severe hazardous erosion potential and were determined so by severe slope not the soil type. The eroded slopes that have

severe hazardous erosion potential along the watercourse are the result of a normal erosion process and catastrophic flow events from Mount Saint Helen's eruption in 1980 (Photo 9). These steep slopes (50-90%) are at the resultant edges of the current stream corridor.

This new corridor/floodplain/channel migration zone averages approximately 268 feet wide (OHWM to base of steep slopes). Pine Creek in this corridor averages approximately 44 feet wide between the OHWM. Slopes from the OHWM to the base of the steep slopes are approximately between 3-7%. Given the capacity of the existing flood zone of Pine Creek, it is deemed that it would take another catastrophic event to undermine the existing slopes and threaten Pine Creek with a large sediment influx. It should be noted that the Three Rivers Development has not exacerbated this situation in any way, except on one isolated lot where vegetation was removed and that lot will be replanted. Current sedimentation and stream conditions are, and will be a result of natural fluvial processes. (Photo 9)

"The complexity and high frequency of natural disturbances leads to a greater species diversity in riparian zones than upslope habitats. Flooding and ice flows are unique to riparian zones and their variable frequency, magnitude, and extent result in plant communities with variable composition, age, and structure. Whereas floods may destroy established riparian communities, they may also deposit the substrates necessary for many keystone riparian species to establish." (Johnson, O'Neil, Wildlife-Habitat Relationships in Oregon and Washington). A riparian zone and its associated values arise as the procut of a number of complex interactions between four fundamental ecosystem features, soils/geomorphology, hydrology, biota, and climate-microclimate. The distribution and composition of riparian plant and animal communities reflect histories of both fluvial disturbances from floods and non-fluvial disturbance regimes of adjacent upland areas such as fire, wind, plant disease, and insect outbreaks. As for any disturbance event the frequency, timing, and magnitude of the disturbance will influence the structure and composition of the biotic community. Floods result in the erosion of established floodplains and their biota as well as the deposition of varied substrates where succession or stand establishment begins anew. Those events have created complex patterns of soil morphology and groundwater dynamics that influence riparian plant and animal communities. (Johnson, O'Neil, Wildlife-Habitat Relationships in Oregon and Washington) The riparian corridor along Pine Creek appears to be a very healthy naturally developing system. This system is in the early successional stages of recovery from past catastrophic events, and is well vegetated with *Poa sp.,* and many large *Alnus rubra* (Red Alder) that provides shade and nutrients to Pine Creek (Photo 10). Recent research papers from the PNW Research Station (USFS) have shown the great value of Alder stands on upper watershed streams due to the variety of Fauna and nutrients provided to the water column for downstream enrichment (Pacific NW Research Station, Science Findings, Issue Sixty Three, May 2004) (Photo 16). The area has a healthy abundance of grasses and vegetation along the creek corridor. The presence of noxious species such as *Cytisus scoparius* (Scotch Broom), and *Cirsium arvense* (Canadian Thistle) was noted on the benches down to the creek and along the creek beds. (Photo 11)

The nearest building site to Pine Creek is approximately 150 feet, measured horizontally from the OHWM along Pine Creek. The channel migration zone (CMZ) is very large due to catastrophic events forming a significant floodplain (Figure 4). These buffers are sufficient for their use as wildlife corridors and forage areas, along with maintaining sufficient margins from the OHWM for preserving slope stability under normal circumstances (Figure 3). These buffers are further enhanced as the majority of them include primarily riparian floodplain areas, with the building sites sitting 20-50 feet and more above them.

Old logging skid roads that traverse through the buffer areas down to Pine Creek were obviously established years ago by the previous timber harvesting to gain access to the lower benches. The old logging roads have currently revegetated due to lack of use and are primarily used now by large wildlife animals such as deer and elk as travel corridors from the creek to the uplands above. This usage was confirmed by the large amount of fecal pellets and a large number of hoof

prints along the old roads. Along with observations of animals (Blacktailed Deer) utilizing these corridors. (Photo 14)

LEWIS AND MUDDY RIVERS

The headwaters of the North Fork Lewis River originate from 12,270 feet on the summit of Mt. Adams. "The Upper North Fork Lewis River has developed from volcanic, glacial, and erosion processes. Mount St. Helens and Mount Adams have been a source of volcanic material for the past 400,000 years." (Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan, 2004) The river from Mt. Adams is virtually pristine down to its junction with the Muddy River; at this point the eruption of Mount St. Helens devastated the riparian habitat. Due to the lahar from the eruption of Mount St. Helens the junction and vicinity of the Lewis River and the Muddy River have little to no woody debris. The riparian habitat in the vicinity of the junction is regenerating into a healthy riparian zone with second growth trees along the banks and slopes of the rivers to provide shade, which was reduced by forestry practices and from the 1980 Mount St. Helens eruption. The Lewis River is one of eleven major subbasins in the Washington portion of the Lower Columbia Region. The Upper North Fork Lewis comprises the portion of the basin upstream of Merwin Dam at river mile 19.5. The river lacks passage for any anadromous fish due to the development and construction of the Lewis River hydrosystem. The hydropower construction has altered the river flows, habitat, and fishes migration conditions. (Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan, 2004)

UPLAND HABITATS

UPLAND PLATEAUS

The upland plateau consists of two main areas: the bench to the west of Pine Creek with the private forest land owned by Olympic Resource Management to the west and the Gifford Pinchot National Forest to the north; and the contiguous area above Pine Creek to the east, which extends to the bench of the Muddy River and the Lewis Rivers.

The plateau above and between the Lewis River, the Muddy River, and Pine Creek is primarily a healthy second growth forest habitat, previously logged by ANE in the mid 1980's. (Photo 24) In developed areas, relatively large wildlife corridors still exist between cabin sites (Photo 19). A representation of the vegetative species throughout the upland plateau is *Tsuga heterophylla* (Western Hemlock), *Thuja plicata* (Western Red Cedar), *Abies grandis* (Grand Fir), *Pseudotsuga menziessii* (Douglas Fir), *Ranunculus sp.* (Buttercup), *oxalis sp.* (Wood Sorrel),*Lupinus sp.*(Lupine) *Polystichum munitum* (Sword Fern), and *vaccinium parvifolium* (Red Huckleberry). The vegetation was so extensive that only a few species we noted continuously. On the slope down to the Lewis and Muddy Rivers large coniferous trees, and a dense understory of shrubs, and herbaceous vegetation is present (the vegetation makeup is the same as listed above). The majority of the vegetation on the slope has not been impacted and provides excellent cover and forage for wildlife. Some areas along the top of the bench have had trees removed prior to conducting the habitat assessment and recommendations made in this document. (Photo 4)

The development that is commencing along the upland above the Lewis River is pushed back approximately 350 horizontal feet from the banks of the river. (Figure 3) The primary concerns for the development along the south fork of the Lewis River are the potential for impacts on: the condition of the river; an old logging road with a spring; bull trout; salmonids; and an active Bald Eagle communal roost adjacent to the development site on the south side of the Lewis River (Eagle Cliffs) (Photo 5).

An old logging skid road cuts down the bank toward the North Fork of the Lewis River, and during the current development process, this road was used to access the lower benches. Initial clearing exposed a groundwater conduit, which now surfaces as a spring. Current conditions of the road prohibit any further use as an access point. The spring has created some localized erosion that does not extend more than 20-30 feet down the old logging road. The short distance of water erosion is due to the type of soil and it's high permeability (Pinchot Cindery Sandy Loam). Water flowing over the side of the road and down the bank infiltrates within approximately 20 feet with no sign of soil movement. It is currently re vegetating, and no action for reconstruction is proposed. Along the Lewis and Muddy Rivers there is approximately a 160-foot band of Bonneville Stony Sandy Loam, which is highly permeable (more than 20 inches/hour), the runoff is slow, and hazardous erosion is slight, which further protects the Lewis and Muddy Rivers from potential sedimentation. (See Geology Section)

The upland plateau vegetation along the east side of Pine Creek has been selectively thinned for cabin sites with densely vegetated areas left between the cabin sites for wildlife utilization as travel corridors. The general vegetation on the east side of Pine Creek on the plateau which extends to the Muddy River to the east is *Tsuga heterophylla* (Western Hemlock), *Thuja plicata* (Western Red Cedar), *Abies grandis* (Grand Fir), *Pseudotsuga menziessii* (Douglas Fir), *Ranunculus sp.* (Buttercup), *oxalis sp.* (Wood Sorrel), *Lupinus sp.* (Lupine) *Polystichum munitum* (Sword Fern), and *vaccinium parvifolium* (Red Huckleberry).

The west Pine Creek upland plateau community is located west of Sasquatch Way. This section of the property is located before Forest Road 25 bridge crossing Pine Creek. The trees on the plateau above Pine Creek to the west has been logged by ANE and Excavating Rental Service (ERS, Jerry Sauer), leaving a large number of seed trees with the remaining portion having been clear-cut prior to the platting for building sites. Along the west border of the subject site the land is private forest land owned by Olympic Resource Management and along the north border is the Gifford National Forest. This open area will develop initially with pioneer species from the existing seed bank, including grasses, forbs, shrubs, and tree regeneration consisting of both coniferous and deciduous species. This mix, especially during the early successional stages will provide prime foraging areas for the wintering elk. Greatest utilization will be in proximity to escape and protective cover and near watercourses. "Use of forage areas depends on their proximity to cover. Usage is most concentrated within 200 feet of the cover edge and becomes insignificant beyond 600 feet of the edge. Elk can do well in the absence of traditional conifer "cover" as long as the elk are not disturbed" (Washington Department of Wildlife Management Recommendations for Priority Species, ELK).

WILDLIFE SPECIES

Based on notification from WDFW that the Three Rivers project would be impacting priority species, specific information on the species and how this project would impact them was investigated. Priority Habitat and species maps from WDFW were reviewed to determine the extent of priority habitats near the subject site. The Priority Habitat and Species map indicated the presence of Bald Eagle communal roosts on adjacent properties, elk winter range habitat encompassing the property, and bull trout documented as present in Pine Creek, the Muddy River, and the Lewis River. Direct and indirect observations of wildlife on the subject site were recorded. Observations included positive sightings, identification of roosting sites, and positive identification of fecal pellets and tracks.

ELK

Cervus elaphus (North American Elk), the subspecies roosevelti range includes areas from the coast through the western cascades. The elk are large animals that range between the size of a deer and a moose. The typical size of a 3 year old male is 500 pounds, while older males weigh twice that much. Antler development only occurs in males and is shortly after birth, but they do not break the skin until the beginning of the second year when the spikes appear. The animal's breed typically from August to November and they typically carry the calves for 8-81/2 months. Elk need to travel due to their need for large amounts of food. The elk at Three Rivers are migratory elk, which means they move to different elevations during the various growing seasons because of the availability of feed at different times of the year. "The year round ranges of the elk varies from 1,500 to 4,000 acres, because they are generally found where the climate is less severe and where food and cover are more readily available." (WDFW, Living With Wildlife). Elk require approximately 0.5 acre of forage per month for 6 months during the winter season, or 3 forage acres per winter period per animal to carry it on a sustained range basis (Trippensee, Wildlife Management). They remain in the lowlands during the winter, generally below 2,500 feet, and move up hill in the spring following the watercourses as the snow recedes. The elk typically feed on the bottom lands early in the morning and gradually work their way up the hillsides as the day advances, bedding down during the middle of the day. Elk like to alternate between open meadows, bushy undergrowth, and mature timber, depending on the season ("edge habitat"). (NRCS, American Elk) "Apparently elk are not shy and will go out into open lands more freely for forage." (Trippensee, Wildlife Management) In the spring and summer, when food is plentiful, elk are mainly grazers, feeding on grasses, sedges and a variety of flowering plants. In the fall and winter elk increasingly become browsers, feeding on sprouts and branches of shrubs and trees, including conifers as a last resort when snow covers other plants. Vegetation specifically eaten by the elk is *Populus tremuloides, Prunus virginiana, Populus trichocarpa, Acer glabrum, Salix sp., Purshia tridentata, Ribes sp., Ceanothus integerimus, Sambucus sp., Vaccinium sp., Holodiscus sp., Cornus sericea, Amelanchier alnifolia, Symphoicarpos albus, Rosa sp., Medicago sativa, Trifolium sp., Taraxacum sp., Epilobium angustifolium, Melilotus sp., and Tragopogon sp.* (NRCS, American Elk). Elk are primarily active during the time of dawn and dusk, but if temperatures are high or the elk are being harassed they typically become more active at night. "When disturbance levels are low and temperatures mild, elk may be observed feeding in short bouts throughout the day. When not hunted, elk adapt well to humans and find lawns and golf courses excellent places to graze." (WDFW, Living with Wildlife)

Elk winter range encompasses the entire subject site as referenced from the Priority Habitat and Species map. A herd of elk was observed in the clear-cut portion of the site on the upland plateau west of Pine Creek. The herd of elk was observed foraging and did not appear disturbed by our presence nor the presence of a large excavating machine. At the time of the investigation the corridors for large wildlife such as elk and deer between developed cabin sites were wide (approximately 50-70') and dense (ocular density approximately 40-60% from the center to cleared cabin sites) enough to provide sufficient corridors (Photo 19). A black tail deer was observed using the corridor between the building sites in close proximity to the observers crossing Lodgepole Lane and Forest Road 25 into the adjacent forested cover. Literature searches provided no documentation or research findings concerning the required width or type of corridor elk or deer require utilizing them. Evidence (observations) seems to suggest the animals will utilize any available travel ways if conditions at the time make the animal feel secure in their use. Further indirect evidence of elk and deer actively using the site during construction activities was observed from vegetation that had been recently foraged and fresh fecal pellets throughout the investigated site.

The habitat at the time of the investigation appears to be able to sustain the winter elk and other large wildlife. The vegetation within the scope of the subject site is primarily native vegetation; *Tsuga heterophylla* (Western Hemlock), *Thuja plicata* (Western Red Cedar), *Abies grandis*

(Grand Fir), *Pseudotsuga menziessii* (Douglas Fir), *Ranunculus sp.* (Buttercup), *oxalis sp.* (Wood Sorrel), *Lupinus sp.* (Lupine) *Polystichum munitum* (Sword Fern), and *vaccinium parvifolium* (Red Huckleberry). Noxious plants that were also observed were *Cytisus scoparius* (Scotch Broom), and *Cirsium arvense* (Canadian Thistle).

In areas that have been logged and the canopy removed, volunteer vegetation (grasses, forbs, and tree regeneration) will establish during the current (2005) growing season providing near optimal forage for the elk herds immediately adjacent to heavy forest cover during the upcoming winter, and especially many seasons into the future. This open area will provide considerably more desirable available forage (grasses and forbs) than the second growth community it will replace.

"Although North American Elk eat a wide variety of plants that vary from one area to another they are primarily grazing animals. Pederson pointed out that generally speaking grasses form 82% of the diet during the spring, 11 percent during the summer, 62% during the fall and 78% during the winter. In addition to grasses consumed during the summer, forbs (succulent green plants other than grasses) compose 75% of the diet. Forbs such as buttercup and asters are obtained by grazing. (Maser et al) History of Oregon Coast Mammals)

BALD EAGLE

Haliaeetus leucocephalus (Bald Eagle) are listed as a state threatened species. Bald eagles are fairly distinct in their appearance as adults, their entire head, nape, chin, throat, upper and under tail coverts, and tail are white often with a pale buffy or creamy tinge; elsewhere is mostly dark brownish-black. (Johnsgard, "Hawks, Eagles, & Falcons of North America") Bald eagles are generally residents near large bodies of water that provide an adequate food supply. Their territory size depend on many habitat characteristics which are, perch trees for foraging, quality of forage habitat, and close proximity to water. The eagles will generally be residents year round in areas where the large bodies of water do not freeze, therefore making food still readily available. High tree density and moderate canopy closure are important to visually buffer human activities within 800 feet of the communal roosts and to protect the nest and nest-tree from blowdown. "In Washington, Grubb (1980) found that productive nests were further from permanent human activity, an average of 400 feet, than from unproductive nests. Fraser et at. (1985) found that eagle nests were further from the shoreline in developed areas, that nests were further from clusters of houses than random points, and that 79% of eagles flushed from the nest at 1000' at the approach of a pedestrian. In Maine, nesting bald eagles avoided disturbed areas near lakes and marine shorelines" (WDFW Management Recommendations for Priority Species. Bald Eagles, quoted as published in document)).

Personal observations by a member of the assessment team while employed by the Ohio Division of Wildlife while doing nesting surveys found an active eagle nest within a 1-acre woodlot adjacent to an active farmstead. Open active agricultural fields in the near vicinity of extensive Lake Erie marshes surrounded the nest and farmstead. Another personal observation by a member of the assessment team regarding adaptability of eagles to their surroundings was observed at Waldron, San Juan Islands, Washington. While fishing off the remote island the fish that were caught would be released into the ocean and eagles would approach within 10 feet of the boat to collect the released fish from the water. The eagles did this numerous times over a week long stay on the island. The investigators feel these field observations on eagle habits and adaptability in the San Juan Islands, and Ohio or elsewhere are as relevant to this site as are references published by the WDFW from Maine and elsewhere to validate eagle ecology. Wildlife science is a product of research and observation, therefore no information based on direct observations should be discounted.

A communal eagle roost was listed on the Priority Habitat and Species map on the south side of the Lewis River, which is adjacent to the subject property. WDFW Management

Recommendations state "In perching areas where little screening cover is present, buffer zones of 800'-1000' are suggested (Stalmaster, Hawks, Eagles, and Falcons of North America)".

BULL TROUT/SALMONIDS

Salveliunus malma (Bull Trout) are federally listed as a "Category 1" candidate species. Bull trout were listed as federally threatened in 1998 and also as a state "sensitive species". Their bodies are typically olive green (to brown) with yellowish, cream spots. The larger fish have yellow and red-orange spots on the sides of their bodies.

Bull trout tend to prefer cold, clear waters of headwater streams, rivers, and lakes connected to natal streams. Temperature is a major factor influencing bull trout distribution, especially for spawning and early rearing. Bull trout require temperatures below 8-9 degrees Celsius (C) (46.4-48.2 F) for spawning initiation, 2-4 degrees C (35.6-39.2 F) for optimal egg incubation and 4-10 degrees C (39.2-50 F) for juvenile rearing. Optimal adult rearing temperatures range from 10-12 degrees C (50-53.6 F). (NRCS, Threatened and Endangered Species: Bull Trout)

Streams with abundant cover (cut banks, root wads, debris jams, boulders) and clean gravel and cobble beds provide the best habitat for the bull trout. The Pine Creek, Lewis River, and Muddy River bull trout populations are believed to be resident (non-migratory) fish, where the fish spend their entire lives living in tributaries and headwater streams. The Swift Reservoir has a spawning population estimated in the range of 100-900 fish, with Pine Creek being a primary spawning habitat tributary, no information on bull trout abundance in the lower North Fork of the Lewis is available. (Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan, 2004) Bull trout spawn in the fall (September-November) as the temperatures fall, and their eggs require exceptionally long gravel residency times (up to 220 days). (NRCS, Threatened and Endangered Species: Bull Trout)

Bull trout are listed as inhabiting Pine Creek, the Lewis River and the Muddy River. Jim Bryne a Fisheries Biologist of WDFW was contacted May 17, 2005 to discuss Pine Creek, the Lewis and Muddy River, and any fish populations present in these rivers. He stated the presence of rainbow trout, whitefish, and bull trout are present in the Pine Creek, and Muddy and Lewis Rivers. He described the general existing conditions of the Muddy and Lewis River and stated that all of this information is located on WDFW's website. The website information had already been included in this report, and inquiry was to obtain more specific and detailed information about the Lewis River, the Muddy River and Pine Creek (pools, fish distribution, specific fish ecology). Mr. Bryne's main issue was that WDFW and USFS were concerned about ATV access, poaching of fish in the rivers, and elk hunting on the subject site. He also stated that there are no anadromous fish present in these watercourses due to the impassable Merwin Dam down stream.

IMPACT ANALYSIS

ETC has assessed the potential impacts from the proposed development at project completion. It is anticipated that the proposed project will have the following impacts: human disturbances to wildlife (ATV's, noise, roads, cabins), fragmentation of upland habitat including the loss of some free range travel corridors; constraint of some of the remaining travel corridors from the buffer of Pine Creek, the buffer of the Muddy and Lewis Rivers, and associated upland sites, and the conversion of native vegetation groundwater recharge areas to roads and homesites. As with any development there will be loss of area and the associated natural functions and values, which need to be mitigated.

This development is at the end of the free flowing sections of Pine Creek, the Muddy River, and the Lewis River, therefore any impacts would affect Swift, Yale, and Merwyn Reservoirs and the lower reach of the Lewis River to a greater extent than the onsite streams. Impacts to any of these systems, although present, are negligible. Potential impacts will affect approximately 4,600 feet or the lower 7.6% of Pine Creek and considerably fewer percentages of the Lewis and Muddy Rivers.

HYDROLOGY

Impacts to the hydrology (both surface and groundwater) will be negligible. The project site soils are a mixture of Stony Sandy Loams, Cindery Sandy Loam, and Sandy Loams with permeability rates of 0.6-20. in/hr on the lower end of the spectrum and greater than 20 in/hr at the upper end. Site construction consists of gravel roads and driveways, and natural ditches and waterways. The only impervious surfaces that will be constructed on the site are buildings (cabins, etc.) with small footprints (roughly 1000 sf). Roof water will be directed to native surfaces and allowed to infiltrate. Due to the nature of the soil and it's associated high infiltration rate, although redirected by roof surfaces and to some degree road surfaces, all precipitation will return to the subsurface as groundwater. This water will recharge subsurface aquifers and sustain stream flows at pre development conditions. Rainfall data and peak 1 hour storm precipitation rates for the Three Rivers Recreational project is presented in Appendix D and is based on the isopluvial contour that is the nearest to the subject site. Peak 1 hour storm precipitation for AV SCS type 1A distribution using the King County Hydrograph Program is as follows for the 2, 5, 10, 25, 50, and 100 year 24 hour storms: 2y= 0.93 in; 5y= 1.10 in; 10y= 1.27 in; 25y= 1.44 in; 50y= 1.52 in; 100y= 1.69 in.

All of the developed portions of the site are made up of Pinchot Cindery Sandy Loam Soils, with a minimum saturated hydraulic conductivity (infiltration rate) of 0.6-20. in/hr. Using a median value of 1.3 in/hr, the site will infiltrate all events up to and including the 10-year storm, and at the high end the soils will infiltrate all storms (i.e. infiltration rate $\geq$ rainfall rate). This is the peak 1 hour rate for these storms, with the 1 hour prior being approximately 41% of this rate and the 1 hour following being approximately 39% of this rate. An example being during the other 23 hours of the 100 year event, the rainfall/hour is approximately 0.69 in/hr during the hour before the peak event. We therefore conclude that the soils on the site will adequately infiltrate any local storm event, based on data presented and the fact that the methodology provides a very conservative output. However, as a general rule, groundwater travels horizontally at a rate approximately 3 time the vertical infiltration rate. Therefore, to prevent potential impacts to the waterways it is suggested that discharge points be a horizontal distance equal to 3 times the height of the adjacent slope (to TOE or lower bench) to prevent groundwater point discharge from the face of slopes down into the waterways

Skamania County Watershed Planning (2514) Process agreed that the maximum water allocation (withdrawal) for this basin was to be 0.38-cfs maximum depletion. The Lower Columbia Basin Watershed Plan (WRIA27, 28) allows 300 gal/day/lot. The maximum available gallons per day on the subject site is 245,616 gallons/day (0.38cfs (max allowed) x 3600 sec/hr x 7.481 gal/cf x 24 hr/day=245,616 gal/day), or enough to supply the requirements for 818 lots. Assuming full build out of 500 lots, and based on the above calculations, the maximum depletion would be 0.232 cfs or 61.1% of the allowed maximum. (Allocation Source: Skamania County, WA Staff)

WATER QUALITY

Runoff from the developed portions of the site poses another potential impact to the Lewis and Muddy Rivers, along with Pine Creek. If runoff did occur and transported silt into receiving waters, harmful side effects to river substrate would occur in the form of sedimentation. The results of sedimentation include temperature increases, covering of spawning gravel, egg mortality, and reduction in food supply through mortality and substrate change. If extensive enough on slow moving, low gradient streams the entire stream ecology can be altered.

Natural channel migration in the streams could cause localized slope failure, however the width of Pine Creek CMZ and developing riparian conditions preclude this unless a catastrophic volcanic event of equal or greater magnitude than the 1980 eruption of Mount St. Helens should occur. Current conditions and natural successional stages along Pine Creek should be considered the normal conditions at this time based on the fact that Mount St. Helens is currently an active, volatile geological entity in this area. Observations of the Pine Creek area indicate the slopes to be stable, although the results of past catastrophic events are evident. (Photo 9)

The apparent stability of the slopes along the Lewis and Muddy Rivers is evident from the mature vegetation on the lower slopes near the streams, and the general "V" shape of the valley slopes except where rock formations create cliffs. The criterion we used to assess the slopes were the age of trees observed, the direction that the trees are growing (leaning, crooks), and the regional geology for the area. (Photo 12). These opinions are reinforced by the investigation conducted by a professional Geotechnical Engineer, Scott Hardman. He surveyed the site prior to our site visit and determined the subject site has a low potential for landslide hazards provided the development of cabins are outside the recommended slope setbacks. (See Geotechnical Report, Appendix D) This recommendation is incorporated into the management plan.

In the past a major concern for water quality issues rural for development near waterways has been septic systems. In the past, some of these systems were either poorly designed, sited in poor soils, installed without permits, or placed to close to waterways. In addition to siting and design, many problems developed from systems that were poorly maintained or simply failed for a variety of reasons (mishap, tree roots, etc). Systems installed on this project will be fully permitted and designed around best available science concerning waste treatment systems for this type of site. Good design, siting permitting, and required maintenance covenants should alleviate any water quality issues associated with these systems.

Department of Ecology (DOE), Dave Howard, Margaret Hill, and Craig Graber conducted a site visit to determine if any water quality issues existed on the site. They concluded that, based on the soil type and existing conditions (developed roads, cut slopes, cabin sites), that there were no water quality issues associated with the site now, or upon build out, provided development guidelines from professional engineers and biologists were followed. Margaret Hill of DOE was

contacted May 19, 2005, for a letter of determination for the site from the site visit on April 6, 2005. Ms. Hill stated that a letter would be a low priority for them because a permit was not issued for the subject site. Ms. Hill stated that the lack of an issued permit by DOE was a determination that the subject sites watercourses would not be harmed by runoff or any other drainage issue.

The current conditions on these streams are relatively unchanged over the last 25 years although the area has experienced extreme meteorological events that triggered a 100 year flood equivalent (several two year events in close succession) in 1996, with extremely wet years in 1997-1999, triggering abnormally high water conditions throughout the region.

Another potential, and probably the most serious source of erosion and sedimentation, would be the use of any motorized vehicles to access the streams. Direct particulate movement and sedimentation would occur where vehicles were operated across or within the watercourses. Indirect effects would be disturbed soil adjacent to streams that would be transported by high water or precipitation events.

Several old skid roads access the streams from the benches where cabin sites are located. Skid roads are to be left in place to facilitate migration of wildlife (particularly deer and elk from the plateau areas to the riparian/watercourse areas) especially along Pine Creek. These roads are natural draws to motorized vehicles, especially ATV's. Without access control these roads would be the source of major stream habitat damage.

RIPARIAN HABITAT

A healthy riparian zone is essential to the overall water quality, especially in relation to fish habitat. Vegetation stabilizes channel banks, reduces flood velocities, reduces floodplain scour and stream sedimentation and provides the major source of carbon for in stream fauna. Additionally the input of terrestrial fauna falling into the receiving waters provides a direct source of food for in water organisms and a broad spectrum of essential nutrients. (Photo 15)

The major potential source of impact to the riparian zones along the watercourses on this site would be motorized vehicle traffic. ATV's and motorcycles would destroy existing vegetation, compact soils, and create disturbed areas that could be colonized by non-native vegetation. Prohibiting motorized vehicles in these zones will prevent these impacts.

Setbacks will also protect these riparian zones. Minimum setback requirements per WDFW have been met (150 feet Pine Creek, 250 feet Lewis and 150 feet Muddy River), although in actuality have been exceeded on most of the site. Building footprints on the benches, with slope setbacks in concurrence with geotechnical recommendations, are at a minimum of 20-50 feet above these zones, which will further protect them from random incursions, and with controlled access points the impacts will be minimal. Mitigation and management recommendations are included in this plan to reduce these potential impacts to a non-significant level. It should be noted that the width of effective or necessary buffer/riparian corridors can be subject to site specific analysis, and based on slope, soil type, nutrient and pollutant loading (adjacent land use), and vegetative cover, and other factors.

ELK

Numerous trees have been cleared from the proposed development site. The primary concern for elk habitat is availability of food, travel corridors, domestic animals, outdoor lighting, and overall harassment of the elk. The impacts to the elk natural habitat will be a result of fragmentation and loss of travel corridors, forage areas, and tree cover due to the habitat being converted into roads and building lots. The total area converted to roads, drives and cabin sites is approximately 401,208 s.f. Recommendations to offset this loss of habitat that originally provided travel corridors and forage areas have been included in the Mitigation/Management Plan. (Figure 9)

Outdoor lighting or spotlights that shine into the habitat areas at night from the cabin sites may impact the grazing and migration of the elk. The potential for harassment of the elk by humans, domestic dogs, and motor vehicles is possible.

Due to the season (October-April) that the elk typically stay on the winter range, interaction between the cabin owners and elk should be minimal. Private forestland (ORM) and the Gifford Pinchot National Forest surround the subject site, these areas are also used by the elk as winter range. The accepted boundary of elk winter range west of the cascades is generally below 2500 feet above sea level (Management Recommendations for Priority Species, WDFW). Therefore this site impacts only a small percentage of the winter range of the Three Rivers basin. (Figure 8)

Elk and other wildlife will still be able to utilize the remaining corridor areas on the site, along with the buffer areas along the waterways connecting the site with offsite areas. With adequate mitigation and management there should be no significant affect on the local elk herd.

BALD EAGLE

Possible impacts to the eagle would be by impacting their communal roosts. Potential impacts would be from human disturbances such as, lighting, and glare from windows, noise (yelling, motorized vehicles, guns, etc), and humans being visually seen. If the outdoor lighting at night from cabins were to shine directly into the habitat area, it may disturb the eagles roosting habits, as with the sun glare from south, east, and western facing window during the daylight hours could affect short term behavior patterns (foraging).

The impact the development will have on the Bald Eagle communal roosts is estimated to be minimal due to the distance of the communal roosts from the nearest cabin site (Greater than the 800' minimum stated in WDFW Management Recommendations for Priority Species-Eagle), and the dense buffer between the Lewis River and the communal roosts to the south. This buffer will screen hikers, fishermen, and other users from the roosting area. (Photo 1) A determination on how the development will impact the Eagle communal roosts is hard to determine based on conflicting research of the adaptability of Eagles to human disturbances. The majority of the research indicated that eagles are adaptable to human disturbances as long as there is a distance of 800 feet or more and are not harassed directly (humans approaching on foot or boat) or indirectly (noise pollution; i.e. ATV's, guns, loud humans, etc.). (Johsgard, "Hawks, Eagles, & Falcons of North America") In a pamphlet by the Washington Department of Wildlife "Management Recommendations for Priority Species" a recommended distance for areas with little screening or cover present is an 800-1000 foot buffer between the communal roosts and development. Even without screening this development meets the WDFW recommendations as stated in "Management Recommendations for Priority Species". (Figure 11)

From our own professional experience, and research that was conducted on bald eagles by professional ornithologists, we concluded the impacts to the birds will be minimal, this is based on parameters of distance from the nests and communal roosts to development, the buffer habitat that will shelter human activities, and the professional determinations of adaptability by ornithologists (Existing Conditions, Bald Eagles). The adaptability is in conjuncture with the privacy and distance that the birds are given from human disturbances.

OSPREY

As requested by Skamania County in a letter May 6, 2005, ospreys were taken into consideration. Osprey literature was searched for all four agencies (USFW, USDA, WDFW, and Skamania County) for priority habitat and species listing. No references were found that ospreys are listed as a priority species, they were listed on the Washington State Monitor List from WDFW. The Washington State Monitor List clearly states that the "species are not considered Species of Concern, but are monitored for status and distribution." (Species of Concern, Washington State Monitor List, WDFW) Therefore, no discussion under Skamania County Critical Area Ordinance is warranted.

BULL TROUT/SALMONIDS

The primary concern for the development near the watercourses is for the fish that inhabit them. The main influences that could result from development are changes in hydrology due to water wells and runoff (reduction in groundwater recharge), sedimentation, septic tank contamination, and an increase in temperature due to the removal of riparian vegetation. Along the Lewis River the buffer is to remain is 250 feet and along Pine Creek and the Muddy River the buffer is 150 feet (as recommended by WDFW). These buffers are designed to reduce impacts to the rivers. No vegetation is to be removed or altered from the outer limits of the buffer zone to the centerline of the streams. If trees were removed along the riparian zone and the temperatures of the rivers increased (primarily along Pine Creek), the bull trout population that utilize that stream specifically for it's temperature (spawning, juvenile development could possibly cease to exist). WDFW comments indicated that there were habitat problems, especially in Pine Creek. (Existing Conditions, Pine Creek) Based on these comments we feel the existing conditions in Pine Creek, a very important role in the life cycles of both bull trout and steelhead, and that in stream work could possibly do more harm than good. No in stream mitigation is proposed under this plan.

The possible changes in hydrology during the summer months could lower the river flows due to groundwater withdrawal by developed water wells serving the site. Skamania County (Watershed Planning, 2514) recommended a maximum depletion of 0.38cfs for the subject site as a threshold impact for groundwater. (WDFW letter, May 5, 2005) The approximate amount that will be used is 0.232 cfs (or 61.1% of the allowed maximum). (Impacts, Hydrology) Infiltration amounts will remain the same as no impervious roads are located on the site, and the high infiltration rate of the soils will accommodate the small amount of impervious runoff from building roofs indicated some runoff. Onsite observations of runoff conditions from roads into roadside ditches and natural conveyances. This runoff however infiltrated well before reaching any buffers or waterways. The total impact to the area hydrology is determined to be negligible as the groundwater withdrawal is based on maximum occupancy, and is still only a small fraction of that allowed by the watershed planning 2541 agreement, while all precipitation will recharge groundwater supplies at the same rate as predevelopment conditions.

The leakage of septic tanks could be harmful to the fish populations in Pine Creek, the Muddy River, and the Lewis River due to *E. coli* and other associated contaminants. With permitting by Skamania County, Dept. of Ecology (DOE) requirements, and maintenance covenants the impacts from septic tank systems should be non-existent on the subject site. (See Impact Analysis, Water Quality)

Sedimentation would suffocate the bull trout eggs and could prevent them from spawning because they need clear, cold water with clean gravel. The eggs are buried at ranges of 3-20 cm with an average range of 10-15 cm, depending on the length of fish and gravel size (20-55mm). The range is significantly shallower than other salmonids in the Pacific Northwest. These factors make the eggs highly susceptible to sedimentation (Center for Watershed and Watershed Studies, U of W). Sedimentation into the waterways is estimated to be non-existent due to the distance of development to the waterways, and the highly permeable soils located on the subject site (as described in Geology section of report), and the exclusion of motorized vehicles from the buffer and riparian zones.

Bull trout currently inhabit Pine Creek, the Lewis River, and the Muddy River. Pine Creek is stated by WDFW in the "Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan" to be a prime watercourse for winter steelhead, and although it isn't listed as prime habitat for bull trout they still use the watercourse for spawning because the temperatures are low and the water is clear, with an abundance of clean gravel. Potential impacts do exist, however they are very minimal provided development guidelines and recommendations are followed. It should be reiterated that this development is at the lower end of the free running reached of all the affected streams. Water volume and velocity are at a maximum, and any short-term impacts would be quickly mitigated, and would affect only a small portion of the streams.

Reportedly there are two holding pools that are utilized by fish prior to moving into Pine Creek from the North Fork of the Lewis River. (Skamania County letter, June 1, 2005) Personal communications with WDFW, Jim Bryne gave no indication of their location, size or depth, fish retention time, or other significant parameters from which an impact analysis could be made. Assuming the pools are located in the free flowing reach of the Lewis River (before impoundment influences) it is felt that the volume and velocity through these pools would transport most pollutants above threshold limits (sediment, bacteria, etc) past the pools and they would be deposited (sediment) in the delta structure at the head of Swift Reservoir. Other pollutants would be assimilated into the volume of Swift, Merwin, and Yale Reservoirs and most probably be naturally mitigated in the water column or reservoir bottom sediments.

MITIGATION AND MANAGEMENT PLAN

The information contained in the preceding sections of this document is based on published information from research documents, reference books, technical papers, and best management practices from a variety of source agencies, academia, an working professionals. This information was evaluated and recommendations made by the authors of this report based on their professional experiences, academic training, and input from reviewing and regulatory agencies. This document is designed to fulfill the requirements of the Skamania County Critical Areas Ordinance Title 21A, in particular chapter 21A.05 Fish and Wildlife Protection. Sections 21A.05.010 through 21A.05.030 and 21A.05.050 are administrative rules that regulate new developments in fish and wildlife habitats. This document deals explicitly with 21A.05.040 Wildlife Management Plans for sites that impact, or have the potential to impact, regulated fish and wildlife sites.

WATERCOURSES

PINE CREEK

1. Establish and maintain a minimum buffer of 150-feet between the OHWM and any development along Pine Creek (cabins, roads, etc.). Clearly mark buffer limits on ground prior to construction. No vegetation removal is allowed within buffer areas, unless it is a mitigated noxious or invasive species.

2. Selectively spray noxious and invasive vegetation (Thistle and Scotch Broom) throughout the subject site with approved herbicides. Wick apply herbicides in areas immediately adjacent to watercourses.

3. Outdoor lighting should be pointed back onto the cabin site property or have protective shields to cast down the light.

4. Allow areas that have been logged in accordance with Forest Practices Act to regenerate naturally from the existing seed bank. Supplement native seed bank with native upland seed mix.

5. Apply jute mats to the major road cuts, fills, and steep slopes (steep slope along Sasquatch Way). Hydroseed with organic mulch or Rexius Microblend to a depth of 1-2" for moisture retention and seed germination (seed mix to be Washington Department of Transportation (WSDOT) Erosion Control Mix or other as approved by Skamania County). Provide a source of irrigation water (water truck with pump, or other means) to keep seed bank wet until fully germinated. All other slopes need to be planted if showing signs of erosion. RipRap could be used to protect slopes as an alternative.

6. Hydroseed roadside ditches, minor cuts, and fills with approved elk forage mix. Jute mat application is not deemed necessary provided plants are fully established prior to October 1, 2005.

7. Site septic systems based on "best available science" for this type of site in accordance with DOE guidelines and permitting by Skamania County. Implement and enforce maintenance covenants to protect sensitive areas from septic failure.

8. Discharge roof drains into dry wells, flow spreaders, or other discharge point as per Skamania County review. Place discharge points at a distance from the top of the steep slopes (especially along the east side of Pine Creek) a distance equal to three times the height of the adjacent slope (i.e. to first bench or Toe of Slope) or maximum distance allowed by lot configuration.

9. Maintain existing skid roads for wildlife corridors from riparian areas to upland. Block skid roads with boulders or other means to prevent motorized vehicle incursions into buffers. Maintain naturally vegetated corridor between cabin sites (50-feet minimum recommended) at nearest lot line to upper end of skid road for travel corridor extension. Covenants to be put in place to prevent any vegetation manipulation or impacts in these areas.

10. Post informative signage at the top of pedestrian access points along the buffer of Pine Creek. Language should address information on bull trout and elk, their presence and status, along with importance of the riparian buffer. Pictures of bull trout on the signs and WDFW threatened species law may be additional useful information. Access points approximately every 0.5 miles or further. See suggested signage text under the bull trout section.

11. Allow selective pruning on trees out of the mitigated buffers for views from cabin sites. The top 30% of the tree must be left intact as to not adversely affect the survival of the trees. Removal of vegetation within geotechnical setbacks should be prohibited.

12. Revegetate areas where trees and vegetation have recently been removed within geotechnical critical areas per recommendations of the Geotechnical Engineer. This does not include trees removed during approved logging operations.

LEWIS AND MUDDY RIVER

1. Establish and maintain a minimum buffer of 250-feet along the Lewis River between the OHWM and any development (cabins, roads, etc.) along the Lewis River. With additional buffer width if required for slope stability upon the recommendation of a geotechnical engineer.

2. Establish and maintain a minimum 150-foot buffer along the Muddy River between the OHWM and any development (cabins, roads, etc.) along the Muddy River. With additional buffer width if required for slope stability upon the recommendation of a geotechnical engineer.

3. Vegetate minor cuts, fills, and slopes with *Alnus rubra* (Red Alder), *Symphoricarpos albus* (Snowberry), and elk forage (native forbs to the area) approved by Skamania County to prevent erosion.

4. Apply jute mats to the major road cuts, fills, and steep slopes (steep slope along Loowit Lane). Hydroseed with organic mulch or Rexius Microblend to a depth of 1-2" for moisture retention and seed germination (seed mix to be WSDOT Erosion Control Mix or other as approved by Skamania County). Provide a source of irrigation water (water truck with pump, or other means) to keep seed bank wet until fully germinated. All other slopes need to be planted if showing signs of erosion. RipRap could be used to protect slopes as an alternative.

5. Revegetate in buffers that have already been cleared with native woody species (especially on slopes). Revegetate with species such as *Thuja heterophylla* (Western Hemlock), *Pseudotsuga menziessi* (Douglas-fir), and *Abies grandis* (Grand Fir).

6. Allow selective pruning on trees out of the mitigated buffers for views from cabin sites. The top 30% of the trees must be left intact so the survival of the trees is not adversely affected. Removal of vegetation within geotechnical setbacks should be prohibited.

7. Outdoor lighting should be pointed back onto the cabin site property or have protective shields to cast down the light.

8. All windows facing south, east, and west should be glare resistant, or shaded by 6'-8' eave/overhangs, or shaded by natural vegetation. No direct sunlight should fall on window surfaces (unless glare resistant). Building covenants and permit restrictions should be in place to insure compliance.

9. Provide common access pedestrian trails to homeowners down to the rivers. Utilize existing skid roads.

10. Block off floodplain access roads and trails with large boulders to prevent off road vehicle use along the floodplains.

11. Post signage at the top of all trailheads leading down to the waterways informing the homeowner of the protected habitat area. Language should address information on bull trout, elk, and bald eagles, their presence and status, along with the importance of the riparian buffer. Pictures of bull trout on the signs and WDFW threatened species law may be additional useful information. See suggested sign format under Bull Trout section.

WILDLIFE SPECIES

ELK

1. Plant all disturbed areas along the new roadways, ditches, and minor cut/fill slopes with elk forage (native grass forb mix designed specifically for elk grazing).

2. Establish elk forage plots in areas primarily devoid of vegetation or in areas of noxious or invasive plant removal. On benches and along Pine Creek CMZ within buffer areas. Homeowners association to maintain these areas through covenants.

3. Re-vegetate or keep natural, forested, 100-foot wide travel corridor of conifers along Pine Squirrel short plat and Pine Needle short plat. This can be utilized from ORM private forestland to Pine Creek.

4. Add notifications to deeds or plat maps informing owners or potential buyers that the property is within big game winter range. The property could be damaged and the owners are liable for the repairs. Any vegetation planted on the subject site should be native to the area.

5. Establish covenants that limit off road vehicles and snowmobiles to established roads on the subject site. Install signs that inform the homeowners of this requirement.

6. Conform with "no fence" language of protective covenants.

7. Keep all dogs on leashes or controlled. Dogs should not be allowed to roam freely and unmanaged on the subject site. All barking should be controlled and not allowed by the owner (control barking by removing the dog from outside).

8. Revegetate approximately 10 acres of forage plots in mitigated areas as seen in Appendix A, Figure 9. Forage plots need to be established to compensate at a ratio of 1:1 for habitat conversion. Suggested forage mix specifications for upland areas are as follows: Sunmark Seed (native mix)"Prairie" *preferred*; or Sunmark Seed (native/introduced) "Rangeland" or (introduced) "Foothills" per agency authorization. Riparian plot preferred mix is Sunmark "Wetland Prairie". Non native seed mixes can only be used if authorized or specified by Skamania County Planning Department. See Appendix for seed specifications. NOTE: Additional forage plots to be added based on future land division impacts beyond current development applications as appended in this document.

BALD EAGLE

1. Establish a minimum buffer of 800-feet between cabin sites and the eagle communal roosts as measured from the edge of the WDFW polygon.

2. Maintain and protect all communal roosts and nests outside the riparian habitat areas/stream buffers, as required by the law.

3. All windows must have no glare, or 6'-8'eaves/overhangs, or be shaded by natural vegetation. No direct sunlight should fall on window surfaces (unless glare resistant). Building covenants and permit restrictions should be in place to insure compliance.

4. Sections of Island short plat and Two Rivers short plat should remain undeveloped and should be protected in perpetuity by a covenant that runs with the land.

12. Post signage at the top of all trailheads leading down to the waterways informing the homeowner of the protected habitat area. Language should address information on bull trout, elk, and bald eagles their presence and status along with importance of the riparian buffer. Pictures of bull trout on the signs and WDFW threatened species law may be additional useful information. See suggested signage text under the bull trout section.

BULL TROUT

1. Post signs at the top of trailheads along all of the watercourses to inform owners about the presence of Bull Trout, and their protected status.

2. Provide covenants that run with the land protecting Bull Trout habitat and the prohibition of taking the species unless it status as a protected species is changed.

3. No in stream habitat modification is deemed necessary or warranted at this time per documentation by agency studies and recommendations (See Lower Columbia River Salmon Recovery and Fish and Wildlife Subbasin Plan).

SUGGESTED SIGN LANGUAGE

"THE STREAMS ON THIS PROPERTY ARE UTILIZED BY PROTECTED FISH SPECIES.

BULL TROUT ARE A FEDERAL THREATED SPECIES AND ANY POACHING OF THIS SPECIES IS PUNISHABLE BY LAW. REFER TO THE WASHINGTON DEPT. OF FISH AND WILDLIFE FISHING REGULATIONS PRIOR TO FISHING IN THESE WATERS.

THIS PROPERTY IS WITHIN ELK WINTER RANGE AND A BALD EAGLE (STATE THREATENED SPECIES) COMMUNAL ROOST IS IN THE VICINITY. BOTH SPECIES MAY BE ENCOUNTERED IN THIS AREA, PLEASE DO NOT APPROACH OR HARRASS THEM IN ANY MANNER

PLEASE BE A GOOD NEIGHBOR AND DO NOT DISTURB THE HABITAT OR WILDLIFE

This sign format, or one of a similar nature, should be placed at all entrance points to the development, at all pedestrian access points to stream and buffer areas, and at other strategic locations within the development (intersections etc.). Visual enhancements and species and habitat information on the signs in selected areas (entrance and pedestrian access points) in a Kiosk style presentation would enhance the effectiveness of the sign program.

SUMMARY AND CONCLUSION

As with all human disturbance and development, impacts to natural systems are a direct result that cannot be avoided. Impacts are predicated on the type of development, location, intensity, prior land use and ownership. Public lands are primarily managed and maintained for their intrinsic values to man, protection of water supplies, recreational opportunities, future raw material supplies, and fish and wildlife habitat. Even on the best managed public lands some impacts are unavoidable in the process of timber removal, recreational access, electrical power generation, right of way easements and a host of other reasons. Private property development generally does not get developed for the general good, but in the prime interest of the owner, whatever those interests may be. Under both development scenarios, impacts are inevitable, and mitigation and ongoing management to offset the impacts are the end result. With well designed mitigation and a comprehensive and enforceable management plan, the impacts to natural ecological systems can be brought back into balance. The Three Rivers Recreational Area project development has complied with existing regulations and oversight as provided by Skamania County, Washington during development, and has provided this document through a third party contract to address issues concerning the impact of their development on the species and habitats on their property.

It is the conclusion of the professionals hired to conduct this Critical Areas Wildlife and Habitat Assessment Report, that if the mitigation and management recommendations outlined in this report are implemented and the protective covenants put in place, that the project will be in compliance with the requirements of Skamania County Ordinance 21A. Based on the aforementioned criteria, it is determined that the Three Rivers Recreational project, as proposed, will have no significant impacts on the priority habitats and species addressed herein.

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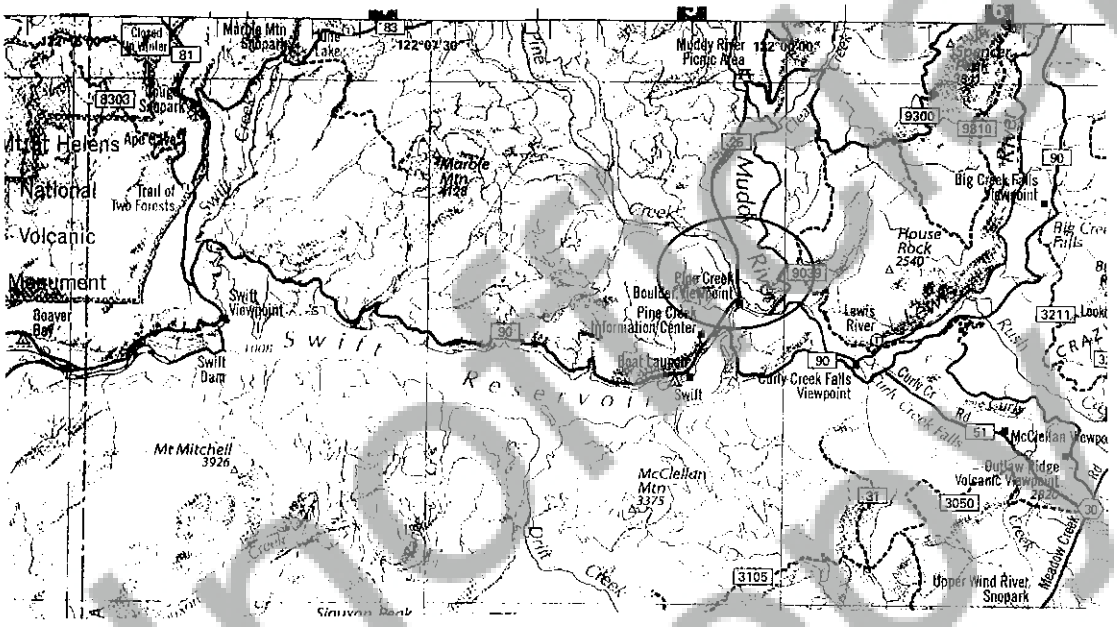
http://www.mt.nrcs.usda.gov/news/bulltrout.html. NRCS. Threatened or Endangered Species

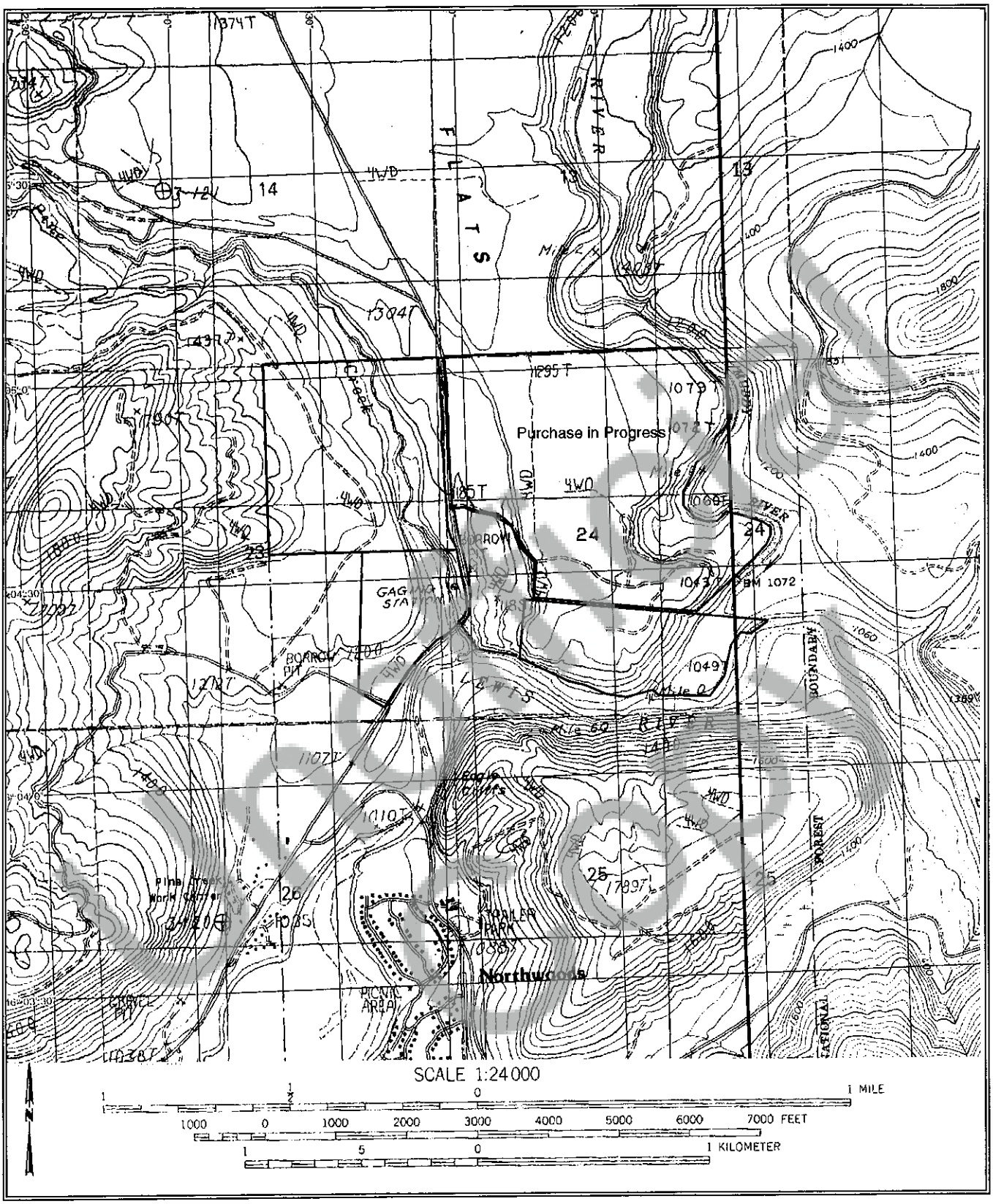
APPENDICES

APPENDIX A

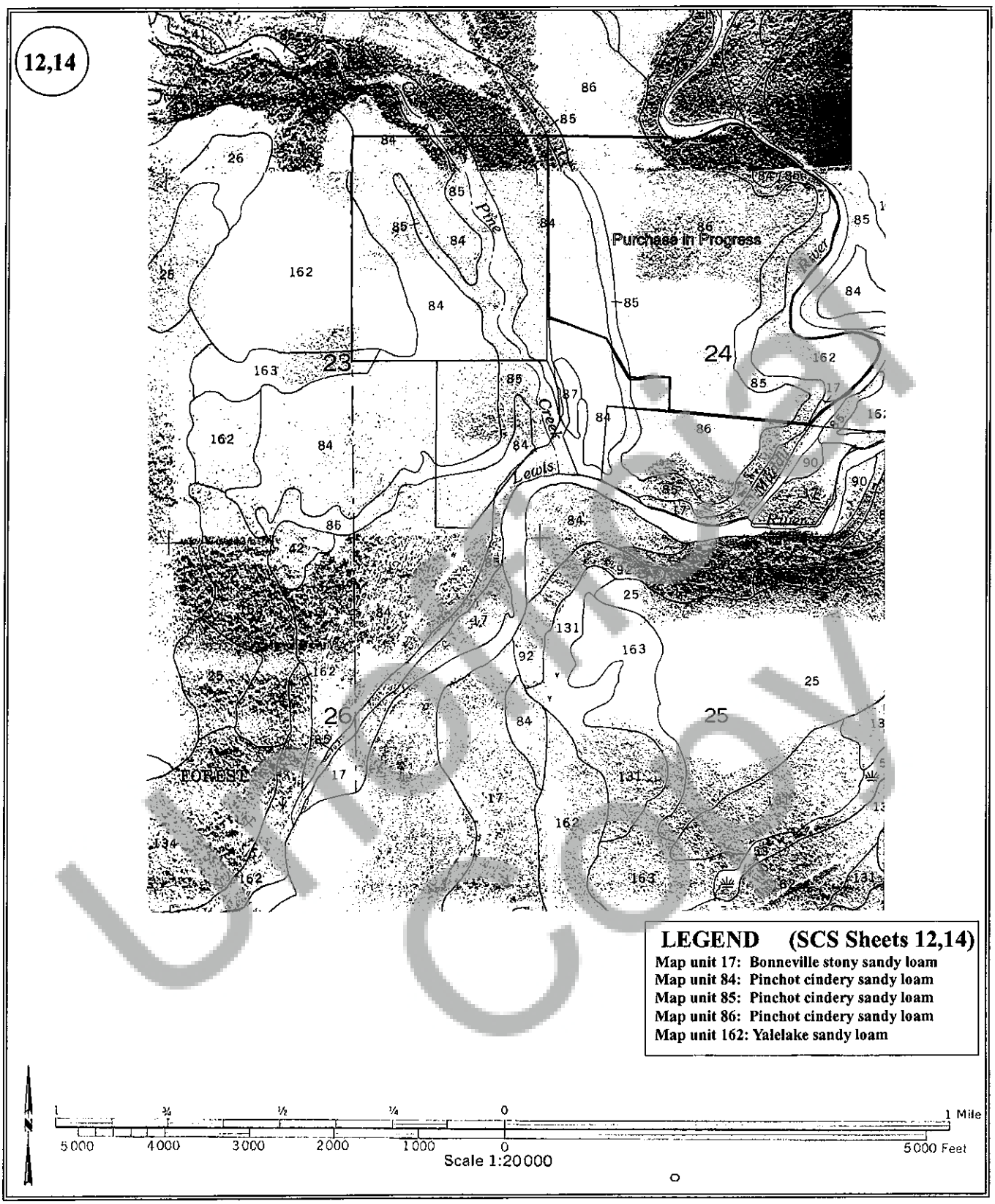
Vicinity and Site Maps
Existing Conditions Maps
Mitigation and Management Maps
Seed Specifications
Site Photographs



environmental technology consultants	
VICINITY MAP (Figure 1) **SKAMANIA, COUNTY** **Benchmark Maps, 2002 (page 110)**	**Subject Property:** **TAX LOT 23 &24** **Skamania County, WA**



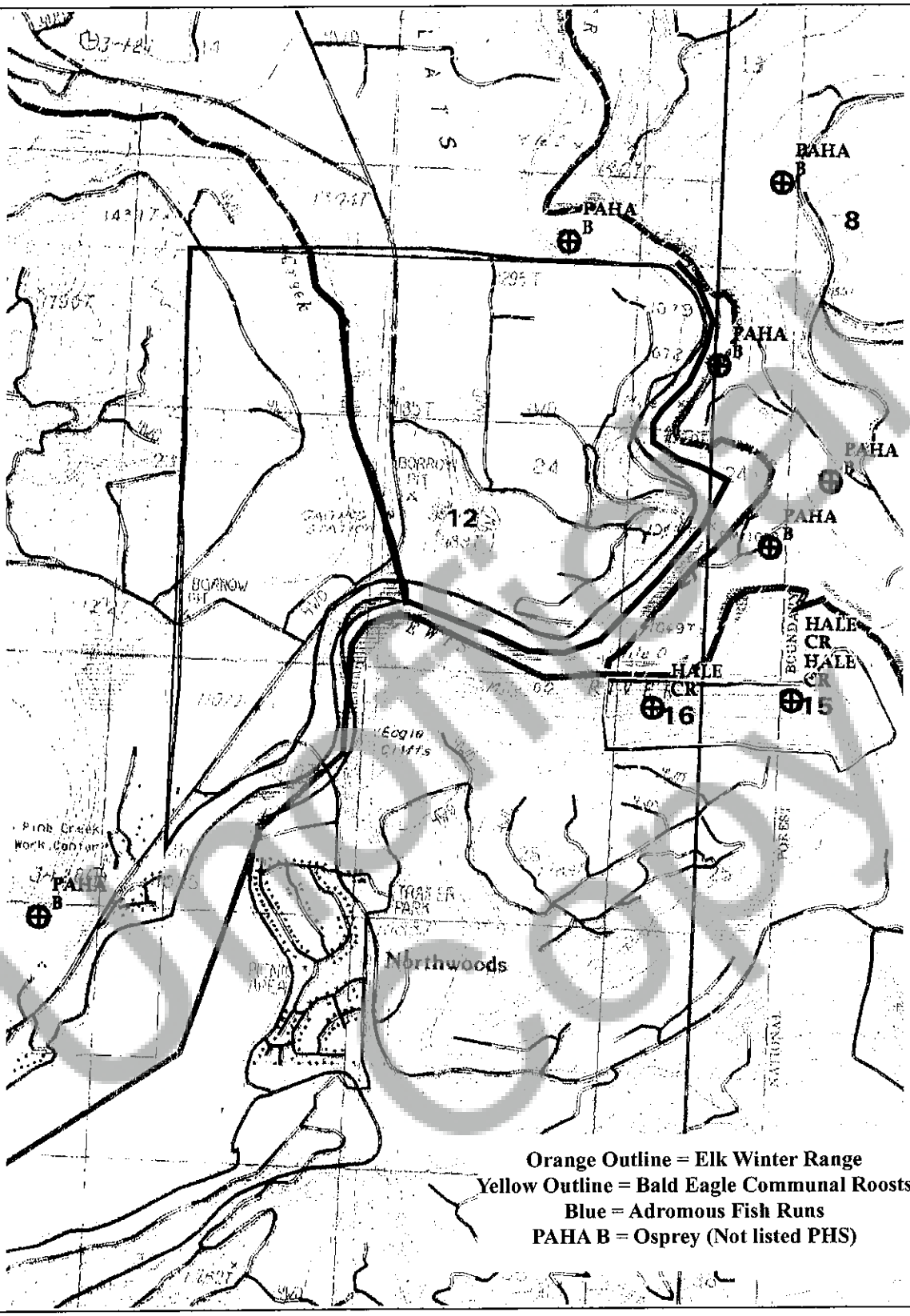
environmental technology consultants	**Subject Property:**
PHYSICAL SETTING (Figure 4) **Washington Region 3** **Delorme USGS Maps, 1999**	**3Rivers** **Forest Road 25, Loowit Road** **Skamania County, WA.**



environmental technology consultants

SCS SOIL SURVEY MAP (Figure 5)
Source: Soil Conservation Service, 1990

Subject Property:
3 Rivers
Forest Road 25, Loowit Road
Skamania County, WA



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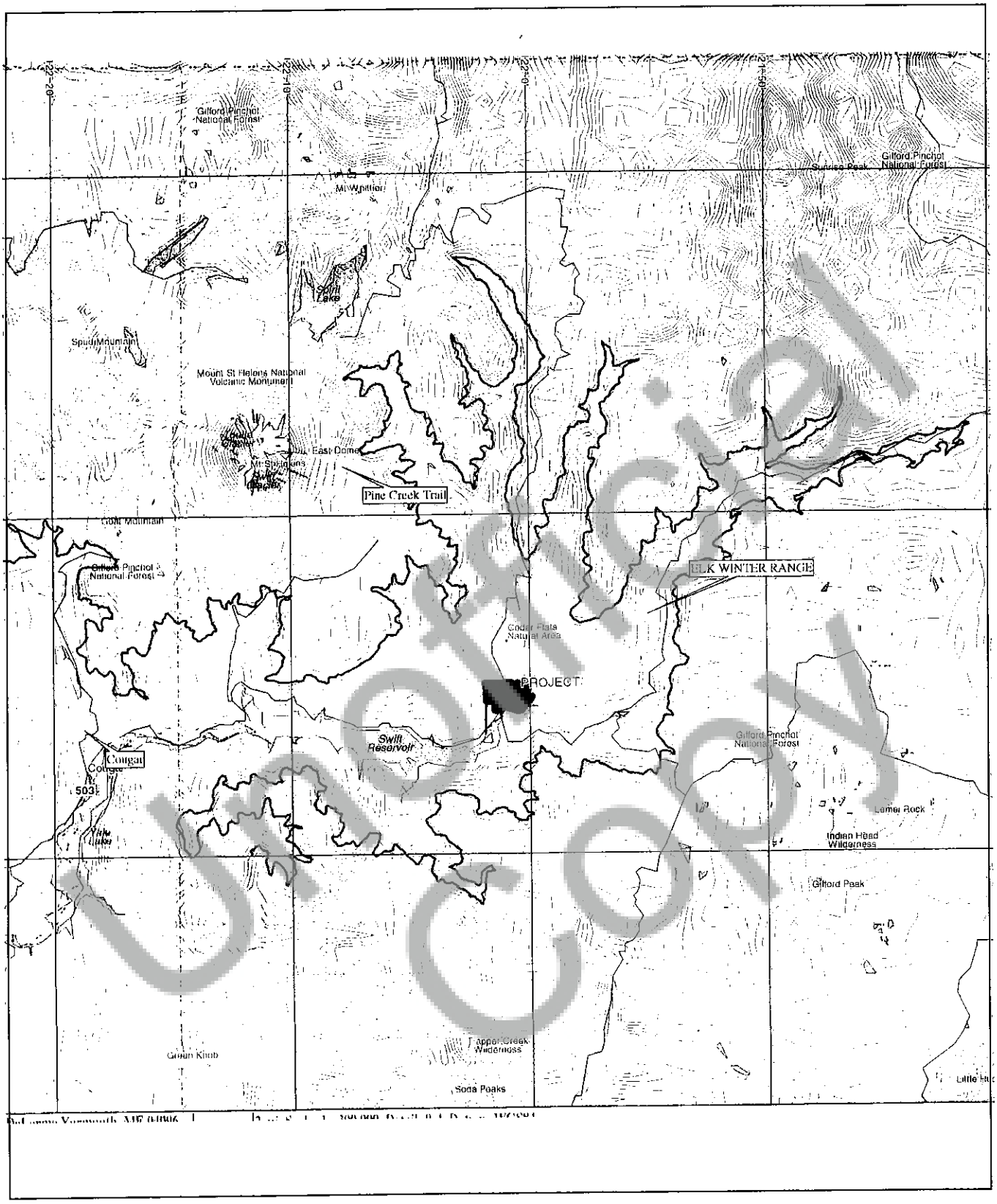
Priority Habitat and Species Map(Figure 6)
Source: WDFW

Subject Property:
3Rivers
Forest Road 25, Loowit Road
Skamania County, WA



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ELK WINTER RANGE (Figure 8)
Western Washington
Delorme, 3-D TopoQuads

Subject Property:
Forest Road 25 & Loowit Lane
Skamania County, Washington

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RIPARIAN FORAGE PLOTS(Figure 10)
Skamania County (example Pine Creek)
USGS AERIAL

Subject Property:
TAX LOT 23 & 24
Skamania County, WA

Jakob Winter / NWPW.com

PRAIRIE

Sunmark's Prairie Mix is designed as a native upland habitat builder, combining winter hardy drought resistant prairie grasses found in the drier areas of the riparian zone. **Prairie** is a magnificent combination of the spectacular beauty the prairies were before the west was won.

Botanical Name	Mixture Composition	Percentage of Mix
Elymus cinereus	Great Basin Wildrye	35%
Oryzopsis hymenoides	Indian Ricegrass	25%
Agropyron trachycaulum	Slender Wheatgrass	20%
Festuca idahoensis	Idaho Fescue	10%
Festuca ovina	Sheep Fescue	10%

Elymus cinereus, Great Basin Wildrye is a cool season, tall, long-lived bunchgrass occurring on sandy, well drained sites. Drought tolerant, salt and alkaline resistant. Excellent forage grass for livestock and wildlife providing abundant cover for game birds, will produce an immense mass of fibrous roots making it very useful for site stabilization and erosion control.

Oryzopsis hymenoides, Indian Ricegrass is a cool season, drought tolerant, perennial native bunchgrass adapted to sandy and well drained soils, forage is highly palatable and nutritious to livestock, wildlife and seeds are a favorite to birds and small mammals because of their high fat content. Excellent for rangeland enhancement and land reclamation.

Agropyron trachycaulum, Slender Wheatgrass is a short lived perennial bunchgrass occurring in a wide variety of areas. Very easy to establish with high germination and excellent seeding vigor. It provides quick cover providing excellent erosion protection while more permanent species are becoming established. Highly palatable for livestock and wildlife.

Festuca idahoensis, Idaho Fescue is a cool season, densely tufted, drought-tolerant perennial bunchgrass. It has excellent winter hardiness and provides forage for a wide variety of mammals. Very attractive deep blue-green color, producing a fine dense fibrous root system.

Festuca ovina, Sheep Fescue is a densely tufted low-growing bunchgrass with an extensive root system that provides excellent drought tolerance; slow to establish, but will crowd out weeds. It is used in conservation seedings as a low growing, persistent ground cover.

Seeding Rate: 40 - 50 Pounds per Acre
1 - 1 1/2 Pounds per 1000 sq feet

Rangeland

Sunmark's ***Rangeland*** is a combination of native and introduced grasses and forbs designed for habitat establishment with an emphasis on forageability. This mix was developed to reduce sod formation, provide high quality forage for Deer Elk and Upland Birds, it is easily establish in most areas of the Pacific Northwest.

Botanical Name	Mixture Composition	Percentage of Mix
Elymus wawawaiensis var secar	Secar Bluebunch Wheatgrass	20.0%
Medicago sativa var. radiant	Radiant Alfalfa	20.0%
Festuca idahoensis	Idaho Fescue	10.0%
Sitanion hystrix	Bottlebrush Squirretail	10.0%
Dactylis glomerata var tekapo	Tekapo Orchardgrass	10.0%
Purshia trudentata	Antelope Bitterbrush	10.0%
Poa ampla var shermans	Sherman's Big Bluegrass	8.0%
Stipa speciosa	Green Needlegrass	5.0%
Koeleria cristata	Prairie Junegrass	2.0%
Balsamorhiza sagittata	Arrowleaf Balsamroot	2.0%
Lupinus albaculis	Sickle Keeled Lupine	2.0%
Achiella millefolium	Western Yarrow	1.0%

Elymus wawawaiensis var secar, Secar Bluebunch Wheatgrass is a selection from a native plant collection made near Lewiston, Idaho. 'Secar' is a densely tufted bunchgrass with abundant, narrow leaves, numerous fine stems, and small seeds. It is early maturing, very drought tolerant, and persistent under adverse conditions.

Medicago sativa var radiant, Radiant Alfalfa is an outstanding alfalfa that has received the highest ratings for yield, quality, drought tolerance, and disease resistance. Performs well in a wide range of soils. Radiant exhibits excellent winter survival, even in the toughest winters.

Festuca idahoensis, Idaho Fescue is a cool season, densely tufted, drought-tolerant perennial bunchgrass. It has excellent winter hardiness and provides forage for a wide variety of mammals.

Sitanion hystrix, Bottlebrush Squirretail grows in dry regions such as the sagebrush grasslands, juniper woodlands, and salt desert shrublands of Idaho and Oregon. It grows on all kinds of soils, but most commonly on dry or gravely areas, or on alkaline or saline soils.

Dactylis glomerata var tekapo, Tekapo Orchardgrass will produce a very thick and dense stand that is able to persist even under hard, continuous grazing. Tekapo is tolerant of heat, moderate drought, low fertility, and most foliar diseases, including rust.

Purshia trudentata, Antelope Bitterbrush despite its bitter taste, is important browse for grazing wildlife and livestock, primarily as a fall or winter forage. The seeds are relatively large and sought by rodents.

Poa ampla var shermans, Sherman's Big Bluegrass is a strong-growing perennial bunchgrass native in Western United States. Plants are up to 4 feet tall, with a deep, fibrous root system. Stands are generally not dense, but the high production of palatable forage make this a very valuable range grass.

Stipa speciosa, Green Needlegrass is a cool-season, native, perennial bunchgrass. It grows in height from 2 to 3 feet. Green needlegrass is nutritious, palatable and decreases under grazing use. Awns are not troublesome to livestock as with some other needlegrasses.

Koeleria cristata, Prairie Junegrass is a cool season native perennial bunchgrass. One of the first grasses to recover after spring thaw, providing early forage for wildlife and livestock. is a cool season native perennial bunchgrass. Establishes easy and is a excellent choice for re-establishing disturbed sites.

Balsamorhiza sagittata, Arrowleaf Balsamroot is a member of the sunflower family. Its bright yellow flower heads can be seen along the roadsides of the sagebrush, grassland, open hillside, and higher plateaus region. The arrowleaf balsamroot averages 2 feet in height and has an almost leafless stalk with one large yellow flower head at its tip. Its large leaves are shaped like arrows and are silvery-grayish-green.

Lupinus albaculis, Sickle Keeled Lupine moderate water requirement; full sun. Excellent choice for establishing rapid cover to control erosion. Pink or purplish banner-type flowers are showy and produce seeds which are readily eaten by birds. Found though out the Great Basin area.

Achiella millefolium, Western Yarrow occurs in prairies, sagebrush plains, pastures, roadsides, and disturbed sites. It grows from the semi-desert zone up to the subalpine zone. It has some shade and drought tolerance.

Seeding Rate: 10 - 12 Pounds per Acre
1/2 Pound per 1000 sq feet

Foothills

Sunmark's *Foothills* is an introduced seed mix that provides erosion control and good wildlife forage on low to mid-elevation sites. Quick to establish and very nutritious for deer and elk, Foothills will provide excellent erosion protection and forageability on weak or disturbed sites.

Botanical Name	Mixture Composition	Percentage of Mix
Lolium multiflorium tetraploid	Tetraploid Annual Ryegrass	25.0%
Dactylis glomerata var. tekapo	Tekapo Orchardgrass	25.0%
Trifolium repens var. NZ	NZ White Clover	15.0%
Lolium perenne tetraploid var. tonga	Tonga Tetraploid Perennial Rye	15.0%
Trifolium incarnatum	Crimson Clover	12.0%
Lotus corniculatus	Birdsfoot Trefoil	8.0%

Lolium multiflorium tetraploid, Tetraploid Annual Ryegrass has wider, more succulent leaves and larger plant cells with higher water content than diploid annual ryegrass. Rapid seedlings establishment and root growth are beneficial to aid in recovery of disturbed and erosion-susceptible sites.

Dactylis glomerata var. tekapo, Tekapo Orchardgrass will produce a very thick and dense stand that is able to persist even under hard, continuous grazing. Tekapo is tolerant of heat, moderate drought, low fertility, and most foliar diseases, including rust.

Trifolium repens var. NZ, NZ White Clover is a long-lived perennial suited primarily for pasture, but can be used for high quality hay and silage. White Clover is an important pasture legume in most temperate regions of the world. It can be grown under irrigation or on dry land where the moisture equivalent is comparable to 18 inches or more precipitation. It is best adapted to well-drained silt loam and clay soils, but is tolerant of poor drainage.

Lolium perenne tetraploid var. tonga, Tonga Tetraploid Perennial Ryegrass has demonstrated a very high rate of survivability, indicating it can withstand lack of adequate winter snow cover, summer drought, and excessive heat better than many grasses. Shown to have an alfalfa-equivalent maturity date, Tonga lends itself to excellent spring growth and high forage yields for multiple years. Tonga can be planted with alfalfa, clover, and other forage grasses to achieve an excellent grazing pasture, hay, silage, and green chop.

Trifolium incarnatum, Crimson Clover is a winter annual normally planted in the fall for forage, cover crops, or garden flowering. It grows vigorously on well-drained sandy or clay soils with medium-to-high fertility. Crimson Clover is an important winter annual forage, with growth continuing through winter. It thrives in a mixture with grasses, provides excellent winter grazing, and makes a good hay or cover crop.

Lotus corniculatus, Birdsfoot Trefoil is a non-bloating legume that is suitable for use in permanent pastures or for use as a hay crop, either alone or sown in combination with grasses. For grazing, Birdsfoot Trefoil is used to best advantage in a rotational grazing system. Birdsfoot Trefoil performs well in areas that are not suitable for alfalfa production because of their acidity, poor drainage, or low fertility.

Seeding Rate: 50 Pounds per Acre
4 Pounds per 1000 sq feet

WETLAND PRAIRIE

Sunmark's Wetland Prairie™ Mix is a historically accurate Native Pacific Northwest Wet Prairie mix, designed to reestablish the ancient Prairies that were here prior to the development of agriculture. Wetland Prairie communities sustained many Native American tribes and was home to countless species of wildlife. From Northern California to Southern BC wetland prairie communities made up over one third of the flora in the lower lying river valleys. **Wetland Prairie ™** is used to reestablish what the first settlers saw upon reaching the end of the Oregon Trail. A perfect balance of Native Grasses and Wildflowers this mix will not only beautify but add to the historical and ecological significance of your site.

Botanical Name	Mixture Composition	Percentage of Mix
Horedum brachyantherum	Meadow Barley	25.0%
Danthonia californica	California Oatgrass	25.0%
Glyceria occidentalis	Western Mannagrass	15.0%
Deschampsia cespitosa	Tufted Hairgrass	7.0%
Sisyrinchium idahoense	Blue Eyed Grass	6.0%
Camassia quammish	Camas	6.0%
Festuca rubra rubra	Native Red Fescue	5.0%
Carex obnupta	Slough Sedge	5.0%
Beckmannia syzigachne	American Sloughgrass	3.0%
Eleocharis palustris	Creeping Spike Rush	2.0%
Erigeron speciosus	Aspen Daisy	2.0%

Horedum brachyantherum, Meadow Barley is a cool season, upright tufted perennial with a very fibrous root system. Its habitat includes wet meadows, along streams and in disturbed sites. An excellent forage grass that provides food and shelter for wildlife.

Danthonia californica, California Oatgrass is a densely tufted cool season perennial with a fibrous root system . Dry to moist, often rocky soils to prairies or grasslands, with fair palibility, seed are sought by small birds and mammals.

Glyceria occidentalis, Western Mannagrass is a cool season upright perennial herb with creeping rhizomes. Wet meadows, moist woods, shallow streams, around springs in the mountains. Succulent stems and sweet seeds provide food and cover for waterfowl.

Deschampsia cespitosa, Tufted Hairgrass is a cool season, densely tufted perennial with short rhizomes. Ranges from Alaska to Arizona an is a integral part of wet prairie communities. A large, leafy and palatable grass that found in wet meadows, around ponds and streams. Provides excellent cover for quail and other upland birds.

Sisyrinchium idahoense, Blue Eyed Grass is a cool season upright perennial herb with beautiful blue to purple and yellow flowers and short rhizomes. Blooms from May thru August , always near wet meadows, along streams in the spring.

Camassia quammish, Camas deep purple to blue perennial herb, grassy slopes to wet meadows. Camas is an important species in the Wetland Prairie environment, it was a major food staple for Native American Indians.

Festuca rubra rubra, Native Red Fescue is a long-lived cool season, perennial sod-former. Performs well in shaded areas. Deep rooting characteristics provides excellent soil stabilization for erosion control and rangeland improvement.

Carex obnupta, Slough Sedge densely tufted, stout rhizomes perennial grass-like. Wet Meadows, Marshes and Streambanks, will form monocultures in low lying depressions. Most common of evergreen sedges on the floodplains and wet areas of the Pacific NW.

Beckmannia syzigachne, American Sloughgrass a cool season, short lived perennial that may develop short rhizomes. Found extensively in swamps and marshes. Excellent for wetland establishment providing nesting habitat for waterfowl.

Eleocharis palustris, Creeping Spike Rush perennial, rhizomous, erect emergent. Often found as a pioneering species in the Wetland Prairie providing a excellent source of food for Ducks and Geese. Found most often in saturated or flooded soils.

Erigeron speciosus, Aspen Daisy biennial or short lived showy perennial. Streambanks and moist meadows found scattered at low to middle elevations. Beautiful pink to purplish white flowers forming numerous heads per stalk.

Seeding Rate: 10 to 15 Pounds per Acre, 1/2 Pound per 1000 Sq. Feet

APPENDIX B

Geotechnical Report

GeoPacific Engineering, Inc.

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

June 14, 2005
Project No. 05-9184

Dave and Brenda Creagan
19707 NE 105th Avenue
Battle Ground, Washington 98604

Fax No.: 360-944-1101

Copies: Chuck Whitten, Hagedorn, Inc. (Fax 360-694-8934)
Annakate Martin, ETC (Fax 360-696-4089)
Karen Witherspoon, Skamania County Planning Dept (Fax 509-427-8288)

Subject: **LANDSLIDE HAZARD STUDY**
PINE CREEK RECREATIONAL PROPERTIES
SKAMANIA COUNTY, WASHINGTON

This letter presents the results of our geotechnical review of the potential landslide hazard at the subject property located at located near the confluence of Pine Creek and the Lewis River at the east end of Swift Reservoir in Skamania County, Washington. The project involves creating short plats for development of recreational properties. Typically, the short plats result in lots ranging from about ¾ to 18 acres in size. The scope of this report is limited to landslide hazard and recommended structural setbacks only.

Many of the proposed lots are located above stream channels with steep banks. In places, the banks have become incised by stream erosion. Based on site reconnaissance and review of geologic maps, the site is underlain primarily by lahar deposits of various ages, from eruptions of the Mount St. Helens volcano.

SCOPE OF WORK AND AUTHORIZATION

It is our understanding that Skamania County is requiring a "Landslide Hazard Study" of this site, as part of the permitting process. The scope of our study included: (1) review of published geologic and hazard mapping, (2) field reconnaissance of the site, and (3) preparation of this brief letter report. A proposal for the performance of this landslide hazard evaluation was submitted by GeoPacific to the client on March 11, 2005. Authorization for the work was given by the client prior to preparation of this report.

June 14, 2005
GeoPacific Project No. 05-9184

SITE CONDITIONS

On February 2, 2005, GeoPacific performed a field reconnaissance with representatives of the owner/developer and Hagedorn, Inc., to observe site conditions and slope geomorphology. Specifically, we observed representative steep slope areas on the following short plats:

- Pine Nut
- Pine Squirrel
- Pine Needle
- Pine Tree
- Pine Cone
- Pine Boulder
- Pine Marten
- Sauer
- Fortin
- Loowit
- Eagle Cliff
- Island
- Two Rivers

The approximate locations of the subject short plats are shown on Figure 1. We also observed exposures of geologic materials in the banks of an old quarry, located east of USFS "25 Road" just north of the Lewis River (Figure 1). It should be noted that the quarry site is not included in any of the Short Plats evaluated in this report, although exposures on the banks of the quarry provided useful information regarding regional geology.

Based on our observations and representative cross sections prepared by Hagedorn, Inc., the majority of the slopes on site range in steepness between about 33 to 50 degrees, with total slope height ranging from about 50 to 90 feet. In general, slopes were wooded, although a few of the slopes exposed bare soil, indicating geologically recent slope retreat due to stream erosion.

REGIONAL GEOLOGY

Regionally, the subject site lies in the western foothills of the Cascade Mountain Range and within the Upper North Fork Lewis River Subbasin. The Pine Creek drainage, a tributary of the Lewis River, is located on the flanks of Mount St. Helens, a highly active composite volcano.

Regional geologic mapping indicates the site is generally underlain by lahar and pyroclastic flow deposits (undivided) of the Ape Canyon, Cougar, Swift Creek, Smith Creek and Pine Creek Eruptive Periods (older than 2,500 years before present). The bottom of the Pine Creek channel is mapped as being underlain by lahar deposits of the A.D. 1980 and Post-1980 Mount St. Helens eruptions (Phillips, 1987). Figure 2 shows a copy of the pertinent portion of the Phillips geologic map, with approximate boundaries of the subject short plats.

Crandell and Mullineaux (1973) map an exposure of the older lahar and pyroclastic deposits on a slope above Pine Creek near the subject site. At least 6 separate pyroclastic flow and lahar deposits are mapped, with the individual flow deposits up to about 12 m (39 feet) thick. Some of the pyroclastic flow units are described as being compact mixtures of pumice fragments and nonvesicular glassy rock fragments, and others consist of breadcrusted pumice blocks and lapilli in a loose ash matrix. Individual blocks and boulders within the pyroclastic flow and lahar deposits range up to about 3 m (10 feet) in diameter. The pyroclastic flow and lahar units are separated by thin layers of air-fall tephra and older stream-deposited material.

Phillips (1987) describes the recent lahar and pyroclastic deposits as follows: "On the eastern flank of Mount St. Helens in the Pine and Muddy Creek drainages, 2.5 to less than 0.5 m of poorly sorted, nonstratified, and generally ungraded mixtures of clay-sized to boulder-sized particles."

CONCLUSIONS AND RECOMMENDATIONS

Based on review of site conditions and available geotechnical information, the subject site is considered to have a low susceptibility to potential landslide hazards, provided that the project is constructed in accordance with applicable building codes and geotechnical recommendations. Although there is some potential for localized sloughing and erosion of active stream banks, it is our opinion that the project is geotechnically feasible provided an adequate slope setback is maintained for permanent structures. The following sections discuss potential landslide hazards and recommended structural setbacks.

Potential Landslide Hazard

For the purpose of evaluating slope stability, we reviewed published geologic mapping and performed a field reconnaissance as discussed above. Published geologic mapping shows no mapped landslides on or adjacent to the site (Crandell and Mullineaux, 1973; Kuntz et al., 1990; Phillips, 1987; Wolfe and Pierson, 1995).

Our reconnaissance indicates that native slopes on the property are generally smooth and uniform, consistent with stable slope conditions. No geomorphic evidence of prior slope instability, such as down-dropped blocks or old scarps, was observed on the site. The older pyroclastic flow and lahar deposits observed on the slopes were generally dense to very dense. Due to the age of these deposits, some cementation has also likely occurred. These materials are generally characterized by high shear strength and a moderate to high resistance to slope instability. Areas of slopes above Pine Creek, the North Fork of the Lewis River and the Muddy River that are experiencing active stream erosion may continue to recede. As a result, structures should be set back from the tops of steep slopes as recommended in the following report section.

The geologic materials on site are generally resistant to landsliding due to their predominantly granular nature and high shear strength. Characteristically, slopes in such materials that are undermined by stream erosion or are oversteepened by other processes tend to fail through shallow surface slumping or erosion, with the resulting slope surface reclined at the soil material's angle of repose. Large-scale ground movement or block sliding is more characteristic of geologic materials where bedding planes of clay or other low-strength material are oriented unfavorably with respect to the slope. Such conditions do not exist on the Short Plats evaluated in this study, and therefore we consider the potential for large-scale ground movement or block landsliding to occur on the subject sites to be very low.

Slope instability in southwest Washington most often occurs in developed areas during periods of heavy precipitation. Stormwater runoff should be collected, controlled, and discharged to a suitable outlet. Stormwater should not be allowed to collect and flow uncontrolled down slope faces.

June 14, 2005
GeoPacific Project No. 05-9184

Recommended Slope Setbacks

Results of this study indicate that the proposed development on the 13 subject Short Plats is geotechnically feasible; however, we recommend that proposed buildings be set back from the slope face in order to protect from undermining of foundations due to erosion and shallow slumping of the slope. For slopes up to about 100 feet high, and flatter than about 1H:1V (Horizontal:Vertical) overall slope inclination, the following criteria may be used in determining appropriate footing-to-slope setbacks.

- No setback is recommended for slopes less than about 30 percent (3H:1V).
- Minimum setback of 7 feet should be used for slopes between about 30 percent (3H:1V) and 50 percent (2H:1V).
- For slopes steeper than 50 percent, setback should be defined as 15 feet back from a 1.5H:1V projection from the toe of the slope.
- For slopes steeper than 50 percent, setback should be a minimum of 15 feet from top of slope, and need not be greater than 30 feet.
- Where the top of the slope is an overhanging bank, the overhang should be trimmed back to a projection of the slope's angle of repose in that area. Setback should be measured from the new top of slope after trimming.

These setbacks are intended to be applied to structural foundations of residential structures. Exterior decking may be located closer to the top of the slope, although additional engineering may be needed at the discretion of the Skamania County Building Department. The owner should be aware that some minor slope movement or sloughing could impact decks constructed within the setback zone.

Where slopes are greater than about 100 feet in total height, or steeper overall than 1H:1V, slope setbacks should be determined on a case-by-case basis. Additional geotechnical studies may be needed in some cases. We understand that two of the lots on the Eagle Cliff Short Plat may exceed 100 feet in height and would therefore require a separate evaluation.

Proper slope management is important to the successful performance of homes on hillside lots. Additional maintenance measures are prudent because slopes are subject to natural slope processes such as runoff, erosion, shallow soil sloughing, soil creep, perched groundwater, etc. The primary measures include maintaining vegetation on the slope face and at the top of the slope, avoidance of side-casting soil material or landscaping debris over the slope face, and protecting the slope from surface water runoff to reduce the potential for minor sloughing and erosion. Surface water should be controlled and concentrated flows of water should not be allowed to flow over the slope face.

UNCERTAINTY AND LIMITATIONS

We have prepared this report for the client, for use on this project only. Within the limitations of scope, schedule and budget, GeoPacific attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. The conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions.

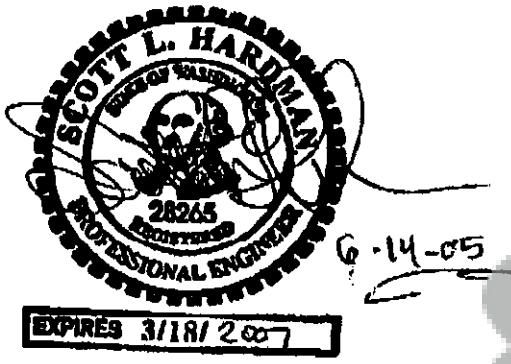
June 14, 2005
GeoPacific Project No. 05-9184

No warranty, express or implied, is made. The scope of our work did not include flood hazard, environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service. If you have any questions, please call.

Sincerely,

GEOPACIFIC ENGINEERING, INC.



Scott L. Hardman, P.E.
Principal Engineer

Attachments: References
Figure 1 – Vicinity Map
Figure 2 – Geologic Map
Figures 3 and 4 – Representative Cross Sections (Hagedorn, Inc.)
Short Plat Maps, Reduced, 13 Total (Hagedorn, Inc.)

June 14, 2005
GeoPacific Project No. 05-9184

REFERENCES

Crandell, D.R. and Mullineaux, D.R., 1973, *Pine Creek Volcanic Assemblage at Mount St. Helens, Washington*, U.S. Geological Survey Bulletin 1383-A.

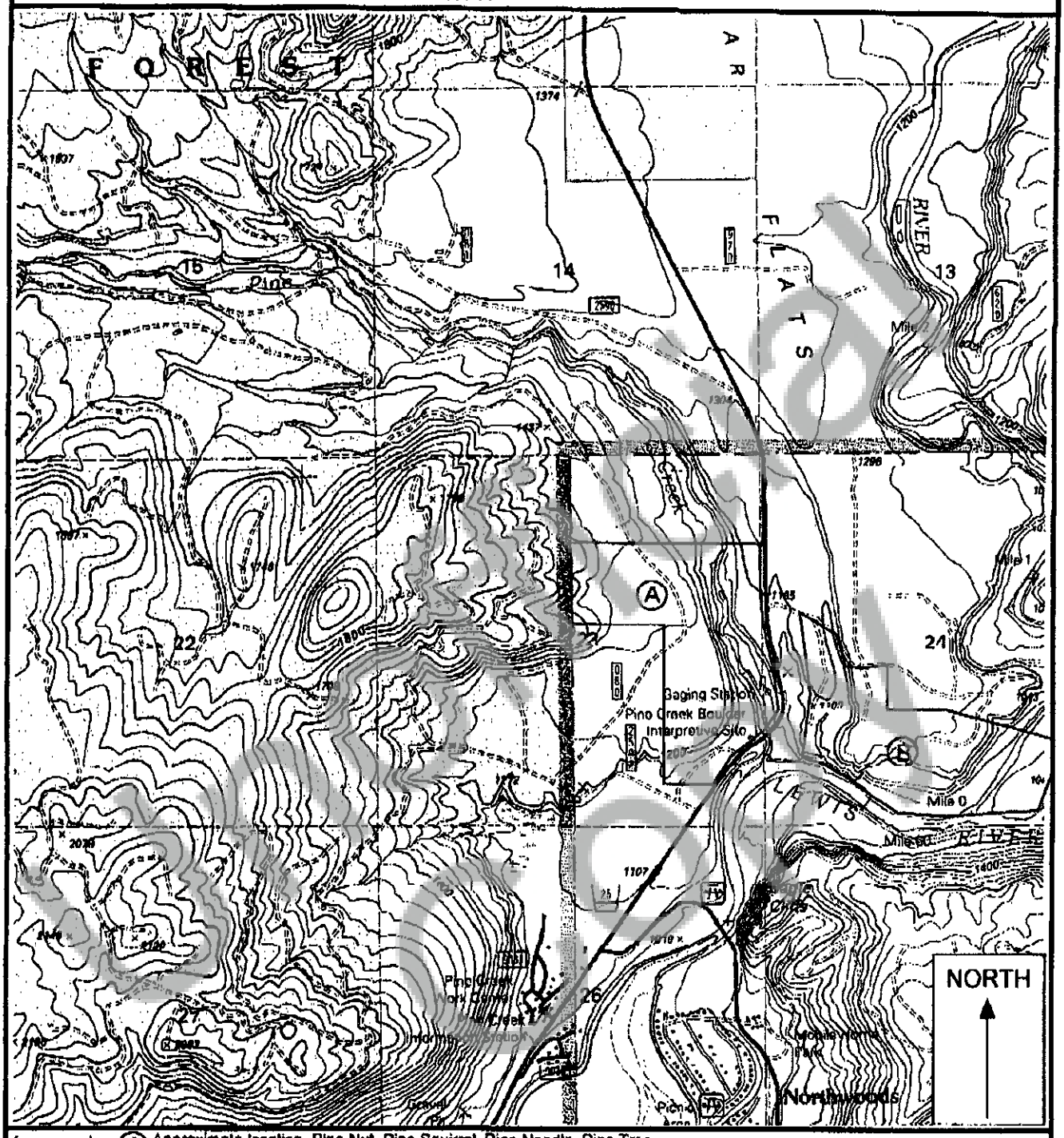
Kuntz, M.A., Rowley, P.D., and MacLeod, N.S., 1990, *Geologic Maps of Pyroclastic-Flow and Related Deposits of the 1980 Eruptions of Mount St. Helens, Washington*, U.S. Geological Survey Miscellaneous Investigation Series Map I-1950.

Phillips, W.M., 1987, *Geologic Map of the Mount St. Helens Quadrangle, Washington and Oregon*, Washington Division of Geology and Earth Resources Open File Report 87-4.

Wolfe, E.W. and Pierson, T.C., 1995, *Volcanic-Hazard Zonation for Mount St. Helens, Washington*, U.S. Geological Survey Open-File Report 95-497.

GeoPacific Engineering, Inc
7312 SW Durham Road
Portland, Oregon 97224
T: 503.598.8445 F: 503.598.8705

VICINITY MAP



Legend

(A) Approximate location, Pine Nut, Pine Squirrel, Pine Needle, Pine Tree, Pine Cone, Pine Marten and Pine Boulder Short Plats

(D) Approximate location, Fortin, Sauer, Lonwit, Eagle Cliff, Island and Two Rivers Short Plats

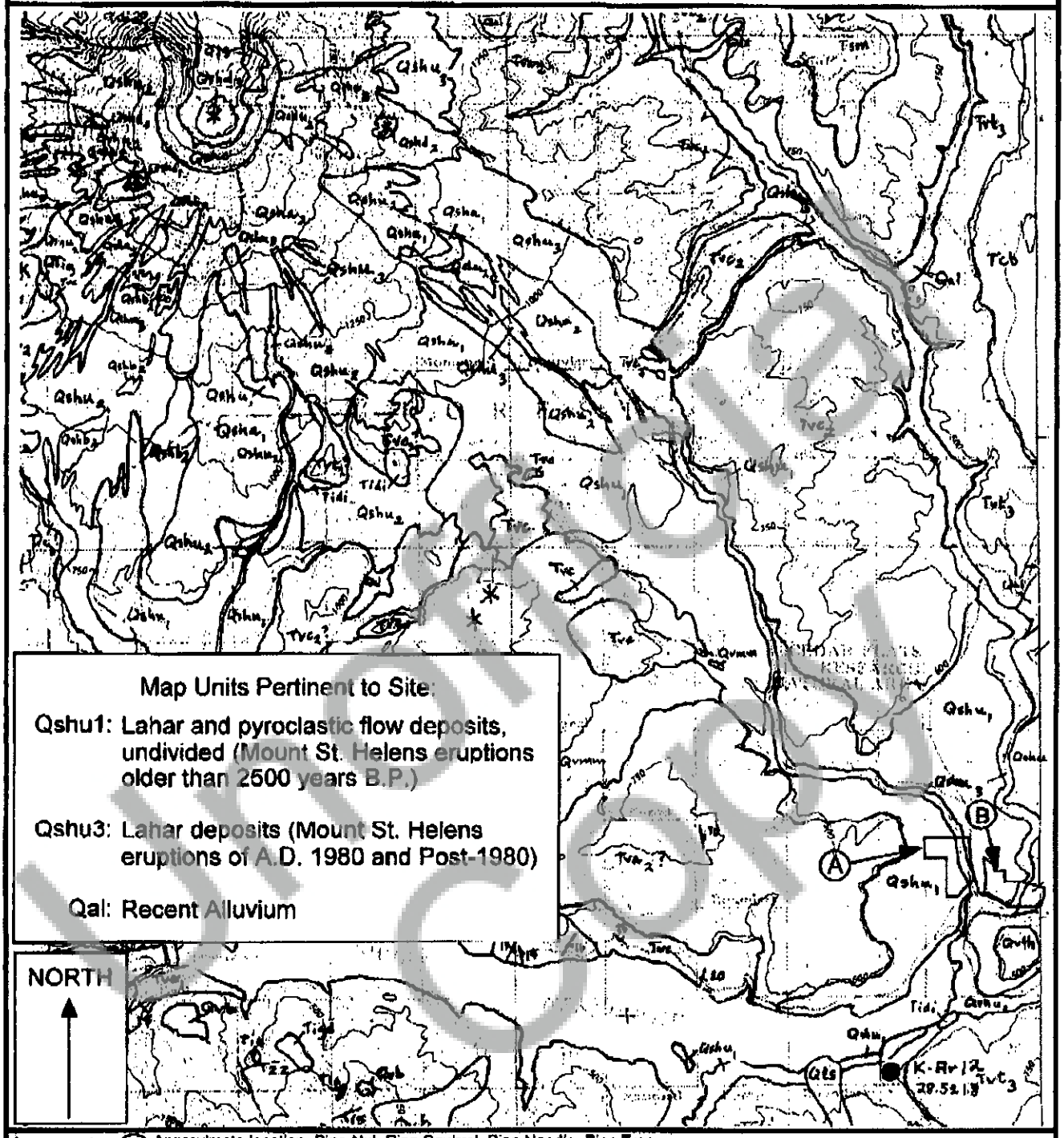
Date: 3/21/05
Drawn by: SLH
Approximate Scale 1 in = 2,000 ft

Base map: U.S. Geological Survey 7.5 minute Topographic Map Series, Cedar Flats, Washington Quadrangle 1998

Project: Pine Creek Short Plats Skamania County, Washington	Project No. 05-9184	FIGURE 1

GeoPacific Engineering, Inc.
7312 SW Durham Road
Portland, Oregon 97224
T: 503.598.8445 F: 503.598.8705

GEOLOGIC MAP



Legend
(A) Approximate location, Pine Nut, Pine Squirrel, Pine Needle, Pine Tree, Pine Cone, Pine Marten and Pine Boulder Short Plats
(B) Approximate location, Fortin, Sauer, Loowit, Eagle Cliff, Iceland and Two Rivers Short Plats

Date: 6/13/05
Drawn by: SLH
Approximate Scale 1:100,000

Base map: Geologic Map of the Mount St. Helens Quadrangle, Washington and Oregon (Phillips, 1987)

Project: Pine Creek Short Plats Skamania County, Washington	Project No. 05-9184	FIGURE 2

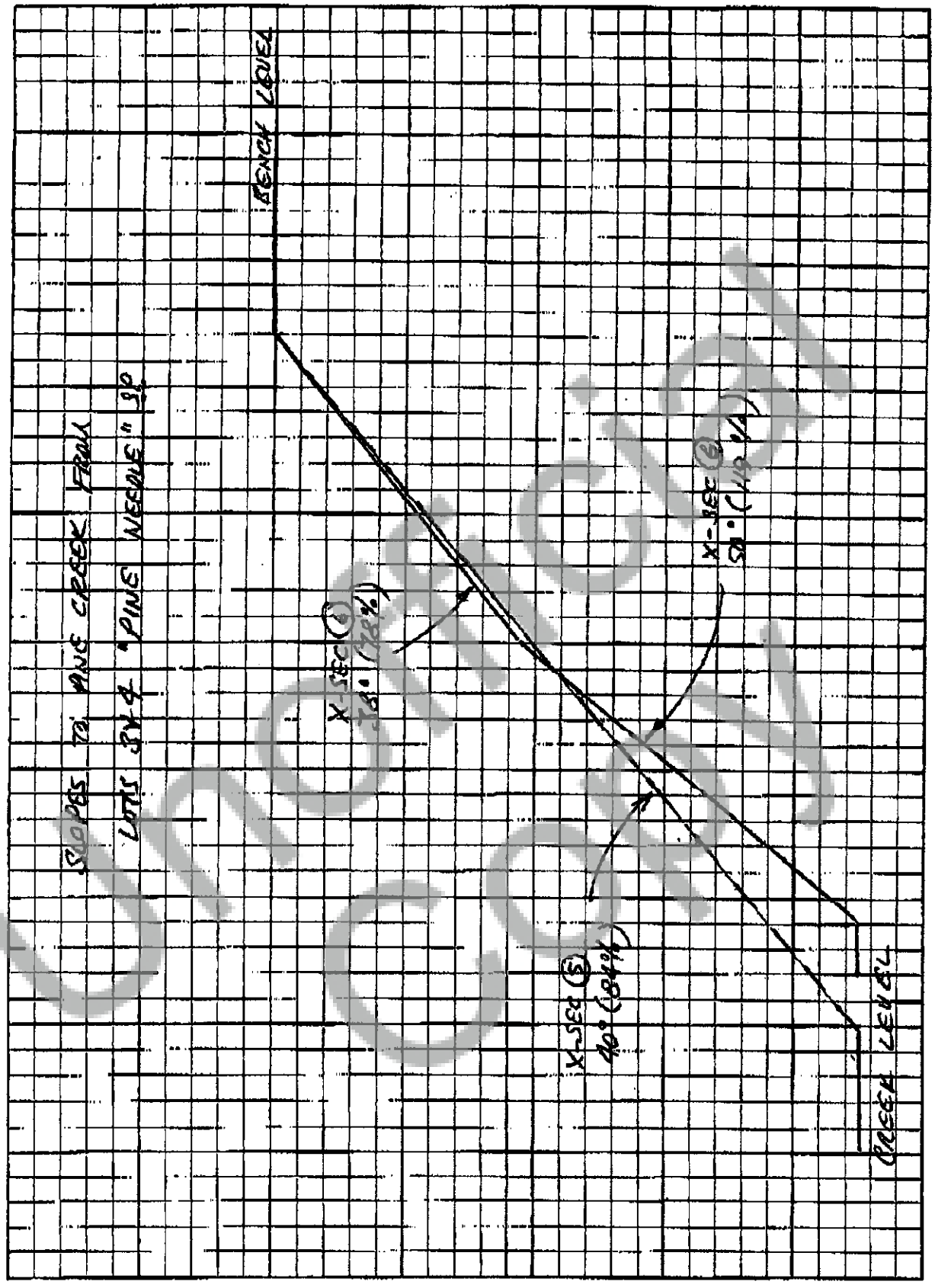


FIGURE 3

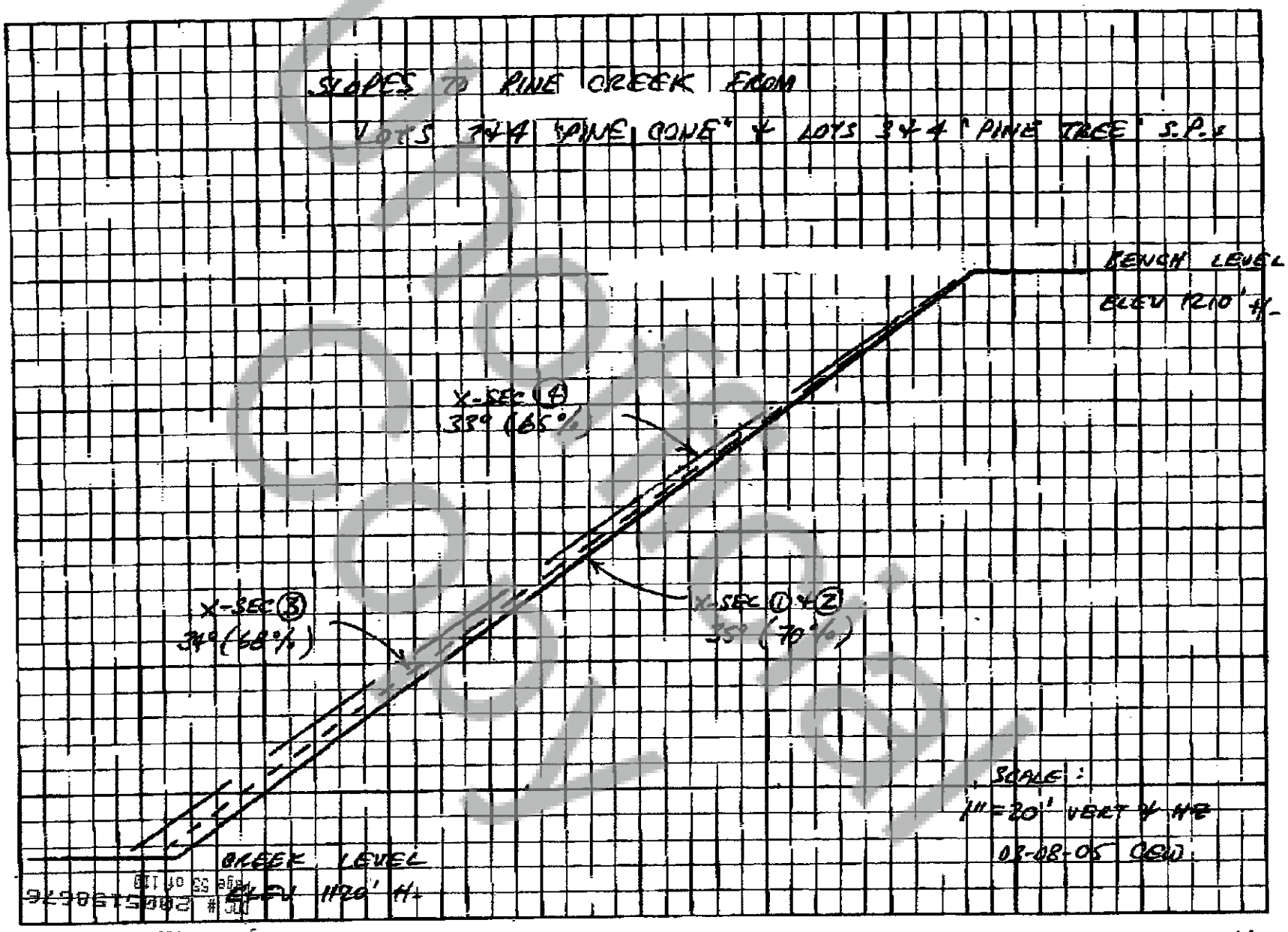
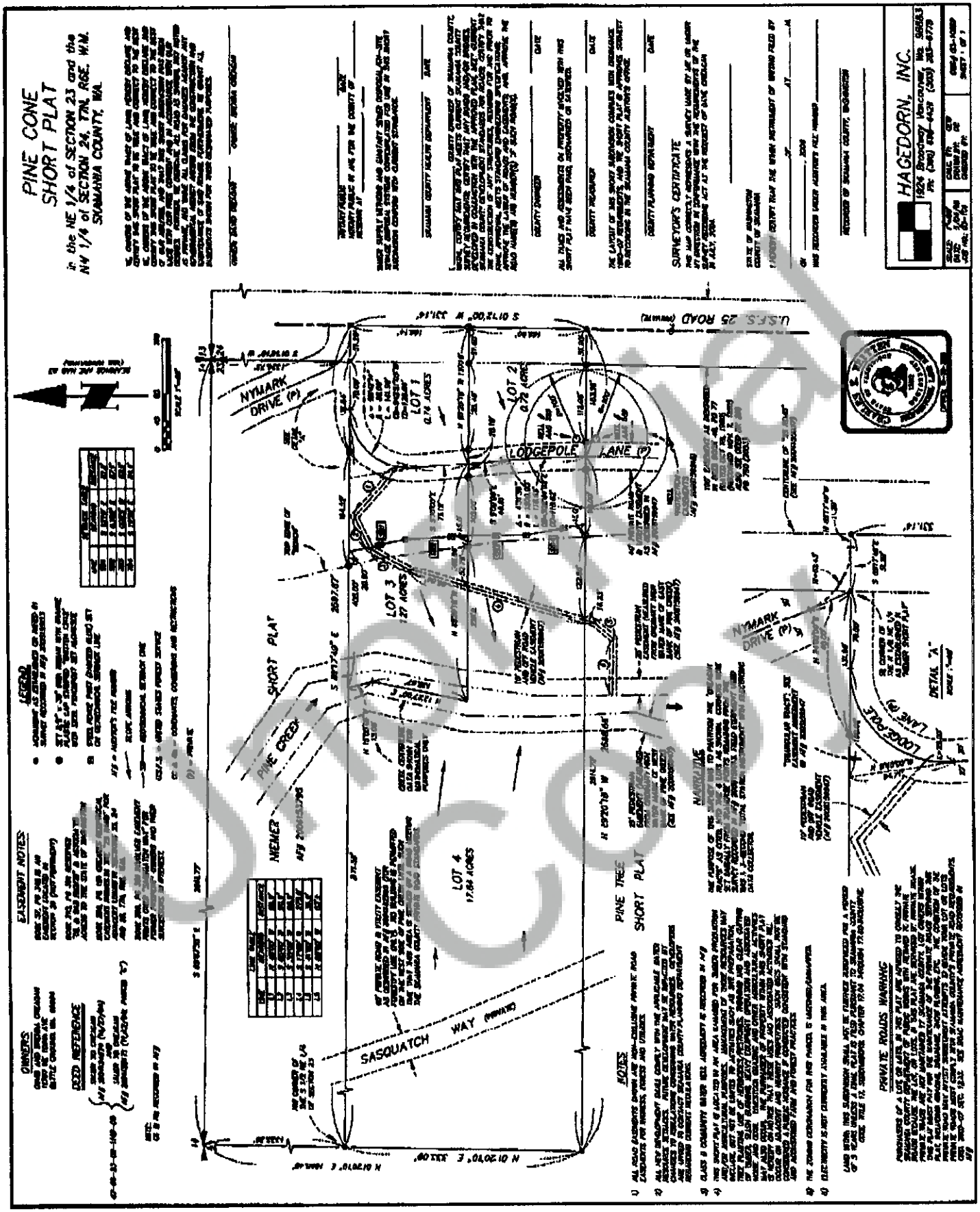


FIGURE 4



PINE TREE SHORT PLAT

in the NE 1/4 of SECTION 23 and the NW 1/4 of SECTION 24, T7N, R6E, W.M. SKAMANIA COUNTY, WA.

OWNERS:
GERALD & MARY SAUER
30288 NE 10th STREET
CAMAS, WA. 98607

DEED REFERENCE
CHANGE TO SAUER
(Af# 2001-[illegible])
AND
SAUER TO SAUER
(Af# [illegible])
07-06-23-00-0122-00

EASEMENT NOTES:
BOOK 33, PG 342 & 344
EASEMENT DESCRIBED IN
SECTION 24 (NOT PLOTTABLE)

BOOK 33A, PG 284 REFERENCE
"GL & CJS SURVEY & ASSOCIATES
ACCESS TO THE SOUTH OF WASHINGTON"

BOOK 33B, PG [illegible] GEODETIC
EASEMENT RECITED AS "26 ROAD" PER
ADJACENT SURVEYS IN SECTIONS 23, 24
AND 25, T7N, R6E, W.M.

BOOK 33B, PG 384 WHELNUS EASEMENT
RIGHTS OVER "SASQUATCH WAY" FOR
FUTURE PROPERTY OWNERS AND HER
SUCCESSORS IN INTEREST.

NOTE:
CR & Rs RECORDED IN Af#

LEGEND
- MONUMENT AS ESTABLISHED OR NOTED IN SURVEY REFERRED TO IN Af# 2005150676
- SET 5/8" x 24" REBAR WITH ORANGE PLASTIC CAP STAMPED "SECTION 12427" WITH STEEL WITNESS POST SET ALONGSIDE
- STEEL FENCE POST (PAINTED BLUE) SET ON BOUNDARY, SETBACK LINE

(##) = AUDITOR'S FILE NUMBER
ELEVATIONS
SETBACK LINE
U.S.F.S. = UNITED STATES FOREST SERVICE
CC & Rs = CONDITIONS, COVENANTS AND RESTRICTIONS
(P) = PLATTED

N
0 40 80 160
SCALE 1"=80'

PINE CONE SHORT PLAT
S 89°22'19" E 2699.68'
2694.79'

SASQUATCH WAY (PRIVATE)
PINE CREEK
PINE CONE LANE (P)
LODGEPOLE LANE (P)

40' PRIVATE ROAD & UTILITY EASEMENT AS RECORDED IN Af# [illegible] (NOT TRANSFERABLE OR PERMITTED ON THE WEST SIDE OF PINE CREEK UNTIL SUCH TIME THAT THIS AREA IS SERVED BY A ROAD MEETING THE SKAMANIA COUNTY PRIVATE ROAD STANDARDS.

LOT 1 0.70 ACRES
LOT 2 0.13 ACRES
LOT 3 1.52 ACRES
LOT 4 17.90 ACRES

GREEN CONTOURS DATA SHOWN FOR MAPPING EQUIP. PURPOSES ONLY

PINE NEEDLE SHORT PLAT
2699.49'

40' PRIVATE ROAD & UTILITY EASEMENT AS RECORDED IN Af# [illegible]

50' PEDESTRIAN EASEMENT (MEASURED FROM ORDINARY HIGH WATER MARK OF EAST & WEST BANKS OF PINE CREEK) (SEE Af# [illegible])

SETBACK TABLE		
LINE	BEARING	DISTANCE
[illegible]	S 00°00'00" W	[illegible]
[illegible]	S 00°00'00" W	[illegible]
[illegible]	S 00°00'00" W	[illegible]
[illegible]	S 00°00'00" W	[illegible]

LAND WITHIN THIS SUBDIVISION SHALL NOT BE FURTHER SUBDIVIDED FOR A PERIOD OF 5 YEARS UNLESS A FINAL PLAT IS FILED PURSUANT TO SKAMANIA COUNTY CODE TITLE 22, SUBDIVISIONS, CHAPTER 22.04 SUPPLEMENT 17.00 INCLUSIVE.

U.S.F.S. 25 ROAD (PAVED)
198' EASEMENT AS RECORDED IN BOOK 48, PG 27 DEEDED OCT 14, 1966) RECORDED NOV. 2, 1966 ALSO SEE DEED IN BOOK 33 PG 338 (2002)
CENTERLINE OF "25 ROAD" (Af# 2004150100)

NARRATIVE

THE PURPOSE OF THIS SURVEY WAS TO PARTITION THE "SAUER TRACTS" AS SHOWN, INTO THE 4 LOTS AS SHOWN. CORNERS WERE SET NORMALLY FROM TIE-NOTES POINTS REMAINING FROM THE SURVEY RECORDED IN Af# 2005150676. FIELD EQUIPMENT WAS USED A 3-SECOND "TOTAL STATION INSTRUMENT" WITH ELECTRONIC DATA COLLECTOR.

NOTES

1) ALL ROAD EASEMENTS SHOWN ARE NON-EXCLUSIVE PRIVATE ROAD EASEMENTS FOR POWER, CABLE AND UTILITIES.

2) ALL NEW DEVELOPMENT SHALL COMPLY WITH THE APPLICABLE RATED RESOURCE SETBACKS. FUTURE DEVELOPMENT MAY BE IMPACTED BY CHANGES TO REGULATIONS CONCERNING WILDLIFE RESOURCES. DEVELOPERS ARE URGED TO CONTACT SKAMANIA COUNTY PLANNING DEPARTMENT REGARDING CURRENT REGULATIONS.

3) CLASS B COMMUNITY WATER WELL AGREEMENT AS RECORDED IN Af#

4) THIS SHORT PLAT IS LOCATED IN AN AREA MANAGED FOR TIMBER PRODUCTION AND/OR AGRICULTURAL PURPOSES. MANAGEMENT OF THESE RESOURCES MAY INCLUDE, BUT MAY BE LIMITED TO ACTIVITIES SUCH AS: SITE PREPARATION, TREE PLANTING, USE OF HERBICIDES/PESTICIDES, THINNING AND CLEAR CUTTING OF TIMBER, SLASH BURNING, HEAVY EQUIPMENT OPERATION AND ASSOCIATED NOISE AND DUST. LIVESTOCK GRAZING AND OTHER AGRICULTURAL ACTIVITIES MAY ALSO OCCUR. THE PURCHASER OF PROPERTY WITHIN THIS SHORT PLAT IS HEREBY ON NOTICE THAT THESE USES AND ASSOCIATED ACTIVITIES WILL OCCUR ON ADJACENT AND NEARBY PROPERTIES. SUCH USES SHALL NOT BE CONSIDERED A PUBLIC NUISANCE IF CONDUCTED CONSISTENT WITH STANDARD AND ACCEPTABLE FARM AND FOREST PRACTICES.

5) THE ZONING DESIGNATION FOR THIS PARCEL IS GMA/AGRI-WOODLAND

6) ELECTRICITY IS NOT CURRENTLY AVAILABLE IN THIS AREA.

PRIVATE ROADS WARNING

PURCHASERS OF A LOT OR LOTS, IN THIS PLAT ARE ADVISED TO CONSULT THE SKAMANIA COUNTY DEPARTMENT OF PUBLIC WORKS WITH REGARD TO FUTURE ROADS BECAUSE THE LOT OR LOTS, IN THIS PLAT ARE SERVICED BY PRIVATE ROADS. PRIVATE ROADS ARE NOT MAINTAINED BY SKAMANIA COUNTY, LIKE SERVICES WITHIN THE PLAT MUST PAY FOR THE MAINTENANCE OF THE PRIVATE ROADS WITHIN THIS PLAT, INCLUDING GRADING, DRAINAGE, SNOW PLOWING, ETC. THE CONDITION OF THE PRIVATE ROAD MAY AFFECT SUBSEQUENT ATTEMPTS TO SUBDIVIDE YOUR LOT OR LOTS. PRIVATE ROADS MUST COMPLY WITH SKAMANIA COUNTY'S PRIVATE ROAD REQUIREMENTS CODE 2007-17 SEC 12.03. SEE ROAD MAINTENANCE AGREEMENT RECORDED IN Af#

OWNER'S PLEDGE

WE, OWNERS OF THE ABOVE TRACT OF LAND, HEREBY DECLARE AND CERTIFY THIS SHORT PLAT TO BE TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE, AND THAT THIS SHORT SUBDIVISION WAS BEING MADE WITH OUR FREE CONSENT AND IN ACCORDANCE WITH OUR DESIRES. FURTHER, WE DEDICATE ALL ROADS AS SHOWN, NOT HERETOFORE SO PREVIOUSLY, AND WAIVE ALL CLAIMS FOR DAMAGES AGAINST ANY GOVERNMENTAL AGENCY ARISING FROM THE CONSTRUCTION AND MAINTENANCE OF SAID ROADS. FURTHERMORE, WE GRANT ALL EASEMENTS SHOWN FOR THEIR DESIGNATED PURPOSES.

OWNER: GERALD SAUER _____ OWNER: MARY SAUER _____

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF _____, 20__
NOTARY PUBLIC IN AND FOR THE COUNTY OF _____
RESIDING AT _____

WATER SUPPLY, SEWAGE AND SANITARY SEWER DISPOSAL/ON-SITE SEWAGE DISPOSAL SYSTEMS DEVELOPED FOR USE IN THIS SHORT SUBDIVISION CONFORM WITH CURRENT STANDARDS.

SKAMANIA COUNTY HEALTH DEPARTMENT _____ DATE _____

I, _____, COUNTY ENGINEER OF SKAMANIA COUNTY, WASH., CERTIFY THAT THIS PLAT MEETS CURRENT SKAMANIA COUNTY SURVEY REQUIREMENTS; CERTIFY THAT ANY ROADS AND/OR BRIDGES DEVELOPED IN CONJUNCTION WITH THE APPROVED PLANS MEET CURRENT SKAMANIA COUNTY DEVELOPMENT STANDARDS FOR ROADS; CERTIFY THAT THE CONSTRUCTION OF ANY STRUCTURES, REQUIRED FOR AND PRIOR TO FINAL APPROVAL, MEETS STANDARD ENGINEERING SPECIFICATIONS; APPROVE THE LAYOUT OF ROADS AND EASEMENTS AND; APPROVE THE ROAD NAME(S) AND NUMBER(S) OF SAID ROAD(S).

COUNTY ENGINEER _____ DATE _____

ALL TAXES AND ASSESSMENTS ON PROPERTY INCLUDED WITH THIS SHORT PLAT HAVE BEEN PAID, DISCHARGED OR SATISFIED.

COUNTY TREASURER _____ DATE _____

THE LAYOUT OF THIS SHORT SUBDIVISION COMPLIES WITH ORDINANCE 1998-07 REQUIREMENTS, AND THIS SHORT PLAT IS APPROVED SUBJECT TO RECORDING IN THE SKAMANIA COUNTY AUDITOR'S OFFICE.

COUNTY PLANNING DEPARTMENT _____ DATE _____

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE SURVEY RECORDING ACT AT THE REQUEST OF GERALD SAUER IN JULY, 2004.

_____

STATE OF WASHINGTON
COUNTY OF SKAMANIA

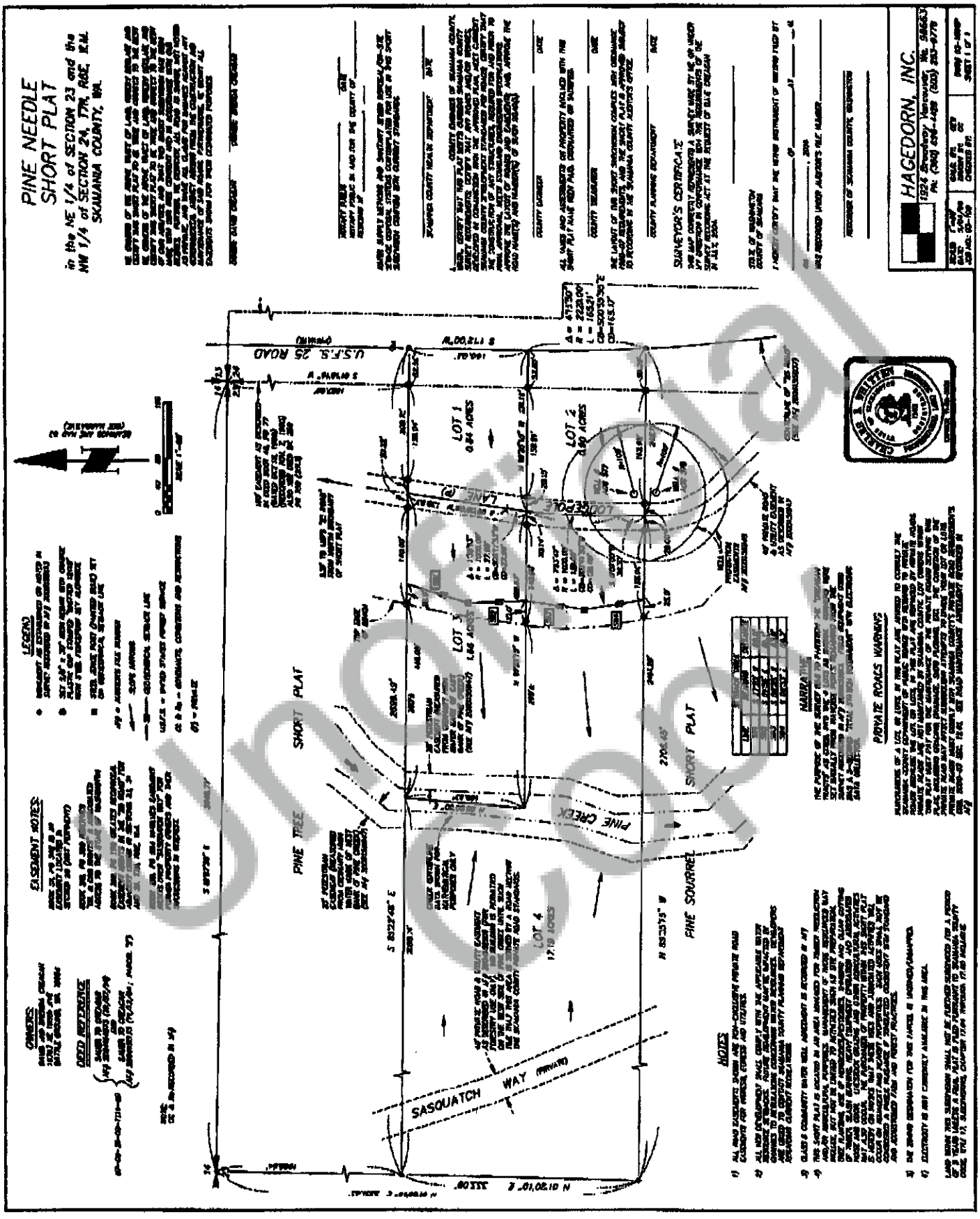
I HEREBY CERTIFY THAT THE FOREGOING INSTRUMENT OF WRITING FILED BY _____ OF _____ AT _____ M.
ON _____, 2004
AND RECORDED UNDER AUDITOR'S FILE NUMBER _____

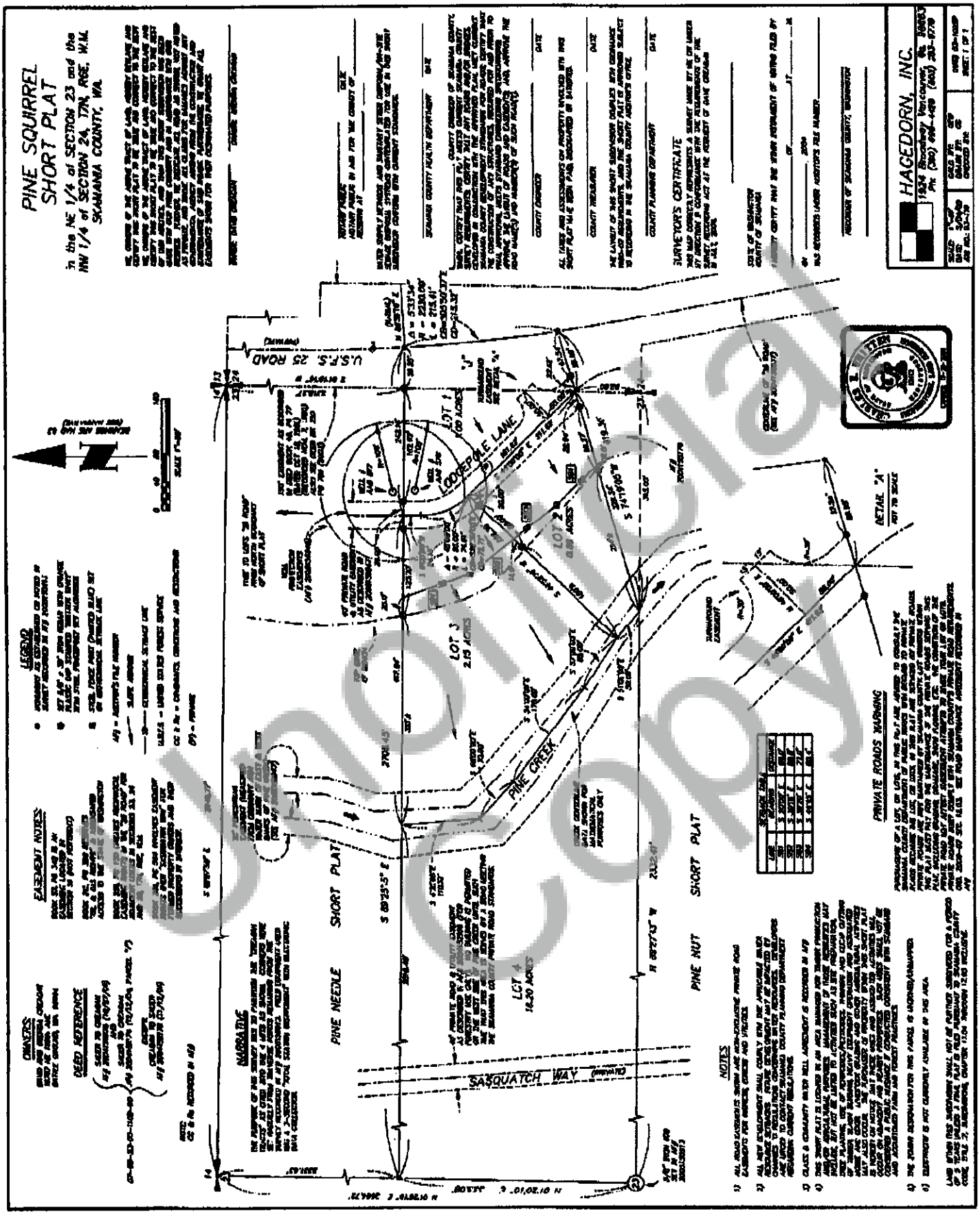
RECORDER OF SKAMANIA COUNTY, WASHINGTON
_____

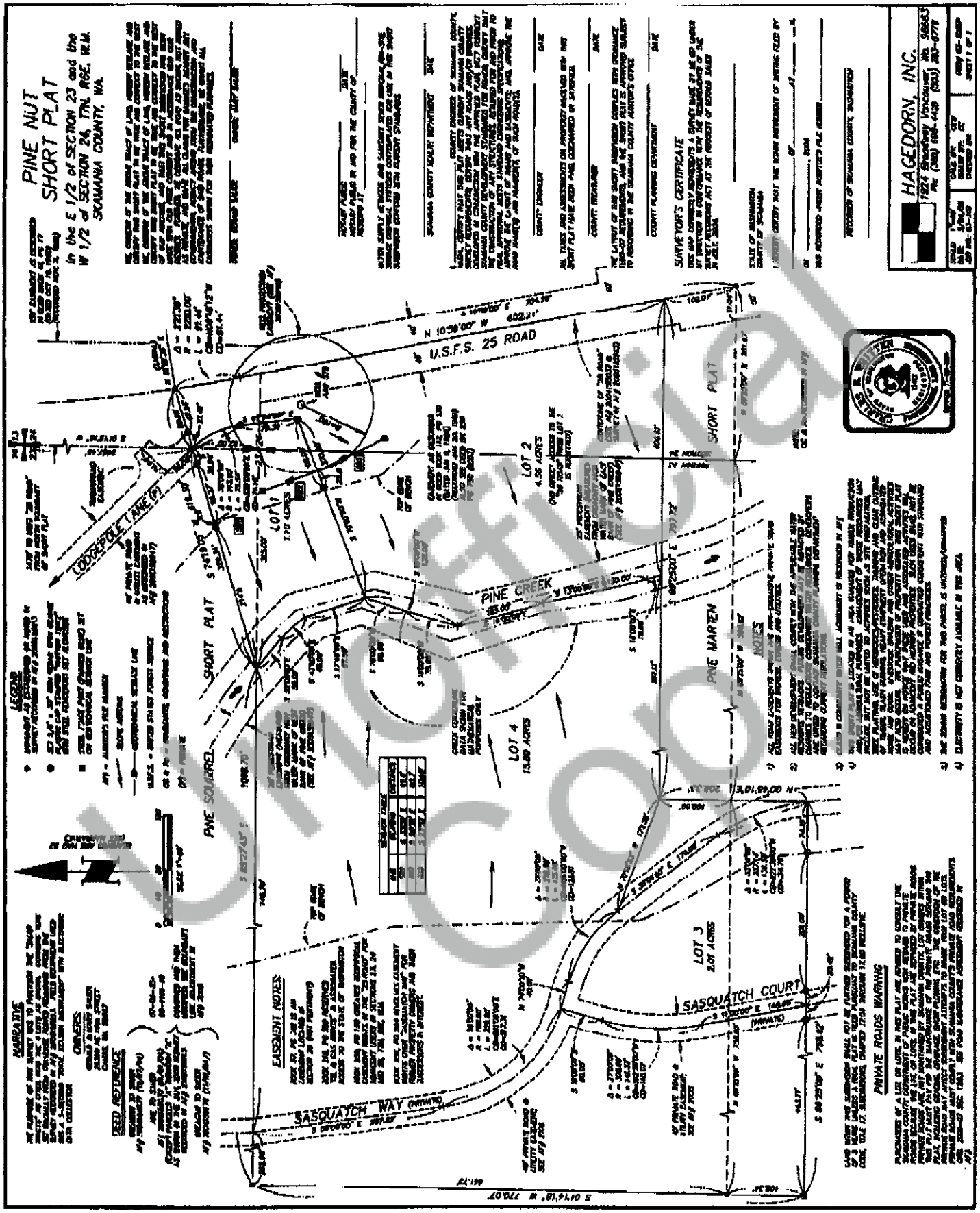
CHARLES E. WELTON
STATE OF WASHINGTON
19462
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES 12-10-2004

HAGEDORN, INC.
1924 Broadway Vancouver, Wa. 98663
Ph: (360) 696-4428 (503) 253-6778

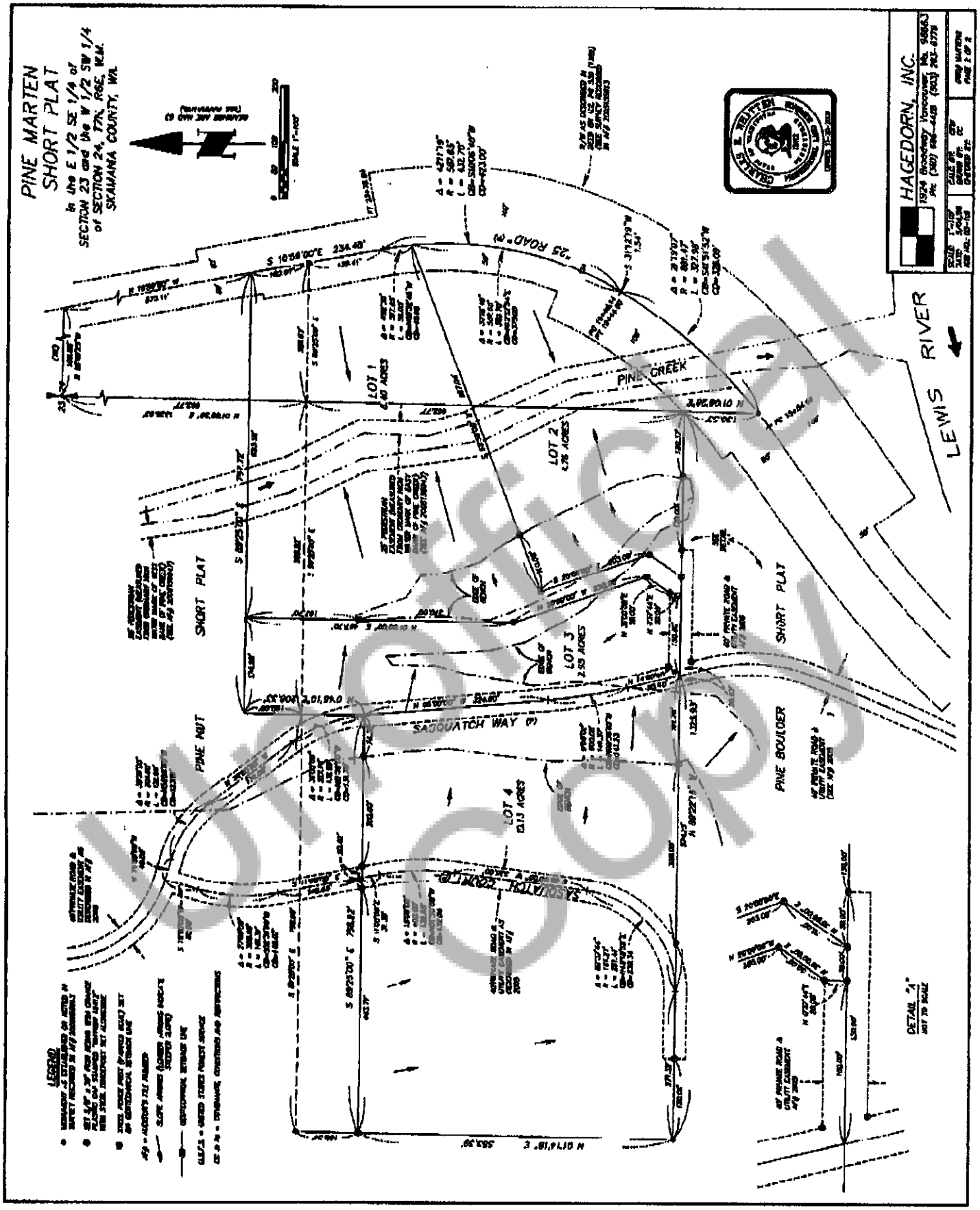
SCALE: 1"=80'	CALC. BY:	CHK:
DATE: 3/04/05	DRAWN BY: CC	DWG 04-PSHP
JOB NO.: 03-100	CHECKED BY:	SHEET 1 OF 1

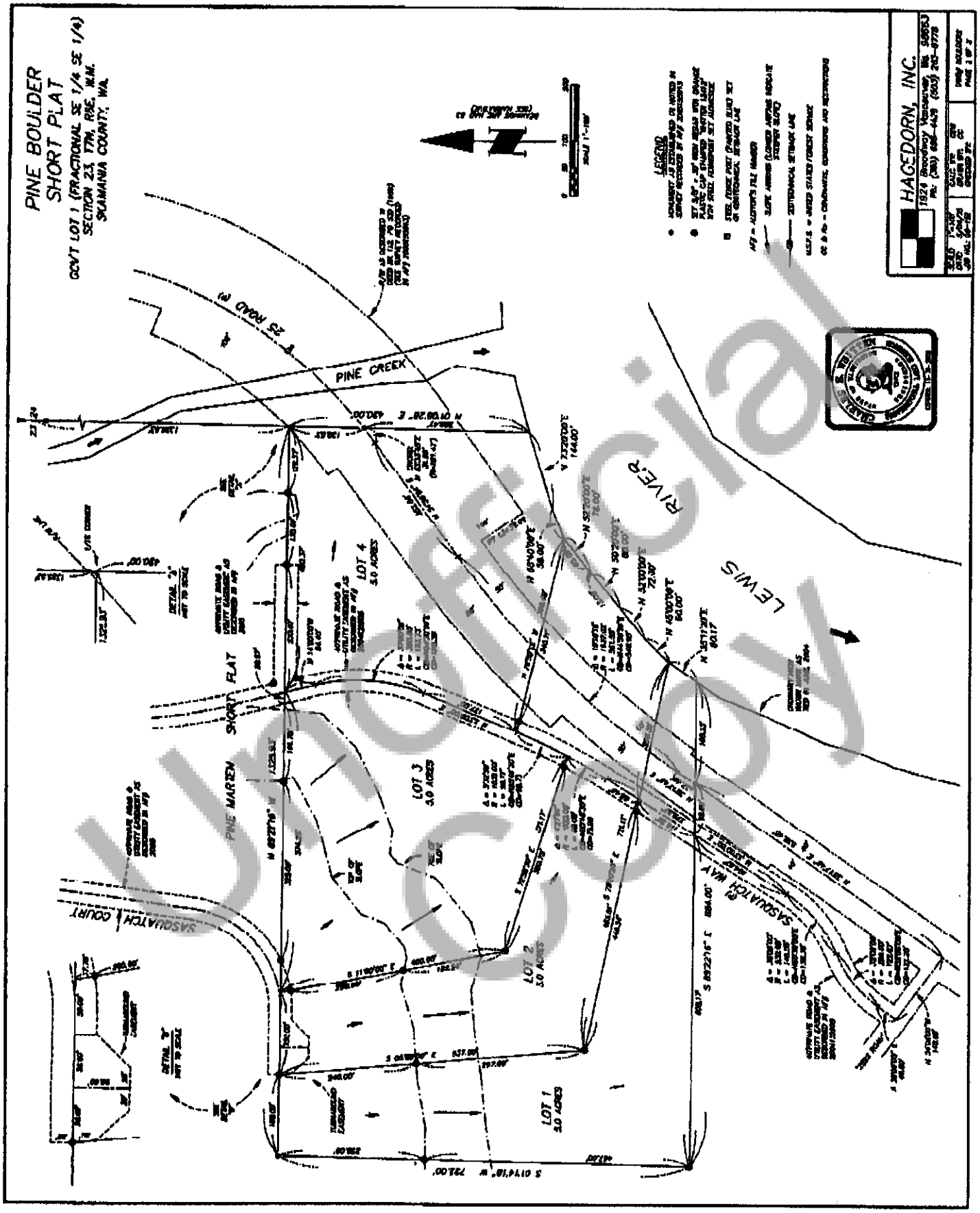


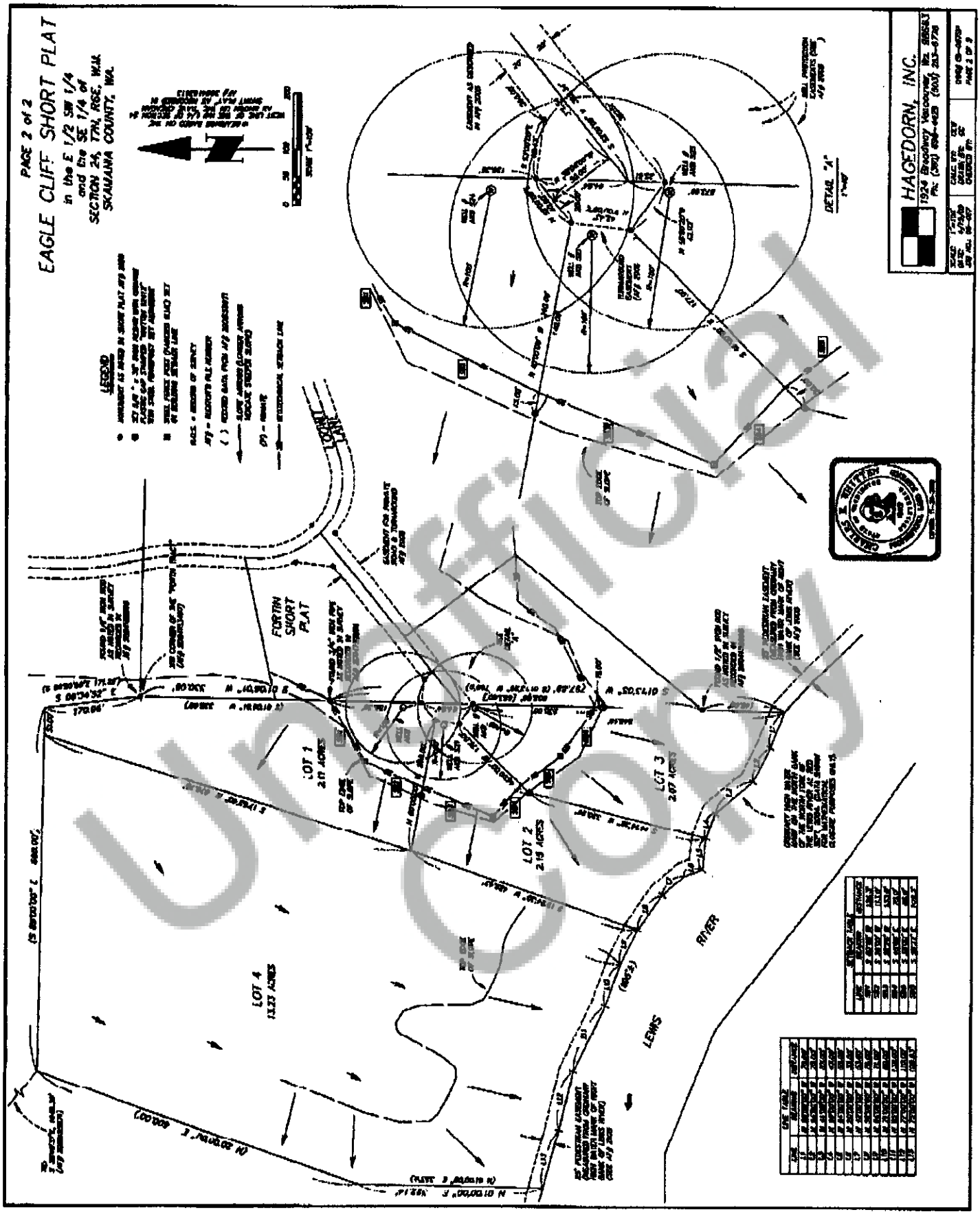

PINE SQUIRREL
SHORT PLAT
in the NE 1/4 of SECTION 23 and the
NW 1/4 of SECTION 24, T7N, R5E, W.M.
SKAMANIA COUNTY, WA.
HAGEDORN, INC.
U.S.F.S. 25 ROAD
LOOKEDALE LANE
PINE CREEK
PINE NEEDLE SHORT PLAT
PINE NUT SHORT PLAT
SASQUATCH WAY
LOT 1
LOT 2
LOT 3
LOT 4
SURVEYOR'S CERTIFICATE
PRIVATE ROADS WARNING
NOTES
EASEMENT NOTES
LEGEND
OWNERS
NEED KEYBOARD
Unofficial Copy

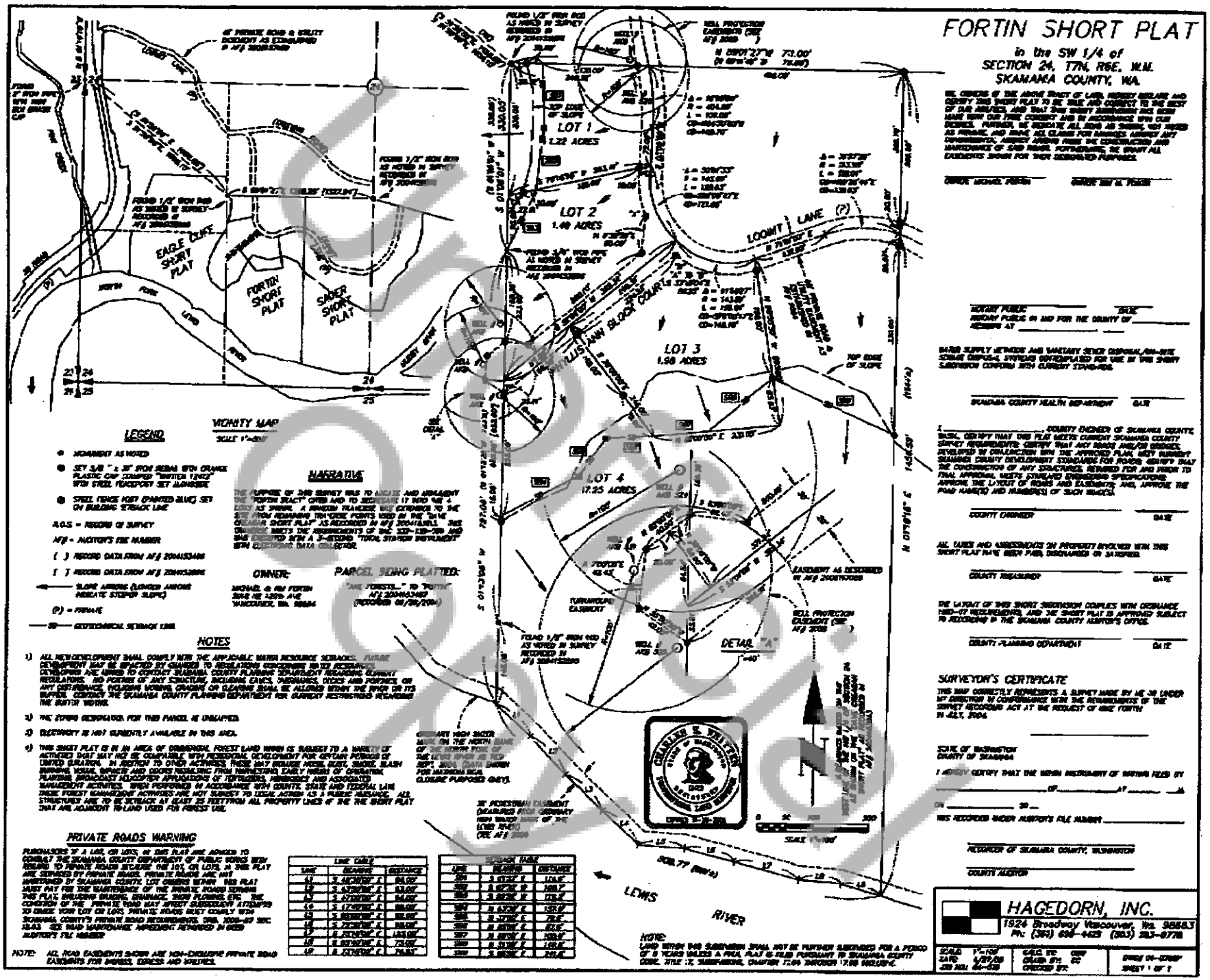


200515876









FORTIN SHORT PLAT

in the SW 1/4 of
SECTION 24, T7N, R6E, W.M.
SKAMANIA COUNTY, WA.

LOT 1
1.22 ACRES

LOT 2
1.40 ACRES

LOT 3
1.58 ACRES

LOT 4
17.25 ACRES

LOOMIT LANE

LEWIS RIVER

EAGLE SHORT PLAT

FORTIN SHORT PLAT

SAGER SHORT PLAT

VICINITY MAP
SCALE 1"=2000'

LEGEND

- MONUMENT AS NOTED
- SET 5/8" x 30" IRON REBAR WITH ORANGE PLASTIC CAP STAMPED "HAGEDORN 13402" WITH STEEL YELLOW POST SET ALONGSIDE
- STEEL FENCE POST (PAINTED BLUE) SET ON BUILDING SETBACK LINE
- R.O.S. = RECORD OF SURVEY
- AF# = AUDITOR'S FILE NUMBER
- ( ) RECORD DATA FROM AF# 2004135486
- [ ] RECORD DATA FROM AF# 2004135886
- SLOPE ARROW (LOWER ARROW INDICATE STEEPER SLOPE)
- (P) = PRIVATE
- GEOTECHNICAL SETBACK LINE

NARRATIVE

OWNER:
MICHAEL & KIM FORTIN
2416 NE 139th AVE
VANCOUVER, WA. 98684

PARCEL BEING PLATTED:
"THE FORESTER" TO "FORTIN"
AF# 2004135487
(RECORDED 08/26/2004)

NOTES

1) ALL NEW DEVELOPMENT SHALL COMPLY WITH THE APPLICABLE WATER RESOURCE SETBACKS. FUTURE DEVELOPMENT MAY BE IMPACTED BY CHANGES TO REGULATIONS CONCERNING WATER RESOURCES DESIGNATED AND LISTED TO CONTACT SKAMANIA COUNTY PLANNING DEPARTMENT REGARDING CURRENT REGULATIONS. NO PORTION OF ANY STRUCTURE, INCLUDING EAVES, OVERHANGS, DECKS AND PORCHES, OR ANY DISTURBANCE, INCLUDING MOWING, GRADING OR CLEARING SHALL BE ALLOWED WITHIN THE RIPER OR ITS BUFFER. CONTACT THE SKAMANIA COUNTY PLANNING DEPARTMENT FOR CURRENT RESTRICTIONS REGARDING THE BUFFER WIDTH.

2) THE ZONING DESIGNATION FOR THIS PARCEL IS UNLISTED.

3) ELECTRICITY IS NOT CURRENTLY AVAILABLE IN THIS AREA.

4) THIS SHORT PLAT IS IN AN AREA OF COMMERCIAL FOREST LAND WHICH IS SUBJECT TO A VARIETY OF ACTIVITIES THAT MAY NOT BE COMPATIBLE WITH RESIDENTIAL DEVELOPMENT FOR CERTAIN PERIODS OF LIMITED DURATION. IN ADDITION TO OTHER ACTIVITIES, THESE MAY INCLUDE NOISE, DUST, SMOKE, SLASH BURNING, VISUAL IMPACTS AND ODORS RESULTING FROM HARVESTING, EARLY PHASES OF OPERATIONS, PLANTING, BROADCAST HELICOPTER APPLICATIONS OF FERTILIZERS, HERBICIDES AND ASSOCIATED MANAGEMENT ACTIVITIES. WHEN PERFORMED IN ACCORDANCE WITH COUNTY, STATE AND FEDERAL LAW THESE FOREST MANAGEMENT ACTIVITIES ARE NOT SUBJECT TO LEGAL ACTION AS A PUBLIC NUISANCE. ALL STRUCTURES ARE TO BE SETBACK AT LEAST 35 FEET FROM ALL PROPERTY LINES OF THE THE SHORT PLAT THAT ARE ADJACENT TO LAND USED FOR FOREST USE.

PRIVATE ROADS WARNING

PURCHASERS OF A LOT, OR LOTS, IN THIS PLAT ARE ADVISED TO CONSULT THE SKAMANIA COUNTY DEPARTMENT OF PUBLIC WORKS WITH REGARD TO PRIVATE ROADS BECAUSE THE LOT OR LOTS, IN THIS PLAT ARE SERVICED BY PRIVATE ROADS. PRIVATE ROADS ARE NOT MAINTAINED BY SKAMANIA COUNTY. LOT OWNERS WITHIN THIS PLAT MUST PAY FOR THE MAINTENANCE OF THE PRIVATE ROADS SERVING THIS PLAT, INCLUDING GRADING, DRAINAGE, SNOW PLOWING, ETC. THE CONDITION OF THE PRIVATE ROAD MAY AFFECT SUBSEQUENT ATTEMPTS TO ENLARGE YOUR LOT OR LOTS. PRIVATE ROADS MUST COMPLY WITH SKAMANIA COUNTY'S PRIVATE ROAD REQUIREMENTS, 2006, 2006-07 SEC. 18.A.5. SEE ROAD MAINTENANCE AGREEMENT RECORDED IN DEED AUDITOR'S FILE NUMBER

NOTE: ALL ROAD EASEMENTS SHOWN ARE NON-EXCLUSIVE PRIVATE ROAD EASEMENTS FOR EGRESS, EGRESS AND UTILITIES.

LINE TABLE		
LINE	BEARING	DISTANCE
L1	S 40°08'09" E	84.00'
L2	S 43°08'09" E	83.00'
L3	S 47°08'09" E	84.00'
L4	S 17°49'51" W	88.00'
L5	S 89°08'09" E	88.00'
L6	S 72°08'09" E	88.00'
L7	S 53°08'09" E	143.00'
L8	S 89°08'09" E	75.00'
L9	S 89°08'09" E	75.00'

CURVE TABLE		
CURVE	BEARING	DISTANCE
C1	S 01°51'51" E	110.47'
C2	S 89°08'09" E	188.71'
C3	S 89°08'09" E	178.87'
C4	S 47°08'09" E	132.19'
C5	S 47°08'09" E	79.41'
C6	S 89°08'09" E	83.61'
C7	S 89°08'09" E	100.91'
C8	S 89°08'09" E	100.91'
C9	S 89°08'09" E	200.41'

NOTE:
LAND WITHIN THIS SUBDIVISION SHALL NOT BE FURTHER SUBDIVIDED FOR A PERIOD OF 5 YEARS UNLESS A FINAL PLAT IS FILED PURSUANT TO SKAMANIA COUNTY CODE, TITLE 12, SUBDIVISIONS, CHAPTER 17.06 SECTION 17.06.100(2)-C

ROTARY PUBLIC _____ DATE
ROTARY PUBLIC IN AND FOR THE COUNTY OF _____
RESIDING AT _____

WATER SUPPLY (WELL) AND SANITARY SEWER DISPOSAL/ON-SITE SEWAGE DISPOSAL SYSTEMS (DESCRIPTION) FOR USE IN THIS SHORT SUBDIVISION CONFORM WITH CURRENT STANDARDS.

SKAMANIA COUNTY HEALTH DEPARTMENT _____ DATE

I _____, COUNTY ENGINEER OF SKAMANIA COUNTY, HEREBY CERTIFY THAT THIS PLAT MEETS CURRENT SKAMANIA COUNTY SURVEY REQUIREMENTS. CERTIFY THAT ANY BONDS AND/OR SECURITY REQUIRED IN CONJUNCTION WITH THE APPROVED PLAT, MEET CURRENT SKAMANIA COUNTY DEVELOPMENT STANDARDS FOR ROADS. ASSURE THAT THE CONSTRUCTION OF ANY STRUCTURES, REQUIRED FOR AND PRIOR TO FINAL APPROVAL MEETS STANDARD ENGINEERING SPECIFICATIONS. APPROVE THE LAYOUT OF ROADS AND EASEMENTS, AND APPROVE THE ROAD NAME(S) AND NUMBER(S) OF SUCH ROAD(S).

COUNTY ENGINEER _____ DATE

ALL TAXES AND ASSESSMENTS ON PROPERTY INVOLVED WITH THIS SHORT PLAT HAVE BEEN PAID, DISCHARGED OR SATISFIED.

COUNTY TREASURER _____ DATE

THE LAYOUT OF THIS SHORT SUBDIVISION COMPLIES WITH ORDINANCE 1985-07 REQUIREMENTS, AND THE SHORT PLAT IS APPROVED SUBJECT TO RECORDING IN THE SKAMANIA COUNTY AUDITOR'S OFFICE.

COUNTY PLANNING DEPARTMENT _____ DATE

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE SURVEY RECORDING ACT AT THE REQUEST OF MIKE FORTIN IN JULY, 2004.

_____
CHARLES S. WALTER
STATE OF WASHINGTON
13402
REGISTERED LAND SURVEYOR

STATE OF WASHINGTON
COUNTY OF SKAMANIA

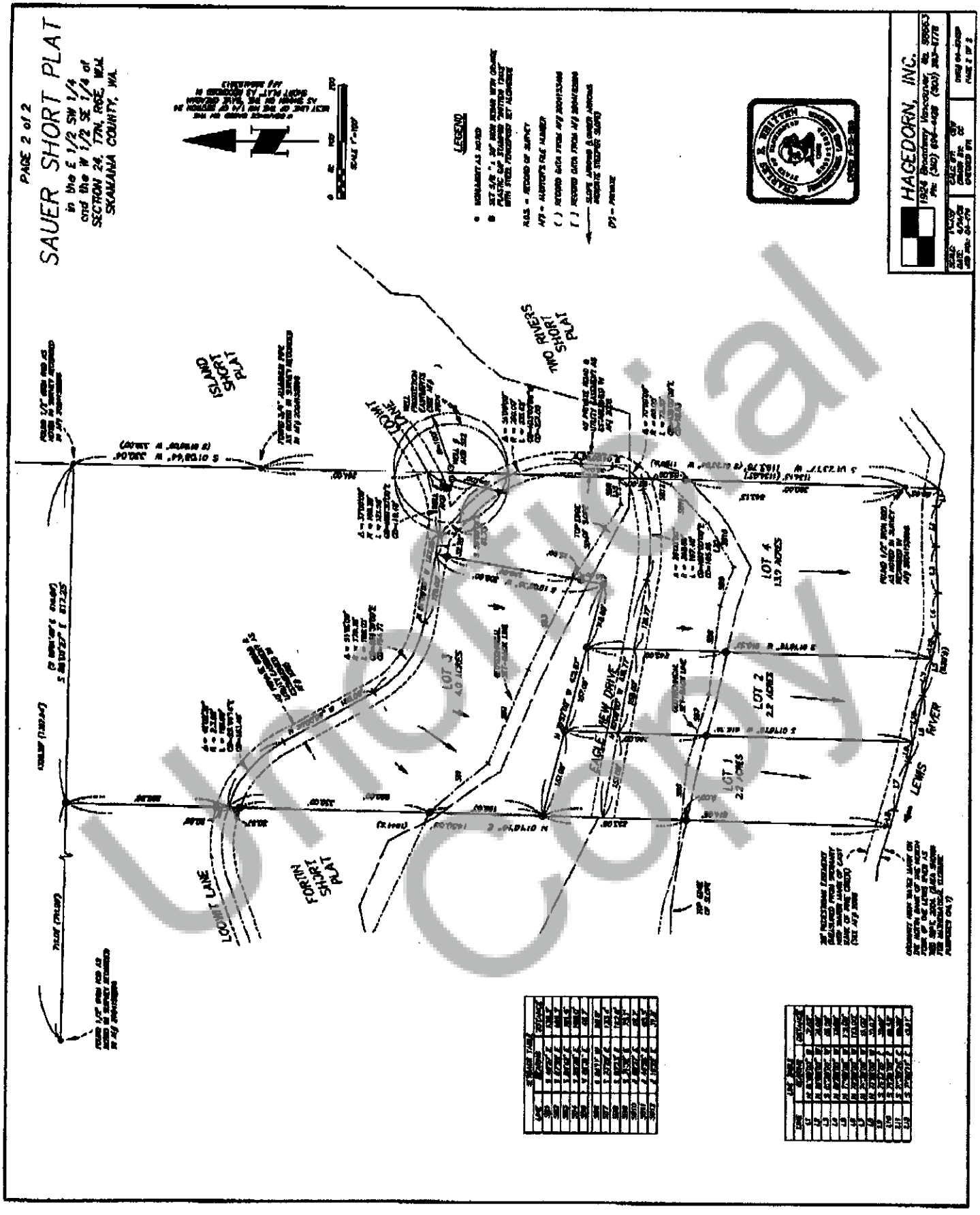
I HEREBY CERTIFY THAT THE WITHIN INSTRUMENT OF WRITING FILED BY _____ OF _____ AT _____ M.
ON _____ 20__
AND RECORDED UNDER AUDITOR'S FILE NUMBER _____

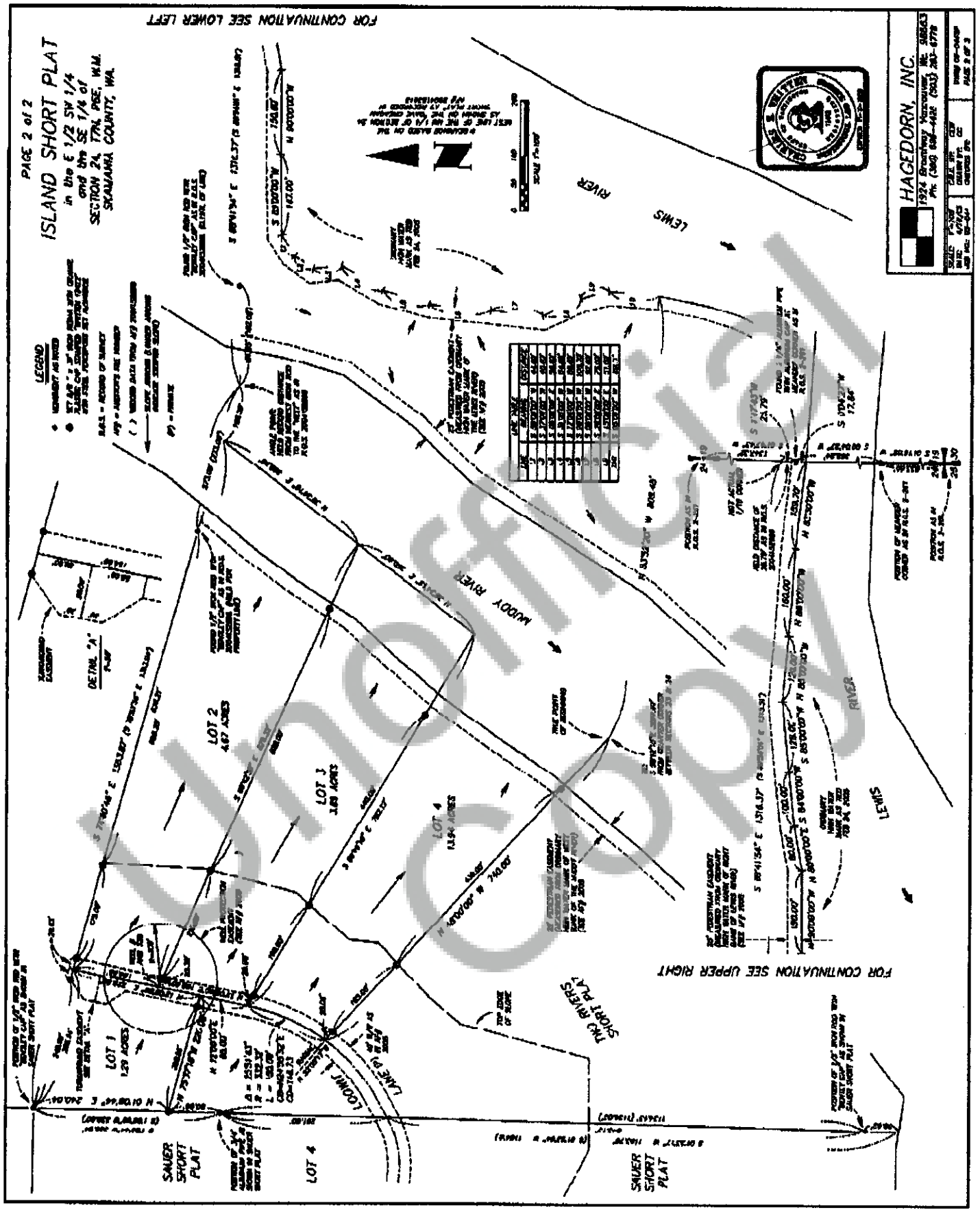
RECORDER OF SKAMANIA COUNTY, WASHINGTON

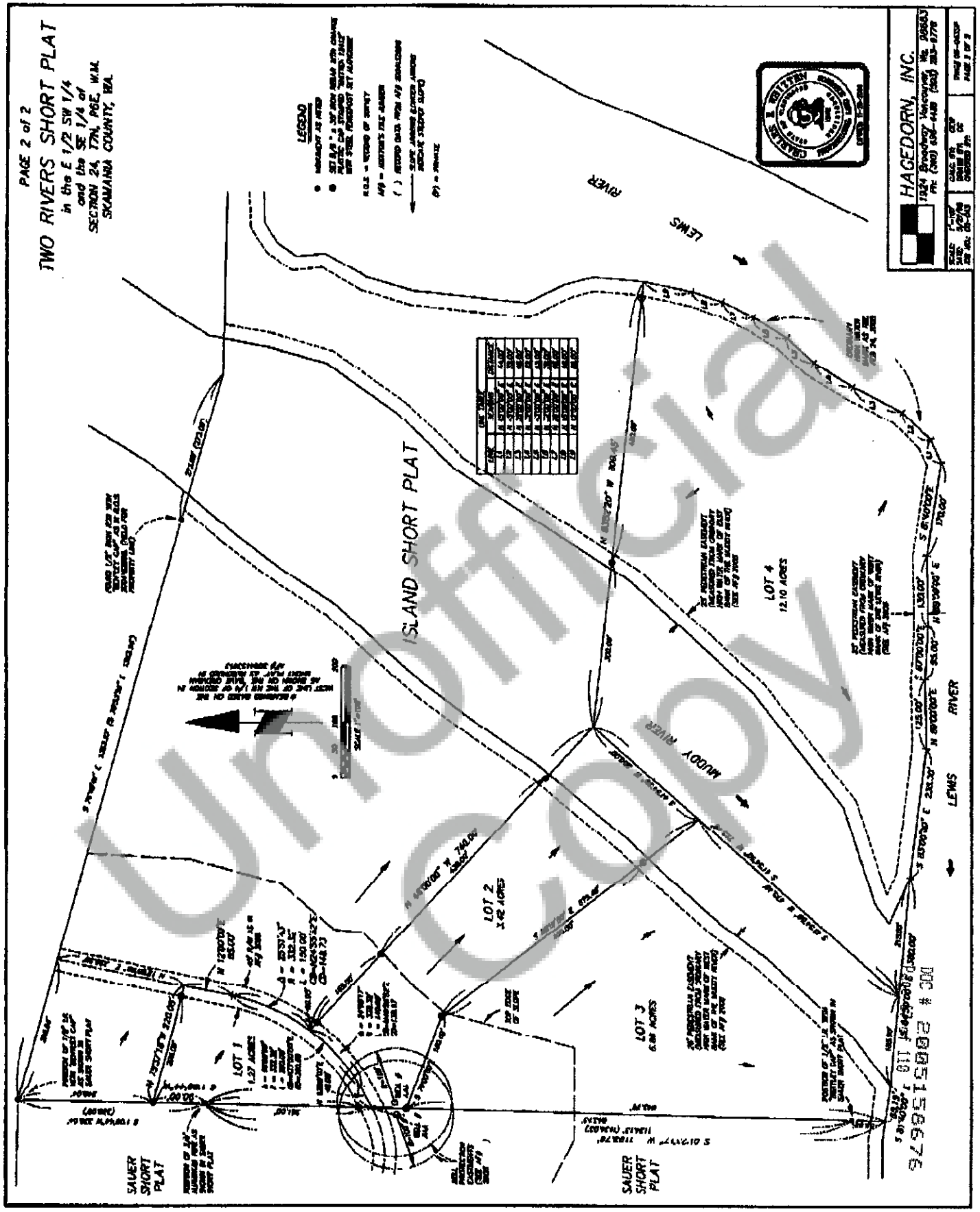
COUNTY AUDITOR

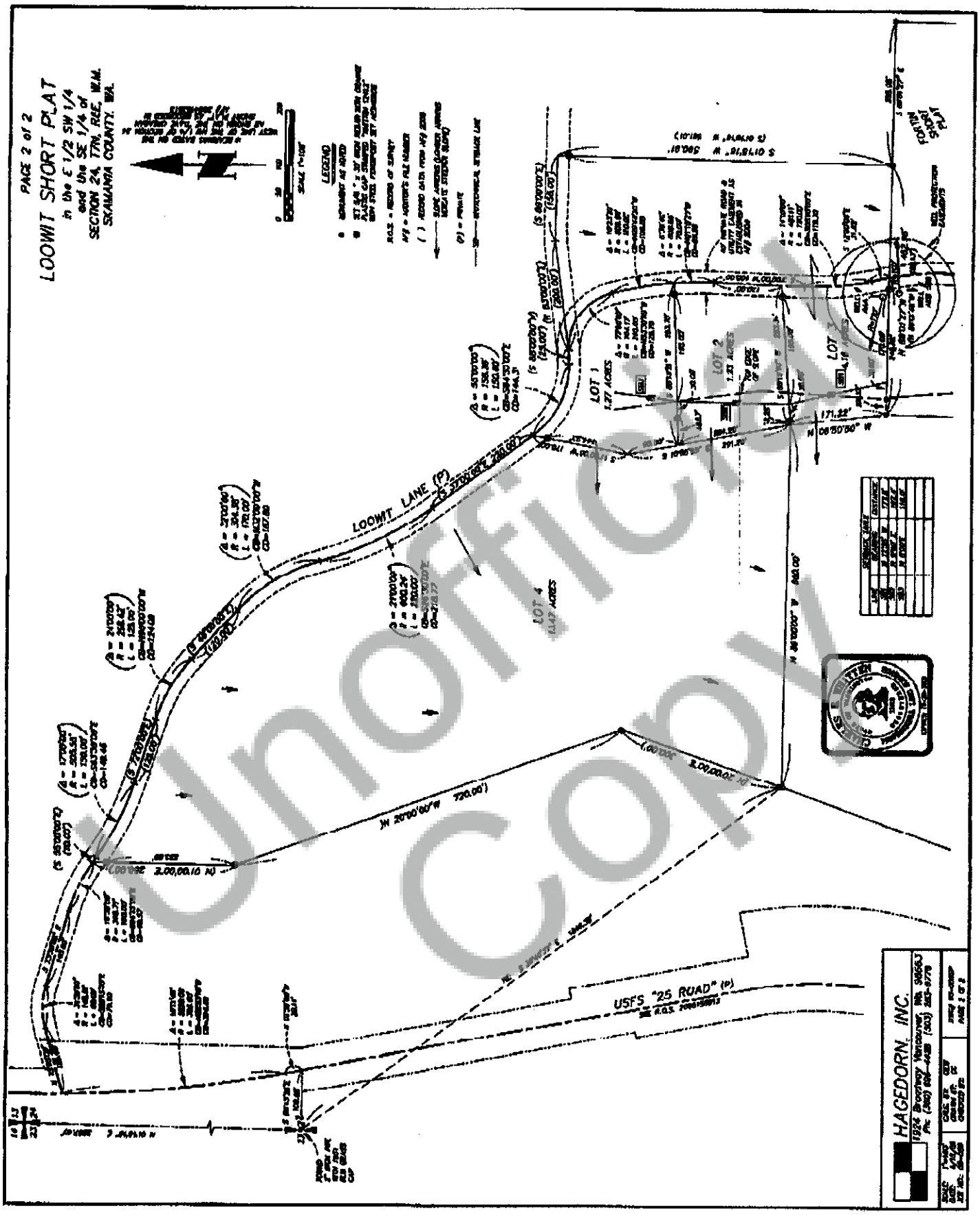
HAGEDORN, INC.
1524 Broadway Vancouver, Wa. 98663
Ph: (360) 696-4429 (503) 283-0778

SCALE 1"=100'
DATE 4/29/05
JOB NO. 04-039
CALC. BY: CSW
DRAWN BY: CC
CHECKED BY:
SHEET 1 OF 1






PAGE 2 of 2
TWO RIVERS SHORT PLAT
in the E 1/2 SW 1/4
and the SE 1/4 of
SECTION 24, T7N, R5E, W.M.
SKAMANIA COUNTY, WA.
ISLAND SHORT PLAT
LEGEND
HAGEDORN, INC.
LOT 1
LOT 2
3.42 ACRES
LOT 3
6.38 ACRES
LOT 4
12.10 ACRES
MUDDY RIVER
LEWIS RIVER
SAUER SHORT PLAT
SAUER SHORT PLAT
Unofficial Copy
DOC # 2005158676
Page 67 of 110



APPENDIX C

Hydrology Data Sheets

Photo 4:
This photo looks down from Fortin short plat, Lot 3 to the Lewis River and across to the eagle roosts. The distance from this location to the communal roosts is approximately 1100 feet.

Photo 5:
A photo south to the adjacent land across the Lewis River approximately 1100 feet, three snags are visible, and presumed to be the vicinity of the eagle communal roosts.

Photo 6:
Another photo looking south from a cabin site (Sauer short plat, Lot 4)on the top of a bench along the Lewis River to the adjacent eagle communal roosts.

Photo 1:
This photo is looking south down into vegetation from a cabin site (Eagle Cliff short plat, Lot 3) on the bluff of the Lewis River.

Photo 2:
Another photo at a cabin site (Fortin short plat, Lot 4) on the bluff of the Lewis River. This photo is looking south into the Lewis at the buffer and adjacent proposed eagle communal roosts.

Photo 3:
At the time of the site investigation this was the condition of a bench above the Lewis River at Eagle Cliff short plat. A recommenation of pruning the trees and leaving the majority of the vegetation was requested.

Photo 24:
This photo is an example of the Scotch Broom in the Purchase in Progress area. The precise location of this photo is in the north-east corner of the propery.
The photo was taken north into the Gifford Pinchot National Forest (the visible peak in the background). This area is currently in second growth stages.

Photo 25:
This photo is looking northwest into the Gifford Pinchot National Forest in the northeast corner of the "Purchase in Progress" area. The noxious or invasive Scotch broom is apparant in this photo.

Photo 21:
This is a photo in the Pine Nut short plat of three cabin sites along Pine Creek.

Photo 22:
This photo is a view from Pine Squirel short plat down to Pine Nut short plat. It is a good representation of the selective thinning taking place in the area.

Photo 23:
This photo is on the bluff looking north at Pine Squirel and Pine Needle short plats. A large animal corridor is along the back of this photo with selectively thinned trees throughout the short plats.

Photo 18:
This tree has fallen on the base of the other trees causing them to lean. From the top of the bluff it gave the impression of slope instabilitydue to the leaning of the tree. Slope instability is probaly not the cause of the initial leaning. This is along the base of the slope at Pine Creek.

Photo 19:
A typical view of the Upland Community throughout the entire subject site. Red Alder and coniferous trees are apparent in this photograph. This photo was taken from Loowit short plat.

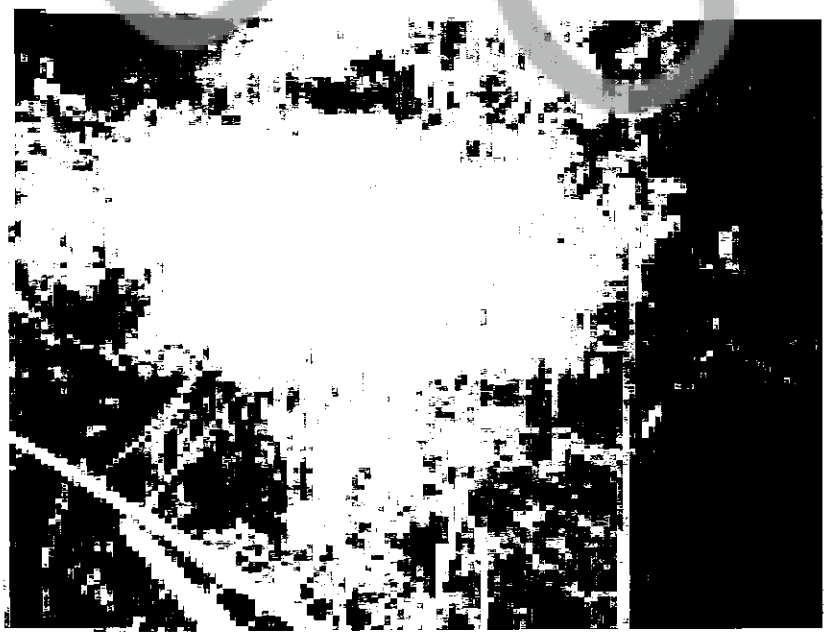


Photo 20:
This is a view from the west side looking down to Pine Creek from one of the future cabin sites.

Photo 16:
This view is south down Pine Creek. It is a good representation of the healthy riparian along the creek.

Photo 17:
This is another picture that represents the slope stability along Pine Creek. All the mature trees are not showing signs of instability.

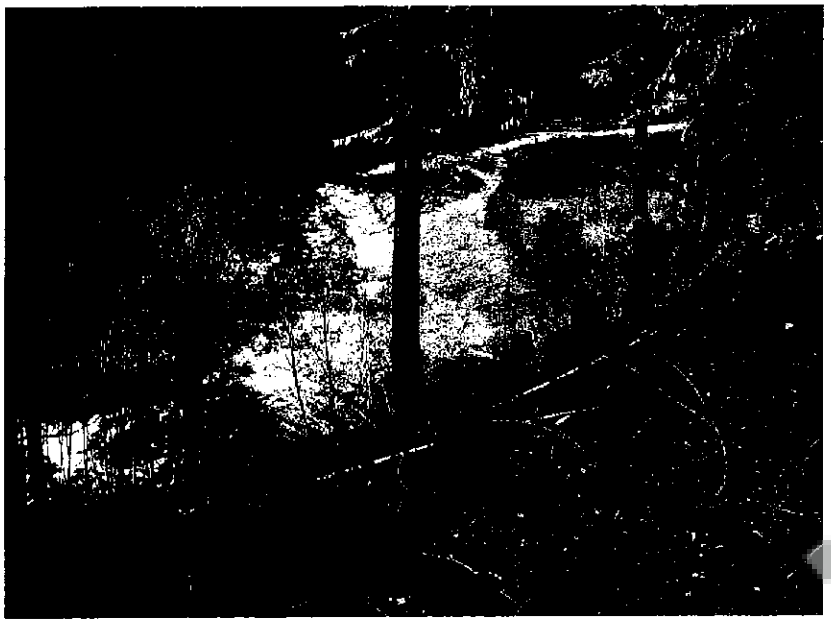


Photo 13:
A view from a cabin site along Pine Creek. This photo represents the distance of the cabin sites to the Creek and the slope stability once again. The tree in this picture is estimated to be at least 20 years old and is still growing straight up.

Photo 14:
This photo is of an old logging road cutting down to Pine Creek. This logging road would be a great general access to the creek for all home owners.

Photo 15:
This photo is from Pine Needle short plat, lot 3. In this photo selective tree cutting is apparent. The trees along the slope are upright and sturdy, and the distance to the creek is approximately 231 feet. The healthy riparian below is evident in this picture.

Photo 10:
This photo shows the density of the healthy riparian, and a holding pool along Pine Creek.

Photo 11:
This is another bench along Pine Creek. The stump in the photo is an example of the logging that happened prior to the current development. Scotch Broom is apparent on the far right of this photo.

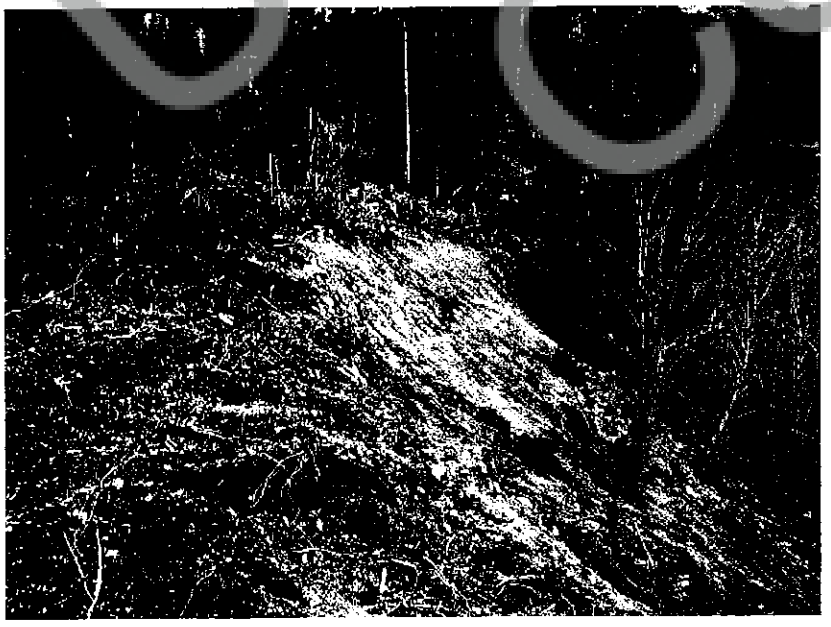
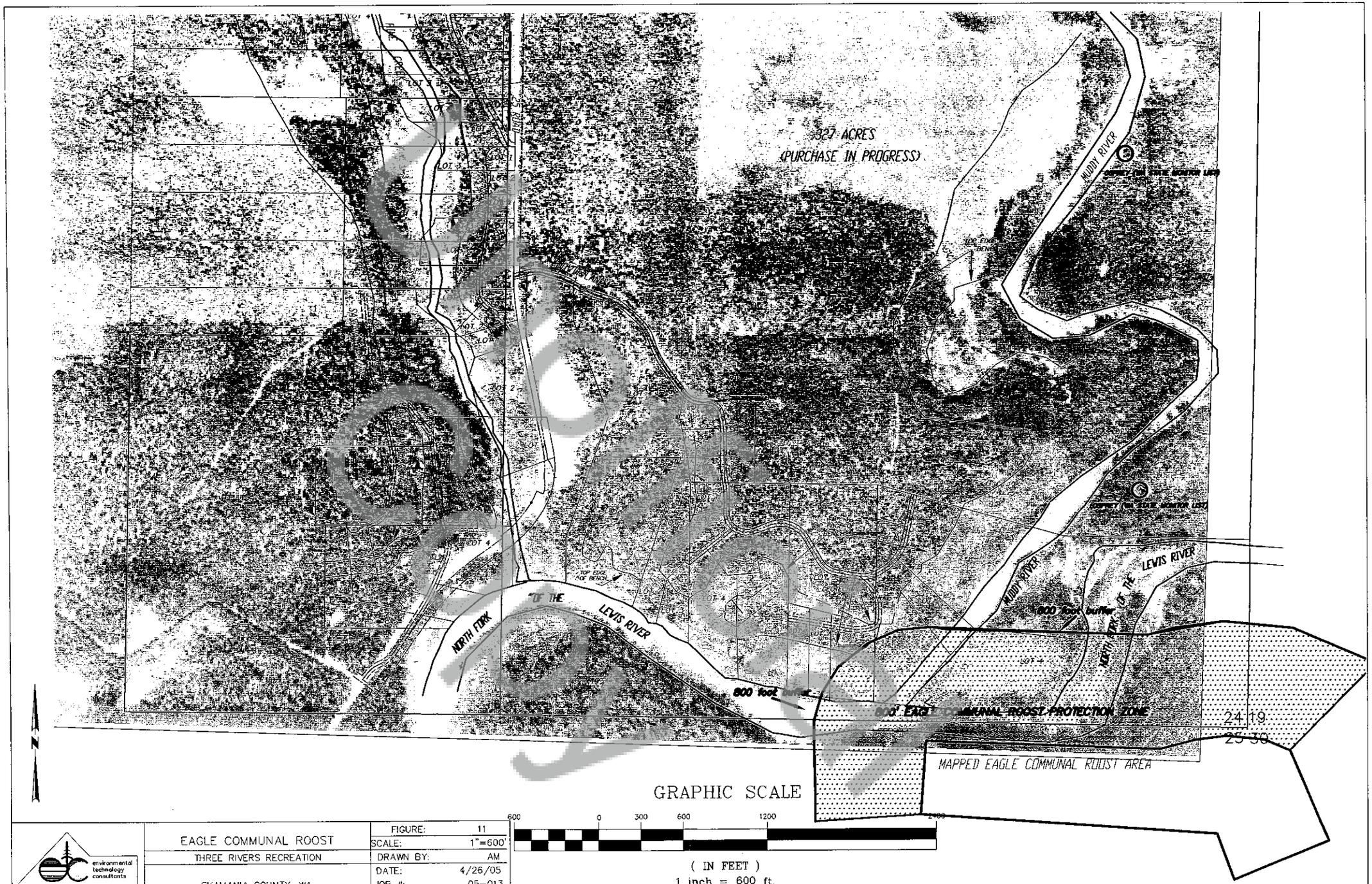


Photo 12:
This is an example of the worst slope along the bluff on the east side of Pine Creek. The trees in this photo represent the slope stability by growing straight up.

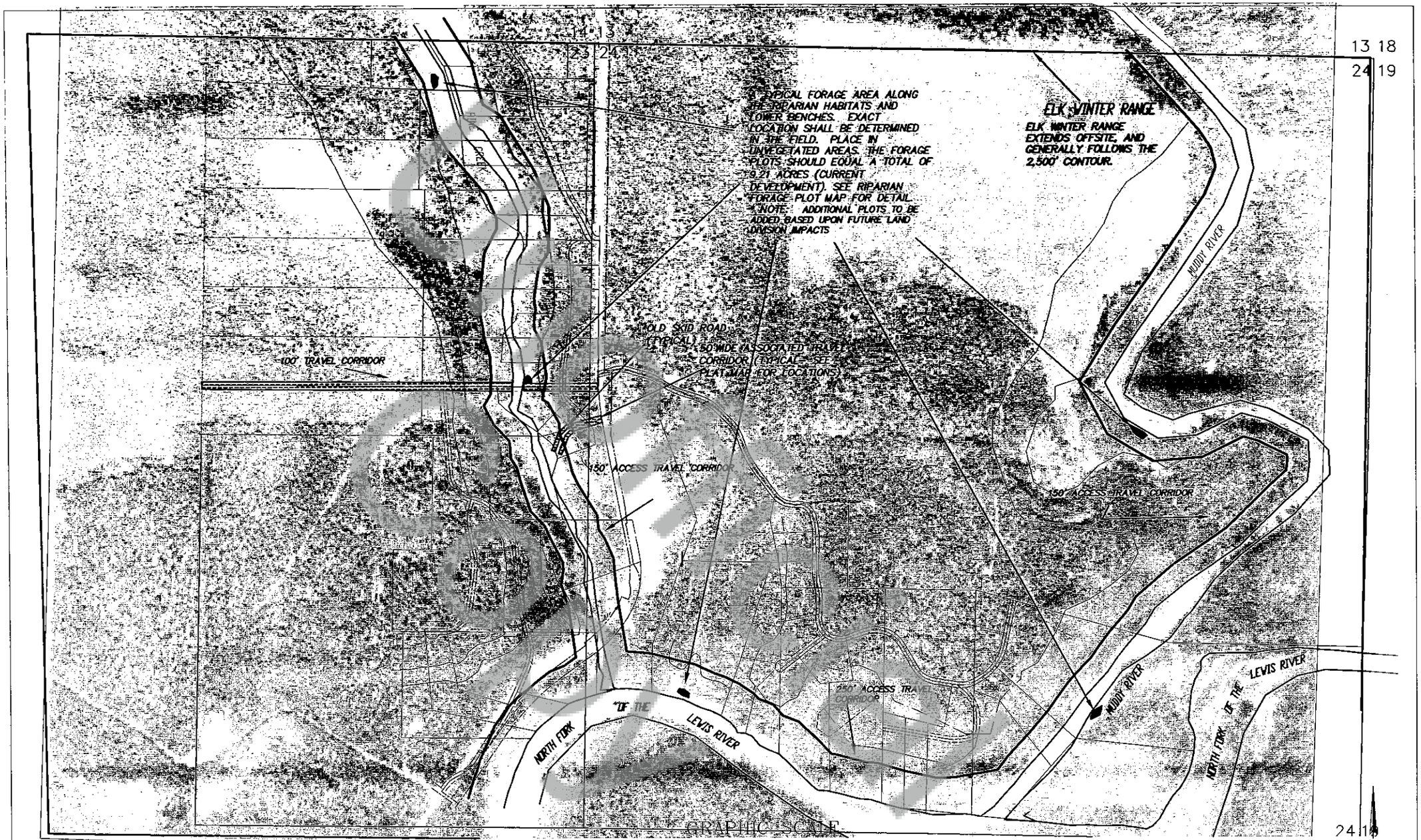
Photo 7:
This photo was taken from Dave short plat, lot 1, and is looking down from the bluff along Pine Creek at a bench. The bench has many native and noxious or invasive plants. The invasive Scotch Broom is apparent in this photo.

Photo 8:
A view north up Pine Creek. Woody debris and the vegetation along Pine Creek are evident in this photo.

Photo 9:
Another view of Pine Creek with the Red Alder along the streambed. This photo also shows the opposite cut bank from the catastrophic event from the 1980 Mount St.Helens eruption.

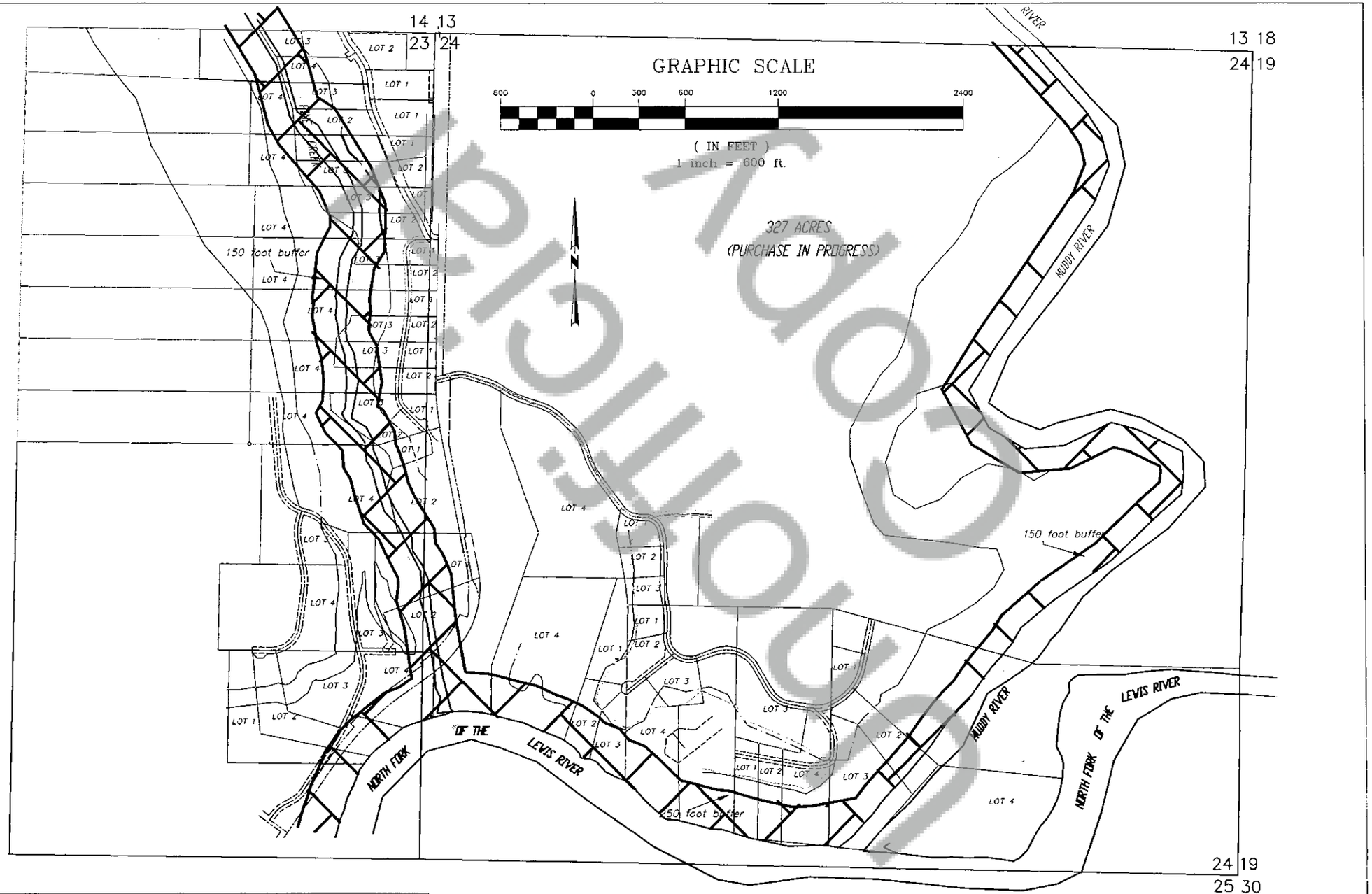


environmental technology consultants	EAGLE COMMUNAL ROOST	FIGURE:	11
	THREE RIVERS RECREATION	SCALE:	1"=600'
		DRAWN BY:	AM
	SKAMANIA COUNTY, WA.	DATE:	4/26/05
		JOB #:	05-013



environmental technology consultants

ELK MANAGEMENT	FIGURE:	9
THREE RIVERS RECREATION	SCALE:	1"=600'
	DRAWN BY:	AM
SKAMANIA COUNTY, WA.	DATE:	4/26/05
	JOB #:	05-013



environmental technology consultants

RIPARIAN BUFFERS	FIGURE:	7
	SCALE:	1"=600'
THREE RIVERS RECREATION	DRAWN BY:	AM
LOCATION: FOREST ROAD 25, LOOMIT LANE	DATE:	4/26/05
SKAMANIA COUNTY, WA.	JOB #:	05-013

NOTES:

ALL ROADS, RIVERS, AND LOT INFORMATION WAS SURVEYED AND ENGINEERED BY HAGEDORN, INC.

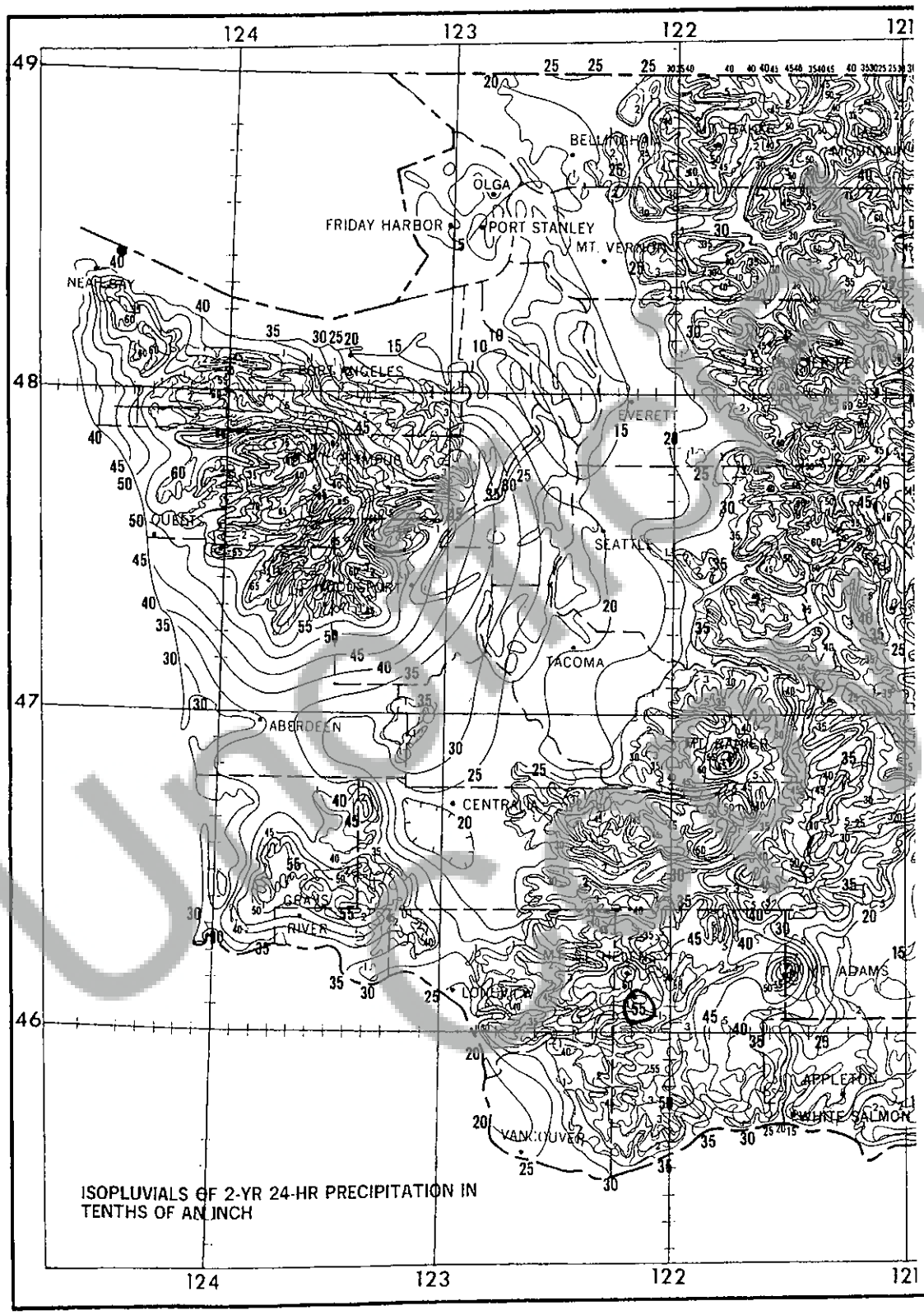
environmental technology consultants

PROPOSED DEVELOPMENT & AERIAL PHOTO	FIGURE:	3
THREE RIVERS RECREATION	SCALE:	1"=600'
LOCATION: FOREST ROAD 25, LOOWIT LANE	DRAWN BY:	AM
SKAMANIA COUNTY, WA.	DATE:	4/26/05
	JOB #:	05-013

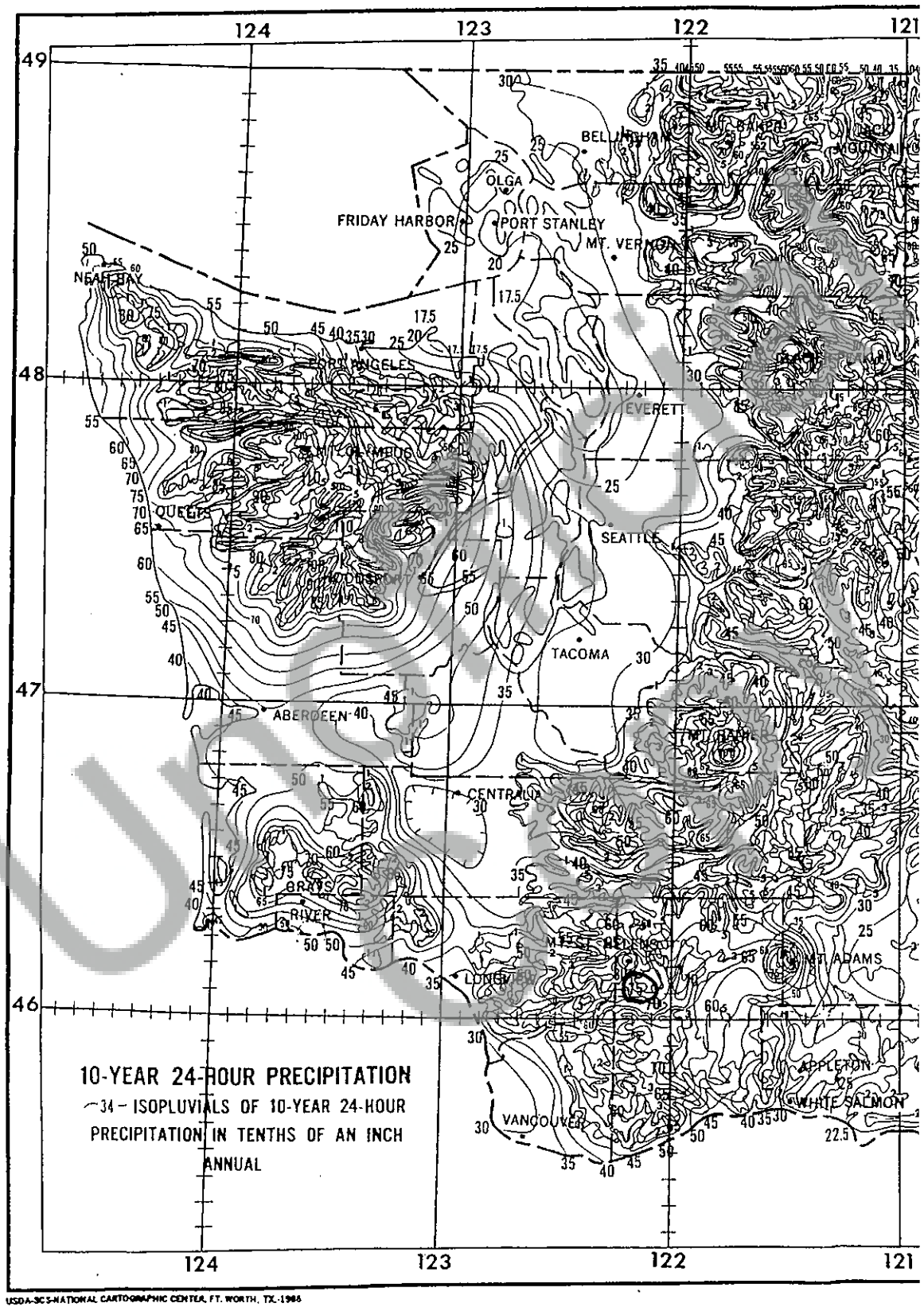
Appendix III-A
Isopluvial Maps for Design Storms

Included in this appendix are the 2, 10 and 100-year, 24-hour design storm and mean annual precipitation isopluvial maps for Western Washington. These have been taken from NOAA Atlas 2 "Precipitation - Frequency Atlas of the Western United States, Volume IX, Washington.

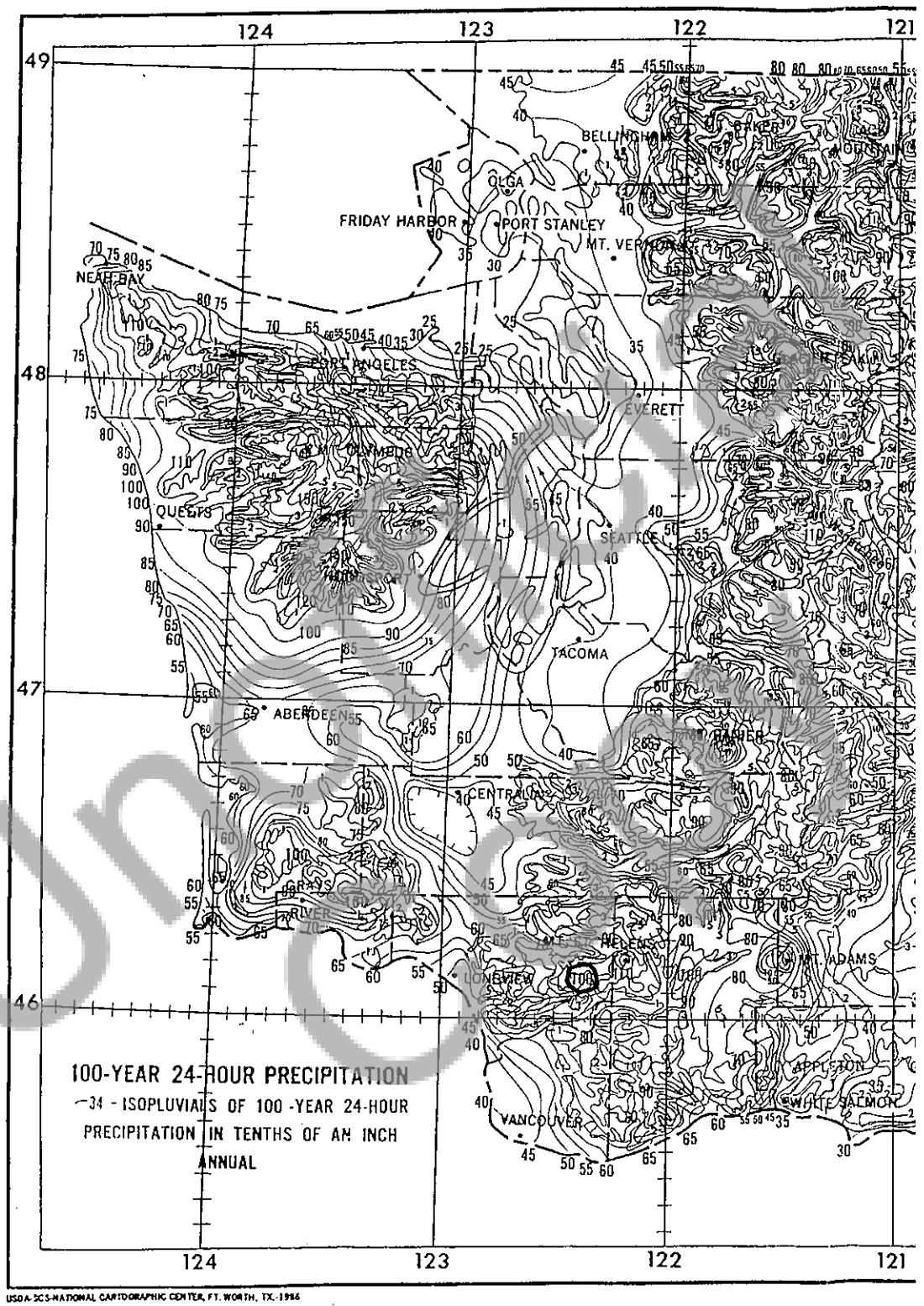
Western Washington Isopluvial 2-year, 24 hour



Western Washington Isopluvial 10-year, 24 hour



Western Washington Isopluvial 100-year, 24 hour



Cumulative Time	Total Precip	10 Min Inc. Precip		2 Year			
				24-hr-total=	5.5	Inches	
0	0.4	0.022					
0.17	0.4	0.022					
0.33	0.4	0.022					
0.5	0.4	0.022					
0.67	0.4	0.022		Source: NOAA Atlas 2			
0.83	0.4	0.022		Precipitation-Frequency Atlas of			
1	0.4	0.022		the Western United States			
1.17	0.4	0.022		Volume IX - Washington			
1.33	0.4	0.022					
1.5	0.4	0.022					
1.67	0.5	0.0275		Methodology: King County Hydrograph Program			
1.83	0.5	0.0275					
2	0.5	0.0275					
2.17	0.5	0.0275					
2.33	0.5	0.0275					
2.5	0.5	0.0275					
2.67	0.6	0.033					
2.83	0.6	0.033					
3	0.6	0.033					
3.17	0.6	0.033					
3.33	0.6	0.033					
3.5	0.6	0.033					
3.67	0.7	0.0385					
3.83	0.7	0.0385					
4	0.7	0.0385					
4.17	0.7	0.0385					
4.33	0.7	0.0385					
4.5	0.7	0.0385					
4.67	0.82	0.0451					
4.83	0.82	0.0451					
5	0.82	0.0451					
5.17	0.82	0.0451					
5.33	0.82	0.0451					
5.5	0.82	0.0451					
5.67	0.95	0.05225					
5.83	0.95	0.05225					
6	0.95	0.05225					
6.17	0.95	0.05225					
6.33	0.95	0.05225					
6.5	0.95	0.05225					
6.67	1.34	0.0737					
6.83	1.34	0.0737					
7	1.34	0.0737					
7.17	1.8	0.099					
7.33	1.8	0.099		PEAK 1 HR PRECIP = 0.9295"			
7.5	3.4	0.187					
7.67	5.4	0.297					

7.83	2.7	0.1485					
8	1.8	0.099					
8.17	1.34	0.0737					
8.33	1.34	0.0737					
8.5	1.34	0.0737					
8.67	0.88	0.0484					
8.83	0.88	0.0484					
9	0.88	0.0484					
9.17	0.88	0.0484					
9.33	0.88	0.0484					
9.5	0.88	0.0484					
9.67	0.88	0.0484					
9.83	0.88	0.0484					
10	0.88	0.0484					
10.17	0.88	0.0484					
10.33	0.88	0.0484					
10.5	0.88	0.0484					
10.67	0.72	0.0396					
10.83	0.72	0.0396					
11	0.72	0.0396					
11.17	0.72	0.0396					
11.33	0.72	0.0396					
11.5	0.72	0.0396					
11.67	0.72	0.0396					
11.83	0.72	0.0396					
12	0.72	0.0396					
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13.5	0.57	0.03135					
13.67	0.57	0.03135					
13.83	0.57	0.03135					
14	0.57	0.03135					
14.17	0.57	0.03135					
14.33	0.57	0.03135					
14.5	0.57	0.03135					
14.67	0.5	0.0275					
14.83	0.5	0.0275					
15	0.5	0.0275					
15.17	0.5	0.0275					
15.33	0.5	0.0275					
15.5	0.5	0.0275					
15.67	0.5	0.0275					
15.83	0.5	0.0275					

16	0.5	0.0275					
16.17	0.5	0.0275					
16.33	0.5	0.0275					
16.5	0.5	0.0275					
16.67	0.4	0.022					
16.83	0.4	0.022					
17	0.4	0.022					
17.17	0.4	0.022					
17.33	0.4	0.022					
17.5	0.4	0.022					
17.67	0.4	0.022					
17.83	0.4	0.022					
18	0.4	0.022					
18.17	0.4	0.022					
18.33	0.4	0.022					
18.5	0.4	0.022					
18.67	0.4	0.022					
18.83	0.4	0.022					
19	0.4	0.022					
19.17	0.4	0.022					
19.33	0.4	0.022					
19.5	0.4	0.022					
19.67	0.4	0.022					
19.83	0.4	0.022					
20	0.4	0.022					
20.17	0.4	0.022					
20.33	0.4	0.022					
20.5	0.4	0.022					
20.67	0.4	0.022					
20.83	0.4	0.022					
21	0.4	0.022					
21.17	0.4	0.022					
21.33	0.4	0.022					
21.5	0.4	0.022					
21.67	0.4	0.022					
21.83	0.4	0.022					
22	0.4	0.022					
22.17	0.4	0.022					
22.33	0.4	0.022					
22.5	0.4	0.022					
22.67	0.4	0.022					
22.83	0.4	0.022					
23	0.4	0.022					
23.17	0.4	0.022					
23.33	0.4	0.022					
23.5	0.4	0.022					
23.67	0.4	0.022					
23.83	0.4	0.022					

Cumulative Time	Total Precip	10 Min Inc. Precip		5 Year			
				24-hr-total=	6.5	Inches	
0	0.4	0.026					
0.17	0.4	0.026					
0.33	0.4	0.026					
0.5	0.4	0.026					
0.67	0.4	0.026		Source: NOAA Atlas 2			
0.83	0.4	0.026		Precipitation-Frequency Atlas of			
1	0.4	0.026		the Western United States			
1.17	0.4	0.026		Volume IX - Washington			
1.33	0.4	0.026					
1.5	0.4	0.026					
1.67	0.5	0.0325		Methodology: King County Hydrograph Program			
1.83	0.5	0.0325					
2	0.5	0.0325					
2.17	0.5	0.0325					
2.33	0.5	0.0325					
2.5	0.5	0.0325					
2.67	0.6	0.039					
2.83	0.6	0.039					
3	0.6	0.039					
3.17	0.6	0.039					
3.33	0.6	0.039					
3.5	0.6	0.039					
3.67	0.7	0.0455					
3.83	0.7	0.0455					
4	0.7	0.0455					
4.17	0.7	0.0455					
4.33	0.7	0.0455					
4.5	0.7	0.0455					
4.67	0.82	0.0533					
4.83	0.82	0.0533					
5	0.82	0.0533					
5.17	0.82	0.0533					
5.33	0.82	0.0533					
5.5	0.82	0.0533					
5.67	0.95	0.06175					
5.83	0.95	0.06175					
6	0.95	0.06175					
6.17	0.95	0.06175					
6.33	0.95	0.06175					
6.5	0.95	0.06175					
6.67	1.34	0.0871					
6.83	1.34	0.0871					
7	1.34	0.0871					
7.17	1.8	0.117					
7.33	1.8	0.117		PEAK 1 HR PRECIP = 1.0985"			
7.5	3.4	0.221					
7.67	5.4	0.351					

7.83	2.7	0.1755					
8	1.8	0.117					
8.17	1.34	0.0871					
8.33	1.34	0.0871					
8.5	1.34	0.0871					
8.67	0.88	0.0572					
8.83	0.88	0.0572					
9	0.88	0.0572					
9.17	0.88	0.0572					
9.33	0.88	0.0572					
9.5	0.88	0.0572					
9.67	0.88	0.0572					
9.83	0.88	0.0572					
10	0.88	0.0572					
10.17	0.88	0.0572					
10.33	0.88	0.0572					
10.5	0.88	0.0572					
10.67	0.72	0.0468					
10.83	0.72	0.0468					
11	0.72	0.0468					
11.17	0.72	0.0468					
11.33	0.72	0.0468					
11.5	0.72	0.0468					
11.67	0.72	0.0468					
11.83	0.72	0.0468					
12	0.72	0.0468					
12.17	0.72	0.0468					
12.33	0.72	0.0468					
12.5	0.72	0.0468					
12.67	0.57	0.03705					
12.83	0.57	0.03705					
13	0.57	0.03705					
13.17	0.57	0.03705					
13.33	0.57	0.03705					
13.5	0.57	0.03705					
13.67	0.57	0.03705					
13.83	0.57	0.03705					
14	0.57	0.03705					
14.17	0.57	0.03705					
14.33	0.57	0.03705					
14.5	0.57	0.03705					
14.67	0.5	0.0325					
14.83	0.5	0.0325					
15	0.5	0.0325					
15.17	0.5	0.0325					
15.33	0.5	0.0325					
15.5	0.5	0.0325					
15.67	0.5	0.0325					
15.83	0.5	0.0325					

16	0.5	0.0325					
16.17	0.5	0.0325					
16.33	0.5	0.0325					
16.5	0.5	0.0325					
16.67	0.4	0.026					
16.83	0.4	0.026					
17	0.4	0.026					
17.17	0.4	0.026					
17.33	0.4	0.026					
17.5	0.4	0.026					
17.67	0.4	0.026					
17.83	0.4	0.026					
18	0.4	0.026					
18.17	0.4	0.026					
18.33	0.4	0.026					
18.5	0.4	0.026					
18.67	0.4	0.026					
18.83	0.4	0.026					
19	0.4	0.026					
19.17	0.4	0.026					
19.33	0.4	0.026					
19.5	0.4	0.026					
19.67	0.4	0.026					
19.83	0.4	0.026					
20	0.4	0.026					
20.17	0.4	0.026					
20.33	0.4	0.026					
20.5	0.4	0.026					
20.67	0.4	0.026					
20.83	0.4	0.026					
21	0.4	0.026					
21.17	0.4	0.026					
21.33	0.4	0.026					
21.5	0.4	0.026					
21.67	0.4	0.026					
21.83	0.4	0.026					
22	0.4	0.026					
22.17	0.4	0.026					
22.33	0.4	0.026					
22.5	0.4	0.026					
22.67	0.4	0.026					
22.83	0.4	0.026					
23	0.4	0.026					
23.17	0.4	0.026					
23.33	0.4	0.026					
23.5	0.4	0.026					
23.67	0.4	0.026					
23.83	0.4	0.026					

Cumulative	Total	10 Min Inc.		10 Year			
Time	Precip	Precip		24-hr-total=	7.5	Inches	
0	0.4	0.03					
0.17	0.4	0.03					
0.33	0.4	0.03					
0.5	0.4	0.03					
0.67	0.4	0.03		Source: NOAA Atlas 2			
0.83	0.4	0.03		Precipitation-Frequency Atlas of			
1	0.4	0.03		the Western United States			
1.17	0.4	0.03		Volume IX - Washington			
1.33	0.4	0.03					
1.5	0.4	0.03					
1.67	0.5	0.0375		Methodology: King County Hydrograph Program			
1.83	0.5	0.0375					
2	0.5	0.0375					
2.17	0.5	0.0375					
2.33	0.5	0.0375					
2.5	0.5	0.0375					
2.67	0.6	0.045					
2.83	0.6	0.045					
3	0.6	0.045					
3.17	0.6	0.045					
3.33	0.6	0.045					
3.5	0.6	0.045					
3.67	0.7	0.0525					
3.83	0.7	0.0525					
4	0.7	0.0525					
4.17	0.7	0.0525					
4.33	0.7	0.0525					
4.5	0.7	0.0525					
4.67	0.82	0.0615					
4.83	0.82	0.0615					
5	0.82	0.0615					
5.17	0.82	0.0615					
5.33	0.82	0.0615					
5.5	0.82	0.0615					
5.67	0.95	0.07125					
5.83	0.95	0.07125					
6	0.95	0.07125					
6.17	0.95	0.07125					
6.33	0.95	0.07125					
6.5	0.95	0.07125					
6.67	1.34	0.1005					
6.83	1.34	0.1005					
7	1.34	0.1005					
7.17	1.8	0.135					
7.33	1.8	0.135		PEAK 1 HR PRECIP = 1.2675"			
7.5	3.4	0.255					
7.67	5.4	0.405					

7.83	2.7	0.2025					
8	1.8	0.135					
8.17	1.34	0.1005					
8.33	1.34	0.1005					
8.5	1.34	0.1005					
8.67	0.88	0.066					
8.83	0.88	0.066					
9	0.88	0.066					
9.17	0.88	0.066					
9.33	0.88	0.066					
9.5	0.88	0.066					
9.67	0.88	0.066					
9.83	0.88	0.066					
10	0.88	0.066					
10.17	0.88	0.066					
10.33	0.88	0.066					
10.5	0.88	0.066					
10.67	0.72	0.054					
10.83	0.72	0.054					
11	0.72	0.054					
11.17	0.72	0.054					
11.33	0.72	0.054					
11.5	0.72	0.054					
11.67	0.72	0.054					
11.83	0.72	0.054					
12	0.72	0.054					
12.17	0.72	0.054					
12.33	0.72	0.054					
12.5	0.72	0.054					
12.67	0.57	0.04275					
12.83	0.57	0.04275					
13	0.57	0.04275					
13.17	0.57	0.04275					
13.33	0.57	0.04275					
13.5	0.57	0.04275					
13.67	0.57	0.04275					
13.83	0.57	0.04275					
14	0.57	0.04275					
14.17	0.57	0.04275					
14.33	0.57	0.04275					
14.5	0.57	0.04275					
14.67	0.5	0.0375					
14.83	0.5	0.0375					
15	0.5	0.0375					
15.17	0.5	0.0375					
15.33	0.5	0.0375					
15.5	0.5	0.0375					
15.67	0.5	0.0375					
15.83	0.5	0.0375					

16	0.5	0.0375					
16.17	0.5	0.0375					
16.33	0.5	0.0375					
16.5	0.5	0.0375					
16.67	0.4	0.03					
16.83	0.4	0.03					
17	0.4	0.03					
17.17	0.4	0.03					
17.33	0.4	0.03					
17.5	0.4	0.03					
17.67	0.4	0.03					
17.83	0.4	0.03					
18	0.4	0.03					
18.17	0.4	0.03					
18.33	0.4	0.03					
18.5	0.4	0.03					
18.67	0.4	0.03					
18.83	0.4	0.03					
19	0.4	0.03					
19.17	0.4	0.03					
19.33	0.4	0.03					
19.5	0.4	0.03					
19.67	0.4	0.03					
19.83	0.4	0.03					
20	0.4	0.03					
20.17	0.4	0.03					
20.33	0.4	0.03					
20.5	0.4	0.03					
20.67	0.4	0.03					
20.83	0.4	0.03					
21	0.4	0.03					
21.17	0.4	0.03					
21.33	0.4	0.03					
21.5	0.4	0.03					
21.67	0.4	0.03					
21.83	0.4	0.03					
22	0.4	0.03					
22.17	0.4	0.03					
22.33	0.4	0.03					
22.5	0.4	0.03					
22.67	0.4	0.03					
22.83	0.4	0.03					
23	0.4	0.03					
23.17	0.4	0.03					
23.33	0.4	0.03					
23.5	0.4	0.03					
23.67	0.4	0.03					
23.83	0.4	0.03					

Cumulative Time	Total Precip	10 Min Inc. Precip		25 Year 24-hr-total=	8.5	Inches	
0	0.4	0.034					
0.17	0.4	0.034					
0.33	0.4	0.034					
0.5	0.4	0.034					
0.67	0.4	0.034		Source: NOAA Atlas 2			
0.83	0.4	0.034		Precipitation-Frequency Atlas of			
1	0.4	0.034		the Western United States			
1.17	0.4	0.034		Volume IX - Washington			
1.33	0.4	0.034					
1.5	0.4	0.034					
1.67	0.5	0.0425		Methodology: King County Hydrograph Program			
1.83	0.5	0.0425					
2	0.5	0.0425					
2.17	0.5	0.0425					
2.33	0.5	0.0425					
2.5	0.5	0.0425					
2.67	0.6	0.051					
2.83	0.6	0.051					
3	0.6	0.051					
3.17	0.6	0.051					
3.33	0.6	0.051					
3.5	0.6	0.051					
3.67	0.7	0.0595					
3.83	0.7	0.0595					
4	0.7	0.0595					
4.17	0.7	0.0595					
4.33	0.7	0.0595					
4.5	0.7	0.0595					
4.67	0.82	0.0697					
4.83	0.82	0.0697					
5	0.82	0.0697					
5.17	0.82	0.0697					
5.33	0.82	0.0697					
5.5	0.82	0.0697					
5.67	0.95	0.08075					
5.83	0.95	0.08075					
6	0.95	0.08075					
6.17	0.95	0.08075					
6.33	0.95	0.08075					
6.5	0.95	0.08075					
6.67	1.34	0.1139					
6.83	1.34	0.1139					
7	1.34	0.1139					
7.17	1.8	0.153					
7.33	1.8	0.153		PEAK 1 HR PRECIP = 1.4365"			
7.5	3.4	0.289					
7.67	5.4	0.459					

7.83	2.7	0.2295					
8	1.8	0.153					
8.17	1.34	0.1139					
8.33	1.34	0.1139					
8.5	1.34	0.1139					
8.67	0.88	0.0748					
8.83	0.88	0.0748					
9	0.88	0.0748					
9.17	0.88	0.0748					
9.33	0.88	0.0748					
9.5	0.88	0.0748					
9.67	0.88	0.0748					
9.83	0.88	0.0748					
10	0.88	0.0748					
10.17	0.88	0.0748					
10.33	0.88	0.0748					
10.5	0.88	0.0748					
10.67	0.72	0.0612					
10.83	0.72	0.0612					
11	0.72	0.0612					
11.17	0.72	0.0612					
11.33	0.72	0.0612					
11.5	0.72	0.0612					
11.67	0.72	0.0612					
11.83	0.72	0.0612					
12	0.72	0.0612					
12.17	0.72	0.0612					
12.33	0.72	0.0612					
12.5	0.72	0.0612					
12.67	0.57	0.04845					
12.83	0.57	0.04845					
13	0.57	0.04845					
13.17	0.57	0.04845					
13.33	0.57	0.04845					
13.5	0.57	0.04845					
13.67	0.57	0.04845					
13.83	0.57	0.04845					
14	0.57	0.04845					
14.17	0.57	0.04845					
14.33	0.57	0.04845					
14.5	0.57	0.04845					
14.67	0.5	0.0425					
14.83	0.5	0.0425					
15	0.5	0.0425					
15.17	0.5	0.0425					
15.33	0.5	0.0425					
15.5	0.5	0.0425					
15.67	0.5	0.0425					
15.83	0.5	0.0425					

16	0.5	0.0425					
16.17	0.5	0.0425					
16.33	0.5	0.0425					
16.5	0.5	0.0425					
16.67	0.4	0.034					
16.83	0.4	0.034					
17	0.4	0.034					
17.17	0.4	0.034					
17.33	0.4	0.034					
17.5	0.4	0.034					
17.67	0.4	0.034					
17.83	0.4	0.034					
18	0.4	0.034					
18.17	0.4	0.034					
18.33	0.4	0.034					
18.5	0.4	0.034					
18.67	0.4	0.034					
18.83	0.4	0.034					
19	0.4	0.034					
19.17	0.4	0.034					
19.33	0.4	0.034					
19.5	0.4	0.034					
19.67	0.4	0.034					
19.83	0.4	0.034					
20	0.4	0.034					
20.17	0.4	0.034					
20.33	0.4	0.034					
20.5	0.4	0.034					
20.67	0.4	0.034					
20.83	0.4	0.034					
21	0.4	0.034					
21.17	0.4	0.034					
21.33	0.4	0.034					
21.5	0.4	0.034					
21.67	0.4	0.034					
21.83	0.4	0.034					
22	0.4	0.034					
22.17	0.4	0.034					
22.33	0.4	0.034					
22.5	0.4	0.034					
22.67	0.4	0.034					
22.83	0.4	0.034					
23	0.4	0.034					
23.17	0.4	0.034					
23.33	0.4	0.034					
23.5	0.4	0.034					
23.67	0.4	0.034					
23.83	0.4	0.034					

Cumulative Time	Total Precip	10 Min Inc. Precip		50 Year			
				24-hr-total=	9	Inches	
0	0.4	0.036					
0.17	0.4	0.036					
0.33	0.4	0.036					
0.5	0.4	0.036					
0.67	0.4	0.036		Source: NOAA Atlas 2			
0.83	0.4	0.036		Precipitation-Frequency Atlas of			
1	0.4	0.036		the Western United States			
1.17	0.4	0.036		Volume IX - Washington			
1.33	0.4	0.036					
1.5	0.4	0.036					
1.67	0.5	0.045		Methodology: King County Hydrograph Program			
1.83	0.5	0.045					
2	0.5	0.045					
2.17	0.5	0.045					
2.33	0.5	0.045					
2.5	0.5	0.045					
2.67	0.6	0.054					
2.83	0.6	0.054					
3	0.6	0.054					
3.17	0.6	0.054					
3.33	0.6	0.054					
3.5	0.6	0.054					
3.67	0.7	0.063					
3.83	0.7	0.063					
4	0.7	0.063					
4.17	0.7	0.063					
4.33	0.7	0.063					
4.5	0.7	0.063					
4.67	0.82	0.0738					
4.83	0.82	0.0738					
5	0.82	0.0738					
5.17	0.82	0.0738					
5.33	0.82	0.0738					
5.5	0.82	0.0738					
5.67	0.95	0.0855					
5.83	0.95	0.0855					
6	0.95	0.0855					
6.17	0.95	0.0855					
6.33	0.95	0.0855					
6.5	0.95	0.0855					
6.67	1.34	0.1206					
6.83	1.34	0.1206					
7	1.34	0.1206					
7.17	1.8	0.162					
7.33	1.8	0.162		PEAK 1 HR PRECIP = 1.521"			
7.5	3.4	0.306					
7.67	5.4	0.486					

7.83	2.7	0.243					
8	1.8	0.162					
8.17	1.34	0.1206					
8.33	1.34	0.1206					
8.5	1.34	0.1206					
8.67	0.88	0.0792					
8.83	0.88	0.0792					
9	0.88	0.0792					
9.17	0.88	0.0792					
9.33	0.88	0.0792					
9.5	0.88	0.0792					
9.67	0.88	0.0792					
9.83	0.88	0.0792					
10	0.88	0.0792					
10.17	0.88	0.0792					
10.33	0.88	0.0792					
10.5	0.88	0.0792					
10.67	0.72	0.0648					
10.83	0.72	0.0648					
11	0.72	0.0648					
11.17	0.72	0.0648					
11.33	0.72	0.0648					
11.5	0.72	0.0648					
11.67	0.72	0.0648					
11.83	0.72	0.0648					
12	0.72	0.0648					
12.17	0.72	0.0648					
12.33	0.72	0.0648					
12.5	0.72	0.0648					
12.67	0.57	0.0513					
12.83	0.57	0.0513					
13	0.57	0.0513					
13.17	0.57	0.0513					
13.33	0.57	0.0513					
13.5	0.57	0.0513					
13.67	0.57	0.0513					
13.83	0.57	0.0513					
14	0.57	0.0513					
14.17	0.57	0.0513					
14.33	0.57	0.0513					
14.5	0.57	0.0513					
14.67	0.5	0.045					
14.83	0.5	0.045					
15	0.5	0.045					
15.17	0.5	0.045					
15.33	0.5	0.045					
15.5	0.5	0.045					
15.67	0.5	0.045					
15.83	0.5	0.045					

16	0.5	0.045					
16.17	0.5	0.045					
16.33	0.5	0.045					
16.5	0.5	0.045					
16.67	0.4	0.036					
16.83	0.4	0.036					
17	0.4	0.036					
17.17	0.4	0.036					
17.33	0.4	0.036					
17.5	0.4	0.036					
17.67	0.4	0.036					
17.83	0.4	0.036					
18	0.4	0.036					
18.17	0.4	0.036					
18.33	0.4	0.036					
18.5	0.4	0.036					
18.67	0.4	0.036					
18.83	0.4	0.036					
19	0.4	0.036					
19.17	0.4	0.036					
19.33	0.4	0.036					
19.5	0.4	0.036					
19.67	0.4	0.036					
19.83	0.4	0.036					
20	0.4	0.036					
20.17	0.4	0.036					
20.33	0.4	0.036					
20.5	0.4	0.036					
20.67	0.4	0.036					
20.83	0.4	0.036					
21	0.4	0.036					
21.17	0.4	0.036					
21.33	0.4	0.036					
21.5	0.4	0.036					
21.67	0.4	0.036					
21.83	0.4	0.036					
22	0.4	0.036					
22.17	0.4	0.036					
22.33	0.4	0.036					
22.5	0.4	0.036					
22.67	0.4	0.036					
22.83	0.4	0.036					
23	0.4	0.036					
23.17	0.4	0.036					
23.33	0.4	0.036					
23.5	0.4	0.036					
23.67	0.4	0.036					
23.83	0.4	0.036					

Cumulative Time	Total Precip	10 Min Inc. Precip		100 Year 24-hr-total=	10	Inches	
0	0.4	0.04					
0.17	0.4	0.04					
0.33	0.4	0.04					
0.5	0.4	0.04					
0.67	0.4	0.04		Source: NOAA Atlas 2			
0.83	0.4	0.04		Precipitation-Frequency Atlas of			
1	0.4	0.04		the Western United States			
1.17	0.4	0.04		Volume IX - Washington			
1.33	0.4	0.04					
1.5	0.4	0.04					
1.67	0.5	0.05		Methodology: King County Hydrograph Program			
1.83	0.5	0.05					
2	0.5	0.05					
2.17	0.5	0.05					
2.33	0.5	0.05					
2.5	0.5	0.05					
2.67	0.6	0.06					
2.83	0.6	0.06					
3	0.6	0.06					
3.17	0.6	0.06					
3.33	0.6	0.06					
3.5	0.6	0.06					
3.67	0.7	0.07					
3.83	0.7	0.07					
4	0.7	0.07					
4.17	0.7	0.07					
4.33	0.7	0.07					
4.5	0.7	0.07					
4.67	0.82	0.082					
4.83	0.82	0.082					
5	0.82	0.082					
5.17	0.82	0.082					
5.33	0.82	0.082					
5.5	0.82	0.082					
5.67	0.95	0.095					
5.83	0.95	0.095					
6	0.95	0.095					
6.17	0.95	0.095					
6.33	0.95	0.095					
6.5	0.95	0.095					
6.67	1.34	0.134					
6.83	1.34	0.134					
7	1.34	0.134					
7.17	1.8	0.18					
7.33	1.8	0.18		PEAK 1 HR PRECIP = 1.69"			
7.5	3.4	0.34					
7.67	5.4	0.54					

7.83	2.7	0.27					
8	1.8	0.18					
8.17	1.34	0.134					
8.33	1.34	0.134					
8.5	1.34	0.134					
8.67	0.88	0.088					
8.83	0.88	0.088					
9	0.88	0.088					
9.17	0.88	0.088					
9.33	0.88	0.088					
9.5	0.88	0.088					
9.67	0.88	0.088					
9.83	0.88	0.088					
10	0.88	0.088					
10.17	0.88	0.088					
10.33	0.88	0.088					
10.5	0.88	0.088					
10.67	0.72	0.072					
10.83	0.72	0.072					
11	0.72	0.072					
11.17	0.72	0.072					
11.33	0.72	0.072					
11.5	0.72	0.072					
11.67	0.72	0.072					
11.83	0.72	0.072					
12	0.72	0.072					
12.17	0.72	0.072					
12.33	0.72	0.072					
12.5	0.72	0.072					
12.67	0.57	0.057					
12.83	0.57	0.057					
13	0.57	0.057					
13.17	0.57	0.057					
13.33	0.57	0.057					
13.5	0.57	0.057					
13.67	0.57	0.057					
13.83	0.57	0.057					
14	0.57	0.057					
14.17	0.57	0.057					
14.33	0.57	0.057					
14.5	0.57	0.057					
14.67	0.5	0.05					
14.83	0.5	0.05					
15	0.5	0.05					
15.17	0.5	0.05					
15.33	0.5	0.05					
15.5	0.5	0.05					
15.67	0.5	0.05					
15.83	0.5	0.05					

16	0.5	0.05					
16.17	0.5	0.05					
16.33	0.5	0.05					
16.5	0.5	0.05					
16.67	0.4	0.04					
16.83	0.4	0.04					
17	0.4	0.04					
17.17	0.4	0.04					
17.33	0.4	0.04					
17.5	0.4	0.04					
17.67	0.4	0.04					
17.83	0.4	0.04					
18	0.4	0.04					
18.17	0.4	0.04					
18.33	0.4	0.04					
18.5	0.4	0.04					
18.67	0.4	0.04					
18.83	0.4	0.04					
19	0.4	0.04					
19.17	0.4	0.04					
19.33	0.4	0.04					
19.5	0.4	0.04					
19.67	0.4	0.04					
19.83	0.4	0.04					
20	0.4	0.04					
20.17	0.4	0.04					
20.33	0.4	0.04					
20.5	0.4	0.04					
20.67	0.4	0.04					
20.83	0.4	0.04					
21	0.4	0.04					
21.17	0.4	0.04					
21.33	0.4	0.04					
21.5	0.4	0.04					
21.67	0.4	0.04					
21.83	0.4	0.04					
22	0.4	0.04					
22.17	0.4	0.04					
22.33	0.4	0.04					
22.5	0.4	0.04					
22.67	0.4	0.04					
22.83	0.4	0.04					
23	0.4	0.04					
23.17	0.4	0.04					
23.33	0.4	0.04					
23.5	0.4	0.04					
23.67	0.4	0.04					
23.83	0.4	0.04					

APPENDIX D

Personal Communications Logs

TELEPHONE CONVERSATION RECORD

_____ Application
_____ Submittal
_____ Prequalification
_____ Inspection

DATE _____ TIME _____ a.m. p.m. PROJECT NO. _____

TO _____ FROM _____

REPRESENTING _____ PHONE NO. _____

SUBJECT _____

5-10-05 Contacted Kathy Hubbard @ Skamania for new GEO-Tech report & she stated unsure if there would be a new one, call again.

5-10-05 Spoke w/ Dave Howard DOE, will try to get memo to us about findings on-site.

SIGNATURE

TELEPHONE CONVERSATION RECORD

_____ Application
_____ Submittal
_____ Prequalification
_____ Inspection

DATE 5-18-05; 5-17-05 TIME 2:30 a.m. (p.m.) PROJECT NO. 05-013

TO Anna Martin FROM Jim Bryne

REPRESENTING WDFW PHONE NO.

SUBJECT 3 Rivers Project

Jim Bryne was asked by Anna Martin to provide info. on the Lewis/Muddy River & Pine Creek.

- He stated: Muddy River - Lahar drastically altered the riparian habitat (tree canopy down) which is now regenerating; no boulders because the area is formed out of ash/pumice; no large woody debris. 1930's Dam installed and resulted in no anadromous fish passage. Bull Trout present.
- Pine Creek: Bull trout, searun cutthroat, whitefish, & rainbow. The flow and gradient are high and conductivity is minimal. Bull trout spawn and juviles develop. All rivers very cold = good for bull trout.
- stated we should have already gotten this information from WDFW website, I stated we have I wanted further info. He went into how WDFW & USFS are concerned w/ ATV use on old logging roads, fish poaching, & Elk hunting. Quoting Dam 3 Rivers pamphlet. Stated "did not know what is going on w/ Skamania County due to the site is under their critical ordinance plan." Does not agree w/ 150' buffer and questions how we measured it. Thinks buffer should be Dam CMZ.

SIGNATURE

TELEPHONE CONVERSATION RECORD

_____ Application
_____ Submittal
_____ Prequalification
_____ Inspection

DATE 5-19-05 TIME 12:03 a.m. p.m. PROJECT NO. 05013

TO _____ FROM Margret

REPRESENTING DOE PHONE NO. 360.407.6246

SUBJECT 3 Rivers Hydrology.

Margret was asked to provide a letter stating their findings at the 3 River subject site. She stated that the letter would not be a high priority because a permit was not issued. The lack of an issued permit is the determination.

SIGNATURE

APPENDIX E

Staff Resumes

RICHARD BUBLITZ

Richard Bublitz is the Division Manager for ETC; he has 25 years experience working in the environmental field. Mr. Bublitz has a broad range of expertise, from working for state and federal agencies in Florida, Ohio and the Pacific Northwest to working the last 13 years as an Environmental Consultant. Mr. Bublitz has been responsible for project management and supervision, client interaction, project mitigation design, and agency coordination at all levels on wetland and environmental resource projects from small urban projects to large private sector projects in most of the Eco-regions in the Pacific Northwest. Recent project include Lincoln City subdivision site, Yacolt Mountain quarry development project, Government Camp mixed use project (Still Creek), Toledo Washington agricultural development, Oregon City wetland mitigation and stream restoration, and Ducks Unlimited in Vancouver Washington.

ANNA MARTIN

Anna Martin is a recent addition to ETC. Mrs. Martin graduated from Washington State University with a degree in Natural Resources. She has a license in Soil Matrix and has been working in the environmental field for three years. Mrs. Martin has worked with the University of Idaho pioneering the use of a MAP (multiple acoustic parameters) tracker, tracking Salmon and Steelhead along the Snake and Columbia River. She has experience from Idaho Fish and Game in identifying smolt, juvenile and adult fishes; stream restoration, and habitat assessment. Mrs. Martin also has experience in water quality testing and soil identification. Recently she has worked on many projects with ETC in wetland delineation, determination, permitting, mitigation, and reporting.