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WASCO COUNTY PLANNING COMMISSION AGENDA PACKET

FOR

Hearing Date: December 7, 2021

Hearing Time: 3:00 pm

Hearing Location: Electronically via Zoom
Meeting ID: 812 3953 0808

HEARING DETAILS: File # 921-18-000086-PLNG. Land Use Board of Appeals Remand (LUBA No. 2019-065) hearing for a Comprehensive Plan Amendment; Exception to Statewide Planning Goal 4; and Zone Change from Forest, F-2 (80) to Forest-Farm F-F (10) by David Wilson. The 40-acre subject property is located along and south of Sevenmile Hill Road, southeast of its intersection with Richard Road, approximately 4.3 miles northwest of The Dalles, Oregon; more specifically described as Township 2 North, Range 12 East W.M., Section 22, Tax Lot 4400; Account 884.

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Date: November 30, 2021
To: Wasco County Planning Commission
From: Wasco County Planning Office
Subject: Submittal for Hearing Dated December 7, 2021
Re: Land Use Board of Appeals Remand of #921-18-000086-PLNG

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SUMMARY OF INFORMATION
Prepared for Planning Commission Hearing

FILE #: 921-18-000086-PLNG **HEARING DATE:** December 7, 2021
NEWSPAPER PUBLISH DATE: November 10, 2021

REQUEST: Approval for:

1. Comprehensive Plan Map Amendment: Change a legal parcel designated "Forestry" to "Forest Farm";
2. Exception to Statewide Planning Goal 4 – Forest Lands; and
3. Zone Change: Change a legal parcel zoned Forest (F-2) Zone to Forest-Farm (F-F 10) Zone (Non-Resource) (remove from resource zone protections).

STAFF RECOMMENDATION: Pertaining to OAR 660-004-0025, staff concludes that the parcel does not meet the required standards of OAR 660-004-0025, and recommends that the Planning Commission deny the request based on the physically developed exception.

Pertaining to OAR 660-004-0028, staff concludes that resource use on the subject parcel has become impracticable according to its commonly understood definition, and recommends that the Planning Commission approve the request based on the "exception area" being irrevocably committed to other uses.

APPLICANT/OWNER: David Wilson, 7100 Seven Mile Hill Road, The Dalles, OR 97058

LOCATION: The subject property is located along and south of Sevenmile Hill Road, southeast of it's intersection with Richard Road, approximately 4.3 miles northwest of The Dalles, Oregon; more specifically described as:

Map/Tax Lot	Acct#	Acres
2N 12E 22 4400	884	40.16

ZONING: Forest (F-2) Zone / EPD-8, Sensitive Wildlife Habitat Overlay Zone

Attachments: **Staff Reviewer:** Daniel Dougherty, Senior Planner

A. Remand Hearing Scope Memorandum
B. Staff Recommendation and Planning Commission Options
C. Staff Report
D. Exhibits

ATTACHMENT A

REMAND HEARING SCOPE MEMORANDUM

MEMORANDUM

SUBJECT: REMAND HEARING SCOPE

TO: PLANNING COMMISSION

FROM: DANIEL DOUGHERTY, SENIOR PLANNER

DATE: 11/24/2021

Background
The Wasco County Planning Department processed David Wilson's Land Use Board of Appeals (LUBA) Remand and Review request on July 13, 2021. The request letter included new evidence for staff consideration of Mr. Wilson's Comprehensive Plan Map Amendment, Goal Exception, and Zone Change request that was approved by Wasco County, appealed, and remanded by LUBA (See *Dooley et al v. Wasco County*, LUBA No. 2019-065) on January 14, 2020.

LUBA addressed four "Assignments of Error" brought by the appellants who challenged Wasco County's record evidence, findings, and conclusions that approved Mr. Wilson's goal exception request under "OAR 660-004-0025 Lands Physically Developed to Other Uses" exception and "660-004-0028 Land Irrevocably Committed" exception. Three "Assignments of Error" found that the County's findings did not support the conclusion to grant an exception under "660-004-0028 irrevocably committed" exception. The "Fourth Assignment of Error" found an overall lack of record evidence to support the County's findings and conclusions. LUBA ordered the County's decision remanded.

Remand Scope
Staff findings and recommendations for this remand hearing are strictly limited to those criteria contested within OAR 660-004-0025 and OAR 660-004-0028.

Supporting Case Law
Von Lubken v. Hood River County, 19 Or LUBA 404 (1990). On remand from LUBA, a local government is entitled to limit its consideration of a request for land use approval to the issues that were the basis for remand.

Strawn v. City of Albany, 21 Or LUBA 172 (1991). City councilors who participated in a decision remanded by LUBA are not bound on remand to vote as they did previously.

ATTACHMENT B

STAFF RECCOMENDATION AND PLANNING COMMISSION OPTIONS

All associated maps are enclosed as **Attachment D Exhibit 15**. The full staff report with all proposed findings of fact and conclusions of law is enclosed as **Attachment C** and was available for public review at the Wasco County Planning Department for review one week prior to the December 7, 2021, hearing. The full staff report is made a part of the record. This summary does not supersede or alter any of the findings or conclusions in the staff report, but summarizes the results of Staff's review and recommendation.

SCOPE OF HEARING

The scope of this Remand Hearing is discussed in Attachment A. Findings and conclusions made with regards to other required local and state law pertaining to the original decision will remain in effect.

STAFF RECOMMENDATION

Pertaining to OAR 660-004-0025, staff concludes that the parcel does not meet the required standards of OAR 660-004-0025, and recommends that the Planning Commission deny the request based on the physically developed exception.

Pertaining to OAR 660-004-0028, staff concludes that resource use on the subject parcel has become impracticable according to its commonly understood definition, and recommends that the Planning Commission approve the request based on the "exception area" being irrevocably committed to other uses.

Staff's approach is to remain neutral and objective throughout the process and garner as much input as possible. Staff will support the recommendation that the Planning Commission feels is appropriate to forward to the Wasco County Board of Commissioners.

FORMAT

Proposed findings of fact, conclusions of law and staff recommendations are provided throughout the Staff Report**. It only takes one Criterion not being met to recommend denial of the request.**

PLANNING COMMISSION OPTIONS

A. Continuation: Based on testimony and evidence presented at the hearing, continue the hearing for more time to deliberate and/or consider the information provided. Additional testimony may provide specific reasons to support a recommendation of approval or denial.

B. Continuation: Based on testimony and evidence presented at the hearing, request additional information of staff or the applicant, and keep the record open for additional information to be provided until the next hearing at a date and time certain.

C. Recommend Approval: Based upon all of the findings of fact and conclusions of law set forth within the Staff Report, the Planning Commission can recommend approval of the exception and zone change under *OAR 660-004-0025 Exception Requirements for Land Physically Developed to Other Uses*, and recommend that the proposed exception area be rezoned to Forest-Farm (F-F 10) Zone (Non-Resource) and that the corresponding plan, map and ordinance changes be made.

ATTACHMENT B

STAFF RECCOMENDATION AND PLANNING COMMISSION OPTIONS

Recommend Approval: Based upon all of the findings of fact and conclusions of law set forth within the Staff Report, the Planning Commission can recommend approval of the exception and zone change under *OAR 660-004-0028 Exception Requirements for Land Irrevocably Committed to Other Uses*, and recommend that the proposed exception area be rezoned to Forest-Farm (F-F 10) Zone (Non-Resource) and that the corresponding plan, map and ordinance changes be made.

D. Recommend Approval With Modification(s): Approve the request with amended findings of fact and/or new conclusions of law.

E. Close the Public Hearing, and Continue Deliberation to Work Session: Acknowledge that all required evidence has been presented and heard. Continue deliberations with a scheduled work session to review and edit individual findings before making a final decision.

F. Recommend Denial: Based upon all of the findings of fact and conclusions of law set forth within the Staff Report, the Planning Commission can recommend denial of the exception and zone change under *OAR 660-004-0025 Exception Requirements for Land Physically Developed to Other Uses*, and recommend that the Commission deny the request for a Zone Change, Goal Exception, and Comprehensive Plan Amendment.

Recommend Denial: Based upon all of the findings of fact and conclusions of law set forth within the Staff Report, the Planning Commission can recommend denial of the exception and zone change under *OAR 660-004-0028 Exception Requirements for Land Irrevocably Committed to Other Uses*, and recommend that the Commission deny the request for a Zone Change, Goal Exception, and Comprehensive Plan Amendment.

G. Recommend Denial With Modification(s): Deny the request with amended findings of fact and/or new conclusions of law.

ATTACHMENT C – STAFF REPORT

File Number: 921-18-000086-PLNG

Requests:

1. Comprehensive Plan Map Amendment: Change a legal parcel designated "Forestry" to "Forest Farm";
2. Exception to Statewide Planning Goal 4 – Forest Lands; and
3. Zone Change: Change a legal parcel zoned Forest (F-2) Zone to Forest-Farm (F-F 10) Zone (Non-Resource) (remove from resource zone protections).

Applicant/Owner: David Wilson

Prepared By: Daniel Dougherty, Senior Planner

Prepared For: Wasco County Planning Commission

Procedure Type: Quasi-Judicial Hearing

LUBA Remand Background:

The Wasco County Planning Department processed David Wilson's Land Use Board of Appeals (LUBA) Remand and Review request on July 13, 2021. The request letter included new evidence for staff consideration of Mr. Wilson's Comprehensive Plan Map Amendment, Goal Exception, and Zone Change request that was approved by Wasco County, appealed, and remanded (See LUBA No. 2019-065) on January 14, 2020.

LUBA addressed four "Assignments of Error" brought by the appellants who challenged Wasco County's record evidence, findings, and conclusions that approved Mr. Wilson's goal exception request under "OAR 660-004-0025 Lands Physically Developed to Other Uses" exception and "OAR 660-004-0028 Land Irrevocably Committed" exception. Three "Assignments of Error" found that the County's findings did not support the conclusion to grant an exception under "OAR 660-004-0028 irrevocably committed" exception. The "Fourth Assignment of Error" found an overall lack of record evidence to support the County's findings and conclusions. LUBA ordered the County's decision remanded.

Remand Hearing Scope:

Staff findings and recommendations for this remand hearing are strictly limited to those criteria contested within OAR 660-004-0025 and OAR 660-004-0028.

ATTACHMENT C – STAFF REPORT

Staff Recommendation:

Pertaining to OAR 660-004-0025, staff concludes that the parcel does not meet the required standards of OAR 660-004-0025, and recommends that the Planning Commission deny the request based on the physically developed exception.

Pertaining to OAR 660-004-0028, staff concludes that resource use on the subject parcel has become impracticable according to its commonly understood definition, and recommends that the Planning Commission approve the request based on the "exception area" being irrevocably committed to other uses.

Planning Commission Hearing Date:

December 7, 2021

Location:

The subject property is located along and south of Sevenmile Hill Road, southeast of its intersection with Richard Road, approximately 4.3 miles northwest of The Dalles, Oregon; more specifically described as:

Map/Tax Lot	Acct#	Acres
2N 12E 22 4400	884	40.6

Zoning:

Forest (F-2) Zone

Comprehensive Plan Designation:

Forestry

Past Actions:

PLALEG-13-08-0002 (Rezone)
PLAPRE-14-06-0003 (Pre-Application Conference for PLAQJR-15-09-0002)
CODENF-14-01-0001 (Nuisance Complaint Regarding Noise from Wood Chipper)
PLAQJR-15-09-0002 (Comprehensive Plan Amendment, Zone Change, Goal Exception)
PLAPAR-17-05-0002 (Partition and Agricultural Structure)
PLAAPL-17-10-0001 (Appeal of Agriculture Structure Size Approval)

Submitted Comments:

Submitted comments related to this Remand hearing are addressed in this Staff Report where appropriate. Provided below is list of public comments submitted.

Agency Commentary / Attachment D (Exhibit 5)
Arthur Smith, Wasco County Public Works Director
Melanie Brown, Wasco County Chief Appraiser
Hilary Foote, Oregon Land Conservation and Development (DLCD) Farm Forest Specialist

Public Commentary / Attachment D (Exhibit 18)
Sheila Dooley submitted comments, but requested they not be addressed in Staff Report.
Mike Sargetakis, Attorney for Sheila Dooley and Jill Barker (Requested opportunity to testify at hearing)

Specialist Commentary / Attachment D (Exhibit 10)
Gary Kitzrow, M.S., Certified Professional Soil Classifier (CPSC), Certified Professional Soil Scientist (CPSS) (License # 1741), Principal Soil Taxonomist.

Maps: Full copies of all maps are located in Exhibit 15.

Property Owner: The following property is referred to in this submittal as the "Subject property:"

TAX LOT NO.	ACREAGE (Approx.)	OWNER	EXISTING DEVELOPMENT
2N 12E 22 4400	40.6 Ac.	David Wilson	Residence

I. APPLICABLE STANDARDS

A. State Law

Oregon Revised Statutes (ORS)
ORS 197.732 - Goal Exceptions

Oregon Administrative Rules (OAR)
OAR 660-015-0000(2) - Goal 2 Land Use Planning" Statewide Planning Goals and Guidelines
OAR 660-015-0000(4) - Goal 4 Forest Lands
OAR 660-004-00025 - Exception Requirements for Land Physically Developed to Other Uses
OAR 660-004-00028 - Exception Requirements for Land Irrevocably Committed to Other Uses

II. BACKGROUND INFORMATION

A. Remand History and Issues addressed in this Staff Report: The Wasco County Planning Department processed David Wilson's Land Use Board of Appeals (LUBA) Remand and Review request on July 13, 2021. The request letter included new evidence for staff consideration of Mr. Wilson's Comprehensive Plan Map Amendment, Goal Exception, and Zone Change request that was approved by Wasco County, appealed, and remanded by LUBA (LUBA No. 2019-065) on January 14, 2020. A hearing before the Planning Commission to consider the Remand request was scheduled for December 7, 2021.

B. Legal Parcel: The subject parcel was legally created by Partition PLAPAR-17-05-0002 recorded with the Wasco County Clerk on September 8, 2017. The subject parcel is considered to be legal because it meets the LUDO Section 1.090 definition of a (Legal) Parcel as it is a parcel in an existing, duly recorded partition.

C. Public Facilities and Services

1. Transportation: The subject property lies south of Sevenmile Hill Road southeast of its intersection with Richard Road, approximately 0.5 miles east of the intersection of Sevenmile Hill/State/Dry Creek Roads. Access to the subject property is from Sevenmile Hill Road.

   The 2009 Wasco County Transportation System Plan (TSP) provides the following information for Average Daily Trips (ADT) and Volume/Capacity (V/C):

	Functional Class	ADT 2009	V/C ratio from TSP
State Rd	RC Rural Major Collector	480	0.01
Dry Creek	RK Rural Minor Collector	78	n/a
Osburn Cut-off	RL Rural Local	51	n/a

The Planning Department prepared a memorandum to the County Court (Board of Commissioners) dated 2/18/98 as a staff report for the Transition Lands Study Area (TLSA) Rezoning Hearing (See 1997 TLSA full report). A 1998 TLSA memo contained the following statistics (1998 TLSA memo, Page 7):

Capacity for State Rd/7-Mile Hill Rd 1,500/day

Copies of the "1997 TLSA full report" and "1998 TLSA memo" are available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 1.

According to the latest version of the Institute of Transportation Engineers (ITE) Trip Generation Manual, a detached single family dwelling produces 9.57 Average Daily Trips (Land Use Code 210). The zone change could potentially add three dwelling units to the area's traffic load, producing approximately 29 new ADT at maximum build-out. The 2009 TSP predicted an ADT of 600 by 2030 with a Volume/Capacity (V/C) ratio of 0.03 for State Road (at Sevenmile Hill Road). Wasco County has not established a mobility standard for Sevenmile Hill Road. However, the Wasco County 2009 Transportation System Plan utilized the Oregon Highway Plan (OHP) mobility standard of 0.70 as a comparison figure. Based on the carrying capacity of State Road/Sevenmile Hill Road, the addition of three dwelling units will not cause the V/C ratio to rise above 0.70. The TSP predicted that the V/C ratio would reach 0.03 by 2030 at 600 ADT, thus, even with the addition of three new dwelling units, the ADT for State Road/Sevenmile Hill Road in 2030 will only equal 629 ADT, which does not approach the 0.70 V/C ratio, nor the 1,500/day capacity of State Road/Sevenmile Hill Road. Using that mobility standard, should the proposed zone change produce the maximum development allowed, it would not have a significant impact on Wasco County's transportation facilities.

A copy of the "2009 Wasco County Transportation System Plan" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG.

2. Water and Sewer: Because of the rural nature of the area, there is no public water system that would be available to serve existing or future residences on the subject property or surrounding lands. A Geologic Survey was published in 1996 as part of the TLSA study (see below under Land Use History) which included a survey of wells and groundwater levels to determine the capacity for development in the Sevenmile Hill area. The land around the subject property was found to have groundwater in relatively good quantities at the time. The static water levels were found to be less than 50' and the depth to base of aquifer was found to be between 100' and 199.' ("TLSA Study Area Ground Water Evaluation – Wasco County, Oregon", Jervey Geological Consulting ("Groundwater Study"), Pages 12-13.) The predominant source of water in this area is from wells. The general conclusion of the 1996 groundwater study was that this area had capacity to support additional residential development. The study also recommended that groundwater levels be periodically monitored to assess the impact of ongoing rural development.

   Water resources for residential use in this area do exist, and are being closely monitored by the Oregon Water Resources Department, as recommended by the TLSA study. According to an October 12, 2018 email between staff and Watermaster Robert Wood, "Sevenmile Hill/ Mosier groundwater levels are declining about 2 feet per year on average". The Oregon Water Resources Department is "not allowing new water rights in that area as the

aquifers are either withdrawn from new appropriations or it has been determined water isn't available within the capacity of the resources." He stated that those uses that are exempt from water rights, such as "single or group domestic use, irrigation of no more than ½ acre lawn/ noncommercial garden, stock use" are still being allowed but that new rules are in place requiring more stringent well construction.

There are no public sewer facilities available in the area. Each of the three potential single family dwelling units will be required to handle its own sewage as required by law. At the development stage, each residential development will have to go through the site evaluation process for an individual septic system and private well. A maximum overall density of 1 residence per 10 acres has provided the necessary land area for adequate handling of sewage for individual properties in areas surrounding the subject property.

A copy of the "TLSA Study Area Ground Water Evaluation – Wasco County, Oregon" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 1.

3. Electricity: Wasco Electric Co-op power lines are located on Sevenmile Hill Road, in close proximity to the site. Electric power is available to serve the existing subject property and each of the three potential properties that may be created. Wasco Electric Co-op currently serves the residence located on the subject property.

4. Fire Protection and Prevention: The subject property is within the Mid-Columbia Fire and Rescue District boundaries. The District has cooperation agreements with the Oregon Department of Forestry and with the Mosier Fire Protection District. When an alarm is received in one agency, it is also transferred to the other two, and when necessary, there is a combined, coordinated response to fire emergencies. Any future development proposals will be required to comply with Wasco County LUDO Chapter 10 Fire Safety Standards.

D. Land Use History:

Transitional Lands Study Area (TLSA) Project

In 1993, Wasco County began work on the Transition Lands Study Area Project ("TLSA") in response to concerns about development in northern Wasco County, and particularly in the area surrounding the parcels in this current proposal, known as the Sevenmile Hill area. These concerns included "availability of groundwater to serve domestic needs, fire hazard, conflict with wildlife, and available lands for rural residential lifestyle in this developing area."

The first phase of the TLSA was a groundwater study. The initial study was published in December 1996 as the "TLSA Ground Water Evaluation, Wasco County, Oregon" by Jervey Geological Consulting (The Groundwater Study"). On September 12, 1997, the final report for the TLSA was published, incorporating the Groundwater Study. The TLSA report included recommendations outlining the sub-areas within the study area that were suitable for residential development, rating them with scores for resource values and development values. Referring to Figure 11 in that report, which is a map indicating the combined values of the two scales, the properties in this current proposal were rated "L/H," meaning that they scored low for Resource Values and high for Development Values (with the exception of the northern part of parcel 2900, which was rated H/H, or having high scores for both Development Values and Resource Values).

The final Recommendation of the TLSA for the Sevenmile Hill area included the following:

- *Retain the existing R-R (5) and A-1 (80) EFU zoning.*
- *Retain the existing F-F (10) areas that have a higher resource value or a low development value (for instance, in areas where water availability is unknown).*
- *Rezone the remainder of the F-F (10) lands to R-R (10). F-F (10) areas would be able to transfer development rights to the area identified as the test area.*

No mention is made in this report of how land within the Forest (F-2) Zone should be addressed. After the TLSA study, eight parcels of Forest-Farm (F-F 10) Zone (Non-Resource) land in the Sevenmile Hill area north of the subject property were converted to Rural Residential (R-R (10)) Zone, removing the requirement for conditional use review of proposed non-farm/forest dwellings (ZNC 99-101 ZO-L and CPA 99-103-CP-L). The County has approved single family dwellings that have subsequently been built on many properties along Seven Mile Hill Road near the proposed exception area.

Betzing Appeal

The County's approval of dwellings south of Sevenmile Hill Road in recent years and the rezoning of portions of the Sevenmile Hill area (in the proximity of the Wilson property) were contentious in the late 1990s. Several appeals were filed by a Mr. Kenneth Thomas, one of which was for a property owned by Mr.Jospeh Betzing. Mr. Thomas is a member of the Society of American Foresters, and owns and manages approximately 1100 acre tract of timberland south of the proposed exception area. The appeals were heard by the Oregon Land Use Board of Appeals (LUBA).

One of Mr. Thomas' central concerns was that rural residential development is generally incompatible with commercial forestry—that the approval of additional dwellings south of Sevenmile Hill Road would increase the fire risk for his commercial forest lands to the south and increase the chance that a forest fire in the commercial forest lands would spread to abutting residences and pose a risk to the community.

The LUBA record of hearing (1997-98), and findings leading to the eventual approval of a dwelling on a 5.1 acre parcel south of Sevenmile Hill Road and abutting the subject property (applicant Joseph Betzing), indicated that the area in which the subject property is located is subject to high wind gusts as well as stable high wind patterns. The area is characteristically dry and subject to drought, which leads to high mortality in forest stands. That record also indicated that the Oregon Department of Forestry (ODF) has identified the area as one of particularly high fire risk during the fire season, and has repeatedly identified residential and associated buildings as significant fire hazards. ODF also testified that "dwellings increase the risk of fire, restrict control tactics, complicate the protection priorities and require additional coordination that result in increased cost." (Betzing Record, page 230.)

Settlement Agreement and 2013 ZNC/CPA/EXC decision

To try and address multiple LUBA cases and find solutions, a Settlement Agreement was entered into on January 5, 2000, between the County Planning Director, the appellant Kenneth Thomas, and applicant Joseph Betzing. The settlement was based on a mutual understanding that the area south of Sevenmile Hill Road included land that was already built (with existing residences),

and committed (through existing plan and zone designations and development approvals) to low-density rural residential uses. The logical boundary, separating commercial forestry uses from built and committed residential areas, was identified as the Bonneville Power Administration Transmission Line Easement also known as "Bonneville - The Dalles Line." The BPA easement area is maintained clear of trees, and acts, because of its width and scarification, as a significant physical break between rural residential uses in the Sevenmile Hill Road area and commercial forestry uses to the south. It was thought that the powerline right-of-way/ easement area would separate and therefore mitigate the potential fire impacts associated with low-density residential uses in the Sevenmile Hill area.

Relevant terms of the Settlement Agreement state:

> The County Department Staff, acting in good faith shall use best efforts in supporting a legislative zone change and comprehensive plan change to modify the zoning and comprehensive plan designation of the property marked in Exhibit A, from Forest (F-2) Zone to Forest-Farm (F-F 10) Zone (Non-Resource).
>
> To institute these recommended changes, the county's comprehensive plan should be amended, to take an exception to Goal 4 and to recognize that the area has changed enough to require a new plan designation. The new designation should permit not just small-scale forest-farm uses, but also low-density rural residential use. In this circumstance, the proposed zoning designation is Forest-Farm, with a ten-acre minimum lot size. Residential use of the area in conjunction with forest or farm uses is allowed outright on parcels meeting the minimum lot size, and otherwise, only subject to a conditional use permit. To further promote the goal of protecting commercial forestry in the area, a Limited Use, Forest Protection Overlay Zone, will require clustering of any proposed dwellings toward the northern portion of the area adjacent to existing residential lots and close to existing road access, and establish additional fire prevention standards and conditions. These measures will improve the utility of the subject property to serve as a buffer between rural residential uses in the area and commercial forestry uses to the south. (Settlement Agreement, Page 1).

A copy of the "Settlement Agreement" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 2.

To implement this change, and by resolution of the County Court, staff proposed a Comprehensive Plan Amendment, Goal Exception, Zone Change, and LUDO Amendment proposal in 2013 sought to apply the Forest-Farm (F-F 10) Zone (Non-Resource) to all or a portion of eight parcels (totaling approximately 287 acres), including the subject parcel of this application, all of which were (and still are) within the Forest (F-2) Zone. This action would have allowed potential development of a maximum of 22 rural residences in an area south of Sevenmile Hill Road (County Road 507) and Dry Creek Road (County Road 405), and north of the southern boundary of Bonneville Power Administration's (BPA) Bonneville - The Dalles Line right-of-way/easement. That right-of-way/easement would have functioned as a physical divider between existing rural residential development and suggested new Forest-Farm (F-F 10) Zone (Non-Resource) lands on the one hand, and the commercial forestry lands south of the easement on the other.

After a 4-3 Planning Commission vote to recommend approval to the Board of County Commissioners, the Board voted 2-0 to deny the proposal (PLALEG-13-08-0002). A review of the

application materials, comments, reports, and the minutes of that meeting indicates that the major concerns were fire safety, and water supply.

lll. FINDINGS

1. State Laws – Oregon Revised Statutes, Planning Goals & Oregon Administrative Rules

1. Introduction

The applicant seeks the following:

(1) Comprehensive Plan Map Amendment: Change a legal parcel designated "Forest" to "Forest Farm";
(2) Exception to Statewide Planning Goal 4 – Forest Lands; and
(3) Zone Change: Change a legal parcel zoned Forest (F-2) Zone, Forest-Farm (F-F 10) Zone (Non-Resource) (remove from resource zone protections).

In order to alter the subject property's land use designation from Forestry to Forest-Farm and to implement that designation through its zoning ordinance, the County must adopt an exception to Statewide Planning Goal 4 – Forest Lands, and amend the Wasco County Comprehensive Plan.

An exception to Statewide Planning Goal 4 – Forest Lands is allowed under statutory and administrative laws. Those Oregon Revised Statutes (ORS) and Oregon Administrative Rules (OAR) that provide for a Statewide Planning Goal exception are provided below:

ORS 197.732

(1) As used in this section:

(a) "Compatible" is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses.

(b) "Exception" means a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that:

(A) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general applicability;

(B) Does not comply with some or all goal requirements applicable to the subject properties or situations; and

(C) Complies with standards under subsection (2) of this section.

(2) A local government may adopt an exception to a goal if:

(***)

(b) The land subject to the exception is irrevocably committed as described by Land Conservation and Development Commission rule to uses not allowed by the

applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable;

(***)

(4) A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the standards of subsection (2) of this section have or have not been met.

(5) Each notice of a public hearing on a proposed exception shall specifically note that a goal exception is proposed and shall summarize the issues in an understandable manner.

(***)

Planning Goal 2, PART II EXCEPTIONS, (OAR 660-015-0000(2))

A local government may adopt an exception to a goal when:

(a) The land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable Goal; [or]

(b) The land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable;"

Exception means a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that;

(a) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general applicability;

(b) Does not comply with some or all goal requirements applicable to the subject properties or situations; and

(c) Complies with standards for an exception.

Chapter 660, Division 4 INTERPRETATION OF GOAL 2 EXCEPTION PROCESS (OAR-660-004)

OAR-660-004-0005
Definitions

For the purpose of this division, the definitions in ORS 197.015 and the Statewide Planning Goals shall apply. In addition, the following definitions shall apply:

(1) An "Exception" is a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that:

(a) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general applicability;

(b) Does not comply with some or all goal requirements applicable to the subject properties or situations; and

(c) Complies with ORS 197.732(2), the provisions of this division and, if applicable, the provisions of OAR 660-011-0060, 660-012-0070, 660-014-0030 or 660-014-0040.

(2) "Resource Land" is land subject to one or more of the statewide goals listed in OAR 660-004-0010(1)(a) through (g) except subsections (c) and (d).

(3) "Nonresource Land" is land not subject to any of the statewide goals listed in OAR 660-004-0010(1)(a) through (g) except subsections (c) and (d). Nothing in these definitions is meant to imply that other goals, particularly Goal 5, do not apply to nonresource land.

OAR-660-004-0010
Application of the Goal 2 Exception Process to Certain Goals

(1) The exceptions process is not applicable to Statewide Goal 1 "Citizen Involvement" and Goal 2 "Land Use Planning." The exceptions process is generally applicable to all or part of those statewide goals that prescribe or restrict certain uses of resource land, restrict urban uses on rural land, or limit the provision of certain public facilities and services. These statewide goals include but are not limited to:

(***)

(b) Goal 4 "Forest Lands"; however, an exception to Goal 4 "Forest Lands" is not required for any of the forest or nonforest uses allowed in a forest or mixed farm/forest zone under OAR chapter 660, division 6, "Forest Lands";

Planning Goal 4, FOREST LANDS, (OAR 660-015-0000(4))

To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

Forest lands are those lands acknowledged as forest lands as of the date of adoption of this goal amendment. Where a plan is not acknowledged or a plan amendment involving forest lands is proposed, forest land shall include lands which are suitable for commercial forest uses including adjacent or nearby lands which are necessary to permit forest operations or practices and other forested lands that maintain soil, air, water and fish and wildlife resources.

FINDING: As provided above, both Goal 2: OAR 660-015-0000(2) and OAR 660-004-0005(1), adopt the legislative (ORS 197.732) definition of "exception" with minor variation. Furthermore, Goal 2: OAR 660-015-0000(2)**,** provides that "[a] local government may adopt an exception to a goal" as long as the underlying request "[c]omplies with standards for an exception." OAR 660-004-0010(1)(b), explicitly provides for a "Goal 2 Exception Process" which "is generally applicable to all or part of those statewide goals which prescribe or restrict certain uses of resource land," to include "Goal 4 'Forest Lands."

In order to effectuate the applicant's request to change the subject property's land use designation from "forestry" to "forest-farm", state law requires that Wasco County adopt an exception to Statewide Planning Goal 4 – Forest Lands, and amend the Wasco County Comprehensive Plan. In order for Wasco County to adopt an exception to Statewide Planning Goal 4, the applicant must demonstrate through clear and objective evidence compliance with applicable standards provided in either "OAR 660-004-0025 Exception Requirements for Land Physically Developed to Other Uses" or "OAR 660-004-0028 Exception Requirements for Land Irrevocably Committed to Other Uses".

As provided above in Section II.A of this report, the Wasco County Planning Department processed David Wilson's Land Use Board of Appeals (LUBA) Remand and Review request on July 13, 2021. The request letter included new evidence for staff consideration of Mr. Wilson's Comprehensive Plan Map Amendment, Goal Exception, and Zone Change request that was approved by Wasco County, appealed, and remanded by LUBA (LUBA No. 2019-065) on January 14, 2020.

The LUBA opinion (See LUBA No. 2019-065) addressed four "Assignments of Error" brought by the appellants who challenged Wasco County's record evidence, findings, and conclusions that approved Mr. Wilson's goal exception request under "OAR 660-004-0025 Lands Physically Developed to Other Uses" exception and "660-004-0028 Land Irrevocably Committed" exception. Three "Assignments of Error" specifically found that the County's findings did not support the conclusion to grant an exception under "660-004-0028 irrevocably committed" exception. The "Fourth Assignment of Error" found an overall lack of record evidence to support the County's findings and conclusions. LUBA ordered the County's decision remanded.

Mr. Wilson has provided new evidence and requests a remand hearing to consider his request. Below, staff has re-evaluated evidence provided in support of the original request as well as the new evidence submitted. Staff has only provided findings and recommendations for those four issues (Assignments of Error) contested in the appeal to LUBA (See LUBA No. 2019-065). Staff findings and recommendations for this remand hearing are strictly limited to those criteria contested within OAR 660-004-0025 and OAR 660-004-0028.

2. ***Exception Requirements for Land Physically Developed to Other Uses.***
OAR 660-004-0025 contains standards for adoption of a "physically developed" exception.

<u>OAR 660-004-0025:</u>
Exception Requirements for Land Physically Developed to Other Uses

(1) A local government may adopt an exception to a goal when the land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal. Other rules may also apply, as described in OAR 660-004-0000(1)

(2) Whether land has been physically developed with uses not allowed by an applicable goal will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception.

FINDING: Information concerning the "physically developed area" of the subject parcel is provided by the original record, Wasco County GIS data (2018 Aerial OSIP Imagery), and the additional evidence (Remand Request Letter & Remand Request Soil Data) submitted by Mr. David Wilson on July 13, 2021.

Analysis includes the following: (1) Physical Development & Fire Buffer & Maintenance Area Estimates; (2) STAFF ANALYSIS (Physical Development & Fire Buffer & Maintenance Area Estimates); and (3) STAFF CONCLUSIONS & RECCOMENDATIONS.

(1) Physical Development & Fire Buffer & Maintenance Area Estimates. Original application materials provide the following description of the existing physical development of the designated exception area (subject parcel):

> Applicant/Owner: David Wilson Application Form (Signed May 4, 2018)
> The subject property is improved with a log home with surrounding decks covering approximately 2,680 ft^2 and a 720 ft^2 basement located approximately halfway between the north and south boundaries and in the western one third of the property. A driveway serving the residence and properties to the south extends from the northwest corner of the subject property southward, generally paralleling the western boundary. There are two barns with stalls located generally east of the log home, each covering approximately 1,110 ft^2 for total coverage of 2,220 ft^2.
>
> Further east of the hay loft and barn there is an original home site with cabin covering 1,980 ft^2 located generally east of the log home. There is an old barn located south of the cabin covering 1,200 ft^2. (Original Application, Page 27).

A copy of the "Original Application" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 3.

Information submitted on remand provides the following estimates regarding the quantification of existing structures and fire buffers:

> Applicant/Owner: David Wilson Remand Letter (Signed July 9, 2021)
> Applicant has again discussed the power line buffer with the power company (15' from centerline), and has applied those in the attached calculations, in addition to a 50' buffer around each structure. Excluding the many roads on the subject property, and ignoring the pond and septic drain fields, the developed area comprises approximately 24.5% of the subject property. Adding 50' buffers along Seven Mile Hill Road and the driveway easement serving properties to the south increases this figure to 32.81%. With over half the property consisting of unsuitable soils, there is virtually no land available to support resource use.

A copy of the "Remand Letter" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 4.

> Power Lines
> 15' either side from center line
> 10,024 linear feet x 30' = 300,730 ft2
>
> Structures
> 50' each side from dimensions below

Log Home 80 x 100 = 36,000 ft2
Barn #1 24 x 35 = 16,740 ft2
Barn #2 30 x 30 = 16,900 ft2
Lean To 16 x 30 = 15,627 ft2
Old Homestead Home 55 x 55 = 24,025 ft2
Old Homestead Barn 25 x 55= 16,875 ft2

Total square footage developed area 426,887 ft2

40 acres = 1, 7 42,700 ft2
426,887/1,740,700 = .2452 (24.52% of total area)

Note: Total does not include roads, natural features, buffers near road or property boundaries, or septic tanks and drainfields

50' buffer along 7 Mile Hill Road = 65,000 ft2
50' buffer along driveway easement= 79,300 ft2

571,187/1,740,700 =.3281 (32.81% of total area)

(Remand Letter, Pp. 3-4).

A copy of the "Remand Letter" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 4.

The applicant also submitted a sitemap illustrating approximate locations of existing physical development, infrastructure, and natural features. (See Below "Applicant Site Map").



Applicant Site Map

A copy of the "Applicant Site Map", "Aerial Photo" and all maps included in this Staff Report are available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 15.

The applicant's site map was not to scale, did not illustrate the estimated distances of utility lines, or provide illustrations of fire fuel break or maintenance buffer zones. Additionally, specific land use criteria that the applicant used in support of the 50' buffer zone requirements that were calculated for the "driveway easements" or "7 Mile Hill Road" was not provided.

(2) STAFF ANALYSIS (Physical Development & Fire Buffer & Maintenance Area Estimates). The original staff reviewer conducted a site visit on June 21, 2018, and confirmed the applicant's description of existing physical development on the subject parcel. A driveway runs along the western property line and provides access to the single family dwelling and accessory structure situated on the west portion of the parcel. This driveway also provides physical access to the single family dwelling located on the neighboring south adjacent parcel, that is owned by the applicant (David Wilson).

A decommissioned farm house is situated at the center of the subject parcel and is served by an additional driveway that bisects the property. This area also contains two additional accessory structures (A pump house and a barn). The property is served by two wells. As provided in submitted well reports, the two wells are capable of serving four dwelling units as each well is permitted to serve two dwellings each. (See below "Physical Development Map").

Physical Development Map



1:4,514

0 0.03 0.05 0.1 mi

0 0.04 0.09 0.17 km

©OpenStreetMap (and) contributors, CC-BY-SA, Oregon Statewide Imagery Program (OSIP) - Oregon Imagery Framework Implementation Team, Wasco County GIS, Lane County, Assessor, Wasco County GIS
Wasco County Planning

Subject Parcel

Developed Areas

N

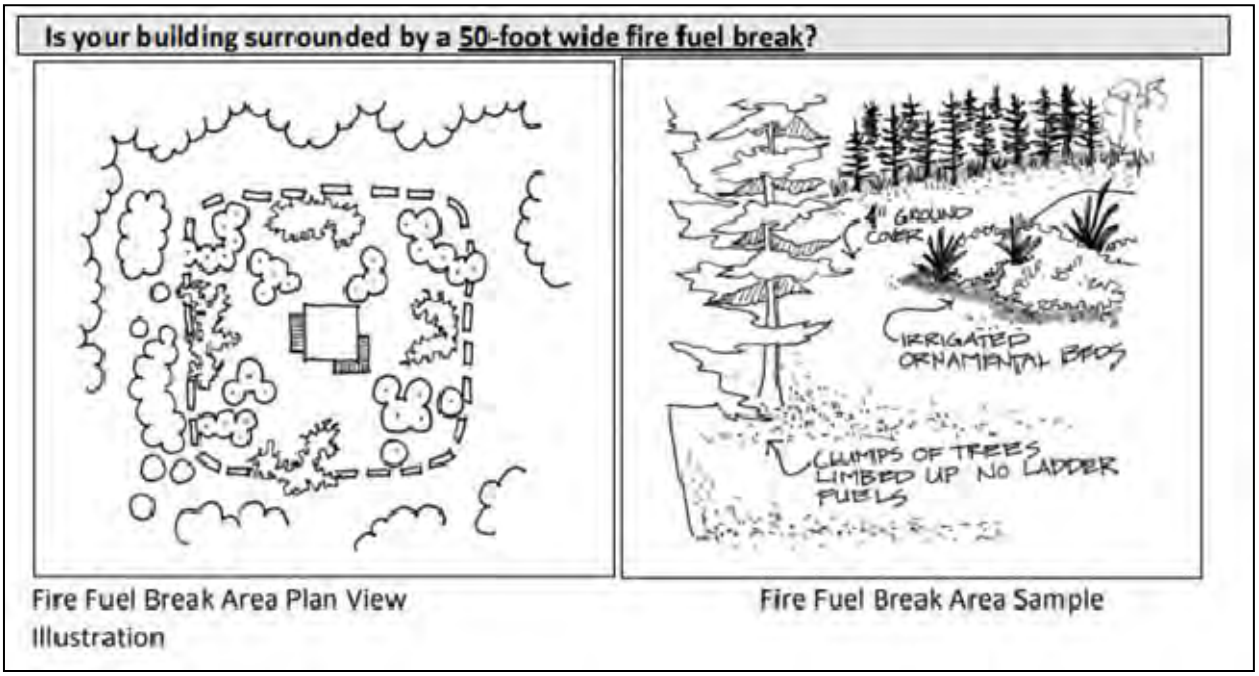
This product is for informational purposes and has not been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

The original staff report provided that approximately 12.5% of the subject parcel was physically developed. It is unclear whether the findings quantified required fire fuel break and maintenance buffer zone areas into the overall percentage of land that is considered "physically developed". The applicant submitted fire fuel break buffer zone area estimates; however, the methodology used for those calculations is unclear. Staff has provided required fire safety criteria and buffer zone area calculation methodology below for confirmed fire fuel break land use criteria and maintenance areas. Staff analysis did not address the unconfirmed 50' fire and maintenance buffer areas that the applicant calculated for the "driveway easements" or "7 Mile Hill Road".

Regarding fire fuel break buffer zones for existing structures, the Wasco County Land Use and Development Ordinance Chapter 10 Section 10.020 - Applicability of Fire Safety Standards applies to the "all rural zones (all zones outside an Urban Growth Boundary)." (Chapter 10, Page 1). All rural zones, including the Forest (F-2) Zone, are subject to fire standards; however, the applicability of the specific standards varies by zone and by use type.

Criteria outlining the creation, design, and maintenance of fuel break buffer zones is provided in Section 10.120 - Defensible Space – Clearing and Maintaining a Fire Fuel Break. Section 10.120 provides the following:

> ***Section 10.120 - Defensible Space – Clearing and Maintaining a Fire Fuel Break***
> *Fire Fuel Break Includes: Irrigated fire resistant domestic plantings, low volume slow burning plantings, and trees encouraged to provide shade and ground cooling. Trees should be grouped. Groups of trees shall be spaced to avoid creation of a continuous tree canopy. Trees shall be kept in healthy fire resistant condition. Trees shall be limbed up to create a vacant area between ground fuels and canopy fuels. Under story vegetation shall be minimized and ground cover shall be kept trimmed low to the ground.*



MAINTENANCE STANDARDS FOR FIRE FUEL BREAK AREA:

- *Ground cover maximum 4 inches tall;*
- *Trees limbed up approximately 8 feet from the ground,*

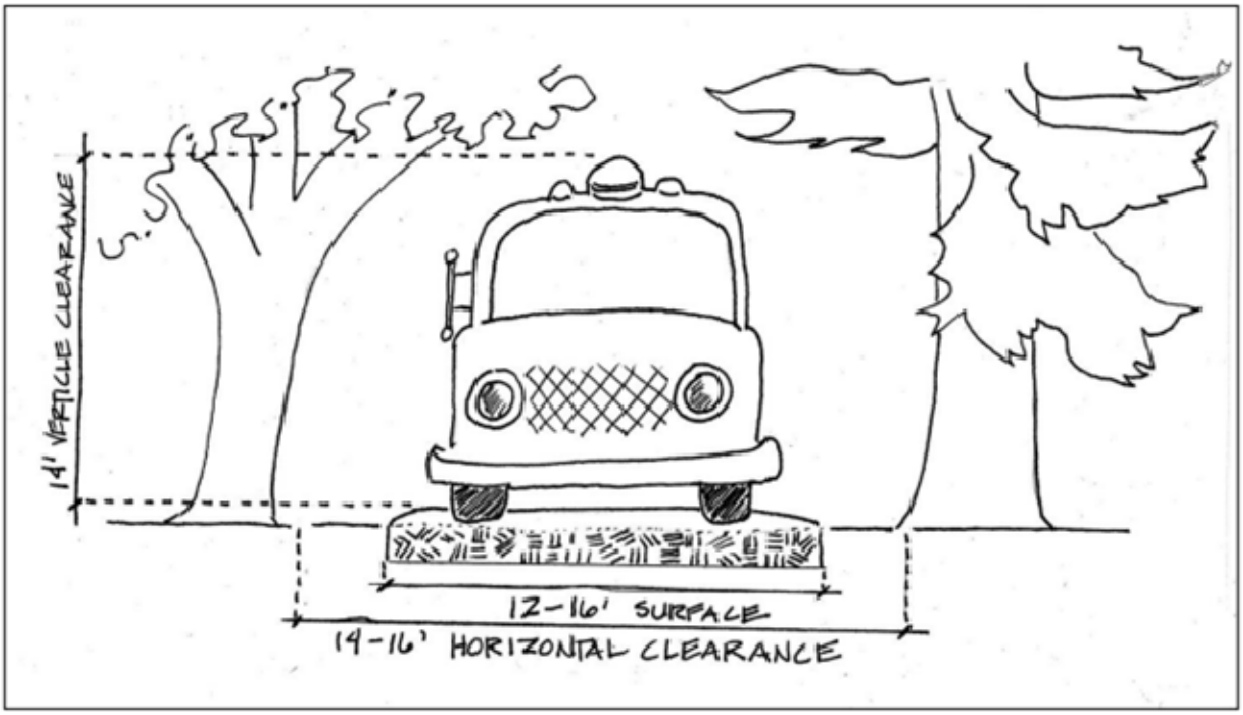
- *Trees kept free from dead, dry, or flammable material;*
- *Ladder fuels must be removed;*
- *No shrubs or tall plants under trees;*
- *Shrubs only in isolated groupings that maximize edges of ornamental beds to avoid continuous blocks of ground fuel;*
- *Keep shrubs and ornamental beds 15 feet away from edge of buildings and drip line of tree canopy; and*
- *Use well irrigated or flame resistant vegetation (See OSU Extension Service publication called "Fire Resistant Plants for Oregon Home Landscapes")*

***A.** This standard is applicable to all dwellings, accessory buildings, and agricultural buildings in: - All Zones*

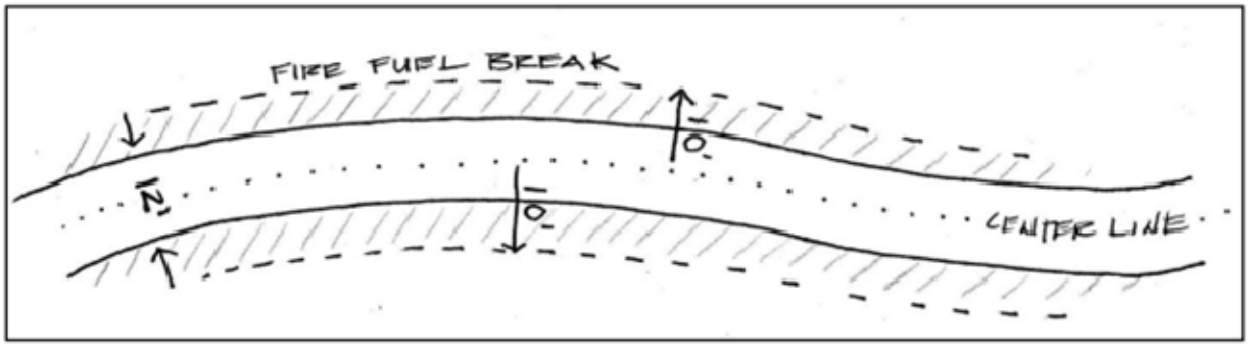
(WC-LUDO Chapter 10 Fire Safety Standards, Pp. 9-10).

Regarding required fire fuel break buffer zone areas along "residential" private access driveways, the Wasco County Land Use and Development Ordinance (WC-LUDO) Chapter 10 Section 10.140 - Access Standards - Providing safe access to and escape from your home, subsections B & C, requires the following:

Section 10.140 - Access Standards - Providing safe access to and escape from your home
***C.** Does your residential driveway provide adequate clearance for emergency vehicles and is there sufficient clear area along the driveway to allow responders to maneuver safely around their vehicles?*



Responding vehicles need over 13 vertical feet and a minimum of 14 horizontal feet of clearance to pass through vegetation along a driveway.



A fire fuel break extending 10 feet either side of the center line of the driveway is required.

C. *This Standard is applicable to all residential driveways in: -All Zones*

(WC-LUDO Chapter 10 Fire Safety Standards, Pp. 18-19).

A copy of the WC-LUDO Chapter 10 Fire Safety Standards is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG.

One of the primary purposes for fire fuel break buffer zone areas is to "reduce threats to life, safety, property, and resources by improving access to and defensibility of development in rural areas." (WC-LUDO Chapter 10 Fire Safety Standards Section 10.010, Page 1). In Wasco County, fire fuel break buffer zone area requirements are explicitly linked to existing and proposed physical development that includes dwellings, accessory structures, agricultural structures, and private access driveways. Fire fuel break buffer zone areas are specifically designed to be kept free from dead, dry, or flammable material and must be rigorously maintained to ensure fuel sources are removed. Although the buffer zone criteria do not mandate the area be completely free of tree and other shrub like vegetation, demonstrating outright compliance or achieving compliance through a Fire Safety Mitigation Plan is required under the WC-LUDO Chapter 10 Fire Safety Standards. Thus, fire fuel break buffer zone areas required under Chapter 10 are considered an integral part of the unit of land's developed area, and shall be included in the calculated percentage of physically developed areas on the subject parcel for this analysis.

Additionally, private maintenance areas for overhead utility lines and public road rights of way are calculated in this analysis due to their nexus to Chapter 10 Fire Safety Standard's purpose of "[reducing] threats to life, safety, property, and resources by improving access to and defensibility of development in rural areas." Id.

Physical Development & Development Fire Buffers. Staff analysis utilized information from the Wasco County Assessor's Office, the application's site map, and the Wasco County Geographical Information System Measurement Tool to approximate the parcel's physical development and fire fuel break buffer zone areas. In determining the subject parcel's physical developed areas, staff took into account that the square feet of private access driveway space cannot be calculated and used as part of the parcel's physically developed area (See *Dooley et al v. Wasco County*, LUBA Opinion No. 2019-065, Page 19), "Finally, we agree with petitioners that the county's findings are inadequate where they fail to explain why the two driveways on the property should be considered as physically developed, when roads are uses allowed by Goal 4.")

A copy of See *Dooley et al v. Wasco County*, LUBA Opinion No. 2019-065 is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 7.

Fire fuel break buffer zone areas for physical development such as dwelling units, accessory structures, and agricultural structures were calculated (approximated) using the below method:

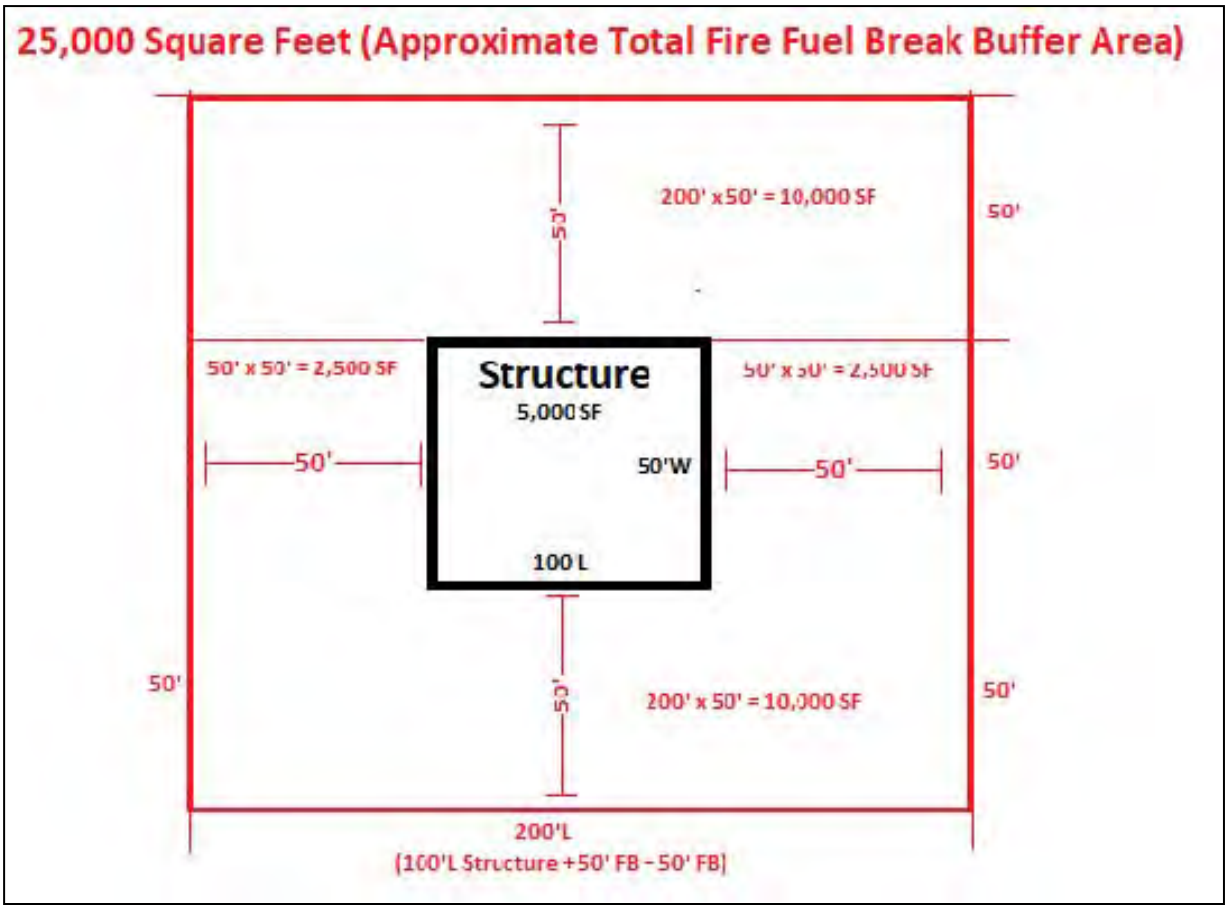


Diagram: Fire Fuel Break Calculation Method

A copy of the "Diagram: Fire Fuel Break Calculation Method" and all created diagrams are available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 16.

Physical development areas and fire fuel break buffer zone areas for dwelling units, accessory structures, and agricultural structures are provided below:

1. Dwelling unit and developed curtilage (80' x 100' = 8,000 SF) // Fire Break = 28,000 SF
2. Accessory/Agricultural Structure #1 (24' x 35' = 840 SF) // Fire Break = 15,900 SF
3. Accessory/Agricultural Structure #2 (30' x 30' = 900 SF) // Fire Break = 16,000 SF
4. Accessory/Agricultural Structure #3 (16' x 30' = 480 SF) // Fire Break = 14,600 SF
5. Dwelling unit (Old Homestead) (55'L x 55'W = 3,025 SF) // Fire Break = 21,000 SF
6. Agricultural Structure (Old Homestead Barn) (25' x 55' = 1,375 SF) // Fuel Break = 18,000 SF

Access Drive Fire Buffers. The following driveway lengths and widths are estimated from the original application materials, site map, Remand Letter, and Wasco County Geographical Information System

Measurement Tool. Although the square footage of existing driveways cannot be considered physical development in this analysis, the required fire fuel break buffer zone areas are considered.

Fire fuel break buffer zone areas for private access drives were calculated (approximated) using the below method:

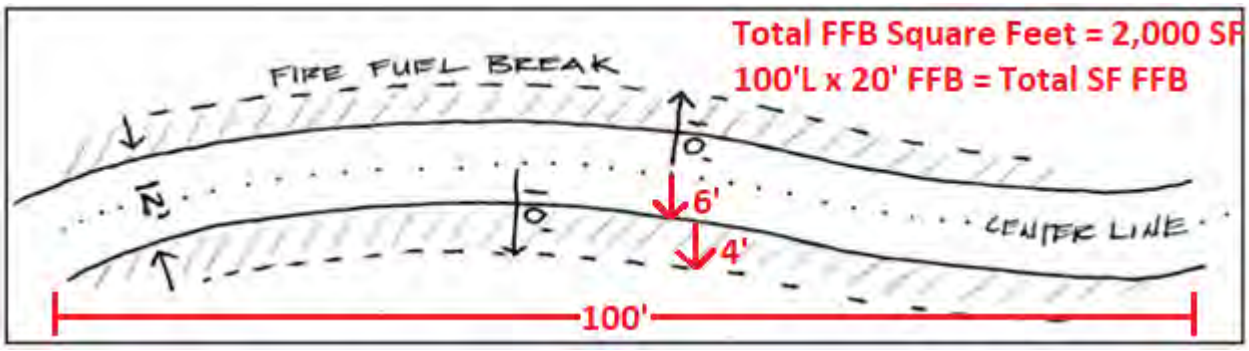


Diagram: Access Drive Fire Fuel Break Calculation Method

Driveway #1: Approx. 20'W x 480'L moving southward from Sevenmile Hill Rd. to driveway split.
Driveway #2: Approx. 20'W x 681'L moving southeast from driveway split to dwelling unit.
Driveway #3: Approx. 20'W x 946'L moving southward from driveway split to south adjacent parcel.
Driveway #4: Approx. 20'W x 1,280' moving southward from Sevenmile Hill Rd. to south parcel.

The following fire fuel break buffer zone areas were calculated for the existing access drives on the subject parcel:

Driveway #1 Fire Fuel Break Buffer Zone Area: 9,600 SF = 480'L x 20'
Driveway #2 Fire Fuel Break Buffer Zone Area: 13,620 SF = 681'L x 20'
Driveway #3 Fire Fuel Break Buffer Zone Area: 18,920 SF = 946'L x 20'
Driveway #4 Fire Fuel Break Buffer Zone Area: 25,600 SF = 1,280'L x 20'

Utility Line Maintenance Area. Staff confirmed by phone with Wasco Electric Cooperative on November 15, 2021, that a 15 foot from center line maintenance easement is provided on each side of overhead power lines, and that the goal of the maintenance easement is to keep areas around power lines free from debris that might obstruct safe transmission of electric power. Staff utilized applicant's submitted sitemap and Wasco County GIS Measurement Tool to approximate and confirm applicant's estimated power line distances and maintenance zones. (See below "Power Line Distance Estimate" Map).


Power Line Distance Estimate
Labels
= Septic
= Water
= Power
= Tel/Com
N
PL #6 (440'L)
Backup Drain Field
Septic Drain Field
Pump House
Well
Septic Drain Field
PL #4 (335'L)
Lean To
Road = 20' Wide
PL #3 (189'L)
Power Pole
Barn
PL # 5 (560'L)
Pond
Barn
Transformer
Trailer Site
Log Cabin
PL #2 (590'L)
PL # 7 (235'L)
PL # 6 (840'L)
Well
Old Barn
Septic Drain Field
Pond (Seasonal)
Former Bird Sanctuary
Transformer
Trailer Site
Trailer Site
PL # 1 (635'L)
Hand Dug Spring
PL = Power Lines

Power Line #1 Maintenance Area Estimate: 19,050 SF = 635'L x 30' (15' from center line)
Power Line #2 Maintenance Area Estimate: 15,900 SF = 530'L x 30'
Power Line #3 Maintenance Area Estimate: 5,550 SF = 185'L x 30'
Power Line #4 Maintenance Area Estimate: 10,050 SF = 335'L x 30'
Power Line #5 Maintenance Area Estimate: 16,800 SF = 560'L x 30'
Power Line #6 Maintenance Area Estimate: 25,200 SF = 840'L x 30'
Power Line #7 Maintenance Area Estimate: 7,050 SF = 235'L x 30'
Power Line #8 Maintenance Area Estimate: 13,200 SF = 440' x 30'

Public Roadway Maintenance Area. Additional information regarding fire fuel break and maintenance areas that are dedicated for publicly maintained roads was requested from the Wasco County Public Works Department. The Wasco County Public Works Director Arthur Smith provided commentary on November 15, 2021:

> WC-Public Works Department Director Arthur Smith Commentary (November 15, 2021):
> We do not have a fire break rule. The county is obligated to prevent obstruction of a publicly dedicated road, but there is no language about fire protection - people can't block a road, it must remain open for travel. However, the county is not obligated to care for or maintain public or private roads, just county roads.
>
> Most county roads are only 22-24 feet in width, but have a 50-60 foot dedicated right-of-way which we manage. We try to keep a clear zone of 4-6 feet on each side of the county road. This is more for vehicular safety than fire protection. We have the right to remove trees, bushes and other vegetation if we deem it is necessary for safety or if the tree represents a road hazard.

A copy of the Director Smith's commentary is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 5.

The applicant provided the following calculation regarding Sevenmile Hill Road maintenance: "50' buffer along 7 Mile Hill Road = 65,000 ft2".

The Wasco County GIS Roads layer provides that Sevenmile Hill Road is a publicly maintained road. Staff utilized Partition Plat 2017-003560 and Wasco County GIS Measurement Tool to approximate the length and width of Sevenmile Hill Road along the subject parcel's north boundary line. The estimated distance is 1,115 feet.

Partition Plat 2017-003560, page 2, provides that Sevenmile Hill Road is at least 60' wide. Considering Director Smith's comments concerning the 50-60' dedicated right-of-way, and the 4-6 foot maintenance area on each side of county roads, staff estimates the dedicated maintenance area for Sevenmile Hill Road that directly applies to the subject parcel is approximately 6,690 SF = (6' x 1,115').

A copy of "Partition Plat 2017-003560" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 6.

Total estimated actual physical development square footage = 14,620 SF
Total estimated fire fuel break buffer zone area development square footage = 113,500 SF
Total estimated fire fuel break buffer zone area for access drives = 67,740 SF
Total estimated maintenance easement area for overhead power lines = 112,800 SF
Total estimated applicable area dedicated for maintenance of Sevenmile Hill Road = 6,690 SF

The estimated physically developed areas, fuel break buffer zone areas, private utility line maintenance areas, and public road maintenance areas on the subject parcel equal 315,350 SF.

STAFF CONCLUSIONS & RECCOMENDATIONS. In *Dooley et al v. Wasco County*, (LUBA Opinion No. 2019-065), the Land Use Board of Appeals agreed with the petitioner's "Fourth Assignment of Error", which argued that staff's findings were not supported by substantial evidence in the record, where the county found that approximately 87 percent of the subject parcel was not physically developed, but still approved a physically developed exception. As noted above, staff conducted thorough analysis of the subject parcel's physical development, and concluded that approximately 18% of the subject parcel is physically developed.

As provided in *Sandgren v. Clackamas County*, and explicitly referred to by LUBA in *Dooley et al.*, in order to "approve a physically developed exception, the county must find that the property has been physically developed to such an extent that all Goal 3 or 4 resource uses are precluded" (*Sandgren v. Clackamas County*, 29 Or LUBA 454, 457 (1995)). The overall demonstration of clear and objective evidence is more straightforward under OAR 660-004-0025 compared to OAR 660-004-0028; however, the standard is demanding, and requires the applicant demonstrate forestry uses are no longer an option. (See *Dooley et al v. Wasco County*, (LUBA Opinion No. 2019-065, Page 18). Additionally, as provided by LUBA in *Dooley et al.*, impracticability of Goal 4 uses caused by existing physical development is not the standard for a physically developed exception request.

In the present case, even if the County accepts the applicant's estimation that 32.81% of the total area of the subject parcel is physically developed, in order to approve the request, the County is "required to determine that the property is "physically developed to the extent that it is no longer available" for forestry uses." (See *Dooley et al v. Wasco County*, (LUBA Opinion No. 2019-065, Page 18), ORS 197.732(2)(a).

Based on the above facts, analysis, and findings, staff concludes that the parcel does not meet the required standards of OAR 660-004-0025, and recommends that the Planning Commission deny the request based on the physically developed exception.

3. Exception Requirements for Land Irrevocably Committed to Other Uses.
OAR 660-004-0028 contains standards for adoption of a "committed" exception.

OAR 660-004-0028:
Exception Requirements for Land Irrevocably Committed to Other Uses

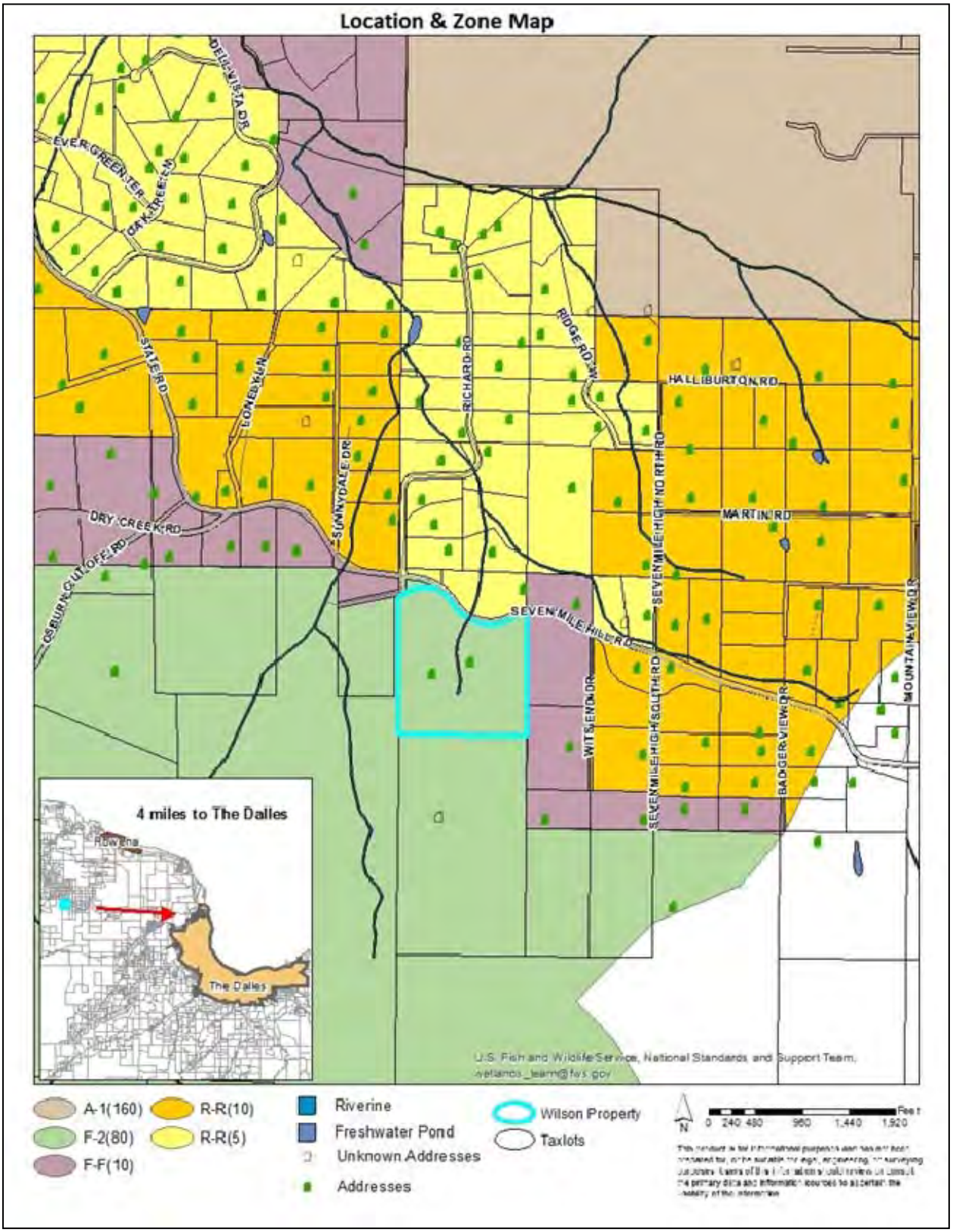
(1) A local government may adopt an exception to a goal when the land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable:

(a) A 'committed exception' is an exception taken in accordance with ORS 197.732(1)(b), Goal 2, Part II(b), and with the provisions of this rule;

(b) For the purposes of this rule, an 'exception area' is that area for which a 'committed exception' is taken;

(c) An 'applicable goal,' as used in this section, is a statewide planning goal or goal requirement that would apply to the exception area if an exception were not taken.

FINDING: Additional evidence was submitted by Mr. David Wilson on July 13, 2021. Mr. Wilson seeks a remand hearing for the purposes of obtaining a 'committed exception' for the subject 40.6-acre property located at 2 North 12 East Section 22 Tax Lot 4400 (Account # 884). For the purposes of this rule, the subject 40.6-acre parcel is the designated 'exception area'. The subject parcel falls within the Wasco County Forest (F-2) Zone, and the applicable Statewide Planning goal that applies to the property is Goal 4: Forest Lands. (See below "Location & Zone Map")



OAR 660-004-0028(1), does not require the evidence demonstrate that "existing adjacent uses and other relevant factors" make resource uses allowed within the designated exception area "impossible," but only that the evidence demonstrate that the "existing adjacent uses and other relevant factors" make resource uses allowed within the designated exception area "impracticable."

Impracticable means "not capable of being carried out in practice," according to Webster's New World Dictionary (2nd College Ed., 1980). "Capable" means "having ability" or "able to do things well." Id. Finally, "in practice" means by the usual method, custom or convention. Id. Webster's Third New International Dictionary, (Unabridged Ed., 1993) defines "impracticable" as "1a: not practicable: incapable of being performed or accomplished by the means employed or at command: infeasible * * * c: IMPRACTICAL, UNWISE, IMPRUDENT * * *"

Application materials submitted in the original request signed May 4, 2018 (received by the Wasco County Planning Office on May 23, 2018), provide the following response to subsections OAR 660-004-0028(1)(a)-(c).

> Applicant/Owner: David Wilson Application Form (Signed May 4, 2018)
> The subject property contains a legal residence, and is surrounded on 2 sides by small residential tracts, and by a residence to the south. The subject property is irrevocably committed to non-resource use. All of the large forested tracts currently producing merchantable timber are located well south of the subject property, and adopting this exception for the subject property will not negatively impact those uses. (Original Application, Page 29).

A copy of the "Original Application" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 3.

Staff has provided renewed analysis throughout this report of the original record evidence as well as the additional evidence submitted for this remand hearing.

> *OAR 660-004-0028:*
> *Exception Requirements for Land Irrevocably Committed to Other Uses*
>
> *(2) Whether land is irrevocably committed depends on the relationship between the exception area and the lands adjacent to it. The findings for a committed exception therefore must address the following:*
>
> *(a) The characteristics of the exception area;*

FINDING: Information concerning the "characteristics of the exception area" is provided by the original record, Wasco County GIS data (2018 Aerial OSIP Imagery), and the additional evidence (Remand Request Letter & Remand Request Soil Data) submitted by Mr. David Wilson on July 13, 2021.

Characteristics and analysis of the subject parcel "exception area", include the following: (1) Physical Development & Fire Buffer & Maintenance Area Estimates; (1a) STAFF ANALYSIS (Physical Development & Fire Buffer & Maintenance Area Estimates); (2) Undeveloped Areas & Soils; (2a) STAFF ANALYSIS (Undeveloped Areas & Soils); and (3) STAFF CONCLUSIONS & RECCOMENDATIONS (Physically Developed & Undeveloped Areas).

Characteristics of the Exception Area

(1) Physical Development & Fire Buffer & Maintenance Area Estimates. Original application materials provide the following description of the existing physical development of the designated exception area (subject parcel):

Applicant/Owner: David Wilson Application Form (Signed May 4, 2018)
The subject property is improved with a log home with surrounding decks covering approximately 2,680 ft^2 and a 720 ft^2 basement located approximately halfway between the north and south boundaries and in the western one third of the property. A driveway serving the residence and properties to the south extends from the northwest corner of the subject property southward, generally paralleling the western boundary. There are two barns with stalls located generally east of the log home, each covering approximately 1,110 ft^2 for total coverage of 2,220 ft^2.

Further east of the hay loft and barn there is an original home site with cabin covering 1,980 ft^2 located generally east of the log home. There is an old barn located south of the cabin covering 1,200 ft^2. (Original Application, Page 27).

Information submitted on remand provides the following estimates regarding the quantification of existing structures and fire buffers:

Applicant/Owner: David Wilson Remand Letter (Signed July 9, 2021)
Applicant has again discussed the power line buffer with the power company (15' from centerline), and has applied those in the attached calculations, in addition to a 50' buffer around each structure. Excluding the many roads on the subject property, and ignoring the pond and septic drain fields, the developed area comprises approximately 24.5% of the subject property. Adding 50' buffers along Seven Mile Hill Road and the driveway easement serving properties to the south increases this figure to 32.81%. With over half the property consisting of unsuitable soils, there is virtually no land available to support resource use.

Power Lines
15' either side from center line
10,024 linear feet x 30' = 300,730 ft2

Structures
50' each side from dimensions below

Log Home 80 x 100 = 36,000 ft2
Barn #1 24 x 35 = 16,740 ft2
Barn #2 30 x 30 = 16,900 ft2
Lean To 16 x 30 = 15,627 ft2
Old Homestead Home 55 x 55 = 24,025 ft2
Old Homestead Barn 25 x 55= 16,875 ft2

Total square footage developed area 426,887 ft2

40 acres = 1, 7 42,700 ft2
426,887/1,740,700 = .2452 (24.52% of total area)

Note: Total does not include roads, natural features, buffers near road or property boundaries, or septic tanks and drainfields

50' buffer along 7 Mile Hill Road = 65,000 ft2
50' buffer along driveway easement= 79,300 ft2

571,187/1,740,700 =.3281 (32.81% of total area)

(Remand Letter, Pp. 3-4).

A copy of the "Remand Letter" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 4.

The applicant also submitted a sitemap illustrating approximate locations of existing physical development, infrastructure, and natural features. (See Below "Applicant Site Map").



Applicant Site Map

The applicant's site map was not to scale, did not illustrate the estimated distances of utility lines, or provide illustrations of fire fuel break or maintenance buffer zones. Additionally, specific land use criteria that the applicant used in support of the 50' buffer zone requirements that were calculated for the "driveway easements" or "7 Mile Hill Road" was not provided.

(1a) STAFF ANALYSIS (Physical Development & Fire Buffer & Maintenance Area Estimates). The original staff reviewer conducted a site visit on June 21, 2018, and confirmed the applicant's description of existing physical development on the subject parcel. A driveway runs along the western property line and provides access to the single family dwelling and accessory structure situated on the west portion of the parcel. This driveway also provides physical access to the single family dwelling located on the neighboring south adjacent parcel, that is owned by the applicant (David Wilson).

A decommissioned farm house is situated at the center of the subject parcel and is served by an additional driveway that bisects the property. This area also contains two additional accessory structures (A pump house and a barn). The property is served by two wells. As provided in submitted well reports, the two wells are capable of serving four dwelling units as each well is permitted to serve two dwellings each. (See below "Physical Development Map").

Physical Development Map



1:4,514

0 0.03 0.05 0.1 mi

0 0.04 0.09 0.17 km

©OpenStreetMap (and) contributors, CC-BY-SA, Oregon Statewide Imagery Program (OSIP) - Oregon Imagery Framework Implementation Team, Wasco County GIS, Lane County Assessor, Wasco County GIS
Wasco County Planning

Subject Parcel

Developed Areas

N

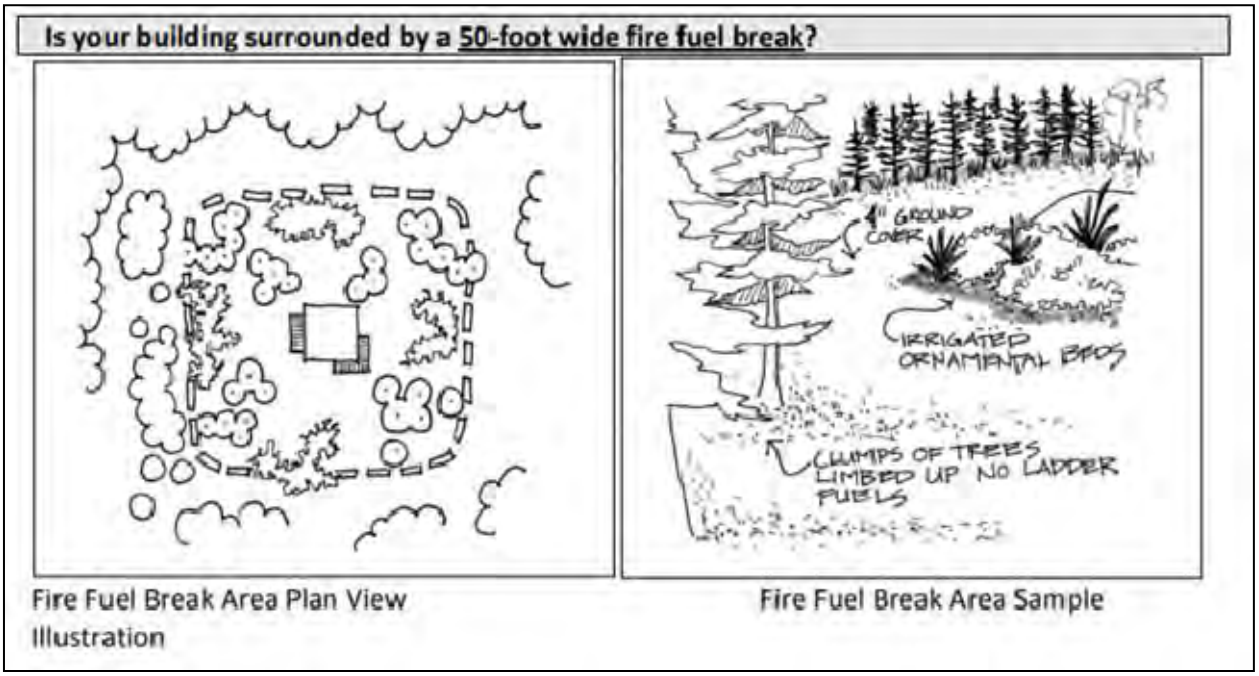
This product is for informational purposes and has not been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

The original staff report provided that approximately 12.5% of the subject parcel was physically developed. It is unclear whether the findings quantified required fire fuel break and maintenance buffer zone areas into the overall percentage of land that is considered "physically developed". The applicant submitted fire fuel break buffer zone area estimates; however, the methodology used for those calculations is unclear. Staff has provided required fire safety criteria and buffer zone area calculation methodology below for confirmed fire fuel break land use criteria and maintenance areas. Staff analysis did not address the unconfirmed 50' fire and maintenance buffer areas that the applicant calculated for the "driveway easements" or "7 Mile Hill Road".

Regarding fire fuel break buffer zones for existing structures, the Wasco County Land Use and Development Ordinance Chapter 10 Section 10.020 - Applicability of Fire Safety Standards applies to the "all rural zones (all zones outside an Urban Growth Boundary)." (Chapter 10, Page 1). All rural zones, including the Forest (F-2) Zone, are subject to fire standards; however, the applicability of the specific standards varies by zone and by use type.

Criteria outlining the creation, design, and maintenance of fuel break buffer zones is provided in Section 10.120 - Defensible Space – Clearing and Maintaining a Fire Fuel Break. Section 10.120 provides the following:

> ***Section 10.120 - Defensible Space – Clearing and Maintaining a Fire Fuel Break***
> *Fire Fuel Break Includes: Irrigated fire resistant domestic plantings, low volume slow burning plantings, and trees encouraged to provide shade and ground cooling. Trees should be grouped. Groups of trees shall be spaced to avoid creation of a continuous tree canopy. Trees shall be kept in healthy fire resistant condition. Trees shall be limbed up to create a vacant area between ground fuels and canopy fuels. Under story vegetation shall be minimized and ground cover shall be kept trimmed low to the ground.*



MAINTENANCE STANDARDS FOR FIRE FUEL BREAK AREA:

- *Ground cover maximum 4 inches tall;*
- *Trees limbed up approximately 8 feet from the ground,*

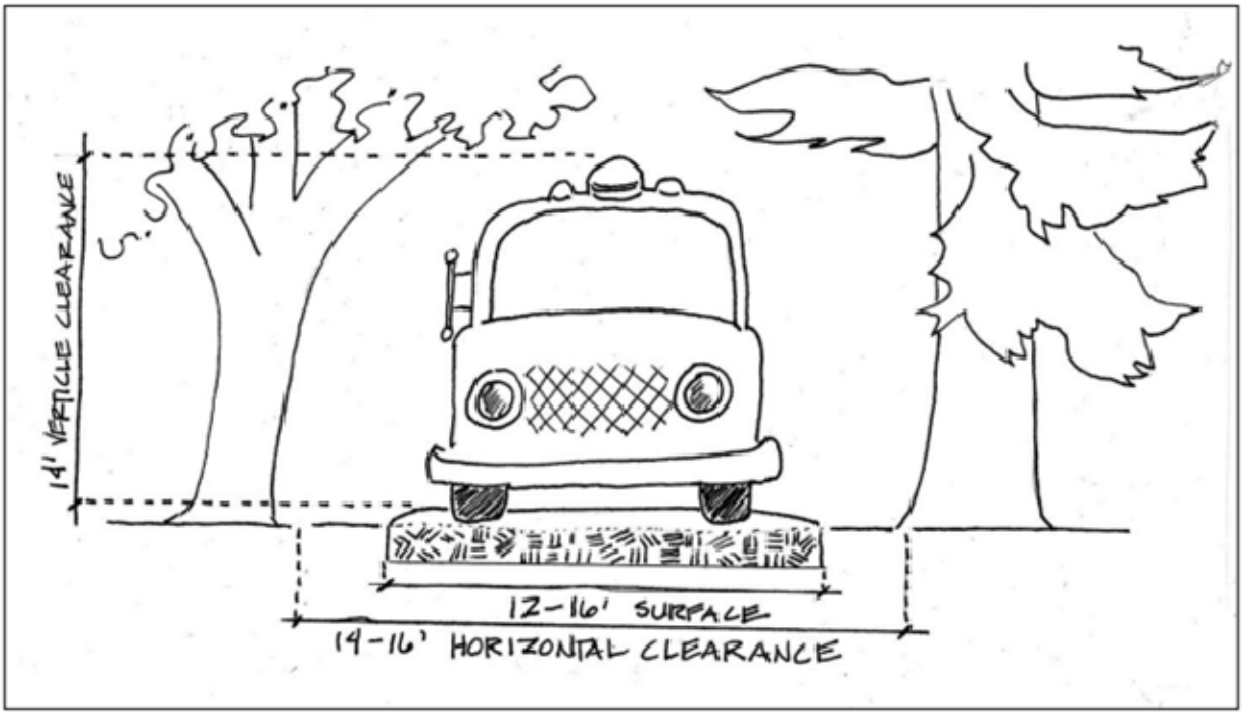
- *Trees kept free from dead, dry, or flammable material;*
- *Ladder fuels must be removed;*
- *No shrubs or tall plants under trees;*
- *Shrubs only in isolated groupings that maximize edges of ornamental beds to avoid continuous blocks of ground fuel;*
- *Keep shrubs and ornamental beds 15 feet away from edge of buildings and drip line of tree canopy; and*
- *Use well irrigated or flame resistant vegetation (See OSU Extension Service publication called "Fire Resistant Plants for Oregon Home Landscapes")*

***A.** This standard is applicable to all dwellings, accessory buildings, and agricultural buildings in: - All Zones*

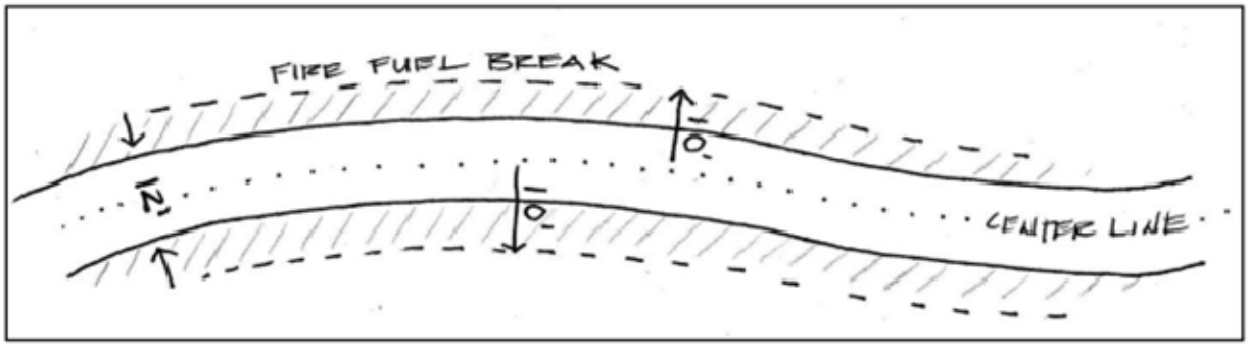
(WC-LUDO Chapter 10 Fire Safety Standards, Pp. 9-10).

Regarding required fire fuel break buffer zone areas along "residential" private access driveways, the Wasco County Land Use and Development Ordinance (WC-LUDO) Chapter 10 Section 10.140 - Access Standards - Providing safe access to and escape from your home, subsections B & C, requires the following:

Section 10.140 - Access Standards - Providing safe access to and escape from your home
***C.** Does your residential driveway provide adequate clearance for emergency vehicles and is there sufficient clear area along the driveway to allow responders to maneuver safely around their vehicles?*



Responding vehicles need over 13 vertical feet and a minimum of 14 horizontal feet of clearance to pass through vegetation along a driveway.



A fire fuel break extending 10 feet either side of the center line of the driveway is required.

C. *This Standard is applicable to all residential driveways in: -All Zones*

(WC-LUDO Chapter 10 Fire Safety Standards, Pp. 18-19).

One of the primary purposes for fire fuel break buffer zone areas is to "reduce threats to life, safety, property, and resources by improving access to and defensibility of development in rural areas." (WC-LUDO Chapter 10 Fire Safety Standards Section 10.010, Page 1). In Wasco County, fire fuel break buffer zone area requirements are explicitly linked to existing and proposed physical development that includes dwellings, accessory structures, agricultural structures, and private access driveways. Fire fuel break buffer zone areas are specifically designed to be kept free from dead, dry, or flammable material and must be rigorously maintained to ensure fuel sources are removed. Although the buffer zone criteria do not mandate the area be completely free of tree and other shrub like vegetation, demonstrating outright compliance or achieving compliance through a Fire Safety Mitigation Plan is required under the WC-LUDO Chapter 10 Fire Safety Standards. Thus, fire fuel break buffer zone areas required under Chapter 10 are considered an integral part of the unit of land's developed area, and shall be included in the calculated percentage of physically developed areas on the subject parcel for this analysis.

Additionally, private maintenance areas for overhead utility lines and public road rights of way are calculated in this analysis due to their nexus to Chapter 10 Fire Safety Standard's purpose of "[reducing] threats to life, safety, property, and resources by improving access to and defensibility of development in rural areas." Id.

Physical Development & Development Fire Buffers. Staff analysis utilized information from the Wasco County Assessor's Office, the application's site map, and the Wasco County Geographical Information System Measurement Tool to approximate the parcel's physical development and fire fuel break buffer zone areas. In determining the subject parcel's physical developed areas, staff took into account that the square feet of private access driveway space cannot be calculated and used as part of the parcel's physically developed area (See *Dooley et al v. Wasco County*, LUBA Opinion No. 2019-065, Page 19), "Finally, we agree with petitioners that the county's findings are inadequate where they fail to explain why the two driveways on the property should be considered as physically developed, when roads are uses allowed by Goal 4.")

Fire fuel break buffer zone areas for physical development such as dwelling units, accessory structures, and agricultural structures were calculated (approximated) using the below method:

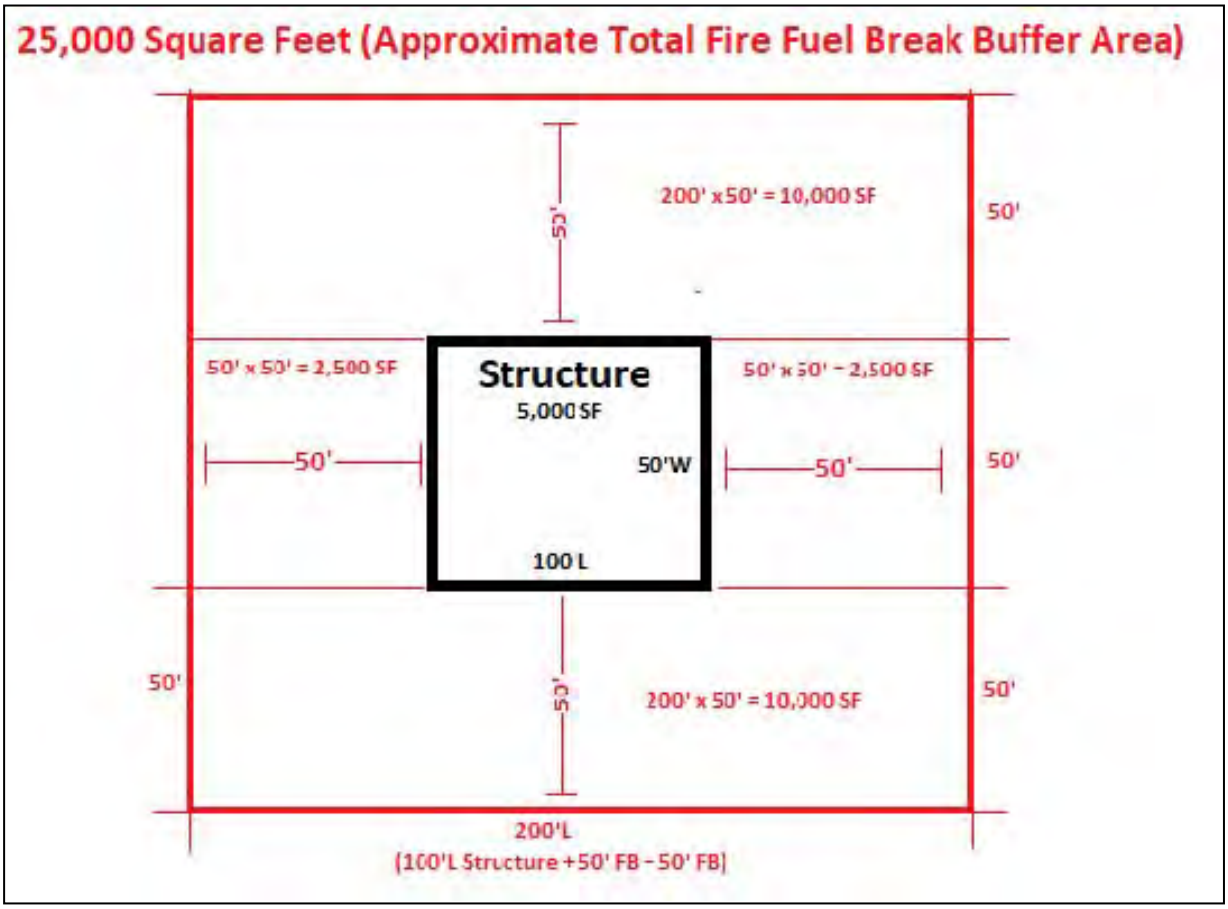


Diagram: Fire Fuel Break Calculation Method

Physical development areas and fire fuel break buffer zone areas for dwelling units, accessory structures, and agricultural structures are provided below:

1. Dwelling unit and developed curtilage (80’ x 100’ = 8,000 SF) // Fire Break = 28,000 SF
2. Accessory/Agricultural Structure #1 (24’ x 35’ = 840 SF) // Fire Break = 15,900 SF
3. Accessory/Agricultural Structure #2 (30’ x 30’ = 900 SF) // Fire Break = 16,000 SF
4. Accessory/Agricultural Structure #3 (16’ x 30’ = 480 SF) // Fire Break = 14,600 SF
5. Dwelling unit (Old Homestead) (55’L x 55’W = 3,025 SF) // Fire Break = 21,000 SF
6. Agricultural Structure (Old Homestead Barn) (25’ x 55’ = 1,375 SF) // Fuel Break = 18,000 SF

Access Drive Fire Buffers. The following driveway lengths and widths are estimated from the original application materials, site map, Remand Letter, and Wasco County Geographical Information System Measurement Tool. Although the square footage of existing driveways cannot be considered physical development in this analysis, the required fire fuel break buffer zone areas are considered.

Fire fuel break buffer zone areas for private access drives were calculated (approximated) using the below method:

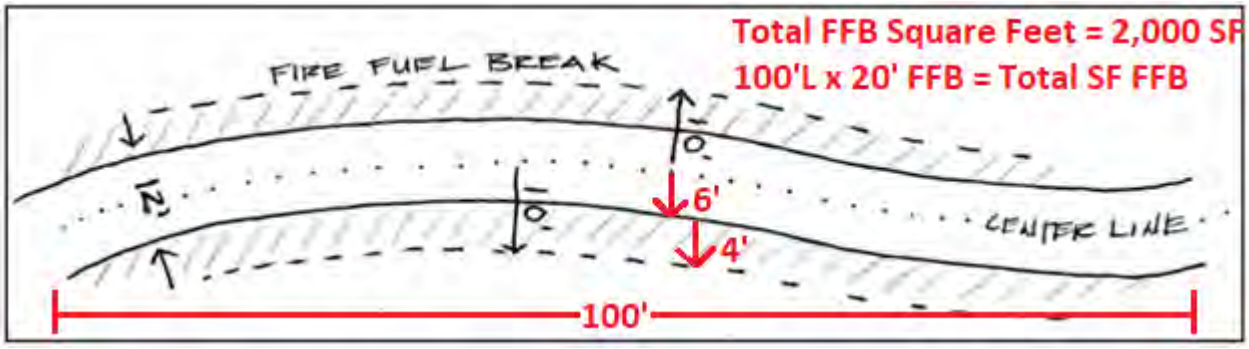


Diagram: Access Drive Fire Fuel Break Calculation Method

Driveway #1: Approx. 20'W x 480'L moving southward from Sevenmile Hill Rd. to driveway split.
Driveway #2: Approx. 20'W x 681'L moving southeast from driveway split to dwelling unit.
Driveway #3: Approx. 20'W x 946'L moving southward from driveway split to south adjacent parcel.
Driveway #4: Approx. 20'W x 1,280' moving southward from Sevenmile Hill Rd. to south parcel.

The following fire fuel break buffer zone areas were calculated for the existing access drives on the subject parcel:

Driveway #1 Fire Fuel Break Buffer Zone Area: 9,600 SF = 480'L x 20'
Driveway #2 Fire Fuel Break Buffer Zone Area: 13,620 SF = 681'L x 20'
Driveway #3 Fire Fuel Break Buffer Zone Area: 18,920 SF = 946'L x 20'
Driveway #4 Fire Fuel Break Buffer Zone Area: 25,600 SF = 1,280'L x 20'

Utility Line Maintenance Area. Staff confirmed by phone with Wasco Electric Cooperative on November 15, 2021, that a 15 foot from center line maintenance easement is provided on each side of overhead power lines, and that the goal of the maintenance easement is to keep areas around power lines free from debris that might obstruct safe transmission of electric power. Staff utilized applicant's submitted sitemap and Wasco County GIS Measurement Tool to approximate and confirm applicant's estimated power line distances and maintenance zones. (See below "Power Line Distance Estimate" Map).


Power Line Distance Estimate
Labels
= Septic
= Water
= Power
= Tel/Com
N
PL #6 (440'L)
Backup Drain Field
Septic Drain Field
Pump House
Well
Septic Drain Field
PL #4 (335'L)
Lean To
Road = 20' Wide
PL #3 (189'L)
Power Pole
Barn
PL # 5 (560'L)
Pond
Barn
Transformer
Trailer Site
Log Cabin
PL #2 (590'L)
PL # 7 (235'L)
PL # 6 (840'L)
Well
Old Barn
Septic Drain Field
Pond (Seasonal)
Former Bird Sanctuary
Transformer
Trailer Site
Trailer Site
PL # 1 (635'L)
Hand Dug Spring
PL = Power Lines

Power Line #1 Maintenance Area Estimate: 19,050 SF = 635'L x 30' (15' from center line)
Power Line #2 Maintenance Area Estimate: 15,900 SF = 530'L x 30'
Power Line #3 Maintenance Area Estimate: 5,550 SF = 185'L x 30'
Power Line #4 Maintenance Area Estimate: 10,050 SF = 335'L x 30'
Power Line #5 Maintenance Area Estimate: 16,800 SF = 560'L x 30'
Power Line #6 Maintenance Area Estimate: 25,200 SF = 840'L x 30'
Power Line #7 Maintenance Area Estimate: 7,050 SF = 235'L x 30'
Power Line #8 Maintenance Area Estimate: 13,200 SF = 440' x 30'

Public Roadway Maintenance Area. Additional information regarding fire fuel break and maintenance areas that are dedicated for publicly maintained roads was requested from the Wasco County Public Works Department. The Wasco County Public Works Director Arthur Smith provided commentary on November 15, 2021:

> WC-Public Works Department Director Arthur Smith Commentary (November 15, 2021):
> We do not have a fire break rule. The county is obligated to prevent obstruction of a publicly dedicated road, but there is no language about fire protection - people can't block a road, it must remain open for travel. However, the county is not obligated to care for or maintain public or private roads, just county roads.
>
> Most county roads are only 22-24 feet in width, but have a 50-60 foot dedicated right-of-way which we manage. We try to keep a clear zone of 4-6 feet on each side of the county road. This is more for vehicular safety than fire protection. We have the right to remove trees, bushes and other vegetation if we deem it is necessary for safety or if the tree represents a road hazard.

A copy of the Director Smith's commentary is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 5.

The applicant provided the following calculation regarding Sevenmile Hill Road maintenance: "50' buffer along 7 Mile Hill Road = 65,000 ft2".

The Wasco County GIS Roads layer provides that Sevenmile Hill Road is a publicly maintained road. Staff utilized Partition Plat 2017-003560 and Wasco County GIS Measurement Tool to approximate the length and width of Sevenmile Hill Road along the subject parcel's north boundary line. The estimated distance is 1,115 feet.

Partition Plat 2017-003560, page 2, provides that Sevenmile Hill Road is at least 60' wide. Considering Director Smith's comments concerning the 50-60' dedicated right-of-way, and the 4-6 foot maintenance area on each side of county roads, staff estimates the dedicated maintenance area for Sevenmile Hill Road that directly applies to the subject parcel is approximately 6,690 SF = (6' x 1,115').

A copy of Partition Plat 2017-003560 is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 6.

Total estimated actual physical development square footage = 14,620 SF
Total estimated fire fuel break buffer zone area development square footage = 113,500 SF
Total estimated fire fuel break buffer zone area for access drives = 67,740 SF
Total estimated maintenance easement area for overhead power lines = 112,800 SF
Total estimated applicable area dedicated for maintenance of Sevenmile Hill Road = 6,690 SF

The estimated physically developed areas, fuel break buffer zone areas, private utility line maintenance areas, and public road maintenance areas on the subject parcel equal 315,350 SF.

(2) Undeveloped Areas & Soils. Original application materials provide the following description of undeveloped areas of the designated exception area (subject parcel):

> Applicant/Owner: David Wilson Application Form (Signed May 4, 2018)
> A good portion of the southeastern portion of the subject property consists of a cleared area growing grass hay which previously served as a pasture for the cabin and now is baled each year. Most of the northern two thirds of the subject property has been cleared at some point in the past and remains clear at this time. There is no merchantable timber on the property, and the property has never supported merchantable timber. There are scrub oaks and pine trees growing on the southern portion and eastern boundary of the property. There are no fir trees of any size larger than a seedling on the property, and historically firs do not survive. Grasses and shrubs create moderately dense underbrush.
>
> The area has no history of crop use with the exception of grass hay grown the pasture area. Due to the terrain and rocky soil, and because the elevation creates climatic extremes, crop agriculture is uneconomical and otherwise impracticable.
>
> The subject property does not have a history of commercially successful grazing for sheep or cattle. Grazing was occasionally tried in the area in the 1940's, but the terrain, thin soil and climate have limited the activities to an occasional attempt rather than a sustained commercial success. There are no properties in the immediate area being used for commercial grazing.
>
> The subject property is in current use for a residence, along with pasture and wildlife habitat in the scrub oak section. It has never been successfully utilized for agricultural purposes and has very limited value as forestland due to the dwellings on the site. (Original Application, Page 28).

Soil Survey. The submitted Remand Letter provides the following information regarding a soil assessment that was conducted on the subject parcel:

> Applicant/Owner: David Wilson Remand Letter (Signed July 9, 2021)
> The application previously proceeded using the Wasco County NCRS soils map for the subject property. That map indicated the subject property contained two Class IV soil types.
>
> On December 18, 2020, Soils Scientist Gary Kitzrow conducted a soils study at the subject property. Mr. Kitzrow found that the subject property consists predominantly of generally unsuitable Class 7 and Class 8 soils. Mr. Kitzrow submitted a report to DLCD on January 23, 2021, which report was reviewed and accepted by Hilary Foote, DLCD Farm, Forest Specialist on March 20, 2021.
>
> On January 15, 2021, Applicant Wilson signed the Soils Assessment Release Form authorizing release of the assessment to Wasco County Planning. Presumably, DLCD provided Wasco County with a copy after Ms. Foote's review and acceptance. *Ms. Foote's Completeness Review letter is erroneously dated March 29, 2001. This is obviously a typographical error. (Remand Letter, Page 1).

Submitted soils data (Scanned Pdf file titled: “Remand Request Soil Data”), includes the following: (1) “Soil Assessment Submittal Form” and “Soil Assessment Release Form”; (2) “Soil Assessment Completeness Review”; and (3) “Wilson – Order 1 Soil Survey”.

The “Soil Assessment Submittal Form” was signed by both the property owner, David Wilson (Signed January 15, 2021) and soil scientist, Gary Kitzrow (Signed January 10, 2021). The “Soil Assessment Submittal Form” provides the Department of Land Conservation and Development the authority to review the soil survey, and provides the following:

> “Soil Assessment Submittal Form” (Submitted to DLCD January 23, 2021):
> Soils assessments must be consistent with the Soils Assessment Report Requirements and will checked for completeness and be subject to audits as described in O.AR 660-033-0030(9). Some soils assessments will additionally be subject to review and field checks by a DLCD-contracted soils professional as described in OAR 660-033-0030(9). Property owners and soils professionals will be notified of any negative reviews or field checks. Soils assessments will not be released to local governments without submittal of a signed release form by the property owner and person who requested the soils assessment; however, when released, any negative reviews of field checks will accompany the soils assessments. (Soil Assessment Submittal Form, Page 1).

The “Soil Assessment Release Form” was signed by the property owner, David Wilson (Signed January 15, 2021), and submitted with the “Soil Assessment Submittal Form”.

Copies of the “Soil Assessment Submittal Form” and “Soil Assessment Release Form” are available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 8.

The “Soil Assessment Completeness Review” was issued and approved on March 29, 2021, by Hilary Foote Department of the Oregon Land Conservation and Development (DLCD) Farm Forest Specialist.

> Soil Assessment Completeness Review (March 29, 2021):
> In accordance with OAR 660-033-0045(6)(a), the Department of Land Conservation and Development (DLCD) finds that this soils assessment is complete and consistent with reporting requirements for agricultural soils capability. The county may make its own determination as to the accuracy and acceptability of the soils assessment. DLCD has reviewed the soils assessment for completeness only and has not assessed whether the parcel qualifies as agricultural land as defined in OAR 660-033-0020(1) and 660-033-0030. (Soil Assessment Completeness Form, Page 1).

A copy of the “Soil Assessment Completeness Review” is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 9.

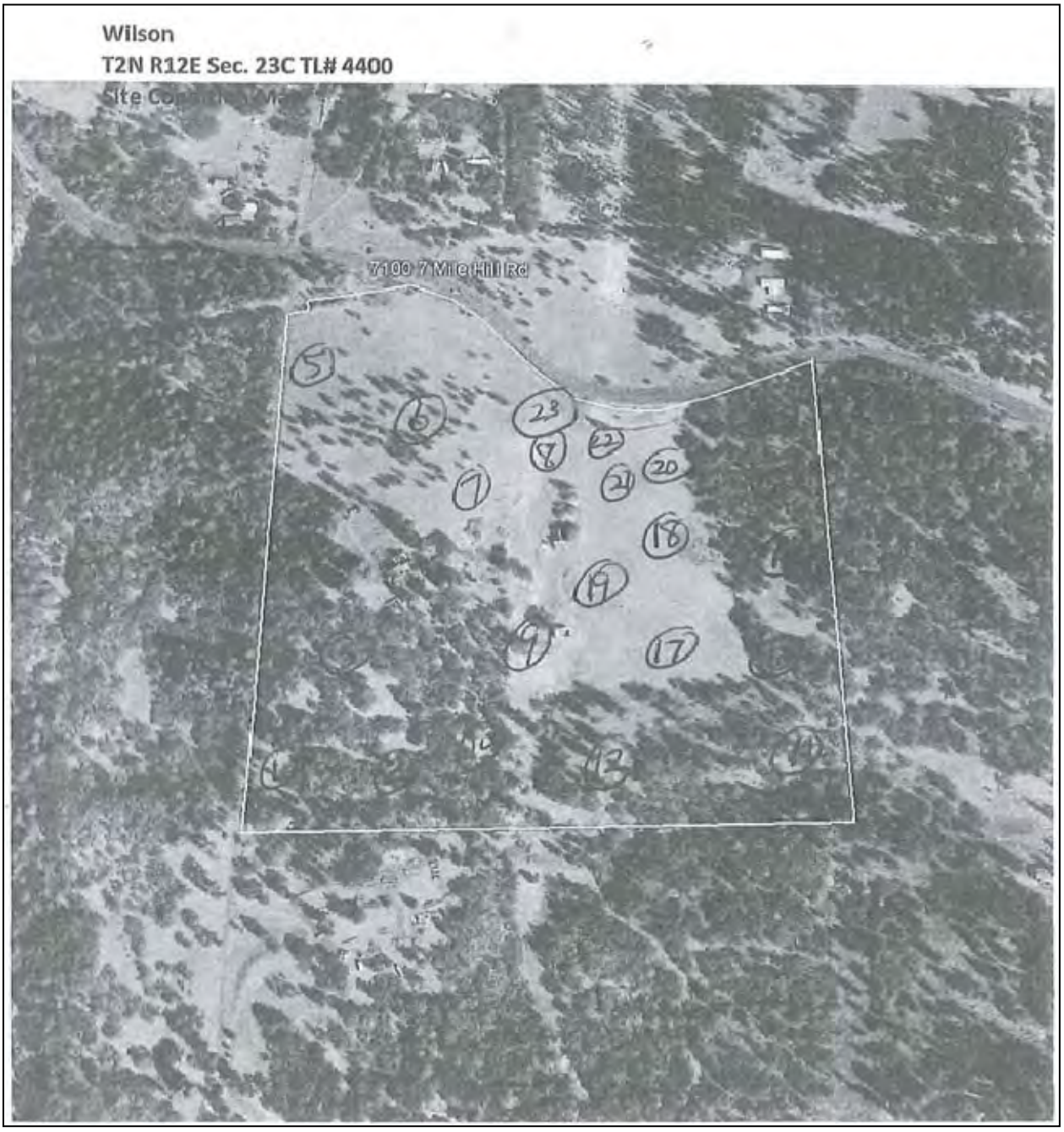
Staff contacted Hilary Foote requesting additional clarification concerning the purpose of the “Soil Assessment Completeness Review”. Ms. Foote confirmed that DLCD’s Soil Assessment's review is only to ensure the applicant’s submitted Soil Survey is complete and consistent, and that the local jurisdiction gets to make its own determination as to the survey's accuracy and acceptability. Additionally, Ms. Foote noted that the report indicates the property is zoned “EFU, not Forest”; however, this discrepancy appears to be a scrivener’s error.

A copy of the referenced communication with Hilary Foote is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 5.

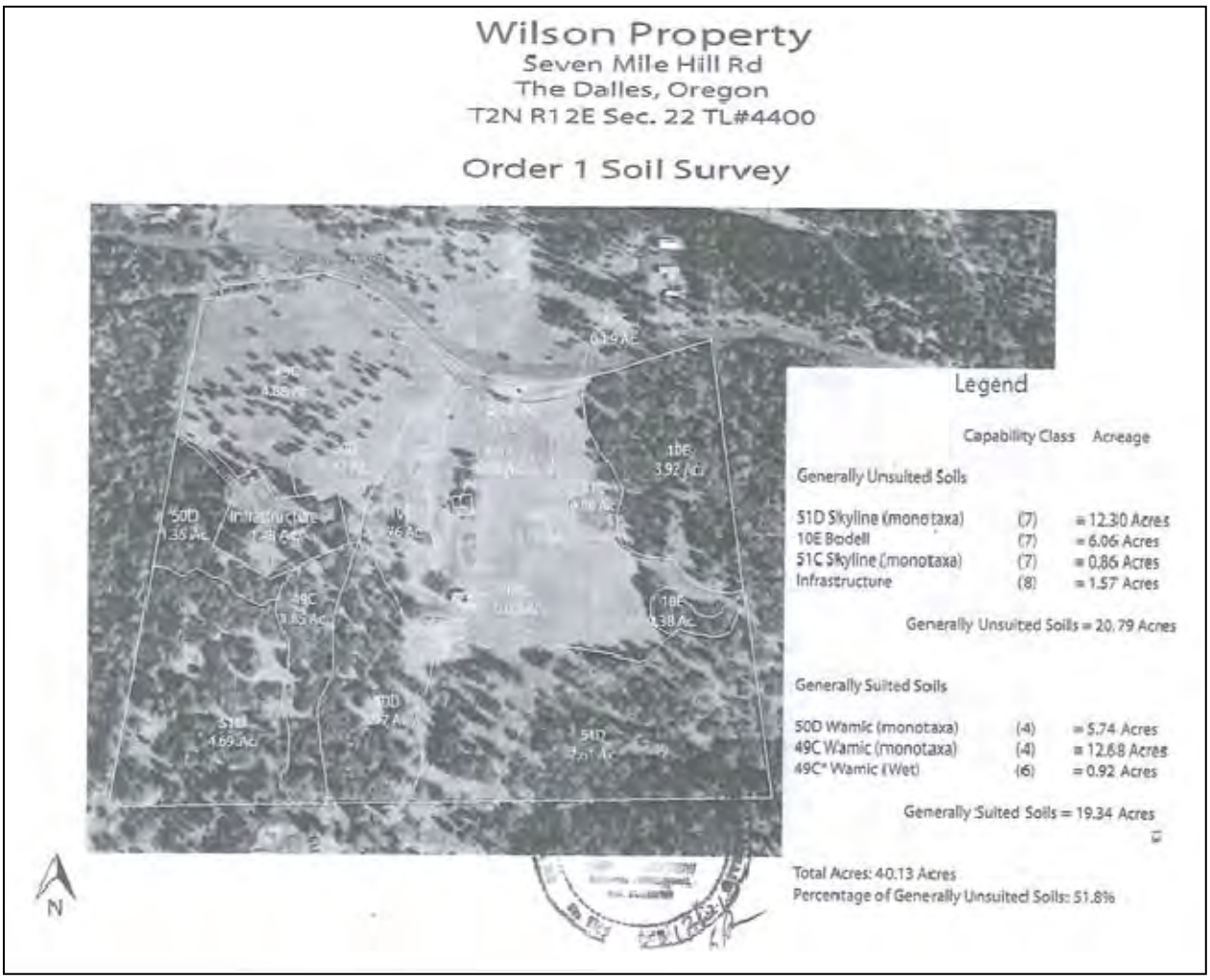
Staff has reviewed the submitted soil report titled: “Wilson – Order 1 Soil Survey”, that was conducted by Soils Scientist Gary Kitzrow, M.S., Certified Professional Soil Classifier (CPSC), Certified Professional Soil Scientist (CPSS) (License # 1741), Principal Soil Taxonomist. The survey was submitted to DLCD on January 23, 2021. There is no indication that the information provided within the soil report is incomplete or inaccurate. Additionally, the credentials of Mr. Kitzrow meet the minimum standards required per OAR 660-033-0045(1). Staff deems the facts, findings, and conclusions within the “Wilson – Order 1 Soil Survey”, to be complete, consistent, and accurate.

The “Wilson – Order 1 Soil Survey” provides that a backhoe was used to excavate and test 23 specific areas on the subject parcel. (See below “Site Condition Map”). (See also Page 10 of “Wilson – Order 1 Soil Survey”).

A copy of “Wilson – Order 1 Soil Survey” is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 11.


Wilson
T2N R12E Sec. 23C TL# 4400
7100 7 Mile Hill Rd

The "Wilson – Order 1 Soil Survey" also provides a map illustrating the results of the soil survey. (See below "Order 1 Soil Survey" Map). (See also Page 13 of "Wilson – Order 1 Soil Survey").



See also the "Enlarged Soil Capability Class Legend" Diagram below.

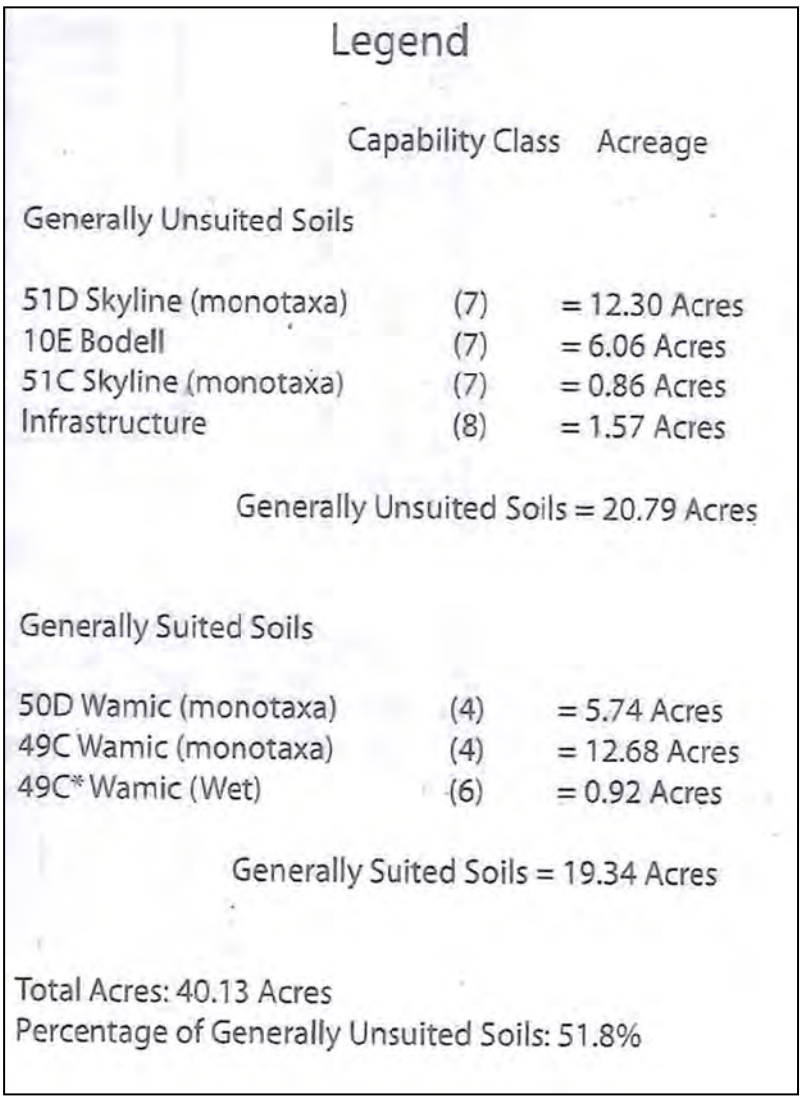


Diagram: Expanded Soil Capability Class Legend Diagram

Identified soil types include the following: 51D Skyline (monotaxa); 10E Bodell; 51C Skyline (monotaxa); 50D Wamic (monotaxa); 49C Wamic (monotaxa); and 49C (Wet).

The "Wilson – Order 1 Soil Survey" subsection (2)(e), provides additional descriptions and correlations between the existing soils and vegetation growth on the subject parcel.

> "Wilson – Order 1 Soil Survey" Subsection (2)(e) (submitted January 23, 2021):
> There are excellent correlations of soil mapping units and vegetation for this study area. The dominant Skyline and Bodell soil units are droughty due to shallow bedrock (< 20"), loamy matricies and very high rock content in the case of the Bodell soil mapping unit (10E). Grasses and hardwood are noted on the mapping units and have not been cultivated in perpetuity. The moderately deep Wamic mapping unit is droughty but does have an argillic horizon hence increased water holding capacities and increased clay content in the Control Section. This area is generally tree-free and has been growing grasses for many years. This particular property is very complex with the vegetative and soil communities NOT aspect related. Regarding the geomorphic surfaces and soil mapping units; the determining factor for mapping No alluvium soils are present. (Wilson – Order 1 Soil Survey, Page 2).

Additionally, the "Wilson – Order 1 Soil Survey" subsection (2)(f), provides notes concerning the underrepresentation of the existing USDA Order 3 Reporting Standards and the number and diversity of Soil Mapping Units on the subject parcel.

> "Wilson – Order 1 Soil Survey" Subsection (2)(f) (submitted January 23, 2021):
> No limitations were encountered in completing this Soil Survey. It is noteworthy; this portion of the *Wasco County Soil Survey Area* is apparently under-represented regarding USDA Order 3 Reporting Standards and the number and diversity of Soil Mapping Units on the Wasco County USDA Soil Legend. By completing offsite reviews of surrounding properties and detailed Order I Soil Survey for the current subject property, Wamic soils are over-represented mapping units given the confirmed diverse and wide range of landforms and geomorphic surfaces in this specific region. Wamic soils are mapped on virtually every landform in this area. Although a pervasive soil series, there are many other soils in this region and we would not expect only one soil to be mapped in such a large geographic domain. Oregon is an extremely diverse state and unlike states such as Iowa where indeed the same soil may be found over a many square mile area, that is not the case in Oregon. This current subject property is a good example of the natural complexity expected in most Oregon areas where hills, valleys and competing landscapes are confirmed. (Wilson – Order 1 Soil Survey, Page 2).

The survey's summary and conclusion are provided in subsection (5).

> "Wilson – Order 1 Soil Survey" Subsection (5) (submitted January 23, 2021):
> A slim majority, (preponderance) of this proposed lot is made up of the shallow, generally unsuited Class 7 Skyline, Bodell units and Class 8 Infrastructure. (irrigated and non-irrigated). The lithic, entic Bodell soil mapping units are shallow, very rocky with restrictive rooting capabilities and low water holding capacities. Skyline soils, which are very definable and modal, on this parcel similarly has shallowness due to a somewhat indurated paralithic contact beginning at less than 20 inches consistently. Conversely, Wamic soils are somewhat deeper, have thicker and more defined topsoils with more clay build-up (hence water holding capacity
>
> This study area and legal lot of record is comprised of 51.8% (20.79 Ac.) of generally unsuited soils Capability Class 7 and Class 8 by Wasco County and DLCD definitions.
>
> (Wilson – Order 1 Soil Survey, Page 3).

A copy of the "Wilson – Order 1 Soil Survey" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 11.

(2a) STAFF ANALYSIS (Undeveloped Areas & Soils). *Vegetation Analysis*. A previous site visit and Wasco County GIS data (2018 Aerial OSIP Imagery), indicate and confirms that grass hay is grown on the parcel. The pasture area is located on the northwest, central, and east portion of the parcel.

The vegetation of the subject parcel is split between open grassland in the north, center, and east portions. Oregon White Oak trees are interspersed with Ponderosa Pine trees. There are very few Douglas Fir trees around the edges of the property. Grasses and shrubs create moderately dense underbrush throughout.

Slope Analysis. The property is mostly flat from the north to the center rising gradually from there to the south, east, and west. Slopes from the road to the southern property line average 6-10%. The low point of the parcel is in the northwest corner at about 1550' in elevation, 100' lower than the dwelling unit at

about 1650’ and 210’ below the high point to the southeast at 1760’. There are no slopes on the property that are too steep for either residential development or for forestry uses.

Wetland Analysis. Staff utilized information from the Wasco County GIS (National Wetlands Inventory, National Hydrography Dataset, and Statewide Wetlands Inventory) to identify one seasonal “Riverine” wetland (stream) that runs in a north-south direction through the center of the subject parcel. Additionally, a pond “Waterbody - Large Scale” and the north-south stream “Flowline - Large Scale” is identified at the center of the subject parcel (approximately 41’+/- from the Agricultural Structure (Old Homestead Barn)). The approximate length of the identified waterbody is estimated to be 1,259 feet long. (See below “Wetland Map”).


Wetland Map
1,259 Feet
© OpenStreetMap (and) contributors, CC-BY-SA, USGS TNM – National Hydrography Dataset. Data Refreshed October, 2021., Oregon Statewide Imagery Program (OSIP) - Oregon Imagery Framework Implementation Team, Wasco County GIS, Lane County Assessors, Wasco County GIS
Statewide Wetlands Inventory
Riverine
National Hyrography Dataset
Waterbody - Large Scale (Pond)
Flowline - Large Scale (Stream)
N
This product is for informational purposes and has not been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Staff has provided the applicable WC-LUDO Forest (F-2) Zone criterion below for wetland buffer areas:

Section 3.127 - Property Development Standards

3. Waterways

a. Resource Buffers: All bottoms of foundations of permanent structures, or similar permanent fixtures shall be setback from the high water line or mark, along all streams, lakes, rivers, or wetlands. (Added 4/12)

(2) A minimum distance of fifty (50) feet when measured horizontally at a right angle for all water bodies designated as non-fish bearing by any federal, state or local inventory.

(***)

(5) The following uses are not required to meet the waterway setbacks; however, they must be sited, designed and constructed to minimize intrusion into the riparian area to the greatest extent possible:

(a) Fences;
(b) Streets, roads, and paths;
(c) Drainage facilities, utilities, and irrigation pumps;
(d) Water-related and water-dependent uses such as docks and bridges;
(e) Forest practices regulated by the Oregon Forest Practices Act;
(f) Agricultural activities and farming practices, not including the construction of buildings, structures or impervious surfaces; and
(g) Replacement of existing structures with structures in the same location that do not disturb additional riparian surface area.

Based on the identified wetland type (non-fish bearing stream), a wetland development buffer of 50 feet on either side of the waterbody is required; however, forest practices regulated by the Oregon Forest Practices Act are exempted to the buffer standards to the degree that they "minimize intrusion into the riparian area to the greatest extent possible." (WC-LUDO Chapter 3 Basic Provisions Section 3.127, Pp. 10-11).

Soils Analysis. The United States Department of Agriculture (USDA), Soil Conservation Service (STS), in cooperation with the Oregon Agricultural Experiment Station, published the "Soil Survey of Wasco County, Oregon, Northern Part", in 1982. The survey's soil map data has been digitized, and was used in determining and analyzing the subject parcel's soil classifications in the original Staff Report. The USDA "Soil Survey of Wasco County, Oregon, Northern Part" is classified as an Order 3 survey.

A copy of the "Soil Survey of Wasco County, Oregon, Northern Part" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 12.

The "Wilson – Order 1 Soil Survey" submitted for this remand hearing is an Order 1 survey.

The Natural Resources Conservation Service Soils webpage provides a description of soil survey orders.

The Natural Resources Conservation Service Soils webpage: Orders of Soil Surveys:
The orders are intended to convey the level of detail used in making a survey, the scale used to delineate map units, and how general the map units are. They also indicate the general levels of quality control that are applied during surveys. These levels affect the kind and precision of subsequent interpretations and predictions.

Order 1 (or first order) surveys are made if [sic] very detailed information about soils, generally in small areas, is needed for very intensive land uses. These land uses commonly require reviews and permits from regulatory agencies, engineers, and other professionals. Order 1 surveys are also conducted for specialized information, such as for critical habitat or cultural resources.

Order 3 (or third order) surveys are made where land uses do not require precise knowledge of small areas or detailed soil information. The survey areas are commonly dominated by a single land use and have few subordinate uses. The soil information can be used in planning for range, forest, and recreational areas and in community planning.

(See https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054254#orders)

The "Soil Assessment Completeness Review", issued and approved on March 29, 2021, by Hilary Foote Department of Land Conservation and Development (DLCD) Farm Forest Specialist provides the following regarding survey order:

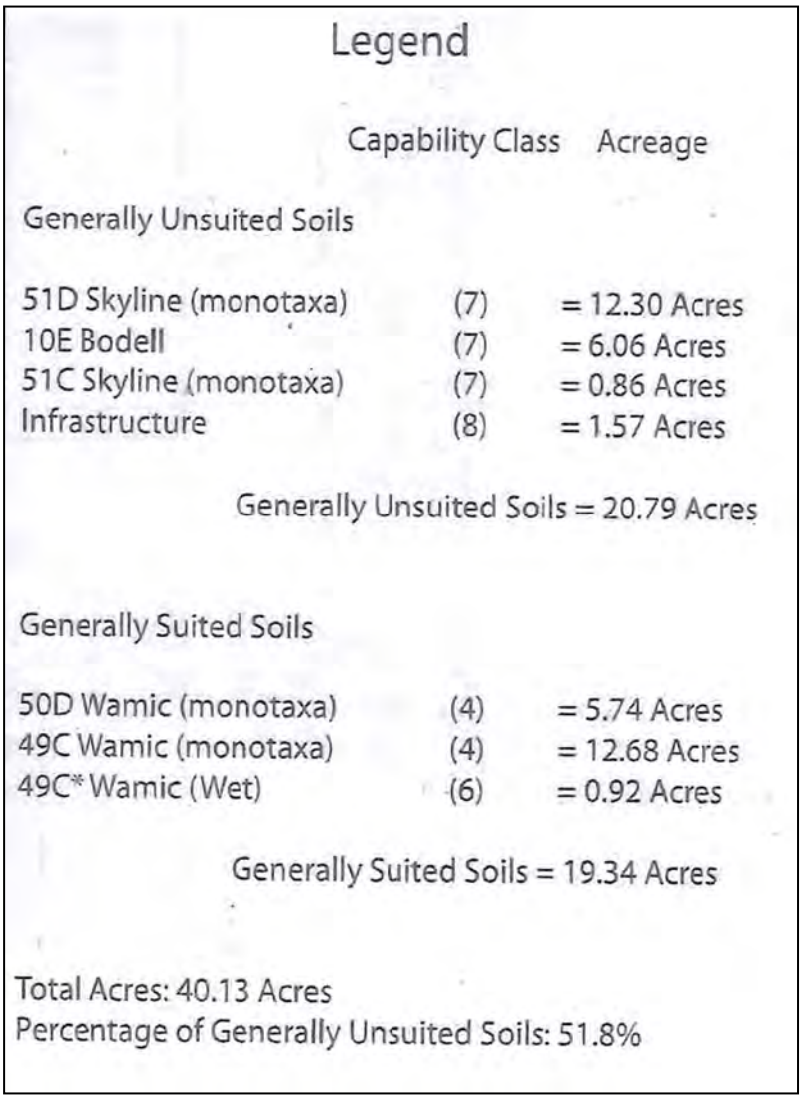
Soil Assessment Completeness Review (March 29, 2021):
The level of order of survey used in the field survey, scale and type of maps used for field investigations, number of sample locations and observation points all confirming or disagreeing with the NRCS mapping units. The survey shall be one or more level of order higher than the NRCS survey as described in the NRCS Soil Survey Manual, 1993. Note that an Order 1 survey is more detailed than an Order 2 or greater survey. Order 1 soil survey was conducted.
(Soil Assessment Completeness Form, Page 2).

As noted earlier, the "Wilson – Order 1 Soil Survey" provides the following analysis regarding the 1982 USDA Order 3 survey:

"Wilson – Order 1 Soil Survey" Subsection (2)(f) (submitted January 23, 2021):
No limitations were encountered in completing this Soil Survey. It is noteworthy; this portion of the *Wasco County Soil Survey Area* is apparently under-represented regarding USDA Order 3 Reporting Standards and the number and diversity of Soil Mapping Units on the Wasco County USDA Soil Legend. By completing offsite reviews of surrounding properties and detailed Order I Soil Survey for the current subject property, Wamic soils are over-represented mapping units given the confirmed diverse and wide range of landforms and geomorphic surfaces in this specific region. Wamic soils are mapped on virtually every landform in this area. Although a pervasive soil series, there are many other soils in this region and we would not expect only one soil to be mapped in such a large geographic domain. (Wilson – Order 1 Soil Survey, Page 2).

Staff notes that the submitted "Wilson – Order 1 Soil Survey", was a parcel specific survey. The "Wilson – Order 1 Soil Survey" contains detailed soil testing analysis, and used a backhoe to excavate 23 study areas to conduct: "Field texturing was completed; Munsell color chart was used for soil colors; standard soil pH kit was used; field assessment for structure, consistence, pores, drainage class, root distribution, effective/absolute rooting depths and related morphology testing detailed map with precision of subsequent interpretations and predictions." ("Wilson – Order 1 Soil Survey", Page 1).

The "Wilson – Order 1 Soil Survey", provides that Skyline, Wamic, Bodell, and Infrastructure are the soil series confirmed on the subject parcel. Specifically identified soil mapping units are provided in the diagram below:



Legend

	Capability Class	Acreage
Generally Unsuited Soils		
51D Skyline (monotaxa)	(7)	= 12.30 Acres
10E Bodell	(7)	= 6.06 Acres
51C Skyline (monotaxa)	(7)	= 0.86 Acres
Infrastructure	(8)	= 1.57 Acres
Generally Unsuited Soils = 20.79 Acres		
Generally Suited Soils		
50D Wamic (monotaxa)	(4)	= 5.74 Acres
49C Wamic (monotaxa)	(4)	= 12.68 Acres
49C* Wamic (Wet)	(6)	= 0.92 Acres
Generally Suited Soils = 19.34 Acres		

Total Acres: 40.13 Acres
Percentage of Generally Unsuited Soils: 51.8%

Diagram: Expanded Soil Capability Class Legend Diagram
(See "Wilson – Order 1 Soil Survey", Page 13)

In order to provide detailed analysis of the soil mapping units identified on the subject parcel, staff utilized the "Soil Survey Single Phase Interpretation Sheets in Oregon" for the 1982 "Soil Survey of Wasco County, Oregon, Northern Part", published by the United States Department of Agriculture (USDA), Soil Conservation Service (STS). The "Soil Survey Single Phase Interpretation Sheets in Oregon" or "Green Sheets" provides detailed data concerning field crops, woodland suitability, windbreaks, wildlife habitat suitability, and potential native plant communities that are supported by the soil mapping unit. The categories and the ratings for the classified soil mapping units are relevant to how well the subject parcel may be able to fulfill the requirements of Goal 4: Forest Lands by conserving forest lands for forest uses.

The subject parcel's predicted crops and pasture yield capability was examined by staff in order to determine the soil quality for field crops. Four "Soil Capability Classes" were identified in the "Wilson –

Order 1 Soil Survey". The "Guide for Using Soil Survey Single Phase Interpretation Sheets in Oregon" published by the Soil Conservation Service (Natural Resources Conservation Service), June 1982, provides the following description of "Capability and Predicted Yields - Crops and Pasture Soil Capability Classes":

> Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, and other characteristics of the soil; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops , or other crops requiring special management.
>
> Capability classes - The broadest groups are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:
>
> Class I soils have few limitations that restrict their use.
>
> Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
>
> Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
>
> Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
>
> Class V soils are not likely to erode but have other limitations, impracticable to remove, that limit their use largely to pasture, range, woodland, or wildlife.
>
> Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.
>
> Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.
>
> Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or to esthetic purposes.
>
> Capability subclasses are soil groups with one class; they are designated by adding a small letter--e, w, s, or c--to the class numeral, for example, lie. The letter e shows- that the main limitation is risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, drouthy, or stony; and c, used in only some parts of the United States, shows that the chief-limitation is climate that is too hot, too cold, or too dry for production of many crops.

> In the capability system, all kinds of soils are grouped at three levels: the capability class, subclass, and unit. The capability unit is a grouping of soils into a defined management unit which is not provided on the SPI sheet.
>
> (Guide for Using Soil Survey Single Phase Interpretation Sheets in Oregon, Pp. 16-17).

A copy of the "Guide for Using Soil Survey Single Phase Interpretation Sheets in Oregon" is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 13.

Staff notes that the "Wilson – Order 1 Soil Survey" discovered that 20.79 acres of the subject parcel's soils fall within the Class 7 and 8 (Class VII & VIII) soil Capability Classes. 19.34 acres of the subject parcel's soils fall within Class 4 and Class 6 (Class IV & VI) soil Capability Classes. Given the percentage of Class 7 and 8 soils, the "Wilson – Order 1 Soil Survey" found that a slight majority of the subject parcel's soils (51.8%) have severe limitations that make them generally unsuitable for cultivation, and limit their use for pasture, woodland, and wildlife. However, while the Soil Capability Classification can be used to broadly understand the behavior of the soils when used for other purposes, "this classification is not a substitute for interpretations designed to show *suitability and limitations of groups of soil for range, for forest trees*, [emphasis added] or for engineering." (Guide for Using Soil Survey Single Phase Interpretation Sheets in Oregon, Pp. 16).

To understand the specific resource suitability of the subject parcel's soil, staff examined the "Green Sheets", which provide the following interpretation guidance for the soil mapping unit's "Woodland Suitability":

> This section deals with the potential productivity and management problems in the use of the soils for woodland production. The species listed in the column for potential productivity of common trees is the one for which site index is given. Site index is an indication of potential productivity and is based on the average total height of the dominant and codominant trees in the stand at the age of 100 years.
>
> Seven site classes are used for ponderosa pine. Site class 1 soils will reach a height of 113 feet or more at age of 100 years; those on site class 2 soils will reach heights of 99 to 112 feet; those on site class 3 soils, heights of 85 to 98 feet; those on site class 4 soils, heights of 71 to 84 feet; those on site class 5 soils, heights of 57 to 70 feet; those on site class 6 soils, heights of 43 to 56 feet; and those on site class 7 soils, heights of less than 43.
>
> The mean site index is given for the listed species. It is based on field sampling. The ordination symbol column gives a connotative symbol representing class and subclass. The first element in the ordination is a number that denotes potential productivity in terms of cubic meters of wood per hectare per year for the common tree species listed. Therefore, 16 means 16 cubic meters per hectare per year of wood is produced at the point where mean annual increment culminates. One cubic meter per hectare equals 14.3 cubic feet per acre.
>
> The second element is a letter expressing selected soil properties associated with moderate or severe hazards or limitations in woodland use or management. Subclass R represents relief or slope steepness, subclass X represents stoniness or rockiness, subclass W represents excessive wetness, subclass T represents toxic substances, subclass D represents restricted rooting depth, subclass C represents clayey soils, subclass S represents sandy soils, subclass F represents fragmental or skeletal soils, and subclass A represents slight or no limitations. Subclass priorities

are in the order listed above. In the columns below management problems, the ratings used are slight, moderate, and severe.

(Guide for Using Soil Survey Single Phase Interpretation Sheets in Oregon, Pp. 18-19).

The previous Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part" only identified Wamic and Wamic-Skyline Complex as the dominant soils on the subject parcel. Specifically identified were, 49C Wamic Loam (29.8 acres); 50D Wamic Loam (10.5 acres) (total = 40.3 acres). 51D Wamic-Skyline Complex (0.5 Acres) was also identifed. (Wilson – Order 1 Soil Survey, Page 3).

The "Wilson – Order 1 Soil Survey" provides that the subject parcel contains 19.34 acres of the Wamic series soil type. Specifically, the 50D Wamic Loam (5.74 acres) mapping unit, and 49C Wamic Loam (13.6 acres = 12.68 49C Wamic (monotaxa) + 49C Wamic (wet)) mapping unit are identified.

Specific details regarding the Wamic soil mapping units identified in the "Soil Survey Single Phase Interpretation Sheets in Oregon" (Commonly referred to as the "Green Sheets") are provided below:

- Capability and yields per acre of crops and pasture (high level management)
  - Both soil types are listed as 4e (Class 4 which has "very severe limitations that reduce the choice of plants, require very careful management, or both" Subclass e indicates that the main limitation is risk of erosion unless close-growing plant cover is maintained). Both soil types have Winter Wheat (35 bushels/acre) and Grass Hay (1.5 tons/acre) listed.
- Woodland Suitability
  - Both soil types are listed as 4A (Class 4, discussed above, and subclass A which represents slight or no limitations). For both soil types, four out of five management problem categories are listed as having 'slight' or 'moderate' problem potential with plant competition the only one rated as 'severe' in both. Plant competition indicates the potential invasion of undesirable species, usually brush, when openings are made in the tree cover. Common trees on these soil types are Ponderosa Pine and Oregon White Oak with Ponderosa Pine listed as the only tree to plant. The site index for both is 70 which is an indication of the potential productivity and is based on the average total height of the stand the age of 100 years. A site index of 70 translates to the high end of Cubic Foot Site Class 6 (20-49 cubic feet per acre potential yield category) for Ponderosa Pine.
- Windbreaks
  - For both soil types the Green Sheets indicate "none" for Windbreaks. This states that windbreaks are not normally needed.
- Wildlife Habitat Suitability
  - This section provides a soil's potential for producing various kinds of wildlife habitat. Under "Potential for Habitat Elements":
    - "Grain Seed" is rated "Fair"; and "Grass & Legume" and "Wild Herb" subgroups are rated a "Good".
    - "Hardwood Trees", "Conifer Plants", and "Shrubs" subgroups are rated as "Fair".
    - "Wetland Plants" and "Shallow Water" subgroups are rated as "Poor"; "Open Land Wildlife" and "Woodland Wildlife" subgroups are rated as "Fair"; "Wetland Wildlife" is rated "Poor", and "Rangeland Wildlife" contains no classification.
- Potential Native Plant Community (Rangeland or Forest Understory Vegetation)
  - Ponderosa Pine and Oregon White Oak tree species are listed.

- Non-tree species: Idaho Fescue; Bluebunch Wheatgrass; Sandberg Bluegrass; Arrowleaf/Balsamroot; and Antelope Bitterbrush.

The "Wilson – Order 1 Soil Survey" provides that the subject parcel also contains approximately 20.79 acres of the Skyline, Bodell, and Infrastructure series soil type. Specifically, the 10E Bodell (5.74 acres) mapping unit, and 49C Wamic Loam (13.6 acres = 12.68 49C Wamic (monotaxa) + 49C Wamic (wet)), and Infrastructure (0.92 acres) mapping unit are identified.

Specific details regarding the 10E Bodell Cobbly Loam soil mapping unit is identified in the "Green Sheets":

- Capability and yields per acre of crops and pasture (high level management)
  - This Bodell soil mapping unit is listed as 7e (Class 7 which has "very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife." Subclass e indicates that the main limitation is risk of erosion unless close-growing plant cover is maintained). This soil type contains no recommended field crop/pasture.
- Woodland Suitability
  - This Bodell soil mapping unit contains no woodland suitability soil classification and has no common trees listed (Specifically listed as "None").
- Windbreaks
  - This Bodell soil mapping unit has no species listed for windbreaks (Specifically listed as "None").
- Wildlife Habitat Suitability
  - This section provides a soil's potential for producing various kinds of wildlife habitat. Under "Potential for Habitat Elements":
    - "Grain Seed", "Grass & Legume" and "Wild Herb" the class is rated a "Poor" for all three subgroups.
    - "Hardwood Trees", "Conifer Plants", and "Shrubs" contain no classification or species provided for all three subgroups.
    - "Wetland Plants", "Shallow Water", "Open Land Wildlife", "Woodland Wildlife", "Wetland Wildlife", and "Rangeland Wildlife" the class is rated a "Poor" for all six subgroups.
- Potential Native Plant Community (Rangeland or Forest Understory Vegetation)
  - No trees are listed.
  - Non-tree species: Idaho Fescue; Bluebunch Wheatgrass; Letterman Needlegrass; Sandberg Bluegrass; Oregon Bluegrass; Arrowleaf/Balsamroot; Buckwheat; and Bighead Clover.

A copy of the pertinent sheets used in the "Soil Survey Single Phase Interpretation Sheets in Oregon" for the 1982 "Soil Survey of Wasco County, Oregon, Northern Part", published by the United States Department of Agriculture (USDA), Soil Conservation Service (STS), is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 14.

No specific details are provided in the "Green Sheets" for soil mapping units 51D or 51C Skyline. Due to the lack of pertinent information in the "Gree Sheets" pertaining to the Skyline mapping units, staff requested additional information from Gary Kitzrow, M.S., Certified Professional Soil Classifier (CPSC), Certified Professional Soil Scientist (CPSS) (License # 1741), Principal Soil Taxonomist. Mr. Kitzrow provided commentary on November 26, 2021:

Gary Kitzrow, Soil Scientist (November 26, 2021):
Skyline units on my report are MONOTAXA units meaning one soil per delineation. Wamic soils are NOT found within those mapping units except as an inclusion. Order I Soil Surveys (such as the current one) separates out soil "Complexes" into their component parts. Order I Soil Surveys are Site Specific Soil Surveys with a high degree of confidence in the final delineations correlated. I have mapped over 1 million acres of soils in the USA and in 2 foreign countries. I use the same USDA-protocols in all jurisdictions I have published Soil Survey Reports in (8) states. The goal of Order I Soil Surveys is to make every soil mapping unit a monotaxa element.

The green sheets DO NOT tabulate the Forestry site index tables because Skyline is a Non-Commercial Forest Soil. As a former USDA-NRCS Soil Scientist here in Oregon and as a degreed forester as well, when employed as a USDA scientist, we left the "Green Pages" blank when there was no commercial timber producing potential OR no trees within the correct age-class or dominance-class to measure and assign a valid site index or mensuration estimate (cu-ft/ac/yr). Skyline has never been cited as a commercial forest soil and predictably, no proper trees are available to measure as well. Since this soil (Skyline) is the dominant soil on this subject parcel, a preponderance of the legal lot of record is not a commercial timber site. This follows suit for agriculture as well which is demonstrated in the Capability Class assignment.

A copy of the Mr. Kitzrow's commentary is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 10.

STAFF CONCLUSIONS & RECCOMENDATIONS (Physically Developed & Undeveloped Areas).

Physically Developed. The standard of proof for evidence submitted in support of this Remand request is "Clear and Objective". The burden of proof falls on the applicant to submit clear and objective evidence that demonstrates the proposal can meet the requirements under the law. In this instance, the submitted Remand materials failed to produce a site map to scale; failed to provide illustrated measurements of infrastructure and existing development; failed to provide fire fuel break buffer zone calculation methodology; and failed to provide source material for the proposed 50' fire fuel break buffer zone areas used in the applicant's estimated "50' buffer along 7 Mile Hill Road = 65,000 ft2" and "50' buffer along driveway easement= 79,300 ft2" calculations.

Staff conducted research and analysis of the existing physical development, and was able to provide the following approximations regarding the subject parcel's physically developed areas:

Total estimated actual physical development square footage = 14,620 SF
Total estimated fire fuel break buffer zone area development square footage = 113,500 SF
Total estimated fire fuel break buffer zone area for access drives = 67,740 SF
Total estimated maintenance easement area for overhead power lines = 112,800 SF
Total estimated applicable area dedicated for maintenance of Sevenmile Hill Road = 6,690 SF

The estimated physically developed areas, fuel break buffer zone areas, private utility line maintenance areas, and public road maintenance areas on the subject parcel equal 315,350 SF.

The subject is parcel is 40.13 acres in size.
(1 Acre = 43,560 SF) (40.13 acres x 43,560 = 1,748,062 acres)
315,350 SF / 1,748,062 SF = 0.1803 or 18% of the subject parcel is physically developed.

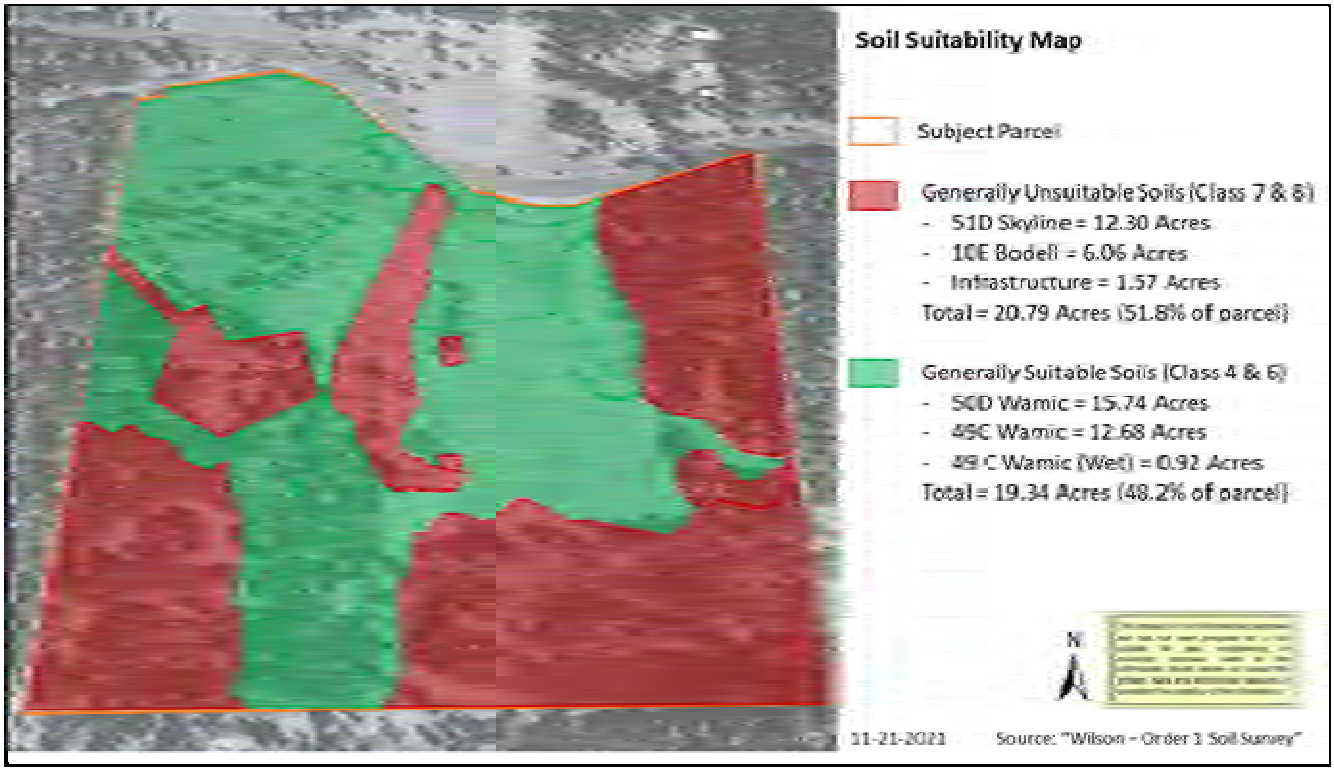
Staff's approximations do not necessarily reflect absolute accuracy, and should not be considered to unconditionally negate the applicant's submitted calculations for physical development. However, unlike the applicant, staff provided source material for applicable fire fuel break buffer zone criteria and applicable utility line and road maintenance easements. Furthermore, staff provided the sources and GIS tools that were used to approximate private access drive and utility line distances. Finally, staff provided calculation methodology for estimated fire fuel break buffer zone areas. Considering these facts, staff recommends the Planning Commission consider staff's approximated percentage of the subject parcel's physically developed area in making its decision regarding this request.

Staff estimates that 18% of the subject parcel is physically developed.

Undeveloped Areas. Neither the subject parcel's slopes or existing wetland buffers significantly hinder or preclude forestry uses. The primary point of analysis for the undeveloped area of the subject parcel is centered around the property' soil quality and its suitability for forestry uses.

The applicant submitted the "Wilson – Order 1 Soil Survey", which provides that 20.79 acres of the subject parcel contains "Generally Unsuitable Soils". Using the soil survey and the "Green Sheets", staff conducted in depth analysis of the soil mapping units identified within the "Wilson – Order 1 Soil Survey". The soil mapping units 50D Wamic, 49C Wamic, and 10E Bodell were explicitly found within the "Soil Survey Single Phase Interpretation Sheets in Oregon" ("Green Sheets"), and analysis was provided. The soil mapping units 51D Skyline and 51C Skyline were not explicitly found within the "Green Sheets"; however, staff did provide analysis of the 51D Wamic-Skyline Complex for reference. The Infrastructure soil mapping unit is also not within the "Green Sheets".

The "Wilson – Order 1 Soil Survey's" "Findings and Conclusions" and remarks made within the 23 individual "Soil Profile Documentation Sheets", provide clear and objective evidence that the areas of the subject parcel containing "Generally Unsuitable Soils" are not favorable for field crops and pasture, large or small scale commercial woodlands, or wildlife habitat. (See below "Soil Suitability Map" for reference).



Soil data evidence was a key issue of contention within the Land Use Board of Appeals opinion in *Dooley et al v. Wasco County* (LUBA Opinion No. 2019-065). Using the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part", the appellants provided in their "Second Assignment of Error", that the county had failed to support its findings to allow the exception to Goal 4: Forest Lands "where the undisputed evidence [had shown that] the subject property contains merchantable tree species in its southern portion and contains soil types that are capable of supporting Ponderosa Pines (20-49 cubic feet per year)." (LUBA Opinion No. 2019-065, Page 14). The appellants successfully argued that the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part", demonstrated that the soil types on the property support Ponderosa Pines, and that the county's findings were "inadequate to explain why the remaining open portion of the subject property could not be planted and [used] for forestry purposes." (LUBA Opinion No. 2019-065, Page 14).

The "Wilson – Order 1 Soil Survey" demonstrates that a majority of the property contains "Generally Unsuitable Soils", and that those soils are primarily located in the south and east portions of the subject parcel where the majority of scattered tree growth exists. Considering these facts, staff recommends the Planning Commission consider the findings and conclusions within the submitted "Wilson – Order 1 Soil Survey" as well as staff's analysis of that survey in making its decision regarding this request.

> *<u>OAR 660-004-0028:</u>*
> *Exception Requirements for Land Irrevocably Committed to Other Uses*
>
> *(2) Whether land is irrevocably committed depends on the relationship between the exception area and the lands adjacent to it. The findings for a committed exception therefore must address the following:*
>
> *(b) The characteristics of the adjacent lands;*

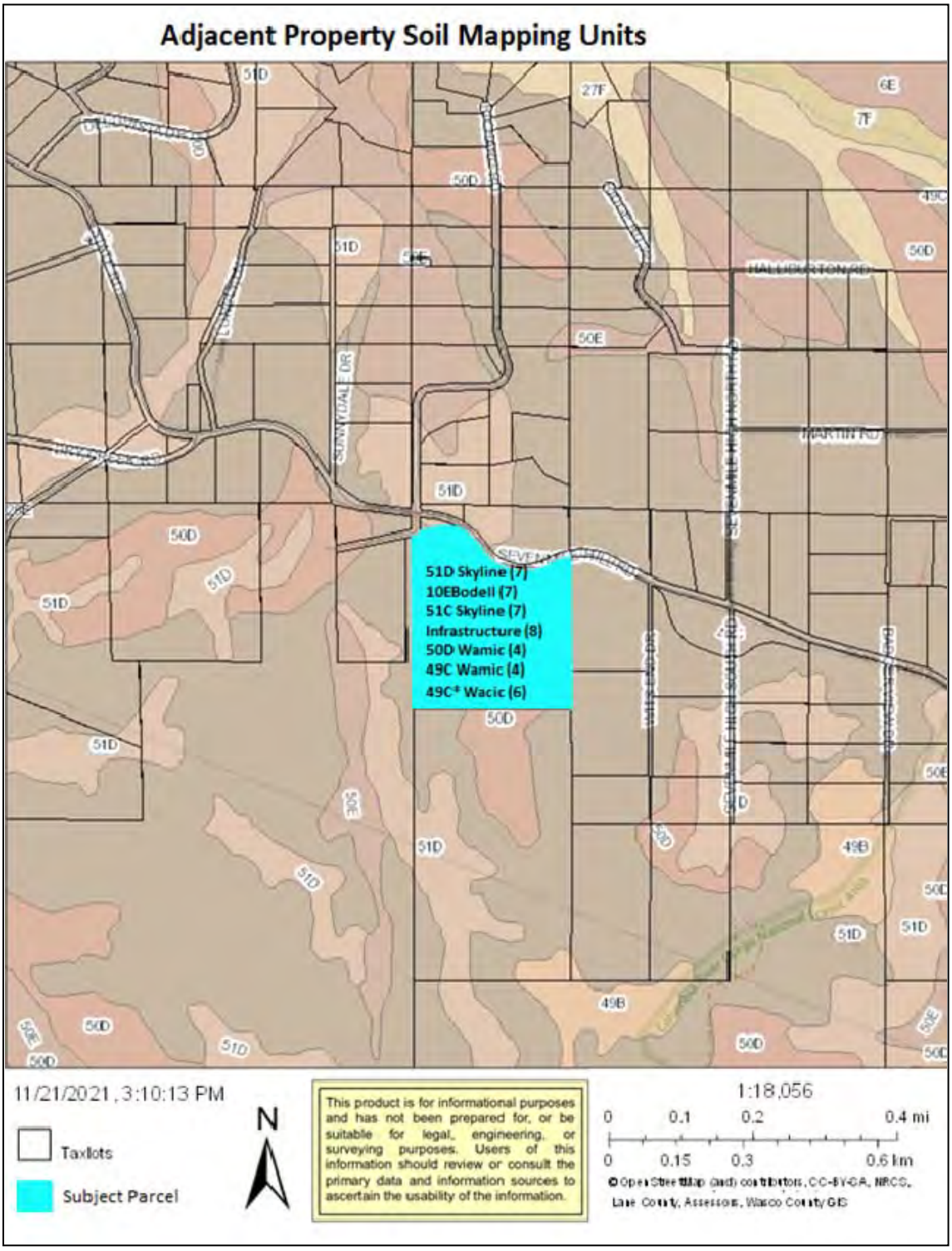
FINDING: Information concerning the "characteristics of the adjacent lands" is provided by the original record, Wasco County GIS data (2018 Aerial OSIP Imagery), and the additional evidence (Remand Request Letter & Remand Request Soil Data) submitted by Mr. David Wilson on July 13, 2021. Additional references are provided throughout this subsection.

Characteristics and analysis of the adjacent lands includes the following: (1) Soil Analysis; (2) General Land Use History, Zoning, and Use; and (3) STAFF CONCLUSIONS & RECCOMENDATIONS.

(1) Soils Analysis. Original application materials provide the following regarding soils analysis on adjacent lands:

> Applicant/Owner: David Wilson Application Form (Signed May 4, 2018)
> **Soils:** The subject property soils are 49C and 50D Wamic Loam. The parcels immediately north of the subject property are generally 51D Wamic Loam soils. Adjacent properties to the south and east are 49C and 50D, like the subject property. (See soils maps and productivity indices) 49C and 50D soils both have a site index of 70 for Ponderosa Pine, indicating a potential yield of 20-49 cubic feet per acre. However, with the exception of the 439 acre parcel adjoining the southwest corner of the subject property, none of the adjacent properties are supporting commercial timber production, and logging on the 439 acre parcel takes place west of the creek which runs parallel to the common boundary. All commercial timber production occurs well south of the subject property, generally south of the BPA power line transecting the area. The subject property has never produced merchantable timber or been logged commercially. (Original Application, Page 19).

The soil mapping units for adjacent and neighboring parcels are provided by the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part". This Order 3 survey was used to obtain the subject parcel's soil data in the original application request. (See below "Adjacent Property Soil Mapping Units" map).



Regarding the subject parcel, the USDA Order 3 survey's soil data is refuted by the "Wilson – Order 1 Soil Survey's" findings and conclusions. Although the scope of the "Wilson – Order 1 Soil Survey" was limited to the subject parcel, the survey's author Mr. Gary Kitzrow, provided comment regarding the under-representation of the number and diversity of Soil Mapping Units on the Wasco county USDA Soil Legend. Specifically, Mr. Kitzrow provided the following:

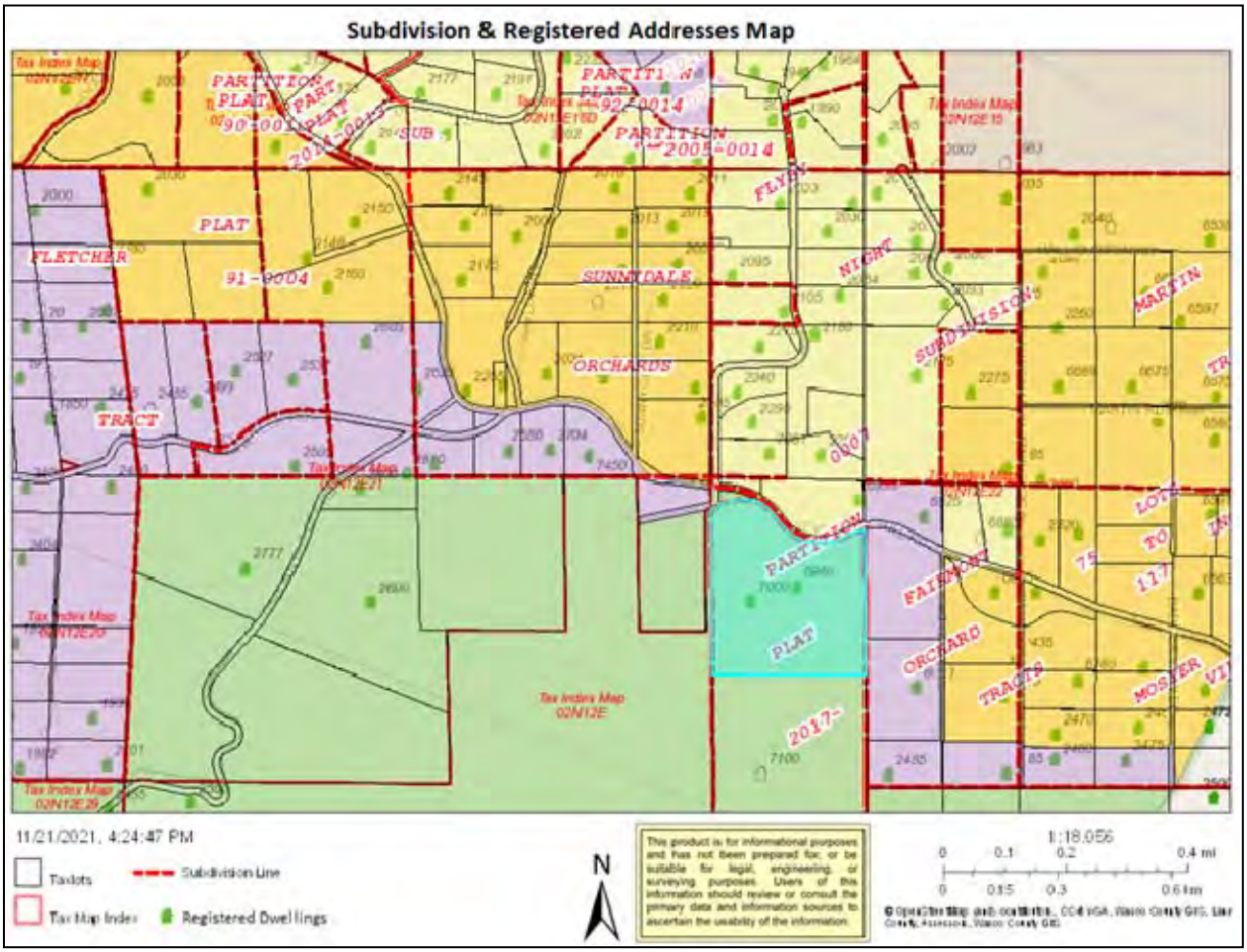
"Wilson – Order 1 Soil Survey" Subsection (2)(f) (submitted January 23, 2021):
By completing offsite reviews of surrounding properties and detailed Order I Soil Survey for the current subject property, Wamic soils are over-represented mapping units given the confirmed diverse and wide range of landforms and geomorphic surfaces in this specific region. Wamic soils are mapped on virtually every landform in this area. Although a pervasive soil series, there are many other soils in this region and we would not expect only one soil to be mapped in such a large geographic domain. (Wilson – Order 1 Soil Survey, Page 2).

It is clear from Mr. Kitzrow's commentary that similar to the subject parcel, it is likely that neighboring and adjacent lands contain a wider array of Soil Mapping Units than is provided within the USDA Order 3 survey. Although Mr. Kitzrow's commentary cannot override the Order 3 USDA's survey of mapped soil units on surrounding parcels, his comments do provide additional information concerning the possible increased diversity of soil characteristics of adjacent lands.

(2) General Land Use History, Zoning, and Use. Information concerning the surrounding area's land use history, zoning, and current use is provided by the land use file records, the Wasco County Assessor's Office, and Wasco County GIS data (2018 Aerial OSIP Imagery, Zoning Layer, Subdivision Layer).

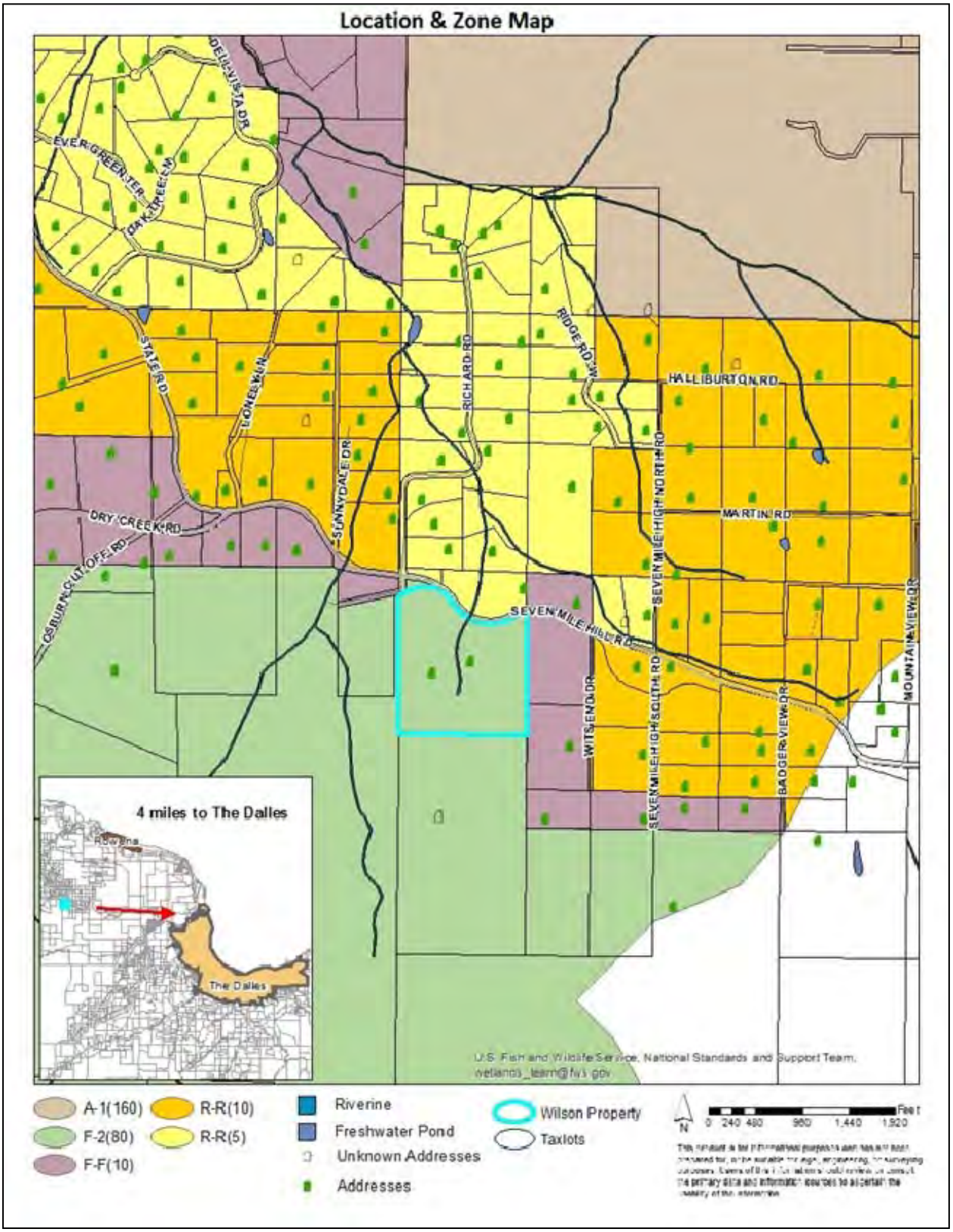
The lands to the north, east, and west of the proposed exception area have been primarily divided into smaller units of land relative to rural development (10 acres or less). A large majority of these parcels were created long before the area was subject to statewide or county-wide zoning regulations. Of the four subdivisions in the area, three were platted in the early part of the twentieth century, and the fourth in 1979 (Fletcher Tract-1908; Fairmont Orchard Tracts-1911; Sunnydale Orchards-1912; Flyby Night Subdivision-1979). Three of these subdivisions primarily contain lots that are approximately 5 acres in size. The county has recognized the area's existing parcel sizes by zoning the area for rural residential development (R-R (5) Rural Residential and Rural Residential (R-R (10)) Zones), and for small-scale agriculture or forestry uses in conjunction with a rural residence (Forest-Farm (F-F 10) Zone (Non-Resource)). Lands to the south, southwest, and west were historically created by deed or land sales contract prior to state or county-wide zoning laws, and many were divided into smaller units of land in the 1980s by partition. Additional details are provided below.

As a result of the parcel creation history, parcel size, and parcel use, and in keeping with the zoning, there has been a significant amount of rural residential development, particularly along the county roads and within the platted subdivisions. There have also been several applications for rural residences in the areas within the Forest-Farm (F-F 10) Zone (Non-Resource). (See below "Subdivision & Registered Addresses Map").



Between 1994 and 1997, the exception area and the lands surrounding it were included in what Wasco County collectively designated as the "Transition Lands Study Area" (TLSA). The county performed an analysis of the area, in part to determine where rural residential development would be appropriate. The final report for the TLSA was published on September 12, 1997, and included recommendations outlining the sub-areas within the study area that were suitable for residential development. The exception area and the lands to the north and east were determined to be suitable for further rural residential development. Certain zone changes have been processed as part of the TLSA program to further the development of residential uses in the area surrounding the exception area.

The exception area is surrounded on two sides (north and east) by residential development and land zoned for rural residential development under the three non-resource rural residential zoning designations, R-R (5) Rural Residential, Rural Residential (R-R (10)) Zone, and Forest-Farm (F-F 10) Zone (Non-Resource). The parcel immediately to the south is zoned for forestry uses, but is used for residential and small scale agricultural uses. Lands further south, and immediately west of the subject parcel "exception area" are generally used for commercial forestry. (See below "Location & Zone Map").


Location & Zone Map
DELL VISTA DR
EVERGREEN TER
OAK TREE LN
STATE RD
LONE OAK LN
SUNNYDALE DR
RICHARD RD
RIDGE RD NW
HALLIBURTON RD
DRY CREEK RD
OSBURN CUTOFF RD
SEVEN MILE HILL RD
SEVEN MILE HIGH NORTH RD
MARTIN RD
WITSEND DR
SEVEN MILE HIGH SOUTH RD
BADGER VIEW DR
MOUNTAIN VIEW DR
4 miles to The Dalles
Rowena
The Dalles
U.S. Fish and Wildlife Service, National Standards and Support Team,
wetlands_team@fws.gov
A-1(160)
F-2(80)
F-F(10)
R-R(10)
R-R(5)
Riverine
Freshwater Pond
Unknown Addresses
Addresses
Wilson Property
Taxlots
N
0 240 480 960 1,440 1,920
Feet

The land on the immediate north and south side of Seven Mile Hill Road are all zoned for and mostly used for residential purposes. This parcel of F-2 is the only such parcel of Forest land on all of Seven Mile Hill Road. All other parcels along Sevenmile Hill Road are within the R-R (5) Rural Residential, Rural Residential (R-R (10)) Zone, and Forest-Farm (F-F 10) Zone (Non-Resource), with 5 or 10 acre minimum parcel sizes.

Lands East of the Subject Parcel. Directly to the east, north east, and south east of the proposed "exception area" are three parcels within the Forest-Farm (F-F 10) Zone (Non-Resource) (T2N R12E, Section 22, Lots 4700, 4300, and 4200). Two of these tax lots abut the eastern boundary of the subject parcel, and the third (tax lot 4700) is located on the immediate north side of Sevenmile Hill Road. Tax lots 4700 and 4200 contain dwelling units and are used for residential purposes. Tax lot 4300 was recently approved for a dwelling unit on October 12, 2021 (See File No. 921-21-000131-PLNG).

The three abutting rural residential lots further to the east are part of a small rural subdivision called Fairmont Orchard Tracts, filed August 5, 1911. The subdivision is located entirely in the southwest quarter of Section 22, Township 2 North, Range 12 East. The subdivision was originally composed of nine lots, Lots 1-6 and Parcels A, B, & C. The numbered lots were generally to the south of Sevenmile Hill Road, oriented in a north-south rectangle, while the lettered parcels form a flagpole on the north side of Sevenmile Hill Road, running west to the western boundary of the section. The lot sizes ranged from 6.08 acres to 13.22 acres on the original plat, making the average lot size 9.66 acres. Over time, three of the original lots have been partitioned into smaller lots, resulting in 12 lots, the smallest being 0.75 acres. The average size is now 6.85 acres.

There are three zoning designations covering the area east of the exception area, R-R (5) Rural Residential, Rural Residential (R-R (10)) Zone, and Forest-Farm (F-F 10) Zone (Non-Resource). The National Scenic Area (NSA) Boundary is located approximately 0.6 miles east of the subject parcel's east property line. Zoning designations within this area of the NSA are predominantly "A-1" Large Scale Agriculture Zone (GMA & SMA). In 1999, Wasco County revised the zoning of the lots 0.1 mile east of the subject parcel, changing them from Forest-Farm (F-F 10) Zone (Non-Resource) to Rural Residential (R-R (10)) Zone (County Ordinance 99-111, amending Ordinance 97-102). Further, according to goals established in the TLSA project, the change in zoning was part of a process seeking to allow the expansion of rural residential uses in this 'transition' area between the more developed areas to the north and the large scale forestry/agricultural uses to the south. These zone changes were objected to and appealed, partly on the basis that they were likely to diminish the buffer between commercial forestry and rural residential uses in the area and increase conflicts between those uses. The appeal was stayed for mediation pursuant to the parties' stipulation, and the matter was later dismissed from LUBA. (*Thomas v. Wasco County* (unpublished), LUBA appeal No. 99-178)

Lands North of the Subject Parcel. Immediately north and northeast of the subject parcel, but still on the south side of Sevenmile Hill Road, is a vacant 0.7 acre parcel, that is zoned Forest (F-2) Zone. The small parcel is owned by Wasco County and is located between the old Sevenmile Hill Road and the current Sevenmile Hill Road. Immediately north of the vacant parcel, on the north side of Sevenmile Hill Road are two lots that are within the R-R (5) Rural Residential zone, and were also part of the Fairmont Orchard Tracts Subdivision discussed above. One of these lots is 0.7 acres, is vacant, and owned by Wasco County. The other lot is 7.9 acres and contains a single family dwelling with associated accessory structures.

The Fly-By Night Subdivision lies north of the Fairmont Orchard Tracts Subdivision on the north side of Sevenmile Hill Road. Three parcels were reconfigured through a partition in 2017. All of the lots north of Sevenmile Hill Road for approximately 0.8 miles are within the R-R (5) Rural Residential zone. North of

the Fly-By Night Subdivision, lands are within the Exclusive Farm Use (A-1) Zone or within the National Scenic Area.

Lands lying to the northwest of the subject parcel are within the Sunnydale Orchards Subdivision. All of the lots within the subdivision that are located north of Sevenmile Hill Road are within the Rural Residential (R-R (10) zone, and all of the lots located on the south side of the road are within Forest-Farm (F-F 10) Zone (Non-Resource). The majority of this subdivision is developed with single family dwellings and associated accessory buildings. North of Sunnydale Orchards there are other subdivisions with lots within the Forest-Farm (F-F 10) Zone (Non-Resource) and R-R (5) Rural Residential zone.

All of the area north of the proposed "exception area" is built and committed to low and medium density rural residential uses in these two platted subdivisions: Sunnydale Orchards Subdivision and Flyby Night Subdivision.

The Sunnydale Orchards Subdivision was recorded on March 8, 1912. It consisted of 25 lots averaging about five acres each, with the largest lot being 11.4 acres. Lots within the subdivision are mostly less than ten acres. The plat for the Flyby Night Subdivision was recorded November 8, 1979. The Flyby Night lots average approximately five acres each, with two larger, approximately 20-acre parcels as the exceptions.

The area located on the north side of Sevenmile Hill Road is the most heavily developed area surrounding the subject parcel. As can be seen in the maps above (See "Location & Zone Map" and "Subdivision & Registered Dwellings Map"), virtually all units of land located north of Sevenmile Hill Road have been improved with a dwelling unit.

Lands West of the Subject Parcel. There are two properties immediately adjacent to the proposed exception area to the west. The northwest parcel is 16.3 acres, with the north 1/3 within the Forest-Farm (F-F 10) Zone (Non-Resource) and the southern 2/3 within the Forest (F-2) Zone. This property is not developed. The adjacent property to the southwest is within the Forest (F-2) Zone, is 439 acres, is in commercial forestry, and is owned by Kenneth Thomas. Lands west of the subject parcel are larger in size and within the Forest (F-2) Zone. These lands stretch almost a mile due west of the subject parcel, across Osborn Cut-Off Road, before they reach the Fletcher Tract Subdivision where properties fall within the Forest-Farm (F-F 10) Zone (Non-Resource) and are much smaller in size (5-15 acres). The majority of lands within the Forest (F-2) Zone is undeveloped, with the exception of three single family dwellings along Osborn Cut-Off Road.

The Fletcher Tract Subdivision was recorded on June 6, 1908 and contains a total of 32 lots, almost all five acres each. All of the lots within the Fletcher Tract are within the Forest-Farm (F-F 10) Zone (Non-Resource). The lots are oriented in two long north-south columns of 16 lots each, with a north-south roadway between the two columns. According to 2018 Aerial OSIP Imagery, this south portion of the platted road south of Dry Creek Road has never been developed, although there are some private access roads leading to the developed parcels. The roadway north of Dry Creek Road was vacated in 1977, but a private road still exists. For the purposes of this report, information was collected on 11 lots in the subdivision. Most of the lots have remained separate 5-acre parcels, but some have been combined under single ownership into larger lots (Tax lots 1000, 2200, 700, 2600, 2700). The 15.29-acre lot (Lot 1000) is the largest parcel in the Fletcher Tract. Beyond the subdivision to the west and south are large parcels within the Forest (F-2) Zone. According to Planning Department records, the Fletcher Tract has been zoned for non-resource use since the implementation of zoning in the county.

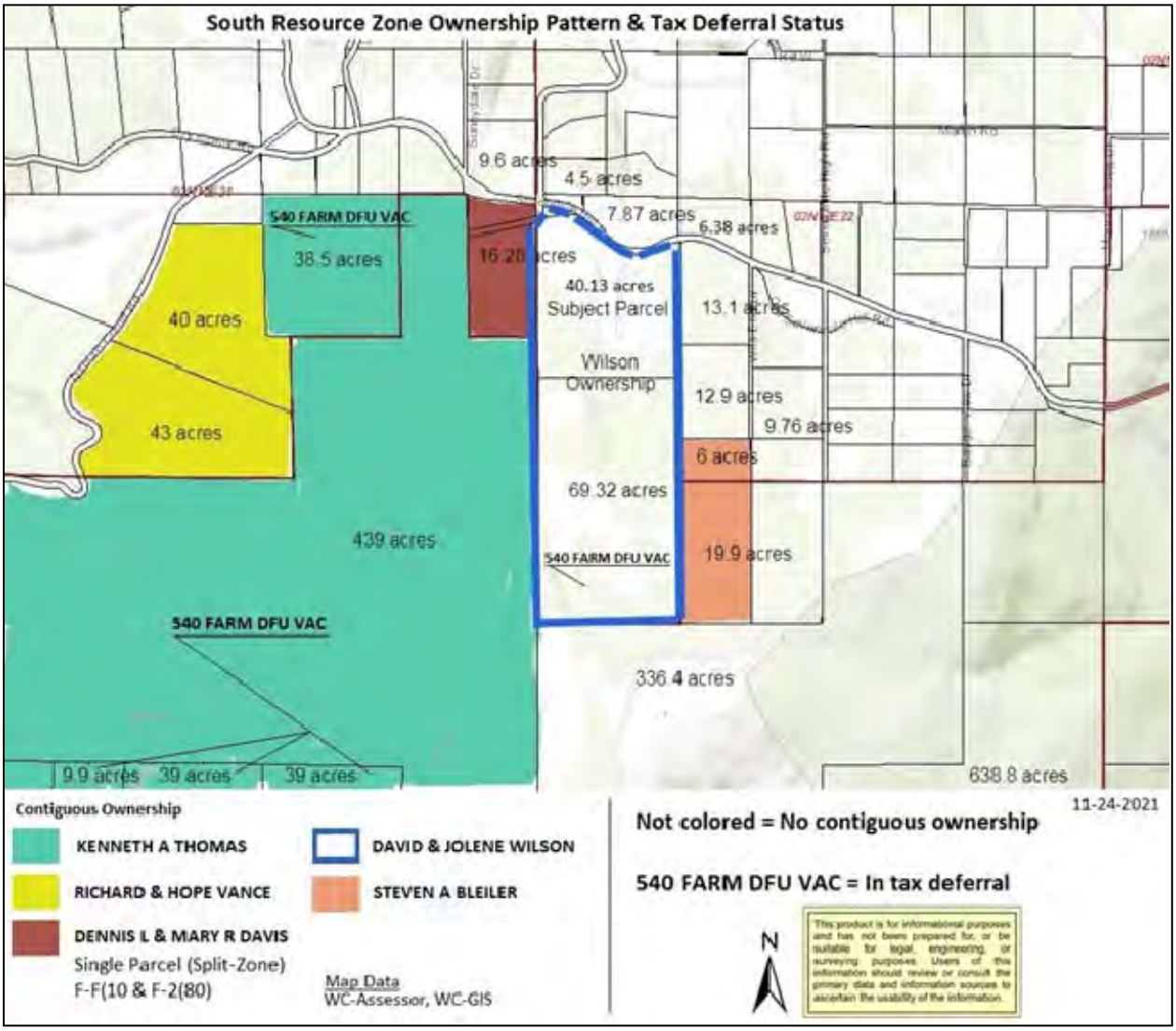
Several of the lots in the Fletcher Tract are in common ownership forming larger tracts, more in keeping with smaller, 10-15 acre woodland lots. When looking at them as individual lots, the majority have no improvements. However, in the area south of Dry Creek Road, five of the lots in the 'eastern column' are in common ownership (Tax Lots 900, 1000 and 1100, covering subdivision Lots 9-13), with a residence on one of those lots. Similarly, three of the lots in the 'western column' are in common ownership (Tax Lots 2100, 2200 and 2300, covering subdivision Lots 20-23), with a residence on two of them. Considering this pattern of use, the majority of the land area is dedicated to non-resource, residential uses. Additionally, because the establishment of the lots predates statewide or countywide zoning in the area, each 5-acre parcel could be developed with residential use.

Lands South of the Subject Parcel. The south adjacent 69 acre parcel is within the Forest (F-2) Zone, and is also owned by the applicant David Wilson. The parcel is used for farm and residential purposes, and no forestry uses occur there. A record Quick Claim deed (recorded 1948-65409), describes the south adjacent parcel, the subject parcel, three separate parcels (now within the Forest (F-2) Zone) and four lots of the Fairmont Orchard Tracts (now within the Forest-Farm (F-F 10) Zone (Non-Resource) and Rural Residential (R-R (10) zone). Land use history provides that the 1948 tract was separated through conveyances throughout the twentieth century to form the existing nine separate units of land situated to the south, southeast, and east of the subject parcel (currently zoned for forest and residential use).

The lands to the south and southwest (all within the Forest (F-2) Zone) were created by deed prior to state and county-wide land use laws. However, it appears that the current 439 acre adjacent southwest parcel (2N 12E 0 2900) owned by Kenneth Thomas and the 40.35 acre parcel (2N 12E 21 2700) and 43.01 acre parcel (2N 12E 21 2800) owned by Richard & Hope Vance were all three reduced in size through a series of two partitions occurring in 1984 and 1985 (MIP-84-118 & MIP-85-103). Further west, the 30.45 acre (2N 12E 21 2900) and the 34.31 acre (2N 12E 21 3000) acre parcels were also reduced in size through a partition (MIP-86-103). The north-south dividing line between the four smaller parcels appears to have been the BPA Line.

A copy of the pertinent deeds and minor partitions, is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 17.

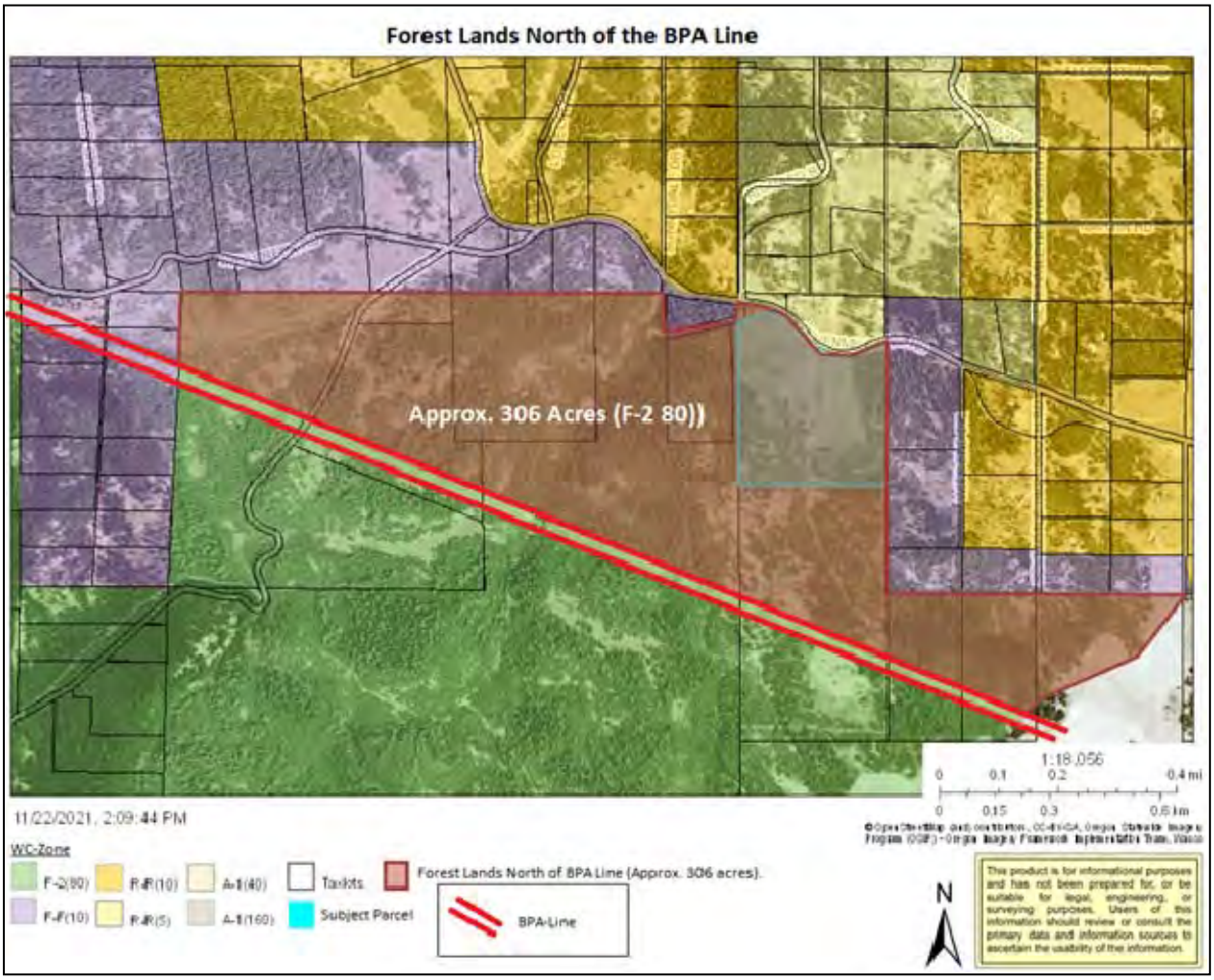
The south adjacent parcel, the southwest adjacent parcel, and a parcel located further west (all in Forest (F-2) Zone) are in tax deferral status. There are three tracts of land wholly in resource use, and one split zoned (Forest-Farm (F-F 10) Zone (Non-Resource) and Forest (F-2) Zone) (See "South Resource Zone Ownership Pattern and Tax Deferral Status" map).



The south adjacent property along with all other properties to the west are bisected by a Bonneville Power Administration Transmission Line Easement also known as “Bonneville - The Dalles Line”. The BPA line runs in a southeast to northwest direction. The transmission line’s maintenance easement is approximately 150’+/- wide, and is clearly demarcated on the below map that was submitted with the applicant’s Remand materials. (See below “Aerial Photo” map).



Additionally, staff analysis provides that an area of approximately 306 acres of Forest (F-2) Zoned land is situated north of the BPA line (including the subject parcel). (See below "Forest Lands North of the BPA Line" map).

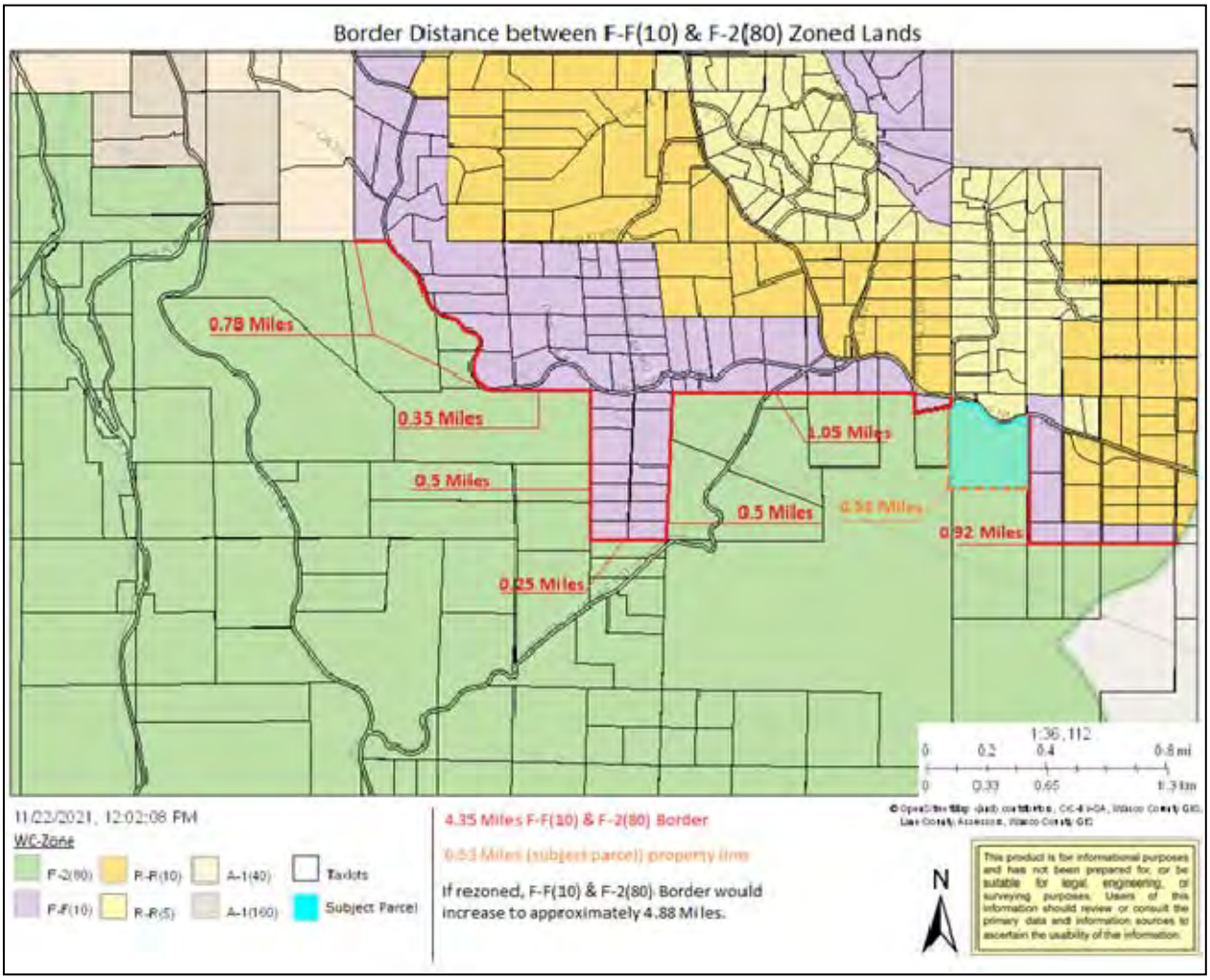


Continuing further south and southwest, lands are squarely within the Forest (F-2) Zone for approximately five miles (crossing Chenoweth Creek Road). This region is undeveloped, with the exception of two parcels along Chenoweth Creek Road, and is primarily being managed for forestry or large scale agricultural (mostly grazing) uses. Deed research indicates these parcels were created prior to modern state and county land use law.

To the far southeast, near areas surrounding Wells Road, approximately 1.5 - 4.5 miles southwest of The Dalles, lands fall within the Forest-Farm (F-F 10) Zone (Non-Resource) and residential zones ((R-R (5) Rural Residential and Rural Residential (R-R (10)) Zone). This area's zoning patterns mimic the zoning pattern of the subject area of analysis with Forest-Farm (F-F 10) Zoned lands situated between resource and residential zoned lands.

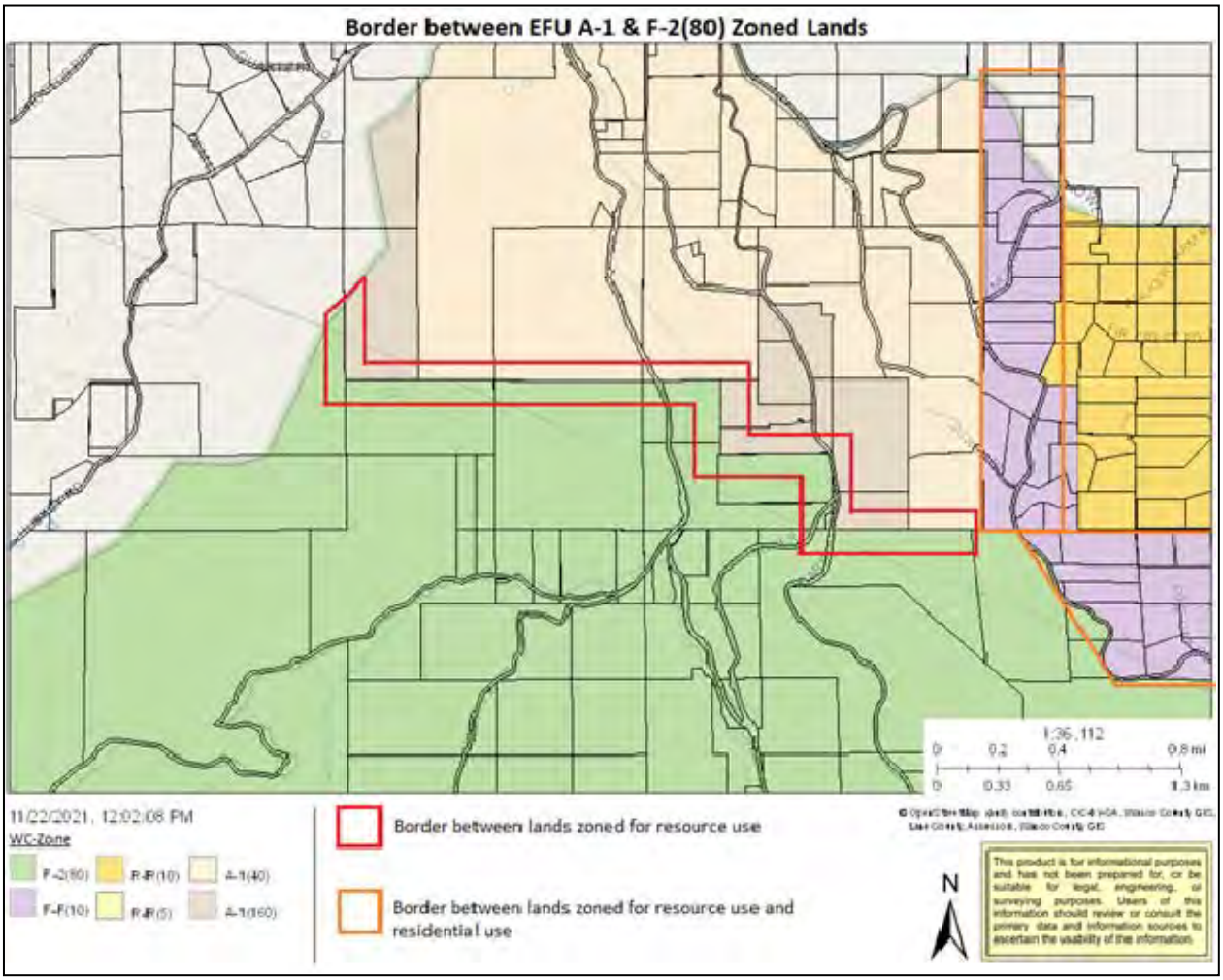
Public access to the south and southwest parcels that are within the Forest (F-2) Zone, is provided by Sevenmile Hill Road (provides access to the 439 acre parcel owned by Kenneth Thomas), Osburn Cut-off Road, and Dry Creek Road.

Zoning & Use. The property border line distance between those lands within the Forest-Farm (F-F 10) Zone (Non-Resource) and those lands within the Forest (F-2) Zone are illustrated in the below "Border Distance between F-F(10) & F-2(80) Zoned Lands" map.



The approximate total border distance between lands within the Forest-Farm (F-F 10) Zone (Non-Resource) and Forest (F-2) Zone is approximately 4.35 miles in length. If rezoned to Forest-Farm (F-F 10) Zone (Non-Resource), the subject parcel's south and west property lines (approximately 0.53 miles) would be integrated into the Forest-Farm (F-F 10) Zone (Non-Resource) and Forest (F-2) Zone border line, which would increase the length total Forest-Farm (F-F 10) Zone (Non-Resource) and Forest (F-2) Zone border to approximately 4.88 miles.

Moving further west, the zoning map explicitly demonstrates that lands within the Forest-Farm (F-F 10) Zone (Non-Resource) are a clear demarcation between properties that are within resource zones (Forest (F-2) Zone and Exclusive Farm Use (A-1) Zone) and those within residential zones (R-R (5) Rural Residential and Rural Residential (R-R (10)) Zone). Furthermore, it is clear that in this region of the county, the Forest-Farm (F-F 10) Zone (Non-Resource) does not separate resource zoned lands. (See below "Border between EFU A-1 & F-2(80) Zoned Lands").



(3) STAFF CONCLUSIONS & RECCOMENDATIONS. Analysis of the characteristics of adjacent lands provides following:

(1) The subject parcel's soils that were mapped by the "Wilson – Order 1 Soil Survey" and those soils mapped on adjacent parcels via the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part" greatly differ in both soil series/classification and soil mapping units represented.

(2) The land use history demonstrates that the properties located to the north, northwest, and east of the subject parcel were developed for residential and small acreage forest-farm purposes. The existing land use designation and zoning pattern of these lands ensures that they are currently used for residential and (non-resource) forest-farm purposes. A majority of the north, northwest, and east adjacent parcels contain active registered addresses, and are generally smaller in size than those lands located to the south, southwest, and west. Lands to the south, southwest, and west are zoned exclusively for and actively in forestry use. The size of the subject parcel, and its historical and current use is more in line with those neighboring north, northwest, and east parcels that are within residential zoning.

(3) From the land use history provided in Section II.D of this report (See *Settlement Agreement and 2013 ZNC/CPA/EXC decision*), and from a geographical standpoint, the BPA Line has a history of being considered a logical man-made boundary for separating forestry uses from built and committed residential areas. Similar to the fire fuel break buffer zone areas and power line and road maintenance

easements, the BPA Line easement area is maintained clear of trees, and acts, because of its width and scarification, as a significant physical break between rural residential uses in the Sevenmile Hill area and forestry uses further to the south, southwest, and west. Moreover, there is a history of public examination and consideration that the BPA Line right-of-way/easement area physically separates, and therefore, mitigates the potential fire impacts associated with low-density residential uses in the Sevenmile Hill area.

(4) The existing zoning maps clearly illustrate that lands within the Forest-Farm (F-F 10) Zone (Non-Resource), are situated between lands within resource zones (Forest (F-2) Zone and Exclusive Farm Use (A-1) Zone) and lands within residential zones (R-R (5) Rural Residential and Rural Residential (R-R (10)) Zone). It is also clear that within the Sevenmile Hill area, the subject 40.13 acre parcel owned by David Wilson (2N 12E 22 4400), the small 0.45 acre parcel owed by Wasco County (2N 12E 22 4500), and approximately 0.32 acres of private access road (Old Sevenmile Hill Road) are the only lands within the Forest (F-2) Zone that directly abut residentially zoned property.

Considering these facts, staff recommends the Planning Commission consider staff's analysis of the characteristics of adjacent lands in making its decision regarding this request.

> *OAR 660-004-0028:*
> *Exception Requirements for Land Irrevocably Committed to Other Uses*
>
> *(2) Whether land is irrevocably committed depends on the relationship between the exception area and the lands adjacent to it. The findings for a committed exception therefore must address the following:*
>
> *(c) The relationship between the exception area and the lands adjacent to it;*

FINDING: The following analysis of the relationship between the "exception area" and the lands adjacent to it are provided from the above facts, analysis, and findings for OAR 660-004-0028(2)(a) and OAR 660-004-0028(2)(b).

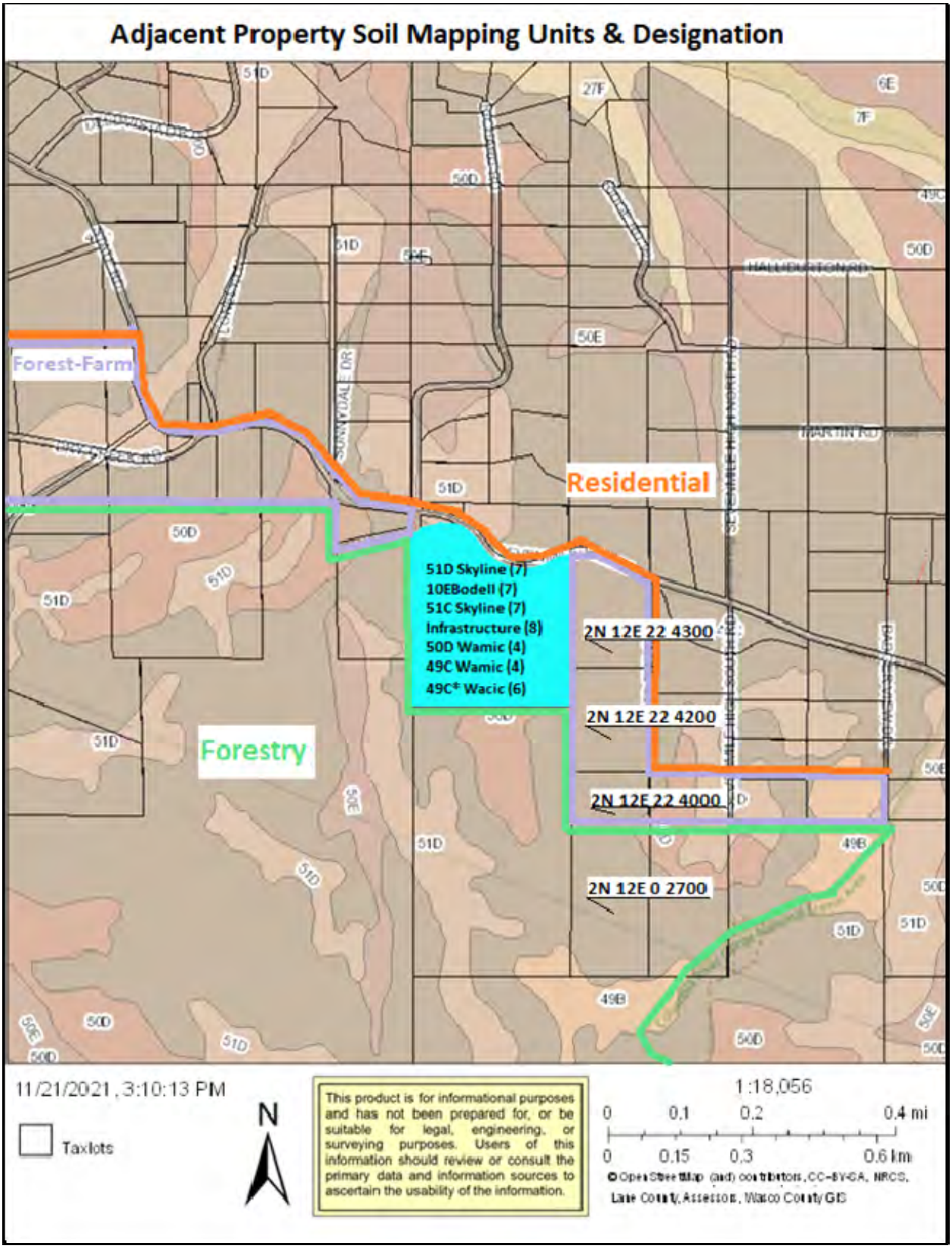
STAFF CONCLUSIONS & RECCOMENDATIONS.

Soils Analysis. The subject parcel's soils that were mapped by the "Wilson – Order 1 Soil Survey" and those soils mapped on adjacent parcels via the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part" differ greatly in both soil classification and soil mapping units represented.

It is clear from the "Wilson – Order 1 Soil Survey" that the subject 40.13 acre parcel ("exception area") contains a majority (20.79 acres / 51.8%) of soil mapping units that are considered "Generally Unsuitable" for large and small scale agricultural and forestry uses. Additionally, the subject parcel, which is designated "Forestry", contains a wider variety of soil mapping units than is provided for in the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part".

The below "Adjacent Property Soil Mapping Units & Designation" map illustrates that the Order 3 USDA soil mapping units represented on all of the surrounding lands in the subject area, which are designated "Forestry", "Forest-Farm", and "Residential", contain one or more of the Wamic series soil mapping units (51D Wamic-Skyline Complex; 50D Wamic; 49B Wamic; 49C Wamic; 50E Wamic). The Wamic mapping units appear to be represented "on virtually every landform in this area," (Wilson – Order 1 Soil Survey, Page 2), regardless of the parcel's land use designation or zone.

For example, the below “Adjacent Property Soil Mapping Units & Designation” map illustrates four tax lots that all contain the same single soil mapping unit (49C Wamic); however, tax lots (2N 12E 22 tax lot 4300, 4200, and 4000), are designated “Forest-Farm” and within the Forest-Farm (F-F 10) Zone (Non-Resource), while tax lot 2N 12E 0 2700, is designated “Forestry” and within the Forest (F-2) Zone.



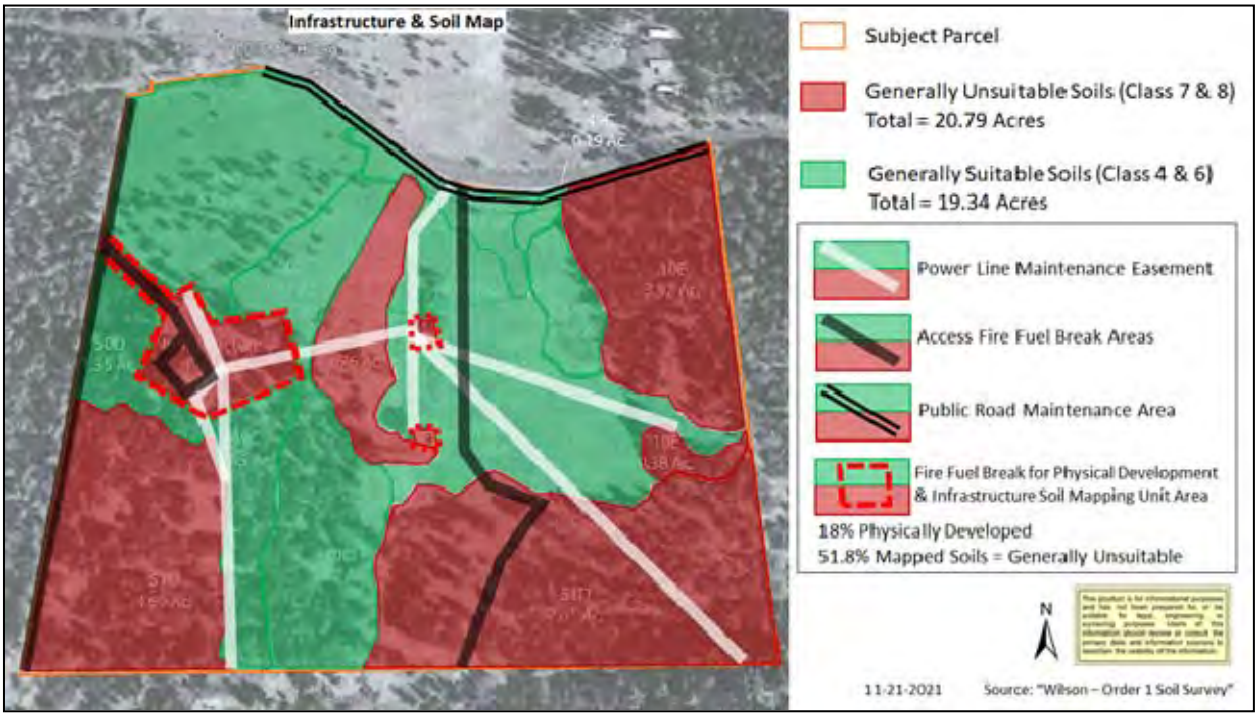
Based on the findings and conclusions of the "Wilson – Order 1 Soil Survey", staff finds that the relationship between the subject parcel's soil mapping units and those mapped on adjacent lands is greatly diminished. Mr. Kitzrow's findings and commentary in the "Wilson – Order 1 Soil Survey"

concerning the pervasiveness of the Wamic soil series, and that "there are many other soils in this region and we would not expect only one soil to be mapped in such a large geographic domain" (Wilson – Order 1 Soil Survey, Page 2), tends to raise a noble question concerning the accuracy of the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part", which was published in 1982.

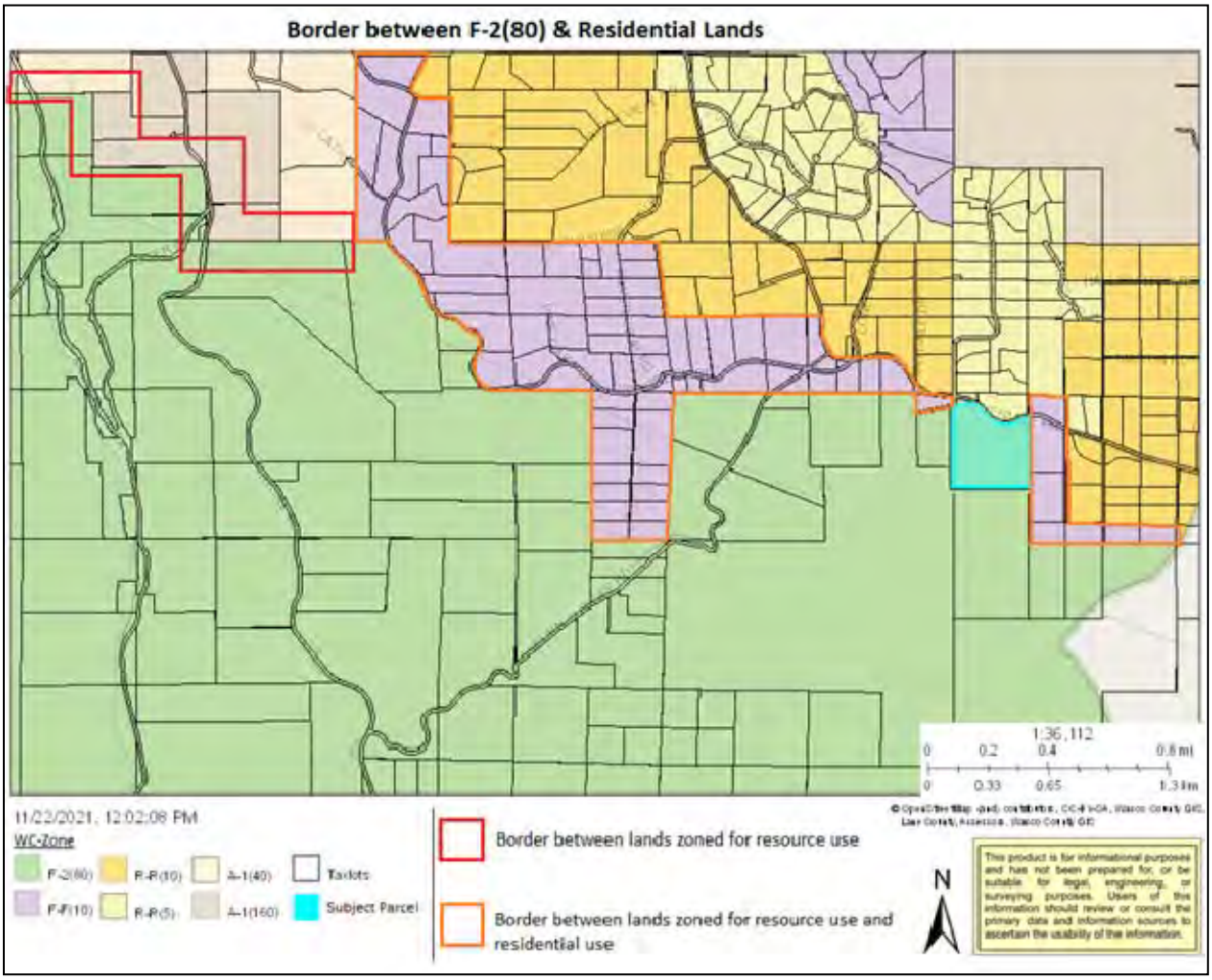
Land Use & Zoning. The land use history demonstrates that the properties located to the north, northwest, and east of the subject parcel were developed for residential and small acreage forest-farm purposes. The existing land use designation and zoning pattern ensures that these lands are currently used for residential and (non-resource) forest-farm purposes. A majority of these adjacent parcels contain active registered addresses, and the parcels are generally smaller in size than those lands located to the south, southwest, and west. Units of land located to the south, southwest, and west of the subject parcel are larger, mostly undeveloped, and within the "Forestry" land use designation. Land use history demonstrates that these properties have historically been in forestry use, and have never been and are currently not used for residential purposes. Regarding the subject parcel's size and its historical and current use, it is clear that the property's existing relationship is more in line with those adjacent residentially zoned lands located to the north, northwest, and east, as opposed to lands located to the south, southwest, and west.

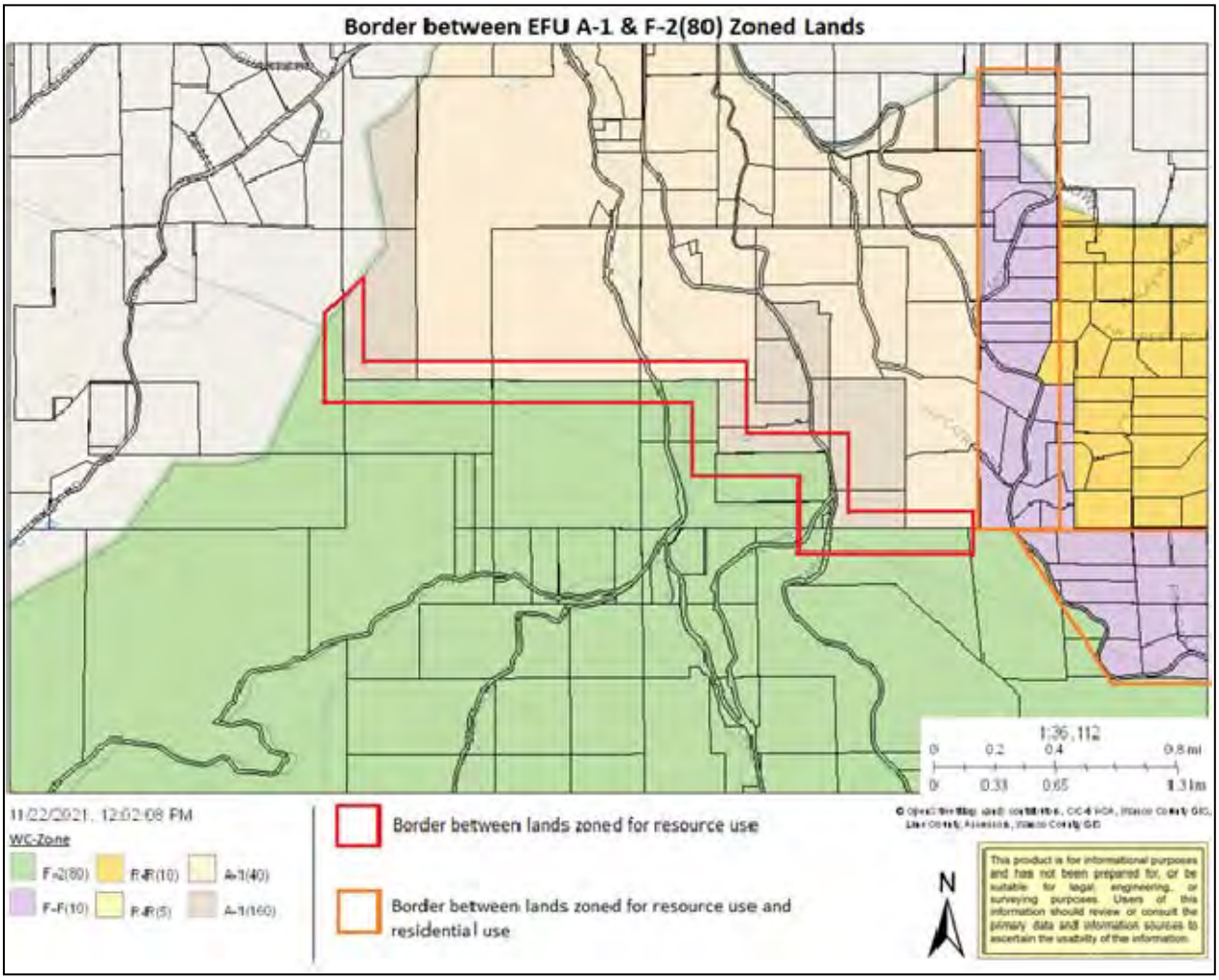
Compared with most parcels located to the south, southwest, and west, the subject parcel contains substantial physical development. Approximately 18% of the parcel is physically developed. The size and scope of the subject parcel's residential development mimics a majority of the residentially zoned parcels located to the north, northwest, and east. Parcel size and residential development on lands located to the north, northwest, and east can prevent or significantly diminish forestry uses within the overall area due to conflicting resource and residential uses. Additionally, if the subject parcel's diminished soil capacity (20.79 acres / 51.8%) and location pattern is taken into consideration and added to its physical development (approximately 18%) locations, one begins to see potential limitations in the parcel's ability to maintain "the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture." OAR 660-015-0000(4).

Taking into consideration those limitations caused by "Generally Unsuitable Soil" locations and physical development on the property in relation to "Generally Suitable Soil" locations, the subject parcel's relationship between "active" forestry uses occurring on neighboring south, southwest, and west properties and the subject parcel's "potential" forestry uses are seriously diminished. (See below "Infrastructure & Soil Map" for reference).



In the Sevenmile Hill area of Wasco County, those properties directly abutting *all* of the designated resource lands (Agriculture and Forestry) and that separate those lands from "Residential" designated lands, are within the Forest-Farm (F-F 10) Zone (Non-Resource). See the below maps for details ("Border between F-2(80) & Residential Zoned Lands" map and "Border Distance between EFU A-1 & F-2(80) Zoned Lands" map).


Border between F-2(80) & Residential Lands
1:36,112
0 0.2 0.4 0.8 mi
0 0.33 0.65 1.3 km
11/22/2021, 12:02:08 PM
WC-Zone
F-2(80)
R-R(10)
A-1(40)
Taxlots
F-R(10)
R-R(5)
A-1(160)
Subject Parcel
Border between lands zoned for resource use
Border between lands zoned for resource use and residential use
N
This product is for informational purposes and has not been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.



In the Sevenmile Hill area, the subject parcel and two two small properties are the only lands within the Forest (F-2) Zone that directly abut residentially zoned property. In this case, a forest zoned property abutting residentially zoned property is completely out of line with the zoning pattern, and not at all in relation to every other unit of land within the Sevenmile Hill area of Wasco County that is within a resource zone. This fact is an interesting conundrum that might be resolved by approving Mr. Wilson's request.

Considering the aforementioned facts provided throughout this report, staff concludes that outside of being designated "Forestry" and within the Forest (F-2) Zone, the subject parcel's relationship with those adjacent south, southwest, and west lands designated "Forest" are significantly diminished. Alternatively, the subject parcel's relationship with those lands to the north, northwest, and east are increased due to their similar use and development patterns.

OAR 660-004-0028:
Exception Requirements for Land Irrevocably Committed to Other Uses

(2) Whether land is irrevocably committed depends on the relationship between the exception area and the lands adjacent to it. The findings for a committed exception therefore must address the following:

(d) The other relevant factors set forth in OAR 660-004-0028(6).

FINDING: These factors are discussed within the findings for OAR 660-004-0028(6).

OAR 660-004-0028:
Exception Requirements for Land Irrevocably Committed to Other Uses

(3) "Whether uses or activities allowed by an applicable goal are impracticable as that term is used in ORS 197.732(2)(b), in goal 2, Part II(b), and in this rule shall be determined through consideration of factors set forth in this rule. Compliance with this rule shall constitute compliance with the requirements of Goal 2, Part II. It is the purpose of this rule to permit irrevocably committed exceptions where justified so as to provide flexibility in the application of broad resource protection goals. It shall not be required that local governments demonstrate that every use allowed by the applicable goal is 'impossible.' For exceptions to Goals 3 or 4, local governments are required to demonstrate that only the following uses or activities are impracticable;

(a) Farm use as defined in ORS 215.203;

(b) Propagation or harvesting of a forest product as specified in OAR 660-033-0120;

(c) Forest operations or forest practices as specified in OAR 660-006-0025(2)(a)."

FINDING: The following analysis of whether the subject parcel "exception area" is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable is provided from the above facts, analysis, and findings for OAR 660-004-0028(2)(a), OAR 660-004-0028(2)(b), and OAR-660-004-0028(2)(c).

The impracticability analysis includes the following: (1) Applicable criteria standards and explanation; and (2) STAFF CONCLUSIONS & RECCOMENDATIONS.

(1) Applicable Criteria Standards and Explanations.

This application seeks an exception to Goal 4: Forest Lands, where the primary goal is to "conserve forest land for forest uses".

ORS 215.203(2)(a) provides*:*

"[F]arm use" means the current employment of land for the primary purpose of obtaining a profit in money by raising, harvesting and selling crops or the feeding, breeding, management and sale of, or the produce of, livestock, poultry, fur-bearing animals or honeybees or for dairying and the sale of dairy products or any other agricultural or horticultural use or animal husbandry or any combination thereof. "Farm use" includes the preparation, storage and disposal by marketing or otherwise of the products or by-products raised on such land for human

or animal use. "Farm use" also includes the current employment of land for the primary purpose of obtaining a profit in money by stabling or training equines including but not limited to providing riding lessons, training clinics and schooling shows. "Farm use" also includes the propagation, cultivation, maintenance and harvesting of aquatic, bird and animal species that are under the jurisdiction of the State Fish and Wildlife Commission, to the extent allowed by the rules adopted by the commission. "Farm use" includes the on-site construction and maintenance of equipment and facilities used for the activities described in this subsection. "Farm use" does not include the use of land subject to the provisions of ORS chapter 321, except land used exclusively for growing cultured Christmas trees as defined in subsection (3) of this section or land described in ORS 321.267 (3) or 321.824 (3).)

OAR 660-033-0120 contains a chart of uses that are allowed outright, conditionally, or not authorized on agricultural lands, including "farm use" and "propagation or harvesting of a forest product," and *OAR 660-006-0025(2)(a)* provides:

(a) Forest operations or forest practices including, but not limited to, reforestation of forest land, road construction and maintenance, harvesting of a forest tree species, application of chemicals, and disposal of slash;

The "forest products" definition can be found in ORS 532.010(4), which states that forest products are "any form, including but not limited to logs, poles and piles, into which a fallen tree may be cut before it undergoes manufacturing, but not including peeler cores." An examination of Farm Uses and their potential on this property are also relevant as indicated by OAR 660-004-0028(3) above. The subject parcel is not in farm use as its defined by state law. The south adjacent parcel is actively engaged in farm use, contains an approved agricultural structure, and is within farm/forest tax deferral (Current Property Class: 549 FARM DFU MH). Additional commentary concerning the south adjacent parcel's use was provided by Melanie Brown Wasco County Chief Appraiser for the Wasco County Assessor's Office:

Melanie Brown Wasco County Chief Appraiser (November 24, 2021):
The account you are requesting information about should be in the name of David W Wilson. His property is in applied for Farm Use. He has to support a qualifying income and it can't be a hobby farm. We send out Income Questionnaires every 3 years, which we will be sending them out next month for the 2022-23 tax year. He did meet the income requirement 3 years ago. According to what he does as a farming practice, he raises livestock and sells enough of them to qualify.

A copy of the Melanie Brown's commentary is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 5.

OAR 660-006-0025(1) describes those "Uses Authorized in Forest Zones". An exception granted to this goal may have an impact on these types of uses. This OAR describes five (5) general types:

OAR 660-006-0025(1)
These general types of uses are:

(a) Uses related to and in support of forest operations;

(b) Uses to conserve soil, air and water quality and to provide for fish and wildlife resources, agriculture and recreational opportunities appropriate in a forest environment;

(c) Locationally-dependent uses, such as communication towers, mineral and aggregate resources, etc.

(d) Dwellings authorized by ORS 215.705 to 215.755; and

(e) Other dwellings under prescribed conditions

In regards to subsection (c), no aggregate sites have been identified on this property, nor is there anything about the subject parcel's location that makes it significant for communication towers. In regards to subsections (d) and (e) there is currently an existing dwelling on the parcel, with no potential for further dwelling units under current rules in the Forest (F-2) Zone. This leaves uses provided for in subsections (a) and (b) as the primary uses which must be safe guarded on this property in accordance with Goal 4: Forest Lands.

The rule does not require that the listed resource uses be impossible in the exception area; rather, it requires that they be impracticable. Impracticable means "not capable of being carried out in practice," according to Webster's New World Dictionary (2nd College Ed., 1980). "Capable" means "having ability" or "able to do things well." Id. Finally, "in practice" means by the usual method, custom or convention. Id. Webster's Third New International Dictionary, (Unabridged Ed., 1993) defines "impracticable" as "1a: not practicable: incapable of being performed or accomplished by the means employed or at command: infeasible * * * c: IMPRACTICAL, UNWISE, IMPRUDENT * * *"

Based on the foregoing, the County must evaluate to what extent the adjacent uses and other factors affect the ability of property owners to carry out resource uses in practice in the "exception area". The rule only requires evaluating whether the resource use can be carried out by the usual, available methods or customs. Consequently, just because a farm or forest use can be attained by methods that are not usual or customary does not mean that the farm or forest use is practicable. Resource designation is not necessary to preserve the area for small scale farm or forestry uses in conjunction with residential use.

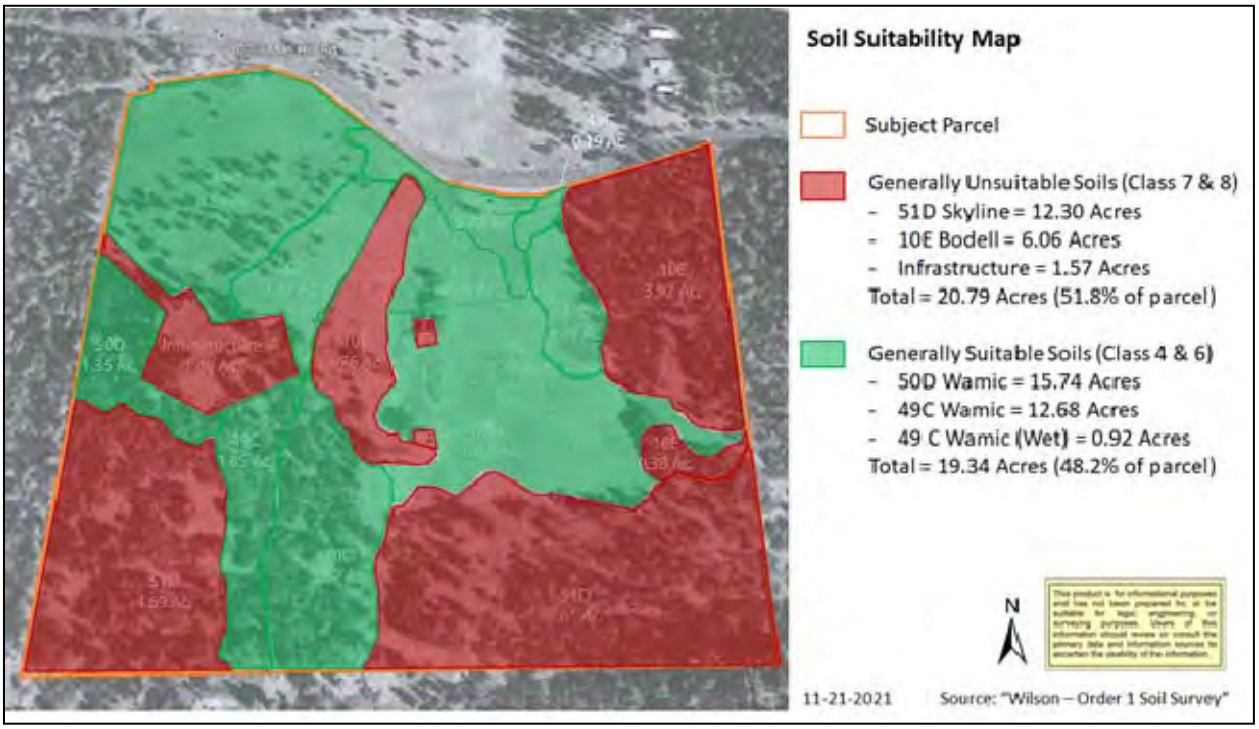
(2) STAFF CONCLUSIONS & RECCOMENDATIONS.

In the above findings, staff has provided significant analysis of the subject parcel's physically developed & undeveloped areas, significant analysis of adjacent lands, and thorough examination of the relationship between the "exception area" and adjacent lands. Based on the above facts, analysis, and findings for OAR 660-004-0028(2)(a), OAR 660-004-0028(2)(b), and OAR-660-004-0028(2)(c), staff concludes that resource use on the subject parcel has become impracticable according to its commonly understood definition. Below, staff has reiterated why the resource use on the subject parcel is impracticable.

Soils Analysis. In *Dooley et al v. Wasco County*, (LUBA Opinion No. 2019-065), the Land Use Board of Appeals agreed with the petitioner's "Third Assignment of Error" which argued that Wasco County's findings were "inadequate to explain why the county found that the uses listed within OAR 660-004-0028(3) were impracticable. In part, the petitioners (appellants) asserted that the undisputed evidence concluded that soil types on the property support Ponderosa Pine harvest, and that the county's findings were "inadequate to explain why the remaining open portion of the subject property could not be planted and [used] for forestry purposes." (LUBA Opinion No. 2019-065, Page 14).

The submitted "Wilson – Order 1 Soil Survey", which is systematically described and analyzed throughout this report, clearly refutes both the soil classifications and soil mapping units that are

mapped for the subject parcel in the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part". The
"Wilson – Order 1 Soil Survey's" "Findings and Conclusions" and remarks made within the 23 individual "Soil Profile Documentation Sheets", provide clear and objective evidence that the areas of the subject parcel containing "Generally Unsuitable Soils" (51.8%) are not favorable for field crops and pasture, large or small scale commercial woodlands, or wildlife habitat. (See below "Soil Suitability Map" for reference).



Furthermore, the fact that the "Wilson – Order 1 Soil Survey" found a wider diversity of soil classes and soil mapping units than are mapped in the Order 3 USDA "Soil Survey of Wasco County, Oregon, Northern Part", brings into question the relationship based on soil taxonomy between the subject parcel and its neighboring parcels. Additional details concerning the "Wilson – Order 1 Soil Survey" can be found throughout this report.

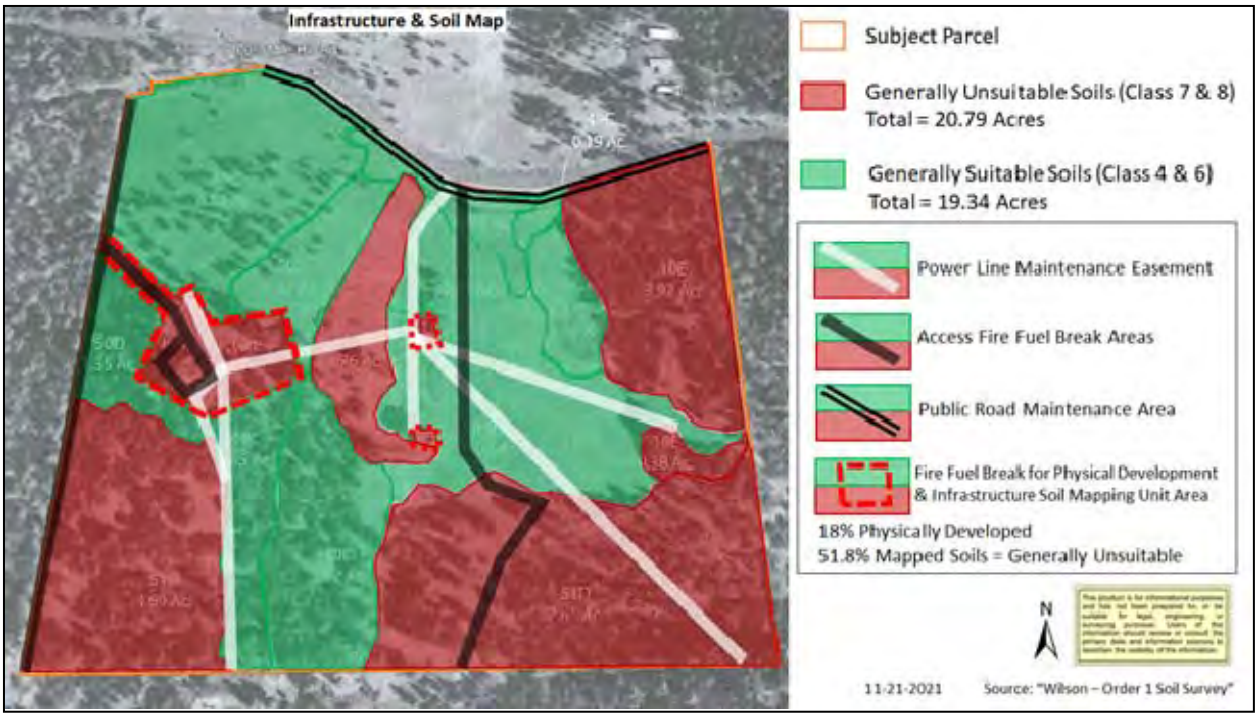
The new soil mapping provides that the "Generally Suitable" soils that can undisputedly support Ponderosa Pine, Winter Wheat, and Grass Hay only equal 19.34 acres (48.2%) of the parcel. Excluding existing physical development, fire buffer fuel break areas, power line maintenance areas, and public road maintenance areas, the above map illustrates a dispersed area of the parcel that is fit for resource use. Further, the "generally suitable" soils are primarily located on the subject parcel's north side where residential use and zoning dominates.

Further analysis provides that the "exception area" is surrounded on three sides by existing residential development, with the potential for additional residential development in the future. Conflicts caused by the proximity of residential neighbors on three sides (north, northwest, and east adjacent parcels), will require added expense related to fire protection, fencing and general control of the area if the subject parcel was actively used for forestry or farmed for profit. Also, residential density surrounding the subject parcel significantly limits the use of pest control techniques to regulate insects and invasive vegetation. Additional nuisance type conflicts with residences are likely to arise because of the noise associated with forestry and farm for profit operations. There are also inherent safety risks associated

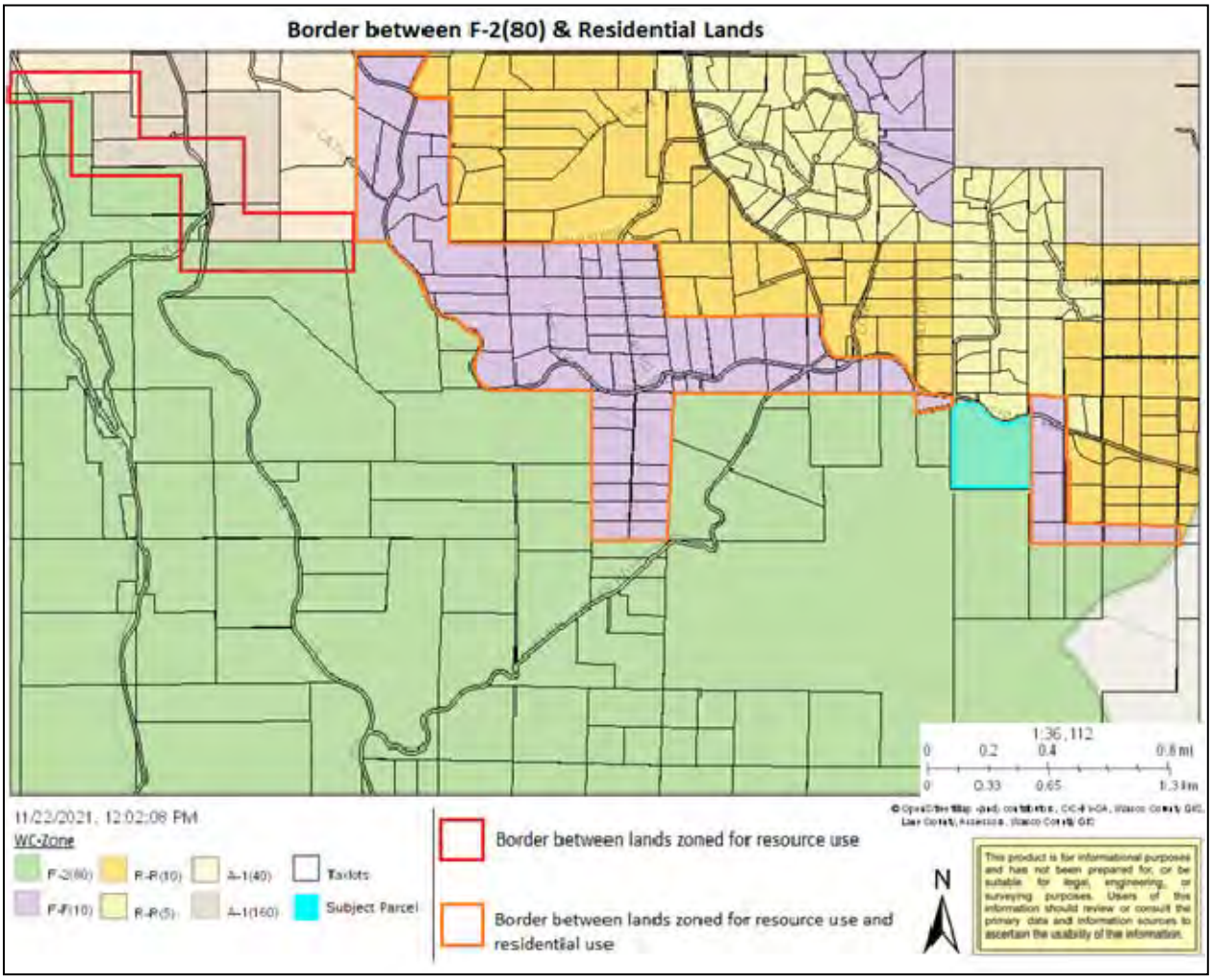
with forestry and farm operations that must be considered if the subject parcel were to be actively used for small-large scale forestry or farm for profit operations, which it currently is not.

Approximately 18% of the parcel is physically developed. The size and scope of the subject parcel's residential development mimics a majority of the residentially zoned parcels located to the north, northwest, and east. The subject parcel contains substantial physical development compared with most parcels located to the southwest, and west, that are actively in forest use.

If the subject parcel's diminished soil capacity (20.79 acres / 51.8%) is taken into consideration and added to its physical development (approximately 18%) locations, the on-site accommodation for forestry and farm for profit use is further reduced. (See below "Infrastructure & Soil Map" for reference).



Finally, the land use designation and zoning pattern for the Sevenmile Hill area clearly illustrates that lands within the Forest-Farm (F-F 10) Zone (Non-Resource) are situated between lands designated for forestry resource use and lands designated for residential use. The subject parcel is one of only three exceptions to the aforementioned pattern. (See the below "Border between F-2(80) & Residential Zoned Lands" map).



When examined individually, each one of the aforementioned issues and conflicts is not enough to justify an exception under this section; however, if the miscellany of the aforementioned issues and conflicts is examined in the totality, the impracticability of resource use activities on the subject parcel gains a great amount of worth.

The greatly diminished soil capacity of the subject parcel; the scattered mapping of “generally suitable” soils that are located mostly on the subject parcel’s north side where residential use and zoning dominates; the existing physical development and residential use of the subject parcel; the risk of increased conflicts between resource uses and residential uses; the surrounding residential uses, and the fact that the subject parcel is the only resource land in the Sevenmile Hill area that directly abuts residentially zoned property, all combined, significantly limits the parcel’s ability for farm use for profit, or to conserve soil, air and water quality and to provide for fish and wildlife resources, agriculture and recreational opportunities appropriate in a “forest” environment.

These issues and conflicts combined, seriously limit the parcel’s ability to achieve Goals 3 and 4 because the uses or activities allowed by the applicable goals that in turn help effectuate Goals 3 and 4, cannot be carried out in practice by the usual method, custom, or convention on this parcel, and thus, due to the totality of the circumstances provided, make the allowed resource uses impracticable.

This section also mandates that a justification for an exception to Goal 4 consider the suitability of the area for farm uses. Due to the aforementioned issues and conflicts, as well as the existing parcel size,

climate and development in the general area, the parcel cannot be, and is not, currently employed for the primary purpose of obtaining a profit from agricultural uses. Additionally, the subject parcel has been removed from farm/forest tax deferral (Current Property Class: 401 TRACT RES IMPR). The area can support small-scale, "peripheral" farm activities taking place on some lands within the Forest-Farm (F-F 10) Zone (Non-Resource) and residential zoned properties where the residential use represents the primary and most highly valued use.

Based on the above facts, analysis, and findings for OAR 660-004-0028(2)(a), OAR 660-004-0028(2)(b), and OAR-660-004-0028(2)(c), staff concludes that resource use on the subject parcel has become impracticable according to its commonly understood definition, and recommends that the Planning Commission approve the request based on the "exception area" being irrevocably committed to other uses.

> *OAR 660-004-0028:*
> *Exception Requirements for Land Irrevocably Committed to Other Uses*
>
> *(4) A conclusion that an exception area is irrevocably committed shall be supported by findings of fact which address all applicable factors of section (6) of this rule and by a statement of reasons explaining why the facts support the conclusion that uses allowed by the applicable goal are impracticable in the exception area.*

FINDING: All applicable factors of subsection (6) are addressed below. Staff's conclusion that resource use within the "exception area" is impracticable is supported by analysis and findings of fact concerning all of the record evidence pertaining to this Remand request, as described throughout this report. A conclusion that the "exception area" is irrevocably committed will be based staff's analysis and findings of fact concerning all of the record evidence pertaining to this Remand request, as described throughout this report.

> *OAR 660-004-0028*
> *Exception Requirements for Land Irrevocably Committed to Other Uses*
>
> (5) *Findings of fact and a statement of reasons that land subject to an exception is irrevocably committed need not be prepared for each individual parcel in the exception area. Lands which are found to be irrevocably committed under this rule may include physically developed lands.*

FINDING: The proposal is for a goal exception, zone change, and comprehensive plan amendment for one parcel. This parcel makes up the entirety of the "exception area". This parcel is physically developed as described above. Findings of fact and a statement of reasons why this land is found to be irrevocably committed are discussed throughout this report.

> *OAR 660-004-0028*
> *Exception Requirements for Land Irrevocably Committed to Other Uses*
>
> *(6) Findings of fact for a committed exception shall address the following factors:*
>
> *(a) Existing adjacent uses;*

FINDING: The existing adjacent uses are discussed and considered in great detail in the above findings for OAR 660-004-0028(2)(b). Existing adjacent uses to the north, northwest, and east are residential, and

zoned as such. The south adjacent parcel is zoned for forestry use, but is not actively used for forestry. Lands to the south, southwest, and west of the subject parcel are zoned for, and used for commercial forestry.

(b) Existing public facilities and services (water and sewer lines, etc.);

FINDING: There are no public water or sewer facilities on either the adjacent land or the "exception area". Electric power and phone service are available to the area. The property can be adequately served by existing fire, police and school facilities. The record supports previous findings for Chapter 11, Section H regarding statewide planning goals, supports this conclusion.

(c) Parcel size and ownership patterns of the exception area and adjacent lands:

(A) Consideration of parcel size and ownership patterns under subsection (6)(c) of this rule shall include an analysis of how the existing development pattern came about and whether findings against the Goals were made at the time of partitioning or subdivision. Past land divisions made without application of the Goals do not in themselves demonstrate irrevocable commitment of the exception area. Only if development (e.g., physical improvements such as roads and underground facilities on the resulting parcels) or other factors make unsuitable their resource use or the resource use of nearby lands can the parcels be considered to be irrevocably committed. Resource and nonresource parcels created pursuant to the applicable goals shall not be used to justify a committed exception. For example, the presence of several parcels created for nonfarm dwellings or an intensive agricultural operation under the provisions of an exclusive farm use zone cannot be used to justify a committed exception for land adjoining those parcels."

FINDING: As discussed in great detail in the findings for OAR 660-004-0028(2)(b), and in the attached supporting documents provide that most of the lands to the north, northwest, and east within the Sevenmile Hill area contain development patterns that were established prior to the adoption of Statewide land use planning goals. Many of the small parcels that characterize the area were created between 1900 and 1920 by subdivision and were marketed as orchard sites that could support a family. The lots in the vicinity of the exception area were not successful because of the cold and dry weather at this location and elevation. Most of the existing lots (many of which were created by subdivision later in the 1970s) have non-resource residences located on them now, as does the subject parcel in the proposed "exception area." Lands to the south, southwest, and west were historically created by deed prior to state and county-wide land use laws, and many were later partitioned into smaller units of land in the early 1980s.

(B) Existing parcel sizes and contiguous ownerships shall be considered together in relation to the land's actual use. For example, several contiguous undeveloped parcels (including parcels separated only by a road or highway) under one ownership shall be considered as one farm or forest operation. The mere fact that small parcels exist does not in itself constitute irrevocable commitment. Small parcels in separate ownerships are more likely to be irrevocably committed if the parcels are developed, clustered in a large group or clustered around a road designed to serve these parcels. Small parcels in separate ownership are not likely to be irrevocably committed if they stand alone amidst larger farm or forest operations, or are buffered from such operations.

FINDING: A tract of land is defined as "one or more contiguous lots or parcels in the same ownership." (WC-LUDO Definitions, Page 48). In this case, a tract of land consisting of the subject 40.13 acre parcel is owned by David and Jolene Wilson and the south adjacent 69.3 acre parcel is also owned by David Wilson. The south adjacent parcel is bisected by the BPA Line, contains one residence, and multiple associated accessory buildings. Neither the subject parcel or south adjacent parcel is currently engaged in forestry uses.

As noted throughout this report, the subject parcel's infrastructure, soil quality, and current use, eliminate the property's ability to be used for farm use. The subject parcel contains small areas that are used for grass hay fields, but is not within farm/forest tax deferral status (Current Property Class: 401 TRACT RES IMPR), and the land is not employed "for the primary purpose of obtaining a profit in money by raising, harvesting and selling crops…" and is not used for any other defined farm use. (WC-LUDO Definitions, Page 18). Mowing natural grasses, maintenance of rural property, and maintaining small grass hay fields are not necessarily farm uses.

Further commentary from Soil Scientist Gary Kitzrow provides:

> Gary Kitzrow, Soil Scientist (November 26, 2021):
> Since this soil (Skyline) is the dominant soil on this subject parcel, a preponderance of the legal lot of record is not a commercial timber site. This follows suit for agriculture as well which is demonstrated in the Capability Class assignment.

The south adjacent parcel; however, is actively engaged in farm use, contains an approved agricultural structure, and is within farm/forest tax deferral (Current Property Class: 549 FARM DFU MH). Additional commentary concerning the south adjacent parcel's use was provided by Melanie Brown Wasco County Chief Appraiser for the Wasco County Assessor's Office:

> Melanie Brown Wasco County Chief Appraiser (November 24, 2021):
> The account you are requesting information about should be in the name of David W Wilson. His property is in applied for Farm Use. He has to support a qualifying income and it can't be a hobby farm. We send out Income Questionnaires every 3 years, which we will be sending them out next month for the 2022-23 tax year. He did meet the income requirement 3 years ago. According to what he does as a farming practice, he raises livestock and sells enough of them to qualify.

A copy of the Melanie Brown's commentary is available for inspection at the Wasco County Planning Department under File 921-18-000086-PLNG, and can be found in Attachment D Exhibit 5.

This subsection provides that "contiguous ownerships shall be considered together in relation to the *land's actual use*" (Emphasis added); however, the facts indicate that the subject parcel and its south adjacent neighbor are not in the same use. Although both parcels may be considered a tract due to common ownership, the parcels are used for completely different purposes, and so cannot be considered together in relation to their actual uses when those uses are polar opposites of each other, especially when the south adjacent parcel's income qualifies the property for tax benefits.

In relation to most forestry operations, a 40.6 acre parcel is a small parcel. According to this subsection, the nature of the subject parcel's small size, alone, is not enough to constitute an irrevocable commitment. However, also according to this subsection, small parcels are more likely to be irrevocably committed if they are developed and clustered around a road designed to serve them. In this case, the

subject parcel contains one large residence in use near the eastern boundary, as well as older structures formerly used as a residence and a barn in the center. Finally, subsection (6)(c)(B), encourages consideration of whether a property stands alone among larger farm or forest operations, or is buffered from them. With regards to the subject parcel, there is no buffer to the south or southwest, as the property to the immediate south is an active farm, and properties to the southwest are in commercial forestry. The next parcel south of that is a 336 acre parcel used predominantly for grazing. The parcel to the east (southeast adjacent to the subject parcel) is 439 acres of land used for forestry. All nearby lands to the north, northwest, and west are residential. The facts provide that the subject parcel does not necessarily stand alone amongst larger farm or forest operations, but nor is it buffered from them. In point of fact, like all of the lands in the Sevenmile Hill area that are designated for forestry use and are already buffered from lands designated for residential use by property within the Forest-Farm (F-F 10) Zone (Non-Resource), an approved goal exception will create a Forest-Farm buffer zone between the adjacent south forestry parcel and the residential lands to the north.

(d) Neighborhood and regional characteristics;

FINDING: Based on the descriptions already provided throughout this report, the "neighborhood characteristics" can best be described as commercial timberland to the south, southwest, and west, and rural residential development within to then north, northwest, and east. The "regional characteristics" include the Sevenmile Hill area that is located approximately six miles west of The Dalles. The Sevenmile Hill area's zoning and use pattern mimics the subject parcel's immediate neighborhood with farm and forestry resource use in the south, southwest, and west, and residential use in the north, northwest, and east, being hemmed in by Columbia River Gorge National Scenic Area.

(e) Natural or man-made features or other impediments separating the exception area from resource land. Such features or impediments include but are not limited to roads, watercourses, utility lines, easements, or rights-of-way that effectively impede practicable resource use of all or part of the exception area;

FINDING: There are no natural impediments separating the proposed exception area from resource land. There is one man-made feature separating the proposed exception area from existing commercial timberlands to the south. The BPA Line and right-of-way/easement, which forms an approximate 150-foot wide cleared area between the residence on the subject parcel and commercial forest areas to the south. This power line is located on the adjacent property approximately 1/3 mile south of the subject property's existing residence (1/5 mile south of the southern property line) and runs slightly northwest to southeast. As described above, the 69 acre parcel owned by the applicant to the immediate south of the subject property has an existing residence (which lies north of and adjacent to the power line) and is in residential use. The power line bisects that property. The 439 acre adjacent property to the southwest of the subject parcel is owned by Ken Thomas, a private landowner who engages in forestry operations on his extensive Wasco County land holdings. The power line separates the northern 70 acres of that parcel from the southern 370 acres, all of which is in the F-2 (Forest) Zone. This impediment feature is not insurmountable or impassable to forest uses.

(f) Physical development according to OAR 660-004-0025; OAR 660-004-0025 states the "Exception Requirements for Land Physically Developed to Other Uses" as follows:

(1) A local government may adopt an exception to a goal when the land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal.

(2) Whether land has been physically developed with uses not allowed by an applicable Goal, will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception."

FINDING: As provided above for the OAR 660-004-0025:

In *Dooley et al v. Wasco County*, (LUBA Opinion No. 2019-065), the Land Use Board of Appeals agreed with the petitioner's "Fourth Assignment of Error", which argued that staff's findings were not supported by substantial evidence in the record, where the county found that approximately 87 percent of the subject parcel was not physically developed, but still approved a physically developed exception. As noted above, staff conducted thorough analysis of the subject parcel's physical development, and concluded that approximately 18% of the subject parcel is physically developed.

As provided in *Sandgren v. Clackamas County*, and explicitly referred to by LUBA in *Dooley et al.*, in order to "approve a physically developed exception, the county must find that the property has been physically developed to such an extent that all Goal 3 or 4 resource uses are precluded" (*Sandgren v. Clackamas County*, 29 Or LUBA 454, 457 (1995)). The overall demonstration of clear and objective evidence is more straightforward under OAR 660-004-0025 compared to OAR 660-004-0028; however, the standard is demanding, and requires the applicant demonstrate forestry uses are no longer an option. (See *Dooley et al v. Wasco County*, (LUBA Opinion No. 2019-065, Page 18). Additionally, as provided by LUBA in *Dooley et al.*, impracticability of Goal 4 uses caused by existing physical development is not the standard for a physically developed exception request.

In the present case, even if the County accepts the applicant's estimation that 32.81% of the total area of the subject parcel is physically developed, in order to approve the request, the County is "required to determine that the property is "physically developed to the extent that it is no longer available" for forestry uses." (See *Dooley et al v. Wasco County*, (LUBA Opinion No. 2019-065, Page 18), ORS 197.732(2)(a).

Based on the above facts, analysis, and findings, staff concludes that the parcel does not meet the required standards of OAR 660-004-0025, and recommends that the Planning Commission deny the request based on the physically developed exception.

(g) Other relevant factors;

To the extent there are other relevant factors, they are discussed throughout this submittal and not repeated here.

b. <u>OAR 660-004-0028(7):</u> The evidence submitted to support any committed exception shall, at a minimum, include a current map, or aerial photograph which shows the exception area and adjoining lands, and any other means needed to convey information about the factors set forth in this rule. For example, a local government may use tables, charts, summaries, or narratives to supplement the maps or photos. The applicable

factors set forth in section (6) of this rule shall be shown on the map or aerial photograph.

FINDING: The submittal complies with this requirement, and includes various maps of the proposed exception area and adjoining lands submitted with the application. Tables, charts, and summaries are also included within the submittal and as exhibits to this narrative, along with maps and other materials.

ATTACHMENT D – EXHIBIT 1

"1997 TLSA full report"
"1998 TLSA memo"
"TLSA Study Area Ground Water Evaluation – Wasco County, Oregon"

MEMORANDUM

To:	**Wasco County Court**
From:	**Planning Staff**
Hearing Date:	**Feb. 18, 1998**
RE:	**Staff summary of Issues for the Transition Lands Study Area (TLSA)**

Background

A nine member citizen based Steering Committee and a Technical Advisory Committee, comprised of local resource experts, was appointed by the County Court in Jan. 1994. The Steering Committee and Technical Advisory Committee met monthly from July 1996 through September 1997. The purpose of the Steering Committee was: **1.** to be representatives for the community in response to concerns about development and resource protection **2.** to assess the resources of the Transition Lands Study Area and establish a factual database for decision making and; **3.** to assess the carrying capacity of the land.

The Steering Committee held a public informational meeting for public input on their recommendations. The Citizens Advisory Group and the Planning Commission held public hearings to consider the Steering Committee recommendations.

Purpose of the TLSA Study

The TLSA study was initiated in 1993 in response to concerns of the Wasco County Planning Commission, elected officials, and members of the community about development in northern Wasco County, including the Seven Mile Hill and Browns Creek/Cherry Heights area. Concerns stemmed from availability of groundwater to serve domestic needs, fire hazards, conflicts with wildlife, and available lands for rural residential lifestyles in this developing area.

The product of this planning effort is a report, the 'Wasco County Transition Study Area, Sept. 12, 1997, which builds on information gathered throughout the TLSA project and makes policy recommendations for integrating future development with resource protection within the Study Area.

Summary of TLSA Steering Committee Recommendations:

The Steering Committee recommendations and the process and methodology which guided their recommendations are documented on page two of the report A vast amount of data was collected and evaluated with project goals in mind. The outcome of the project relied on this information to establish best land use practices for the Study Area through a public process. Attachment A 'Qwik Facts' provides an overview of key data considered by the Steering Committee.

There were five key recommendations made by the TLSA Steering Committee. The complete list of policy recommendations and action items are discussed more fully on page 2 and 3 of the TLSA study included in your packet.

EXHIBIT 2

Steering Committee Recommendations:

- 1. Change a portion of the F-F(10), Farm-Forest zone to R-R(10) Rural Residential zone(a new zone).
- 2.Upzone approximately 200 acres of existing F-F(10) land to R-R(5) adjacent to existing R-R(5). The upzone is in an area where there is fire protection, adequate road capacity for additional traffic, and within an area which shows no groundwater anomalies. The upzone would add approximately 32 additional homes to the number of new homes allowed by current zoning.
- 3. Designate a " test" receiving area for the Transfer of Development Rights (TDR) Attachment B explains TDR's).
- 4. Implement development standards for fire, scenic, and roads within the new R-R(10).
- 5. Do not implement House Bill 3661 provisions for the Lot of Record or Template Test dwellings in the F-2, Commercial Forest zone.

Action of the Citizens Advisory Group:
A public hearing was set For November, 18, 1997. There was not a quorum of the members attending, therefore we could not hold a hearing to review the Steering Committee recommendations. Rather than try to reach a consensus. on the SC Recommendations, the CAG members voted on the five steering committee recommendation listed above Their votes are noted on the Attachment C

Main Issues Discussed by the Planning Commission:
Issue 1 - House Bill 3661 provisions for Lot of Record dwellings and Template Test dwellings in the F-2 Commercial Forest zone

The Steering Committee recommendation was not to implement either of the two provisions for dwellings in the F-2 zone. Their recommendation was based on inventory data showing this area as having a high resource value, and a low development value (due to lack of infrastructure).

What is the difference between the two provisions? The Lot of Record provision would allow dwellings to those landowners who have owned the land prior to 1985 and still own it. The Legislative intent for this provision was for fairness and equity to those landowners who may not have been aware of the state landuse laws adopted in 1974. The Template test for dwellings was based on available area wide information regarding overall landuse pattern, land values, and infrastructure within the area. Criteria in the Statue for applying the template test provision address the facilities and service capabilities of the area. These criteria would result in a denial of all applications based on the data resulting from the TLSA study. Specifically, the data showed a lack of road capacity and fire protection, that is, it exceed the facilities and service capabilities of the area.

Issue 2 - Implementing the Transfer of Development Rights test area, The Planning Commission asked to get an opinion from the District Attorney on the legality, and or risk involved, other

issues were the discrepancy between the upzone area and the TDR area.

An opinion was provided by District Attorney Smith (Attachment D). To summarize, the Transfer of Development rights tool is valid planning tool, but he cautions that it has not been tested in Oregon . Smith also listed concerns with two different treatments, both which are being recommended, for the upzone and TDR area, and suggested that if approved the Commission's findings clearly spell out the reasons why the areas are being treated differently. His overall advise is to proceed with caution.

Planning Commission Recommendations

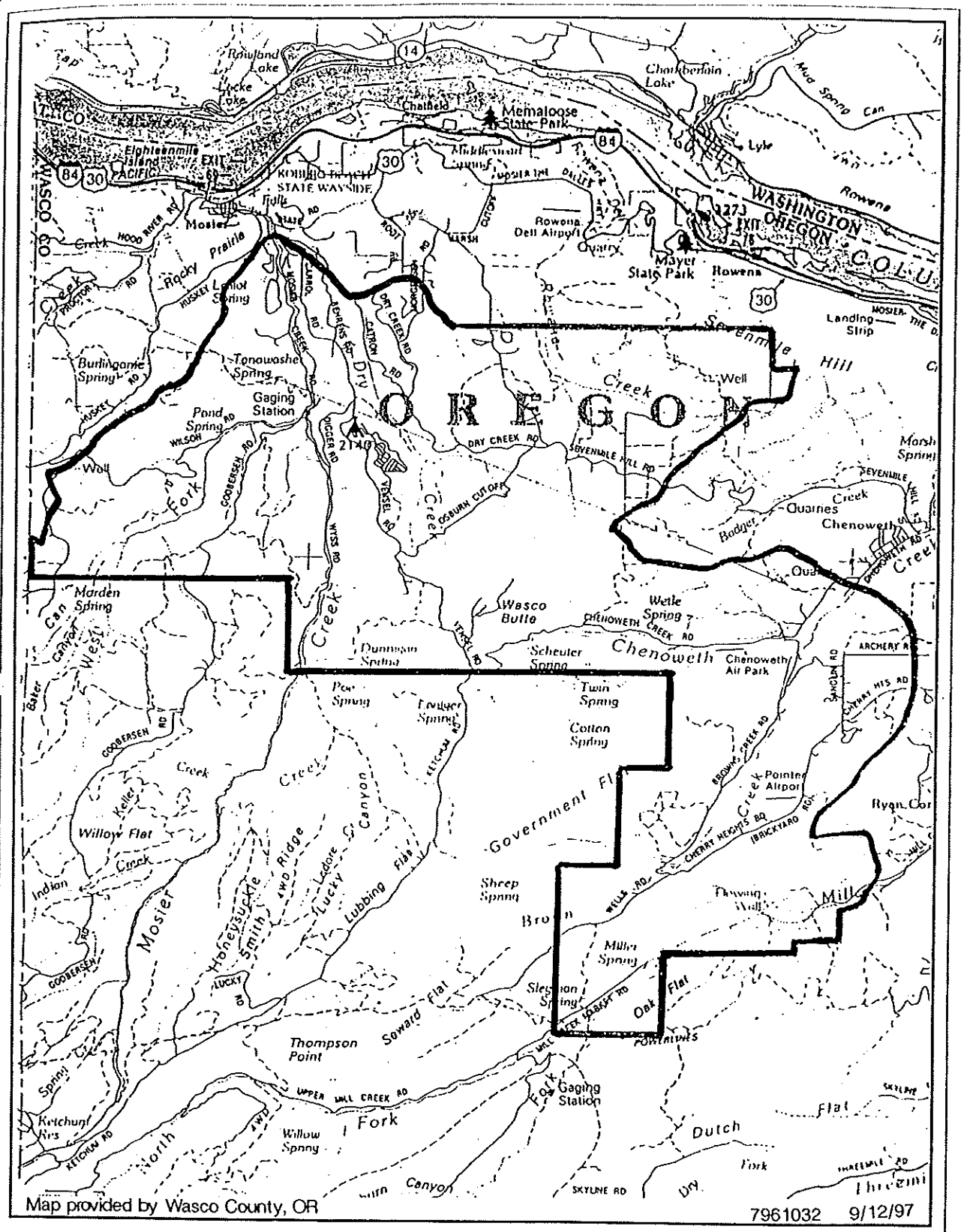
1. To Change a portion of the FF-10 zone to R-R (10) (a new zone, L.U.D.O. Section 3.220 "R-R" Rural Residential) as proposed by the TLSA Steering Commission and as delineated on the map entitled TLSA Recommendation, and dated, September 1997, and also including as R-R(10), those areas shown on the map as the proposed R-R(5) upzone, and Transfer of Development Rights Test Area.

2. To adopt development standards for fire, scenic, and roads within the new R-R(10) zone, with two wording changes in Section D.2. Scenic Development Standards D.2. (b) and (g) from mandatory requirements for house colors, and fences, to non-mandatory requirements; and with a wording change in Section E. 9. (e) Fire Standards from undergrounding of power and telephone being located underground where practicable instead of where possible. (Ordinance Attached)

3. To implement the Lot of Record provision in the F-2 Commercial Forest Zone for parcels within a fire protection district or by contracting for fire protection, based on the Legislative intent to provide for fairness and equity to landowners owning prior to 1985 and, not to implement the Template Test provision based on the available area wide information regarding overall landuse patterns, land values, and infrastructure in the F-2 Commercial Forest Zone based on the TLSA study.

4. To put on 'hold' the Transfer of Development Rights Test Area with direction to planning staff to explore the necessary size of the receiving area; look into who manages the conservation easements and; to gather more information in order to determine the reason and potential effectiveness of implementing this tool in the TLSA area.

5. Not to upzone the approximately 200 acre area identified by the Steering Committee from a F-F (10) zone to a R-R (5) zone, and to review this issue at the bi-annual advisory group review with respect to the additional information that will be available concerning the Transfer of Development Rights.



Location of the Wasco County Transition Lands Study Area, Oregon.

FIGURE 1

SRI/SHAPIRO/AGCO INCORPORATED

ATTACHMENT "A"

TLSA " QUICK FACTS"

The TLSA 'Quick Facts' sheet was put together to provide a broad overview of the extensive data that provided the basis for the recommendations of the TLSA study.

GROUNDWATER AQUIFERS

- The previous report information presented two years ago was a broad overview of water in TLSA. This study identified overdraft areas with a computer model based on assumptions about aquifer behavior.
- Since then the TLSA study has done more detail mapping of well behavior. The facts seem to indicate that the original model was too pessimistic.
- The Jervey Study, December 1996, provided more water data in the TLSA:
- All of the aquifers in TLSA are water table aquifers or hydraulically tied to water table aquifers.
- These aquifers were identified and mapped, for the first time, through the TLSA process. Aquifer systems were identified using similar rock types; similarities in static water levels of the aquifers; similarities in yield, decline and performance criteria, and aquifer continuity.
- 817 wells were included in this review, 592 wells were located and are shown on TLSA maps.
- There is no obvious overall trend of aquifer depletion in TLSA.
- Declines in wells (observed) occur primarily in basalt aquifer wells and appear to be linked to the internal structure of the basalts.
- Deepenings of wells (where the was a lowering of static water levels) are due to specific negative situations having to do with the geology adjacent to the wellbore
- Generally, 7 Mile Hill has basalt aquifers and; Cherry Hill/Browns Creek has sedimentary aquifers.
- Basalt aquifers have a more erratic behavior i.e., higher fluctuations (higher highs, lower lows); sedimentary aquifers have lower yields, but consistent performance.

- Domestic water usage per average household (gross) is approx. 200,000 gallons/year.

- Irrigation water usage (gross) is approx. 434,555 gallons/year per acre.

- Information gained through this study provides the foundation for a data base. Continued monitoring can be used to help individual property owners to better understand the behavior of their wells and help to avoid future problems.

COUNTY ROADS

- Wasco County Public Works Dept. maintains 70 miles of roads in the TLSA but many of the rural properties are served by private roads and public roads which are maintained by adjacent landowners.

- Roads that are not paved now are unlikely to be paved by Wasco County in the foreseeable future.

- Under existing zoning regulations, in rural residential areas of TLSA, 498 new homes could be built (301 existing). This would increase demand of services on roads that the county would have to provide. 185 of the total potential new homes could be built on Seven Mile; 313 in the Cherry Heights/Browns Creek. (Does not count potential new homes in resource zones).

- The capacity of a road is expressed as a maximum daily volume measured in Average Daily Traffic (ADT), along with other factors applicable to capacity assessments for individual road segments, such as grade, curves, lane and shoulder width. The capacity of a road is unaffected by whether it is a gravel road or a paved road. (1 home averages 4 trips/day) This is a 30 year old figure, the estimate is low.

- Four county maintained roads in TLSA have the traffic capacity remaining to accommodate new development under existing zoning. The following roads would be within their design capacity as constructed today. Roads in TLSA with at least 25% capacity remaining are shown below .

	Capacity	ADT	at Buildout (current zoning)	Total
Mill Creek Rd.	1500	317	(+60 ADT) =	377
Cherry Hgts. Rd.	1500	724	(+472 ADT) =	1196
Browns Crk. RD.	1500	353	(+478 ADT) =	831
State Rd.(not counting east & west ends which do not have existing capacity)	1500	352	(+740 ADT) =	1092

- Funds for road maintenance and improvements do not come from property taxes. Funding sources include: 1. Timber receipts (which are being phased out) and; 2. a portion of the state highway funds allocated to Counties based on number of vehicles registered in the county. Property owners with cars registered in another county do not contribute to county roads.

- There are some public roads that are not maintained by anyone. You can experience problems with the maintenance and cost of maintenance of your road.

FIRE

- There are two fire protection districts in the TLSA. Not all areas are in a fire protection disctirt. Rural Residential areas in the TLSA are, for the most part, in either the Mosier Rural Fire Protection District, which is made up of voluntees; or Mid Columbia Rural Fire Protection District.

- The Oregon Dept. of Forestry Fire Protection District covers wildfires in the TLSA. ODF does not cover structural fires. Residences pay a tax to the ODF for wildfire coverage.

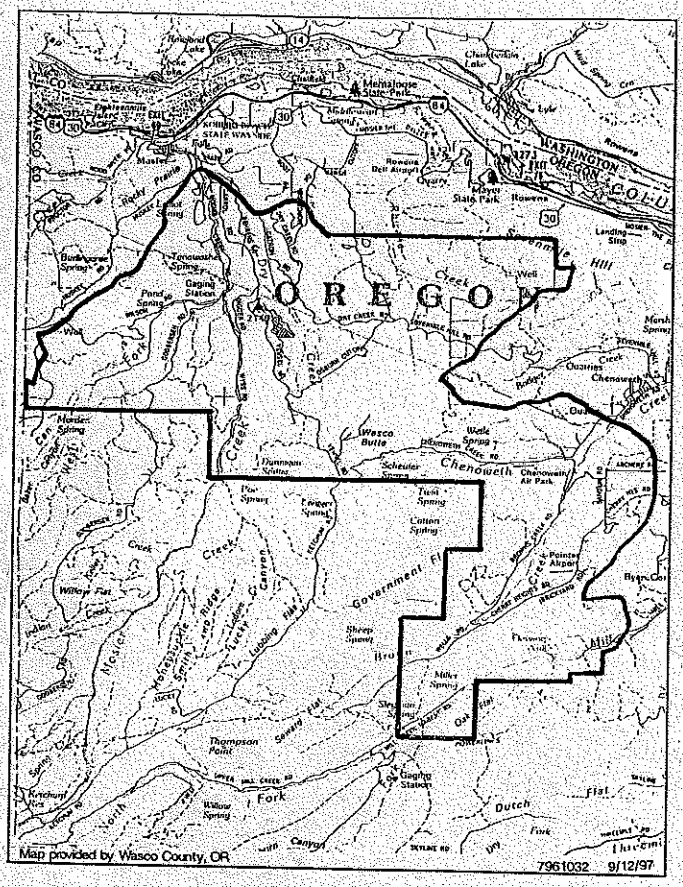
- Fire District response times (time it takes to get to a call) vary depending of access to the property and distance. Portions of the TLSA within the Mid Columbia Fire Protection District are not accessible for fire trucks

- Emergency response time can not be guaranteed. Under some extreme conditions, you may find that emergency response is extremely slow and expensive.

POTENTIAL DEVELOPMENT

- Under current zoning the potential for new houses is:
- In the Rural Residential, R-R(5) zone = 93
- In the Farm Forest, F-F(10) zone = 405
- In the Agricultural zone AG -1 = 14
- In the Commercial Forest, F-2(80) zone = 51 Template Test Dwellings
  42 Lot of Record Dwellings
  (24 In a fire district)

Wasco County Transition Lands Study Area (TLSA)



Prepared for

Wasco County

Prepared by

SRI/SHAPIRO/AGCO, Inc.

In cooperation with
Northwest Economic Associates

September 12, 1997

Wasco County Transition Lands Study Area (TLSA)

Prepared for

Wasco County
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In cooperation with

Suzanne Rock
Northwest Economic Associates

September 12, 1997

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Acknowledgements

The TLSA Project involved a Steering Committee (SC) and Technical Advisory Committee (TAC) who guided the planning process and were integral to selection of alternatives. Members included the following:

Steering Committee

- Sandee Burbank (Planning Commission representative)
- Sheila Dooley (Citizens Advisory Group representative)
- Bruce Lumper (Bill Creek resident)
- Jim Wilcox (Board of Realtors)
- Jennifer Ringlbauer (Seven Mile Hill resident)
- Matthew Koerner (Mosier City Council)
- Wayne Huskey (Timber owner/Husky Ridge/South Mosier)
- Ron Nelson (Cherry Heights resident)
- Bill Reeves (Agricultural representative/Mosier Rural Fire District).

Technical Advisory Committee

- Dusty Eddy, District Conservationist, Soil Conservation Service
- Ron Graves, Manager, Soil and Water Conservation District
- Jim Bishop, County Executive Director, Agricultural Stabilization and Conservation Service
- Lynn Long, Extension Agent, Wasco County Extension Office
- Jim Torland, Oregon Department of Fish and Wildlife
- Keith Kohl, Oregon Department of Fish and Wildlife
- Larry Hoffman, Unit Forester, Oregon Department of Forestry
- Ken Polehn, President, Wasco County Farm Bureau
- Larry Toll, Wasco County Watermaster
- Jodi Calica, General Manager, Natural Resources Department, Confederated Tribes of the Warm Springs
- Dan Boldt, Director, Wasco County Public Works Department
- Gay and Mac Jervey, Geological Consulting.

Key County staff from the Planning and Economic Development Office involved in the TLSA Project included:

- Karen Mirande, Associate Planner
- Dotty DeVaney, Associate Planner
- Kim Jacobsen, Former Director.

In addition, Gay Jervey, a TAC participant, volunteered her time to prepare extensive groundwater analysis for the TLSA Project. This analysis was integral to completion of the study and Wasco County is extremely grateful for her generosity and dedication.

1.0 LOCATION AND PURPOSE

1.1 Location

Which County lands are involved in the study area?

The Wasco County Transition Lands Study Area (TLSA) Project encompasses approximately 24,000 acres of land located in unincorporated Wasco County, Oregon, between the cities of The Dalles and Mosier, and south of the Columbia River Gorge National Scenic Area (Figure 1). The study area includes all or part of the following sections:

Township 1 North, Range 12 East, Sections 1, 2, 10 through 15, and 22 through 24;
Township 1 North, Range 13 East, Sections 6, 7, and 19;
Township 2 North, Range 11 East, Sections 12 through 14, and 22 through 27;
Township 2 North, Range 12 East, Sections 7, 8, 13 through 23, and 25 through 36; and
Township 2 North, Range 13 East, Section 31.

The study area was divided into two broad areas: 13,500 acres (about 56% of the Study Area) currently zoned Forest or Exclusive Farm Use (EFU) orchard, and 10,500 acres (about 44% of the Study Area) currently in mixed zoning for residential and resource use (Figure 2). The 10,500-acre area includes two distinct parts: the Seven Mile Hill Area in the north-central part of the Study Area, and the Mill Creek/Cherry Heights Area in the southeastern part of the Study Area. The primary focus of the Steering Committee was on looking at development issues for the 10,500-acre mixed residential and resource use portion of the study area.

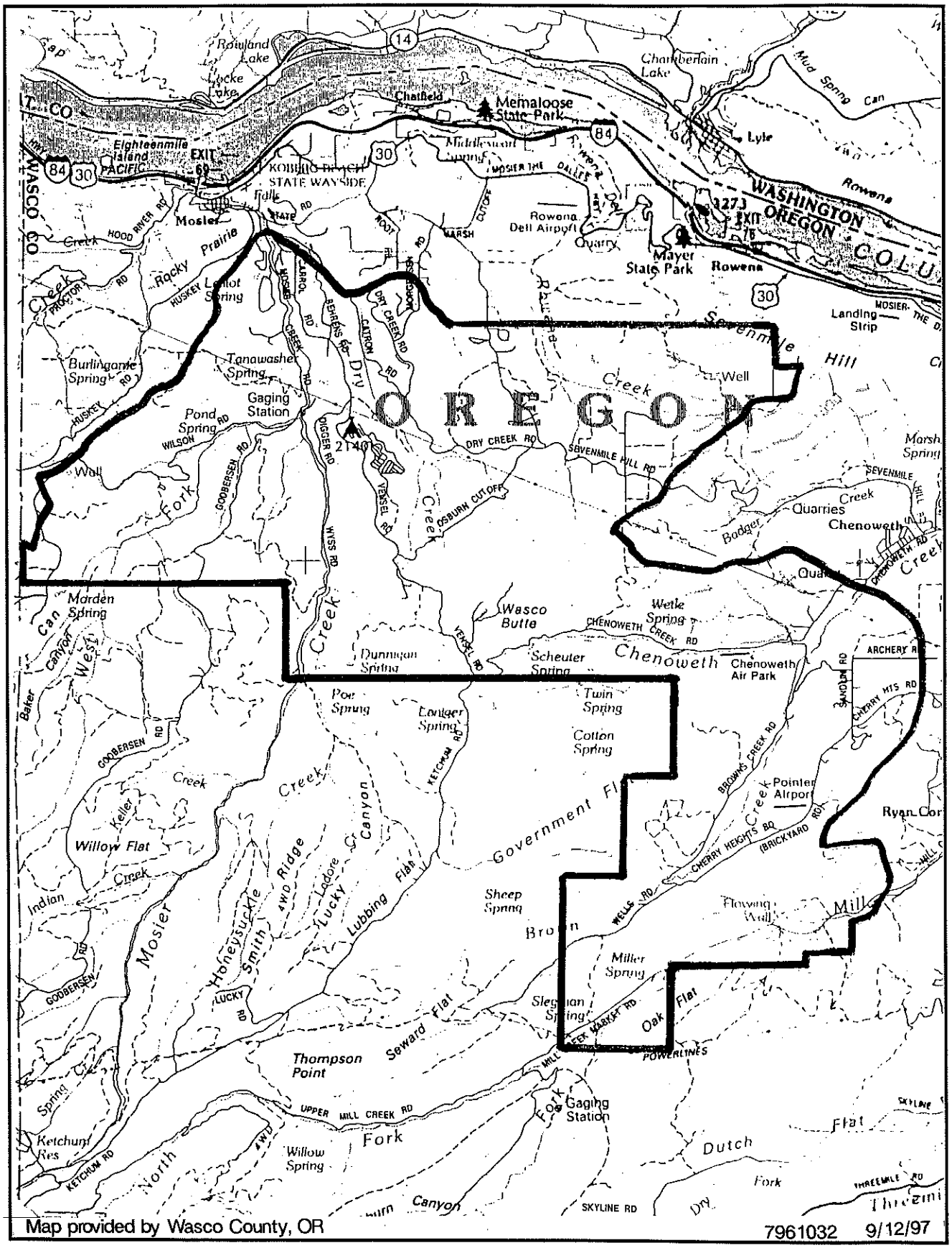
1.2 Purpose

What is the purpose of the process and this document?

This document discusses analysis methods and results of the TLSA Project. The TLSA Project was initiated in 1993 in response to concerns of the Wasco County planning commission, elected officials, and members of the community about development in northern Wasco County, particularly in the Seven Mile Hill Area. Concerns stemmed, in part, from availability of groundwater to serve domestic needs, fire hazard, conflicts with wildlife, and available lands for rural residential lifestyles in this developing area.

In 1993, the Wasco County Budget Committee appropriated funds to conduct a water study of Study Area lands (referred to as "Phase 1" in this document). In 1996, additional funds were appropriated to continue the Study Area project (referred to as "Phase 2" in this document). The following purposes guided the Phase 2 analysis process:

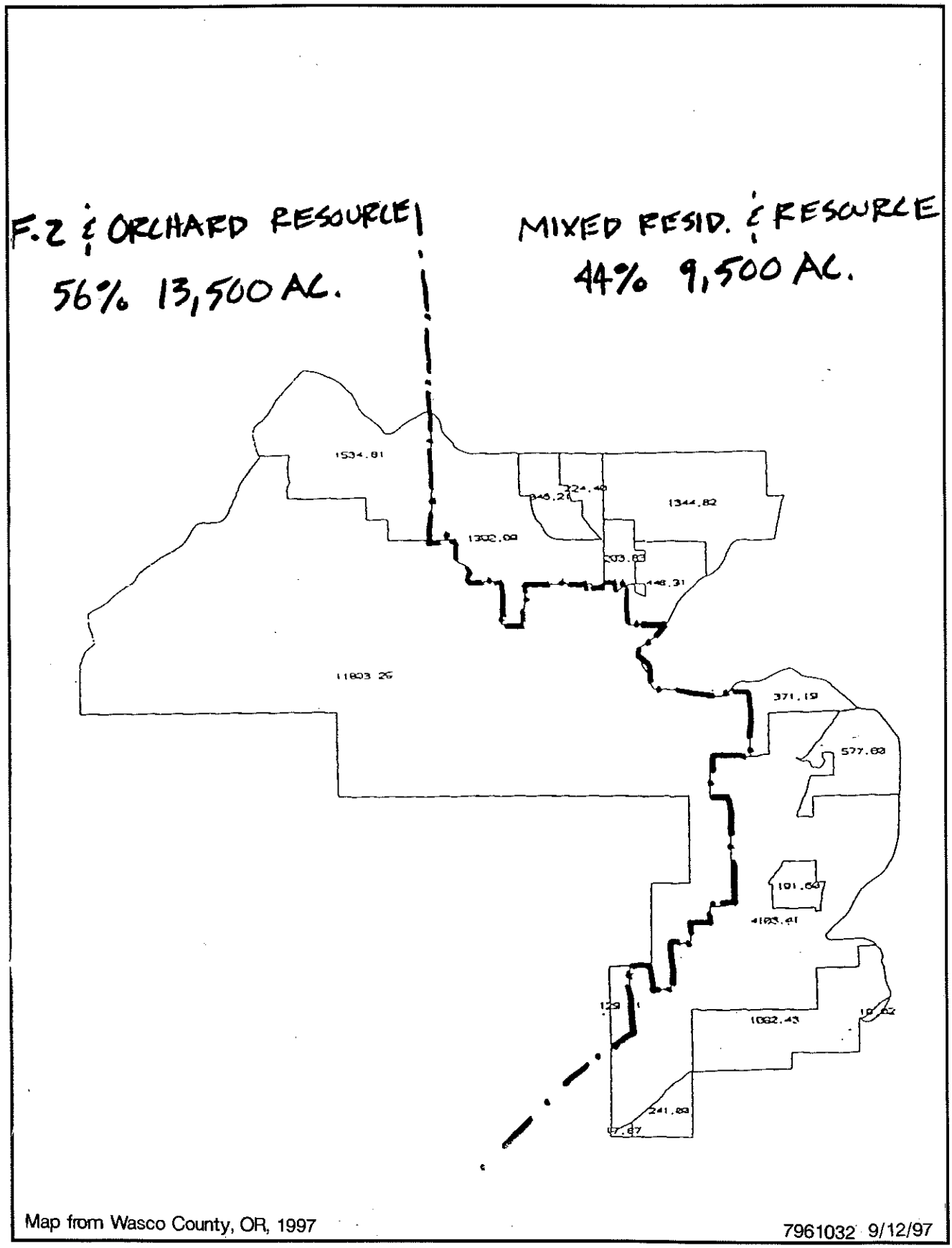
- Study the appropriateness of current zoning within the study area in response to recurring concerns with development patterns and potential resource conflicts.
- Establish a factual database incorporating information gained from local experts and the public at large during the course of public meetings and workshops.
- Establish best land use practices within the study area using the best available information.



Location of the Wasco County Transition Lands Study Area, Oregon.

FIGURE 1

SRI/SHAPIRO/AGCO INCORPORATED



Map from Wasco County, OR, 1997

7961032 9/12/97

Wasco County Transition Lands Study Area
Acreage Summary

FIGURE 2

SRI/SHAPIRO/AGCO INCORPORATED

- Build a citizen-based monitoring program allowing local residents to track impacts of land use decisions on such factors as groundwater availability, wildlife, and infrastructure, and provide updated information in a bi-annual review process.

Outcomes of the project were to be consistent with the Oregon Revised Statutes and Statewide Planning Goals, satisfy State Periodic Review requirements, and address integration recommendations on potential implementation of House Bill 3661 (forest template test or lot-of-record provisions in the forest zone).

The product of this planning effort is this Land Use Alternatives Study, which builds on information gathered throughout the TLSA Project and makes policy recommendations for integrating future development with resource protection within the Study Area.

2.0 POLICY RECOMMENDATIONS AND ACTION ITEMS

What plan does the Steering Committee recommend?
What should be done to implement the recommendation?

The nine key policy recommendations are as follows:

1. Proceed with caution -- change should be introduced gradually while monitoring programs are established to develop a better understanding of resource carrying capacities.

2. Preserve the rural lifestyle and quality of life in the 10,500-acre portion of the study area currently in mixed residential and resource zones and uses.

3. Protect the resource values in the 13,500-acre portion of the study area zoned A-1, in orchard use, and zoned F-2, in forest production.

4. Educate existing and future residents of the study area about the demands, risks, and responsibilities that are part of rural living.

5. Protect the existing number of development options provided under existing zoning -- no down zoning is recommended.

6. Limit or control the increase in potential numbers of home sites in the study area -- no, or very little, immediate up zoning is recommended. (Currently, 301 out of the total of 799 allowed by zoning have been developed.)

7. Focus growth into the Browns Creek/Cherry Heights corridor -- a combination of regulatory up zoning and incentive based tools (transfer of development rights) would be used.

8. A local land trust should be created or an existing qualified entity should seek to identify, purchase, and protect significant open spaces and oak woodlands within the study area.

9. Review the effectiveness of the plan -- a bi-annual audit of the program should be held for consideration of new information including, but not limited to: infrastructure development, growth and build-out rates, impacts on resources such as water and wildlife, successes or failures of siting standards, and progress of private local preservation efforts.

Recommended action items include:

- Planning staff will draft required ordinance and comprehensive plan amendments to implement the recommended land use plan (Figure 3), new R-R(10) zoning, and siting standards addressing roads, fire, scenic, and habitat issues (see TLSA Development Standards in Appendix 1). These ordinance amendments are not proposed to include implementation of the HB 3661 forest template test or lot-of-record provisions in the Forest zone.

- Educational materials will be prepared and made available to the public. These materials will be modeled closely after those used in Larimer County, Colorado in its "Code of the West: The Realities of Rural Living" (see copy of code in Appendix 1). Wasco County will add simplified discussions of septic system maintenance, well maintenance and monitoring, conservation of backyard wildlife and oak woodland values, and water conservation measures.

- A local water monitoring program will be developed and implemented (see Local Water Monitoring Program in Appendix 1).

- Audubon Society will coordinate an Oak Woodland Research Committee that will focus on the identification and monitoring of impacts on oak woodland habitat in the study area and the providing of educational materials.

- Interest in the creation of a local land trust will be gauged. If sufficient interest exists, an organization will be formed to seek permanent protection of valuable open areas and oak woodlands in the Study Area (see Land Trust Proposal in Appendix 1).

3.0 PUBLIC PROCESS AND GOALS

What did the Steering Committee want to accomplish?

The policy statements and recommended land use plan were developed in response to a set of common goals established by the TLSA Steering Committee (SC) based on input from the Technical Advisory Committee (TAC).

Because the study was initiated in response to concerns about development and resource protection expressed by members of the community, obtaining their input and addressing their concerns was considered essential for success of the planning effort. Input was sought from public officials and private citizens, many of whom live in the Study Area. The Steering Committee and Technical Advisory Committee were reconvened to continue their work on Phase 2 of the TLSA Project. Meetings of the Steering Committee and Technical Advisory Committee were held, usually monthly, throughout the project. Background information from Phase 1 of the study, including mapped data and hydrogeologic reports, were used extensively in Phase 2 as a basis for analysis.

One task of the Steering Committee was to establish goals for the TLSA Project, which would guide the planning process and its outcomes. Goals, as established by the Steering Committee, are included in the following sections.

3.1 Resource-related Goals

3.1.1 Forest

1. Protect commercial/industrial forest land in large tracts.
2. Protect and maintain opportunities for wood lot production on smaller parcels.
3. Provide for recreational opportunities where [this] does not pose a threat to accepted forest practices.
4. Buffer commercial/industrial forest land from conflicts with residential use.
5. Protect private property rights of the commercial/industrial forester.

3.1.2 Agriculture

1. Leave all commercial farm land under the protection of the recently revised agricultural ordinances.
2. Protect and maintain opportunities for small scale farming on moderately sized parcels (right to farm).
3. Buffer commercial farmland from conflicts with residential use.
4. Protect the rights of small scale farmers to accepted farming practices.

3.1.3 Wildlife

1. Avoid increasing conflicts between potential development and big game where possible.
2. Maintain diversity of wildlife, and provide means for animals to get from one place to another.

3.2 Development-related Goals

3.2.1 Water

1. Use the best available observations and information about water in the study area as one of many factors considered, rather than the primary driving or limiting factor, in adjusting residential densities.
2. Identify areas suitable for development that support an increase, but do not exceed appropriate density, of wells.
3. Develop a long-term plan for assessing the behavior of domestic wells (using a representative sample) in each aquifer unit.

3.2.2 Fire

1. Ensure adequate protection of forest resources.
   - Maintain limits to uses posing potential fire risk in or near commercial forest land.
   - Apply strict fire standards and require development to be in a fire district, as required by state statute in the Forest Zone, to enable domestic fires to be contained.

2. Ensure adequate protection of existing and potential residential development.
   - Apply fire standards in accordance with Oregon Department of Forestry recommendations.
   - Consider setbacks from ridge tops based on recommendations of Mid-Columbia Fire and Rescue and Mosier Rural Fire Protection District.
   - Focus residential development within fire districts.
   - Consider increasing densities where fire response times are shortest.
3. Ensure adequate protection of agricultural resources.
   - Review agricultural fire standards and consider making recommendation to Agriculture Resource Group (ARG) if changes are warranted.

3.2.3 Access/Roads

1. Ensure "safe and sane" access to residential areas.
2. Identify main routes with additional carrying capacity and use them to greatest extent possible to provide access to new development.
3. Do not increase densities or development potential without providing means of ensuring that adequate access is both constructed and maintained.
4. Identify new public and private road development needed to access potential new development areas.

3.2.4 Housing

1. Provide rural residential housing opportunities outside the National Scenic Area (NSA) and Resource Zones - Evaluate suitability of land and carrying capacity relative to current zoning.
   - Consider rezone of F-F (10) to R-R (10) where dwellings can be permitted subject to standards rather than conditionally.
   - Evaluate portions of F-F (10) zone for ability to accommodate increased density.
   - Explore feasibility of limited rezone of non-productive F-2 lands.
2. Maintain rural character.
3. Retain open space values.
4. Protect scenic views/scenic quality.

4.0 INVENTORY PROCESS

What facts were considered by the Steering Committee in making their recommendation?

Data was collected and evaluated with the project goals in mind. Alternative land use plans were developed and evaluated for compliance with the project goals.

From the outset of the TLSA Project's Phase 2, three factors were clear:

- Substantial information about the physical environment of the Study Area existed as an outcome of the first phase of study. Information included several study area maps in hard-copy and AutoCAD format, and the report entitled Hydrogeologic Investigation of the TLSA, prepared for Wasco County by Northwest Geological Services, Inc. in 1994 (see Appendix 4). This information needed to be organized,

evaluated, and in some cases, refined or supplemented so that it could be used in Phase 2 of the TLSA study.

- Additional factors relating to the suitability of the study area lands for development or resource uses needed to be addressed.
- The outcome of the project would need to rely on this information to establish best land use practices for the Study Area through a public planning process.

4.1 Analysis Approach

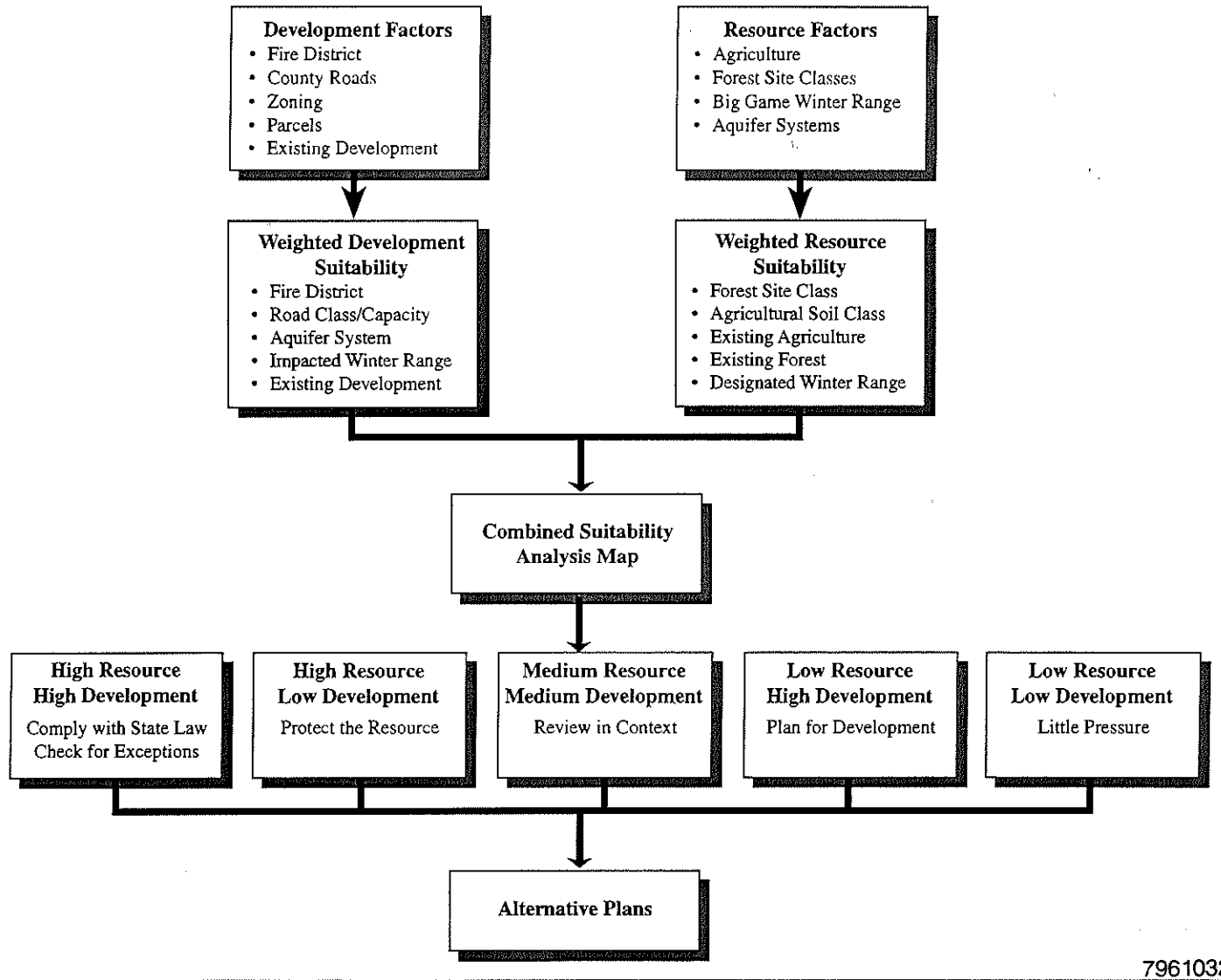
The overall analysis approach was designed to address the two primary concerns that prompted the study: development opportunity and resource protection. Substantial time in the early months of the study was dedicated to determining which factors constitute development opportunity or suitability, and which factors contribute to a need for resource protection. The outcome of this discussion was the development of a set of inventory maps that could be combined in various ways to build composite maps, which were used to develop land use alternatives for the Study Area. The inventory maps provided base data that were used in developing weighted suitability composite maps. The suitability composite maps addressed development values and resource values. The resulting maps included a weighted analysis of factors contributing to development suitability and resource suitability. The two composite maps--resource composite and development composite--were combined into a suitability analysis map to determine areas with high development value (high development suitability/low resource suitability) and high resource value (high resource suitability/low development suitability).

The flow diagrams (Figures 4 and 5a-d) provide conceptual depictions of the process, which is discussed in more detail in the following sections.

4.2 Inventory Maps

Inventory maps were developed, including the following:

- Fire Districts and Response Time
- County Road Capacity
- Zoning
- Parcels
- Developed Parcels
- Parcels by Size
- Potential Development (based on current zoning)
- Agriculture: Historically Cropped Lands
  Existing Agriculture (Land in Production)
  Agricultural Soil Classes
- Forest Site Classes
- Big Game Winter Range
- Well Locations
- Aquifer Systems



Wasco County Transition Lands Study Area
Simplified Flow Diagram

FIGURE
4

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Wasco County TLSA Project: Opportunities and Constraints Analysis

1: Agricultural Suitability

2: Forest Suitability

SOURCE MAPS

Zoning	Zones (A-1(80), A-1(20, F-2(80), F-F(10), R-R(5), RMH-2))	Zoning	Zones (A-1(80), A-1(20), F-2(80), F-F(10), R-R(5), RMH-2))
Existing Ag (Field&Perennial)	Existing registered field and perennial crops	Forest Site Classes	Forest Site Classes 4, 5, 6, and 7
Ag Soil Classes	High Value (Class 1&2, Prime&Unique), Other Productive (Class 3-6, not Prime&Unique), and Unsuitable (Class 7-8)	Soils	Soil classes
Parcels	Parcel boundaries/ownership	Parcels	Parcel boundaries/Ownership/Centerpoints

ANALYSIS MAPS

Agricultural Suitability Weighted Values	Soil Class: High Value (Class 1-2) = 2 pt. Class 3 - 6 = 2 pt. Existing Agriculture = 1 pt.	Forest Suitability Weighted Values	Forest Site Class (Predominantly): Class 6 = 1 pt. Class 5 = 2 pt. Class 4 = 3 pt. Existing Forest Use ≥ 80 ac. in F-2 (80) zone = 1 pt.

CONTINUED ON FIGURE 5b

COMPOSITE MAPS LEVEL 1

Forest and Agriculture Resource Weighted Composition

COMPOSITE MAPS LEVEL 2

Combined Land Use Values Based on Resource Composite and Development Composite Map Values (Matrix)

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Wasco County Transition Lands Study Area
Revised "Recipe" Diagram

FIGURE 5a

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Wasco County TLSA Project: Opportunities and Constraints Analysis

3: Big Game Winter Range Availability

4: Fire Districts/Response Time

SOURCE MAPS

Big Game Winter Range	Big Game Winter Range boundary from Comprehensive Plan
Impacted Winter Range	Impacted winter range inventory from ODFW
Low Elevation Winter Range	Low elevation winter range inventory from ODFW
Rivers and Streams	Surface water features coverage
Fire Hazard	Extreme and High fire hazard
Fire Districts	Wasco County Rural Fire District (RFD) boundaries Mosier RFD Oregon Department of Forestry
Response Time	Fire response time (in minutes) by section and Wasco Co. RFD

CONTINUED ON FIGURE 5c

ANALYSIS MAPS

Big Game Winter Range	1 pt.	Fire District Coverage	1 pt.

COMPOSITE MAPS LEVEL 1

Forest and Agriculture Resource Weighted Composition	Development Values Weighted Compositions

COMPOSITE MAPS LEVEL 2

Combined Land Use Values
Based on Resource Composite
and Development Composite
Map Values (Matrix)

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Wasco County Transition Lands Study Area
Revised "Recipe" Diagram

FIGURE 5b

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Wasco County TLSA Project: Opportunities and Constraints Analysis

5: Access Suitability

6: Water Capability

SOURCE MAPS

County Roads	Roads in TLSA	Zoning	Zoning
Road Capacity	Remaining Capacity on County Roads Using Wasco County Road Classifications: Class I < 25 Average Dail Traffic (ADT) - 18' Gravel Class II ADT (25 - 250) - 22' Paved, 26' Roadway Class III ADT (250 - 1,500) - 24' Paved, 30' Roadway	Developed Parcels	Existing Developed (house)
		Aquifer Units	

CONTINUED ON FIGURE 5d

ANALYSIS MAPS

Access Suitability Weighted Values	Class III Roads with Significant Capacity Remaining (up to 75%) = 2 pt. Class I Roads with Significant Capacity Remaining (up to 75%) = 1 pt.	Water Capability Weighted Values	"Green" Aquifer† = 2 pt. "Yellow" Aquifer†† = 1 pt.

COMPOSITE MAPS

LEVEL 1	Development Values Weighted Compositions
LEVEL 2	Combined Land Use Values Based on Resource Composite and Development Composite Map Values (Matrix)

† Green Aquifer - An aquifer system that, based on hydrographs and well records, shows no particular anomolies such as water level decline, deepenings, or deep static water level.
†† Yellow Aquifer - An aquifer system that, based on hydrographs and well records, has unexplained anomolies including deep aquifer, major and minor deepening, shallow soils.

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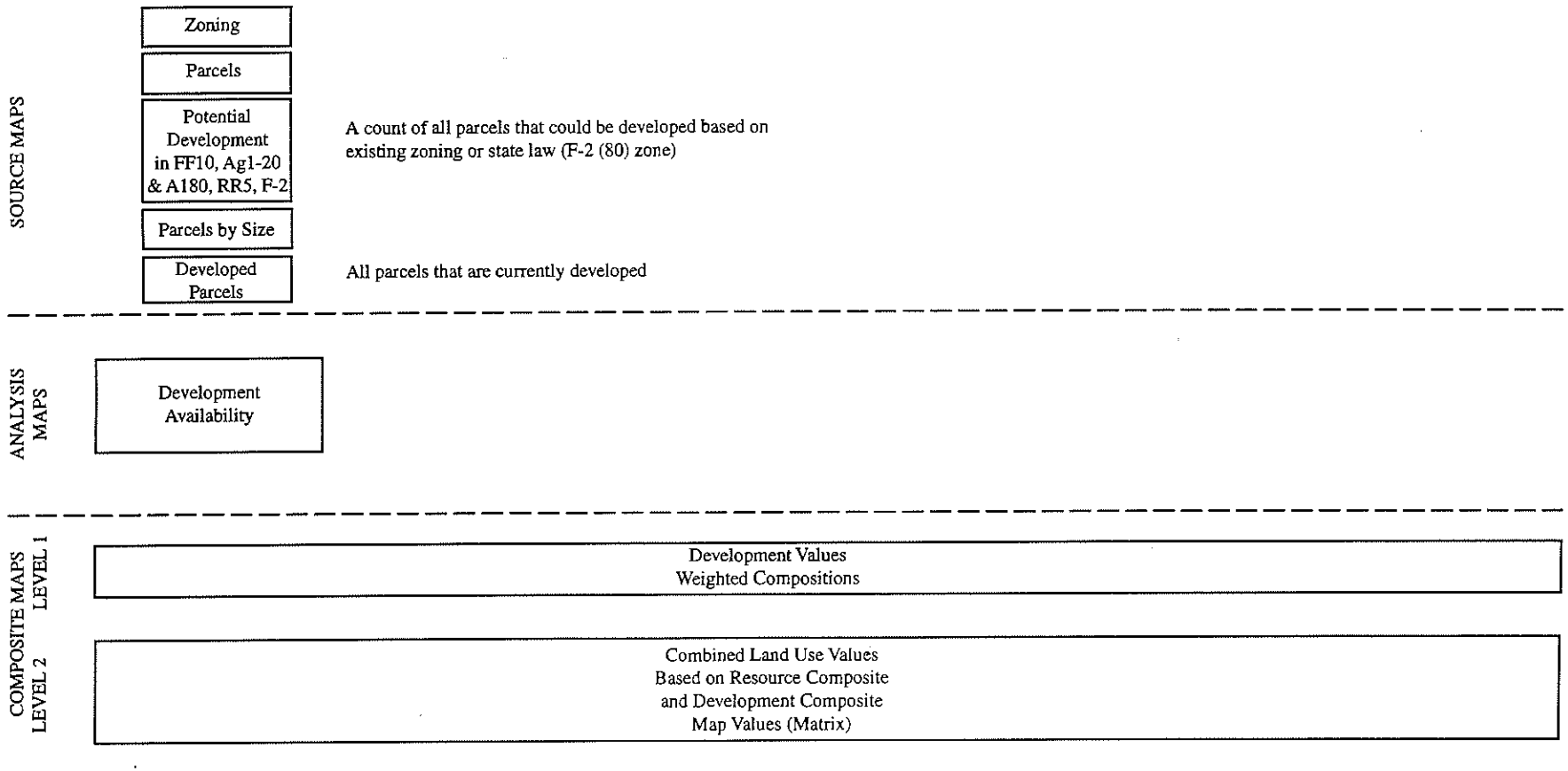
Wasco County Transition Lands Study Area
Revised "Recipe" Diagram

FIGURE 5C

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Wasco County TLSA Project: Opportunities and Constraints Analysis

7: Development Availability



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Wasco County Transition Lands Study Area
Revised "Recipe" Diagram

FIGURE 5d

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4.3 Analysis Maps

Analysis maps were derived by combining the inventory data into two categories: "development suitability" and "resource suitability." Components, by category, are listed below by category.

Development suitability included the following:

- Fire Districts and Response Time
- County Road Capacity
- Zoning
- Developed Parcels by Size
- Potential Build out by Zone
- Aquifer Systems

Forest and Agriculture resource suitability included the following:

- Agriculture: Existing Agriculture (Land in Production)
  Agricultural Soil Classes
- Forest Site Classes
- Big Game Winter Range
- Aquifer Systems

The presence of pine oak woodland habitat also was discussed at length as a resource suitability consideration. Definitive mapping of pine oak woodland habitat areas was not available for inclusion in the composite maps but will be developed for future consideration. Pine oak habitat values were addressed by the Steering Committee through public education and siting standards.

4.3.1 Suitability Composite Maps

The next step in the analysis was to determine how important each component was to determining the lands' suitability for development (Development Suitability Composite) and the lands' value as resource land (Forest and Agriculture Resource Suitability Composite). The weighting and combination of the components are discussed below.

4.3.2 Development Suitability Composite

Components of development suitability included:

- Located within the fire district;
- Accessible by a Class III or Class I road with 75% capacity remaining;
- Located within recognized iinpacted Big Game Winter Range; and
- Located within either a "green" or "yellow" aquifer system, which are aquifer systems having identified units within them generally supporting densities greater than or equal to existing zoning.

Points were assigned to each of these factors and the respective points were added to identify which parcels within the Study Area were most suitable for development. The weighted values given to each factor and the composite totals are shown in Figures 6 and 7; the highest possible value was 7 points.

4.3.3 Forest and Agricultural Resource Suitability Composite

Components of forest and agricultural resource suitability included:

- Located within forest site class 4-6, or located within agricultural soil class 1-2 or 3-6;
- Identified as existing agriculture or existing forest; and
- Located within designated Big Game Winter Range.

Points were assigned to each of these factors and the respective points were added to identify which parcels within the Study Area were most suitable for forest and agricultural resources. The weighted values given to each factor and the composite totals are shown in Figure 8; the highest possible value was 6 points.

4.3.4 Potential Development

A set of maps was also produced to identify development potential (how many houses could be built) within the existing zoning districts in the Study Area. These maps included:

- Potential Development AG-1 (20) and (80) Zones
- Potential Development F-F (10) Zone
- Potential Development R-R (5) Zone
- Potential Development F-2 (80) Zone

These maps indicated the total number of parcels per section that would be available for development based on the existing zoning classification. Based on this information, it was possible to identify total potential development that would be possible within the Seven Mile Hill Area and the Mill Creek/Cherry Heights Area (Figure 9). Although this information was not used to produce the combined weighted compositions map described in Section 4.4 below, it provided a frame of reference for evaluating impacts of zone changes while exploring Policy Alternatives.

4.4 Combined Suitability Composite

The next step in analysis was to combine the Development Suitability map with the Forest and Agricultural Resource Suitability map to identify which parts of the Study Area were most appropriate for development and which were most appropriate for resources use/protection. This was accomplished by developing a matrix of development versus natural resources values, as shown in Figure 10. The matrix identifies the conflicts between the suitability maps. For example, if an area had a resource value of 5 and a development value of 2, it was classified H-L (High-Low)within the matrix. Based on the matrix and the map combining the Development Suitability and Resource Suitability maps in Figure 11, lands within the Study Area were categorized as follows:

- Low development value/Low resource value (L-L)--No conflict; these lands will experience little pressure either for development or resource use/protection.

DEVELOPMENT VALUES WEIGHTED COMPOSITIONS

(including aquifer systems)

Transition Lands Study Area

Legend

Weighted Totals

	1	Low
	2	
	3	
	4	
	5	
	6	
	7	High

Resource Values

Fire District
- In District = 1 point

Roads
- Class III With 75% Capacity Remaining = 2 points
- Class I With 75% Capacity Remaining = 1 point

Water
- Green Aquifer System = 2 points
- Yellow Aquifer System = 1 point

Recognized Impacted Winter Range
- Impacted Winter Range = 1 point

Miles: 0 1 2 3

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Wasco County Transition Lands Study Area

FIGURE 6

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Map from Northwest Economic Associates, 1997

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DEVELOPMENT VALUES WEIGHTED COMPOSITIONS

Transition Lands Study Area

Legend

Weighted Totals

1	Low
2	
3	
4	
5	
6	
7	High

Resource Values

Fire District
In District = 1 point

Roads
Class III With 75% Capacity Remaining
2 points
Class I With 75% Capacity Remaining
1 point

Recognized Impacted Winter Range
Impacted Winter Range = 1 point

Miles
0 1 2 3

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Wasco County Transition Lands Study Area

FIGURE 7

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Map from Northwest Economic Associates, 1997

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FOREST & AGRICULTURE RESOURCES

WEIGHTED COMPOSITIONS

Transition Lands Study Area

Legend

Weighted Totals

	1	Low
	2	
	3	
	4	
	5	
	6	High

Resource Values

Forest Site Classes
- Class 4 = 3 points
- Class 5 = 2 points
- Class 6 = 1 point

Agricultural Soil Classes
- Class 1-2 = 2 points
- Class 3-6 = 1 point

Existing Agriculture
- Agriculture = 1 point

Existing Forest
- F2(80) Parcels >= 80 = 1 point

Designated Big Game Winter Range
- Big Game Winter Range = 1 point

Miles: 0 1 2 3

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FIGURE 8

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Map from Northwest Economic Associates, 1997

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EXISTING DEVELOPMENT AND POTENTIAL DEVELOPMENT SUMMARY

	7 Mile Hill	Mill Creek - Cherry Heights	Totals
Existing Development	114	187	301
Potential Development	185	313	498
Cluster Provison Bonus Density Increase (Add to potential)			
Potential Increase at 25% Bonus	1	50	
Potential Increase at 50% Bonus	11	102	

Development is defined as dwellings.

Potential development numbers are based on what would be allowed under the current zoning in the FF-10, RR-5, and Agricultural Zones only. Numbers do not take into account unbuildable lots based on topography.

Potential development by zones

7 Mile Hill			Mill Creek-Cherry Heights		
FF-10	=	125	FF-10	=	256
RR-5	=	52	RR-5	=	50
Ag	=	8	Ag	=	7

Example of how to figure a cluster bonus.

a 40 acre parcel in the FF-10 would get 4 houses(1 per each 10 acres). With a cluster provision, the same parcel would get 1 extra dwelling at 25% bonus (4 dwellings x .25); or 2 extra dwellings (4 dwellings x .50).

Source - Potential Development Maps produced for TLSA
April 7, 1997

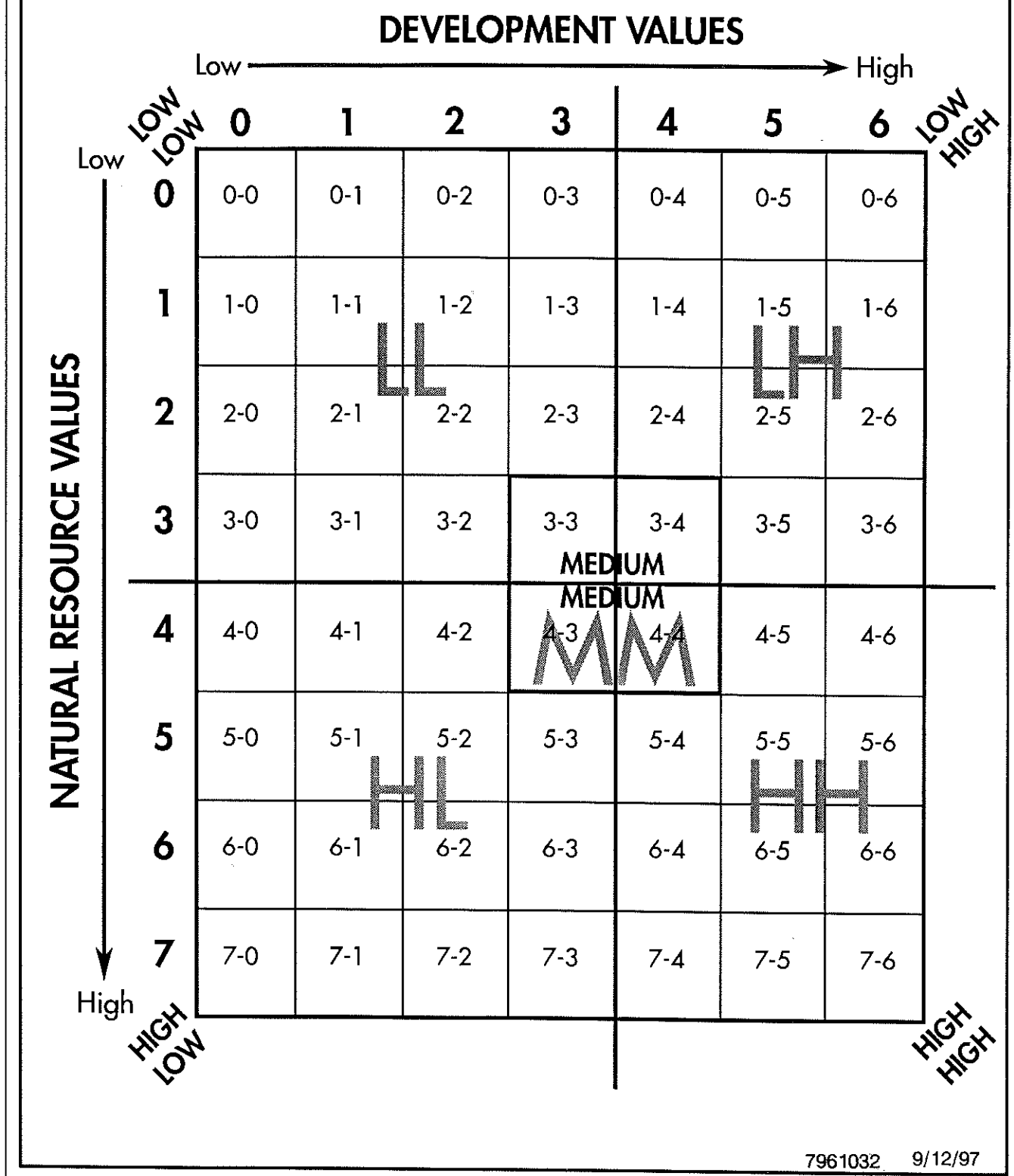
Tables from Wasco County, OR, 1997

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Wasco County Transition Lands Study Area
Summary of Existing Development and Potential Development

FIGURE 9

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Wasco County Transition Lands Study Area
Development versus Resource Values Matrix

FIGURE 10

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COMBINED LAND USE VALUES

(based on resource composite & development composite map values)

Transition Lands Study Area

Value Comparison

	Forest & Agriculture Values	Development Values
L/L	0-1-2	0-1-2-3
L/H	0-1-2	4-5-6-7
H/L	3-4-5-6-7	0-1-2-3
H/H	3-4-5-6-7	4-5-6-7

F&A-Dev Medium Ranges

M/M 3-3, 3-4, 4-3, 4-4

0 1 2 3 4 5 6 7

Low High

Miles

0 1 2 3

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June 1997

Wasco County Transition Lands Study Area

FIGURE 11

9/12/97

Map from Northwest Economic Associates, 1997

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- High resource value/Low development value (H-L)--plans for these lands should protect the resource.

- Low resource value/High development value (L-H)--plans for these lands could accommodate development.
- Medium resource value/Medium development value (M-M)--Potential conflict; lands in this category must be reviewed in context to determine which factor (development or resource use/protection) is more important to plan for.
- High resource value/High development value (H-H)--plans for these lands must also be reviewed in context. Land uses must be based on review of applicable statutes, which usually will favor the resource, but there may be exceptions.

5.0 PRELIMINARY DEVELOPMENT ALTERNATIVES

What was the full range of alternatives considered?

Three preliminary alternatives were developed based on the development and resource value analysis. These include: Alternative 1--Mimimum Development, Alternative 2--Moderate Development, and Alternative 3--Maximum Development (Figures 12, 13, and 14). The alternatives reflect the range of development that could occur in the Study Area, from essentially "status quo" to substantial increases in allowed density. The alternatives are described below, accompanied by a discussion of the positive and negative aspects of each.

As noted earlier in this report (see Section 2.0), two areas were identified as most suitable for development based on the Development Suitability Maps: the Seven Mile Hill Area, in the northeastern part of the Study Area, and the Mill Creek/Cherry Heights Area, in the southeastern part of the Study Area. The preliminary alternatives focus on these areas.

5.1 Alternative 1--Minimum Development

This alternative represents the "status quo," allowing very little increase in development density above what was already allowed by current zoning. A key factor recognized by the Steering Committee was that the potential exists for approximately 500 additional homes to be built under the current zoning, in addition to the existing approximately 300 homes. Water Monitoring Areas were designated as areas which could experience increased densities in the future if adequate water is available (Figure 12).

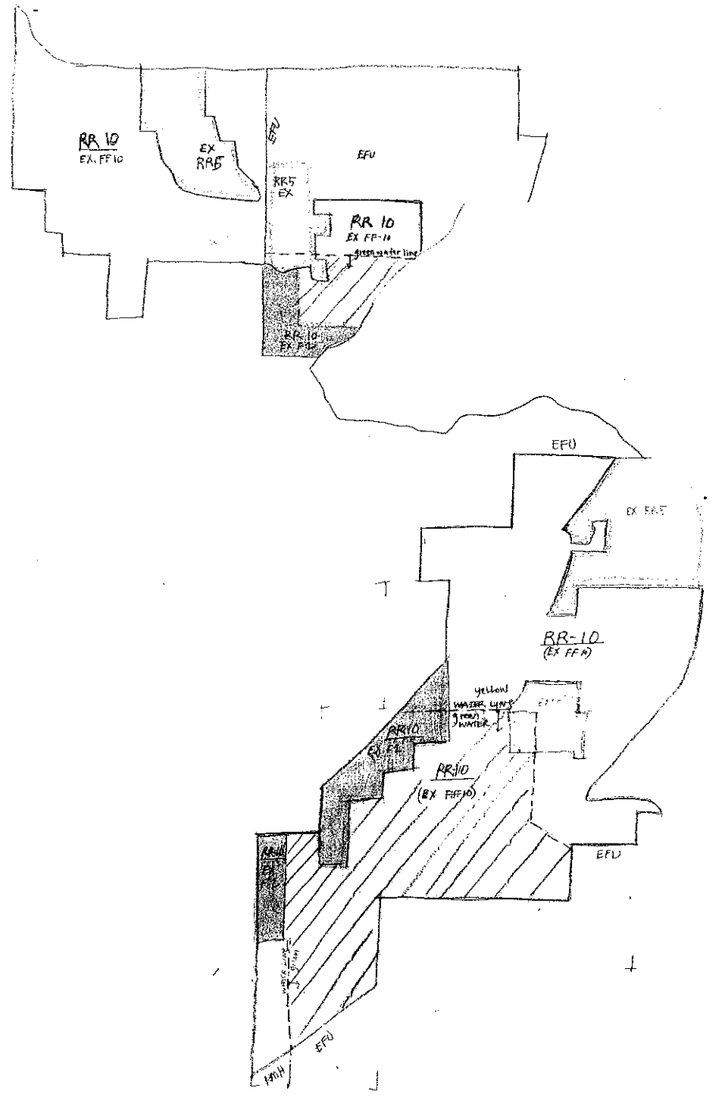
5.1.1 Seven Mile Hill Area

In the Seven Mile Hill Area, Alternative 1 would:

- Retain the existing A-1 (80) EFU and R-R (5) Rural Residential, and the vast majority of the F-2(80) zoning.
- Rezone the remainder of the area from F-F (10) Forest-Farm and a small amount of F-2 (80) Forest to R-R (10) Rural Residential, a new zone created as a result of this study.
- Rezone one area of F-2(80), approximately 80-100 acres located in the southeast corner of the Seven Mile Hill Area, to R-R(10).

ALTERNATIVE FOR MINIMUM DEVELOPMENT

(Same zoning w/ minor changes)



ALL EXISTING FF10 TO RR10

WATER MONITORING AREAS FOR POTENTIAL INCREASE IN DENSITY (areas where current chance appearing is worthwhile, other areas will be monitored, but not being considered for density increase).

PROPOSED MINOR INCLUSIONS OF RESOURCE LAND TO RR-10 (RLS)

MINIMUM DEVELOPMENT

PROS:

- Rezone only very limited resource zoned lands with low resource values, retaining areas of higher resource value.
- Retain existing ten acre minimum.
- No increase in potential impacts on BGWR.
- Allows further testing and monitoring of aquifer systems prior to any increase in density - "we'll never be able to promise water but may understand the odds better."
- Doesn't increase potential service needs (roads and fire protection).
- Retains familiar 10 acre land use pattern.

CONS:

- Without development standards and education for rural occupants, still impacts fire protection, rural character and "other" wildlife habitat as ten acre densities developed.
- No increase in potential $'s for rural fire protection.
- Monitoring still important to provide understanding of water issues to rural dwellers.
- Fails to provide a smaller lot option for rural dwellers - each rural residence "consumes" a minimum of ten acres.

Map from Wasco County, OR, 1997

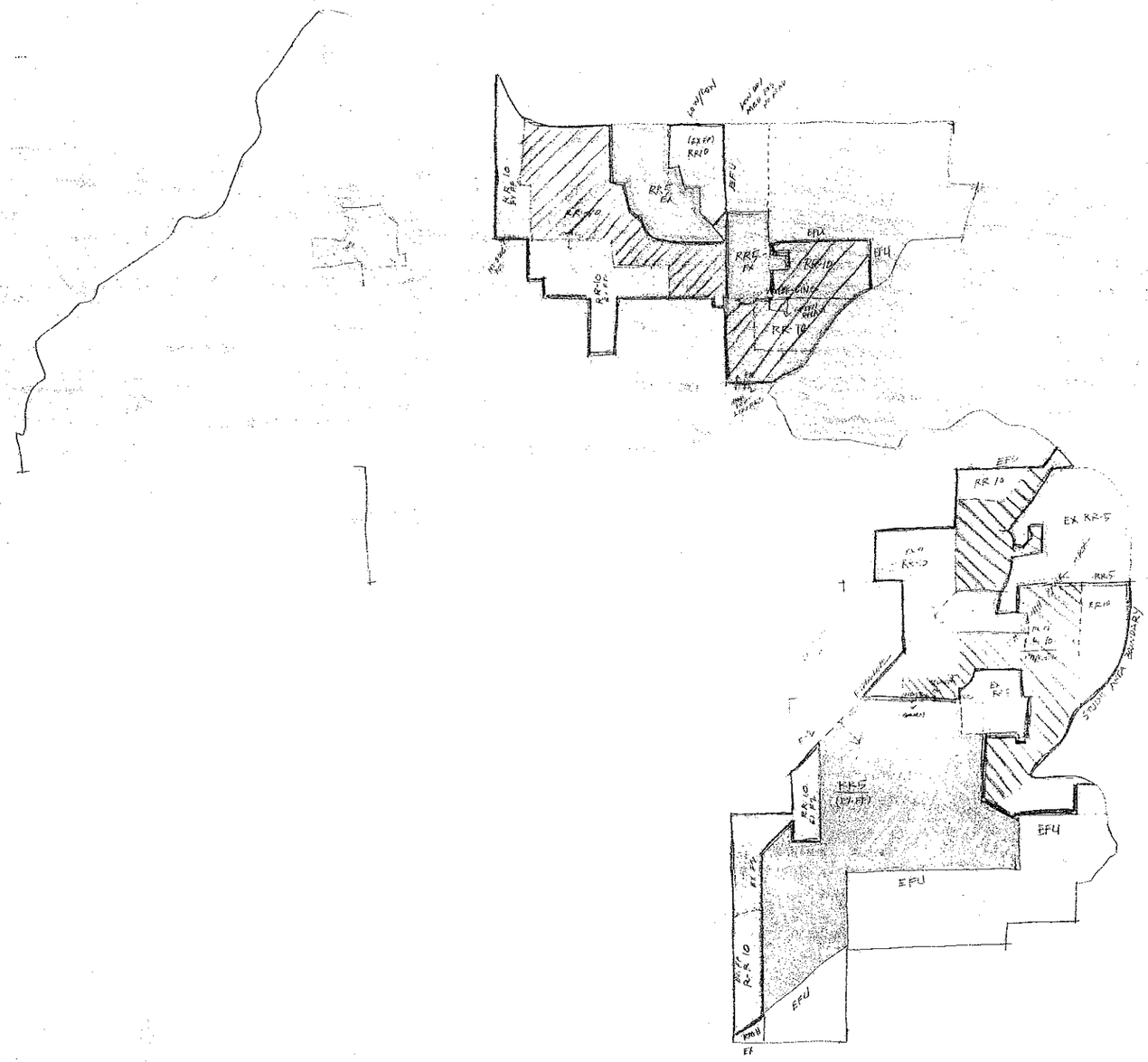
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Wasco County Transition Lands Study Area
Alternative 1 - Minimum Development

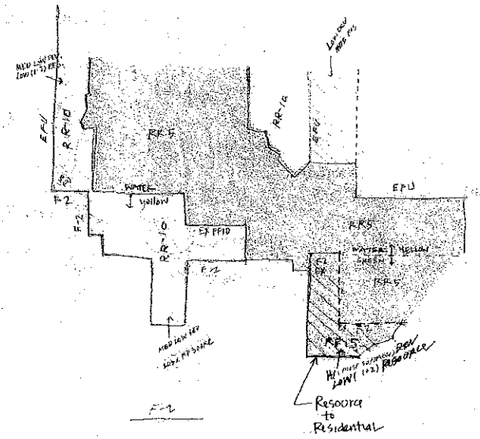
FIGURE 12

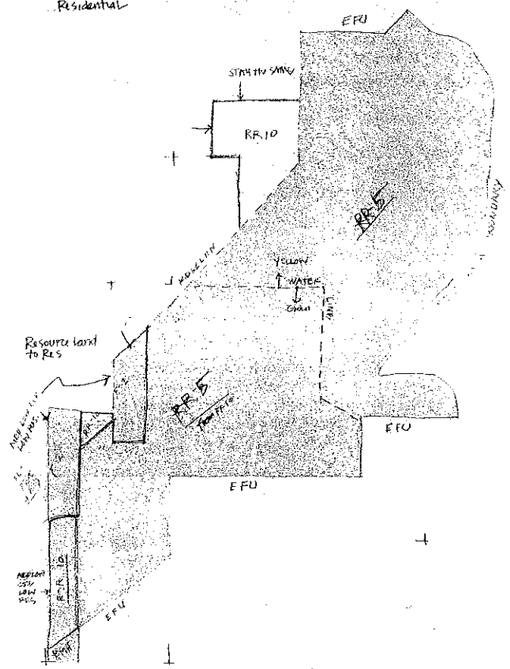
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ALTERNATIVE FOR MODERATE DEVELOPMENT


EFU
RR 10
EX RR-5
EFU
EFU
EFU
EFU
EFU
EFU
EFU
RR 10
EFU
EFU
EFU
EFU
EFU
EFU
EFU

ALTERNATIVE FOR MAXIMUM DEVELOPMENT





PROS

MAXIMUM DEVELOPMENT

PROS :

- Maximizes development in areas of low or lower resource value - taking pressure off higher value lands.
- Maximizes development in impacted areas of big game winter range (BGWR)- taking pressure off areas with remaining habitat values.
- Not limited by possible ground water shortages - water can be purchased or hauled if needed.
- Allows all serviceable (roads and fire district) land to be developed fully- taking pressure off areas with substandard services.
- Allows broad increase in densities with in fire districts- increasing revenues within the same service area.
- Maximum accommodations for rural housing- could consider cluster density bonuses at even higher than five acres.
- Broad comprehensive density increases provide for more consistent development pattern rather than infill after ten acre lot pattern has continued to develop.

CONS:

- Impacts other wildlife habitat- quantifiable data not available.
- Possible over extension of ground water supplies and increased densities in areas where aquifer system behavior is not well understood.
- Hauling water to domestic dwellings is not the usual and customary practice in this area - can't form water districts or co-ops outside UGB.
- Without adequate Road standards increases risks of fire loss in less accessible areas (increased structure values and more lives affected) .
- Without LIDs (limited improvement districts) or Development Fees, no increased revenues for Road Department to provide for additional development and maintenance as traffic increased.
- Impacts on rural character.
- Provides no trial run for development standards and education programs.

Map from Wasco County, OR, 1997

7961032 9/12/97

Wasco County Transition Lands Study Area
Alternative 3- Maximum Development

FIGURE 14

SRI/SHAPIRO/AGCO INCORPORATED

- Create and coordinate a water monitoring program tied to specific Water Monitoring Areas.

Creation and application of the R-R (10) zone would simplify the approval of homes by eliminating the conditional review process. Residential use would be permitted subject to standards for approval (see Appendix 1 for a summary of this new zone).

Water Monitoring Areas are areas that could be rezoned in the future to allow increased development, provided water monitoring indicates water availability would be able to accommodate increased density (water monitoring information is included in Appendix 6 of this report). Water Monitoring Areas were determined based on aquifer systems within the Study Area determined to be "green" or "yellow." A "green" aquifer system is one that, based on hydrographs and well records, shows no particular anomalies such as water level decline, deepenings, or deep static water level. A "yellow" aquifer system is one that, based on hydrographs and well records, has unexplained or negative anomalies including deeper than average aquifers, major and minor deepenings of wells, decreases in static water levels and/or has shallow soils.

5.1.2 Mill Creek/Cherry Heights Area

In the Mill Creek/Cherry Heights Area, Alternative 1 would:

- Retain the existing R-R (5) Rural Residential zoning.
- Rezone the remainder of the area zoned F-F (10) to the new R-R (10) zone.
- Rezone two small segments zoned F-F(80) located along the western boundary of this area to R-R (10).
- Create and coordinate a water monitoring program aimed at Water Monitoring Areas identified over approximately one-half of the Mill Creek/Cherry Heights area.

5.1.3 Pros and Cons of Alternative 1--Minimum Development

Pros include the following:

- Only a very limited area of resource-zoned (F-2 (80)) lands with low resource values would be rezoned to R-R (10), thus retaining areas of higher resource value in their existing zoning.
- The existing 10-acre minimum would be retained in rezoned areas.
- There would be no increase in potential impacts on the Big Game Winter Range (BGWR).
- Further testing and monitoring of aquifer systems would be undertaken before any increase in density is allowed. This will result in a better understanding, through monitoring and evaluation, of the aquifer systems and how they are affected by development.
- Potential service needs (i.e., for roads and fire protection) would not increase.
- The existing, and familiar, 10-acre land use pattern would be retained.

Cons include the following:

- Without development standards and public education about the impacts of increased density, impacts on fire protection services and wildlife habitat, and changes in the rural character of the area, would result.
- There would be no increase in potential revenue for rural fire protection services.
- Likely less incentive to monitor aquifers, however, monitoring of aquifers still would be important to provide understanding of water issues to rural dwellers.
- Fails to provide a smaller lot option; each rural residence would continue to "consume" a minimum of 10 acres of land.

5.2 Alternative 2--Moderate Development

Alternative 2 would allow more development than with Alternative 1, with other areas in both the Seven Mile Hill Area and Mill Creek/Cherry Heights Area identified for a future increase in density if there is water monitoring data to support it. A much larger part of the Mill Creek/Cherry Heights Area (about half) would be rezoned to R-R (5) (Figure 13). This would allow more development than with Alternative 1.

5.2.1 Seven Mile Hill Area

In the Seven Mile Hill Area, Alternative 2 would:

- Retain the existing A-1 (80) EFU and R-R (5) Rural Residential zoning.
- Rezone the remainder of the area, which currently is zoned for F-F (10) and F-2 (80), to R-R (10).
- Create a much larger water monitoring area than Alternative 1, which means it could be rezoned in the future to allow increased development, provided water monitoring indicates water availability.

5.2.2 Mill Creek/Cherry Heights Area

In the Mill Creek/Cherry Heights Area, Alternative 2 would:

- Retain the existing R-R (5) zoning.
- Rezone existing F-F (10) in the northern part of the area to R-R (10), and designate about half a Water Monitoring Area.
- Rezone a small area of existing F-2 (80) in the southern part of this area to R-R (5).
- Rezone existing F-2 (80) and F-F (10) along the western boundary to R-R (10).

5.2.3 Pros and Cons of Alternative 2--Moderate Development

Pros include the following:

- Limits increased densities.
- Directs increased densities to areas of low or lower resource value, areas where the Big Game Winter Range (BGWR) already is impacted, and/or areas where aquifer systems are behaving more predictably ("green areas").
- Areas are identified where density could increase once more is known about water availability (Water Monitoring Areas).

- Density increases are focused in serviceable areas.
- A limited opportunity for an increase in fire district revenues is provided.
- Increased densities are first directed to areas accessed by an existing road system with adequate capacity for increased traffic, allowing the Road Department to assess impacts of increased development on roads.
- The opportunity is provided to assess the effectiveness of development standards, for maintaining fire/road access and preserving rural character, and educational programs to increase awareness of water, wildlife, and right-to-farm issues, before increases in density occur.
- Limited accommodations for rural housing are provided.

Cons include the following:

- Limited impacts on other wildlife habitat would result.
- There is no guarantee that water will be available to accommodate higher densities.
- A limited increase in risk of fire loss would result in accessible areas.
- Traffic on roads would increase to a limited extent without an automatic increase in Road Department revenue to offset increased service demand.
- Rural character would be affected in certain areas to a limited extent.

5.3 Alternative 3--Maximum Development

This alternative would rezone most of the Seven Mile Hill Area and the Mill Creek/Cherry Heights Area to R-R (5), thus allowing the most development of the three alternatives (Figure 14). This alternative does not consider water to be a limiting factor to development.

5.3.1 Seven Mile Hill Area

In the Seven Mile Hill Area, Alternative 3 would:

- Retain the existing A-1 (80) EFU and R-R (5) zoning.
- Rezone areas with medium-low development value and low resource value from F-F (10) to R-R(10).
- Rezone the remainder of the existing F-F (10) to R-R(5) without regard to water considerations.

5.3.2 Mill Creek/Cherry Heights Area

In the Mill Creek/Cherry Heights Area, Alternative 3 would:

- Retain the existing R-R (5) zoning.
- Rezone most areas in the northern half from F-F (10) to R-R (5); the exception would be a small area along the western boundary that has a medium-low development value and a low resource value, which would be rezoned to R-R (10).
- Rezone the southern half of the area to R-R (5), with a small part along the western boundary rezoned to R-R (10).

5.3.3 Pros and Cons of Alternative 3--Maximum Development

Pros include the following:

- Development is maximized in areas of low or lower resource value, thus taking development pressure off lands with higher resource value.
- Similarly, development is maximized in areas of impacted Big Game Winter Range, taking pressure off areas with remaining habitat values.
- Development would not be limited by possible groundwater shortages; water could be purchased or hauled if needed.
- All serviceable (roads and fire district) lands can be fully developed, which takes pressure off areas with substandard services.
- A broad increase in densities is allowed on lands within the fire districts, resulting in increased revenues within the same service area.
- There is maximum accommodation of rural housing; cluster density bonuses could be considered at greater than 5-acre minimum lot size.
- Broad comprehensive density increases proposed with this alternative provide for a more consistent development pattern, rather than resulting in infill after the 10-acre pattern has continued to develop.

Cons include the following:

- Although quantifiable data is not available, this alternative is expected to result in impacts on wildlife habitat.
- It is possible that over-extension of groundwater supplies will occur as a result of increased densities in areas where the behavior of aquifer systems is not well understood.
- Hauling of water for domestic use is not the usual and customary practice in the Study Area, and formation of water districts or co-ops outside the urban growth boundary (UGB) is not allowed; therefore, water availability could become a problem.
- Without adequate road standards, there would be increased risk of fire loss in less accessible areas, and likely increased structure damage and more lives affected as a result of increased density.
- Without local improvement districts (LIDs) or development fees, there would not be increased revenue for the Road Department to provide for additional development and maintenance as traffic increases.
- Impacts on rural character would result.
- A "trial run" for development standards and educational programs is not provided.

6.0 ALTERNATIVE PLANS

What was the preferred preliminary alternative?
What options were considered for implementing the preferred alternative?

Based on analysis and comparison of the Preliminary Development Alternatives (Section 5.1) and consideration of information derived from analysis of the Potential Development maps (as described in Section 4.3.3 of this report), the Steering Committee selected Alternative 1 – Minimum Development as their preferred alternative. The Steering Committee agreed to look at some options for development within the context of the

Minimum Development Alternative. Three Preferred Policy Alternatives were developed. The Preferred Policy Alternatives focus on the same mixed residential and resource use areas of the Study Area as the Preliminary Development Alternatives: the Seven Mile Hill Area and the Mill Creek/Cherry Heights Area. These alternatives were refinements of the Minimum Development Alternative, and were guided and developed from the policy statements. They explored three different approaches to developing the Minimum Development Alternative, as follows:

(1) Maintain the existing number of homes that can be developed by current zoning, but provide flexibility of lot size through transfer of development rights.
(2) Identify specific areas for immediate upzone (increased density), but significantly limit these areas.
(3) Identify specific areas for an upzone in the future, as warranted.

The Preferred Alternative plans combine features of each of the Preliminary Development Alternatives. Each approach aims to:

- Proceed with caution;
- Focus growth in the Mill Creek/Cherry Heights area; and
- Retain rural character and quality of life.

The plans also include a new concept--transfer of development rights (TDR)--to allow a transfer of a development (house) to another location. The alternative concepts are explained in detail in the following sections.

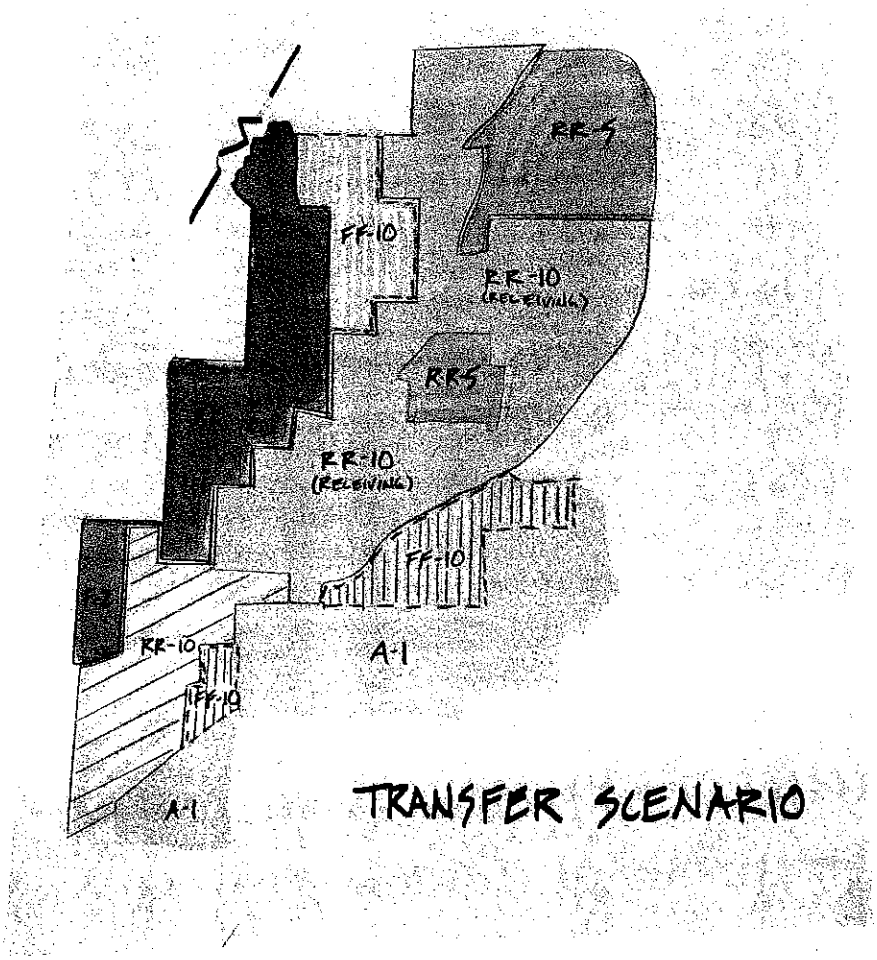
6.1 Transfer of Development Rights (TDR) Alternative

The Transfer of Development Rights Alternative transfers development rights from areas with high resource values and/or lower development values to areas with high development potential. This approach could result in higher protection for resource lands while allowing some flexibility for development (Figures 15 and 16). Areas most suitable for development will be allowed to build out at higher densities than allowed under current zoning. They would be allowed to increase their density by purchasing a development right (unbuilt homesite) from another property owner and agreeing to develop the "transferred" homesite within the receiving area where development suitability is highest. The key is that increased densities allow for infill development where best suited, and make possible the utilization of development rights from areas that are less suitable for development, which may include areas of steep slopes, ridgelines, aquifer anomalies, significant wildlife habitat, and/or locations compromising scenic views.

6.1.1 Seven Mile Hill Area

In the Seven Mile Hill Area, the TDR Alternative would:

- Retain the existing R-R (5) and A-1 (80) EFU zoning.
- Retain the existing F-F (10) areas that have a higher resource value or a low development value (for instance, in areas where water availability is unknown).
- Rezone the remainder of the F-F (10) lands to R-R (10). None of the rezoned R-R (10) areas would be able to receive development rights under the TDR concept.



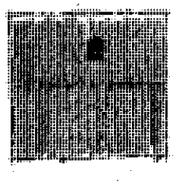
Map from Wasco County, OR, 1997 7961032 9/12/97

Wasco County Transition Lands Study Area
Transfer of Development Rights (TDR) Alternative

FIGURE 15

SRI/SHAPIRO/AGCO INCORPORATED

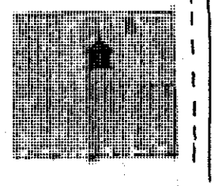
VALUE WITH DEVELOPMENT RIGHT ON 10 AC



5AC. WITH HOUSE (160,000.00)
5AC. HOME SITE (45,000.00)
205,000.00

LESS

VALUE WITHOUT DEVELOPMENT RIGHT

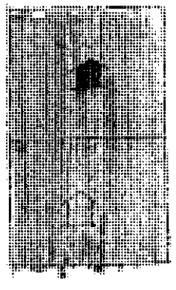


10AC WITH HOUSE (160 000.00)

DEVELOPMENT RIGHT VALUE TO BUYER

$ 45,000.00

VALUE WITH DEVEL. RT. ON 20AC.



10AC WITH HOUSE (160 000.00)
10AC HOMESITE (50,000.00)
210,000.00

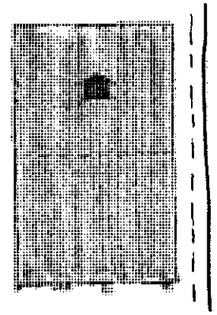
BROWN'S CREEK CHERRY HT'S

(160,000.00)
(70,000.00)
(230,000.00)

MOSIER 7 MILE HILL

LESS

VALUE WITHOUT DEVEL. RT.



20AC WITH HOUSE (160,000.00)

(170,000.00)

DEVELOPMENT RIGHT VALUE TO SELLER

$ 70,000.00 (BROWN'S CREEK CHERRY HT'S)
$ 60,000.00 (MOSIER 7 MILE HILL)

7961032 9/12/97

Figure from Wasco County, OR, 1997

Wasco County Transition Lands Study Area
Example of Transfer of Development Rights

FIGURE 16

SRI/SHAPIRO/AGCO INCORPORATED

6.1.2 Mill Creek/Cherry Heights Area

In the Mill Creek/Cherry Heights Area, the TDR Alternative would:

- Retain the areas with R-R (5) zoning.
- Retain a small area of F-F (10) and areas of F-2 (80) along the western area boundary.
- Rezone the remainder of lands currently zoned F-F (10) to R-R (10) with TDR receiving status.

6.1.3 Intent and Impacts of the TDR Alternative

What is the intent of the TDR Alternative?

- The overall density (number of new homes) would not increase, but would allow lot size flexibility.
- Development would occur at a slower pace, which allows time to explore ways to fund the cost of providing service to developing areas.
- Increased densities would occur in the most accessible areas, as driven by the market.
- An incentive is generated for private purchase of development rights.
- Those who pay (for transfer of development rights) are those who stand to benefit from increased development.
- Rural character would be maintained.
- Development would proceed with caution and allow time for water monitoring data to be compiled.

What are the impacts of the TDR Alternative?

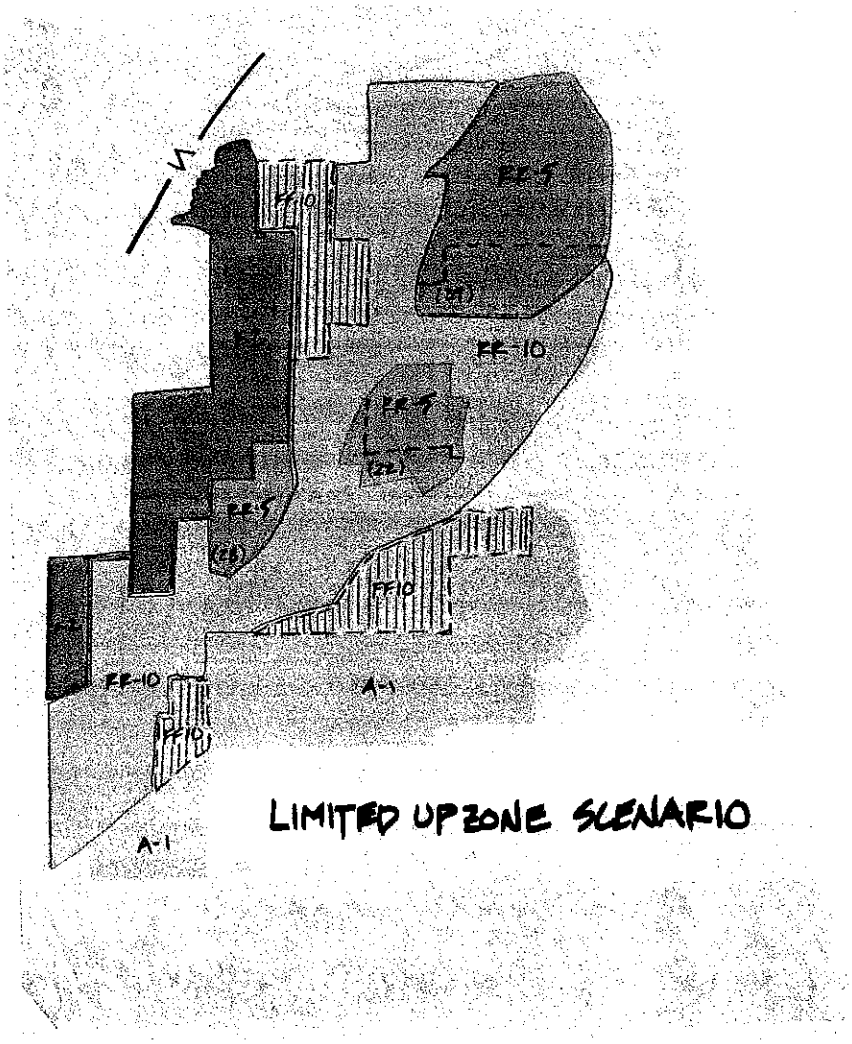
- TDR is a new concept and will be difficult to understand and/or explain.
- There is no guarantee that development rights will be purchased and built out in the "receiving areas;" however, the alternative acknowledges the value of creating incentives, rather than regulating development through such methods as downzoning.
- TDR may be complex and difficult to implement because of higher administrative costs and staff time commitments.
- Creates higher densities in "receiving areas" than zoning would indicate.

6.2 Limited Upzone Alternative

The Limited Upzone Alternative identified areas that are best suited for an upzone based on development suitability (Figure 17) Generally, these are areas that have good road access, are in a fire district, are in an impacted Big Game Winter Range area, and are located in an aquifer that has few anomalies. There is not a transfer of development rights (TDR) in this alternative.

6.2.1 Seven Mile Hill Area

In the Seven Mile Hill Area, the Limited Upzone Alternative would be the same as with the TDR Alternative, but there would not be the opportunity to transfer or sell development rights.



Map from Wasco County, OR, 1997

7961032 9/12/97

Wasco County Transition Lands Study Area
Limited Upzone Alternative

FIGURE
17

SRI/SHAPIRO/AGCO
INCORPORATED

6.2.2 Mill Creek/Cherry Heights Area

In the Mill Creek/Cherry Heights Area, the Limited Upzone Alternative would retain the existing F-F (10) areas that have a higher resource value (the same as Alternative 1). However, this scenario identifies two areas for an upzone from F-F (10) to R-R (5). These areas are identified as having a high development value and include the following:

- Area 1--south of the existing R-R (5). Rezoning this area to R-R (5) would result in approximately 39 additional homesites.
- Area 2--south of Lutz Lane. Rezoning this area to R-R (5) would result in approximately 22 additional homesites.

6.2.3 Intent and Impacts of the Limited Upzone Alternative

What is the intent of the Limited Upzone Alternative?

- Rural densities would increase in the most appropriate areas.
- Upzoning and downzoning are familiar concepts; therefore, the action would be easily understood by landowners.

What are the impacts of the Limited Upzone Alternative?

- The number of potential homesites would increase by 60+, which would put more demand on infrastructure and services, such as the road system.
- It would be difficult to "go back" once areas are upzoned.

6.3 Future Expansion Alternative

The Future Expansion Alternative identifies the same two areas for an upzone as are identified in the Limited Upzone Alternative (Figure 18). In this scenario the upzone of an area would be phased in as development pressure occurs in the future, and as more information on water is gathered. There is no difference between this alternative and the Limited Upzone Alternative other than the rezone areas are identified and reserved for future growth.

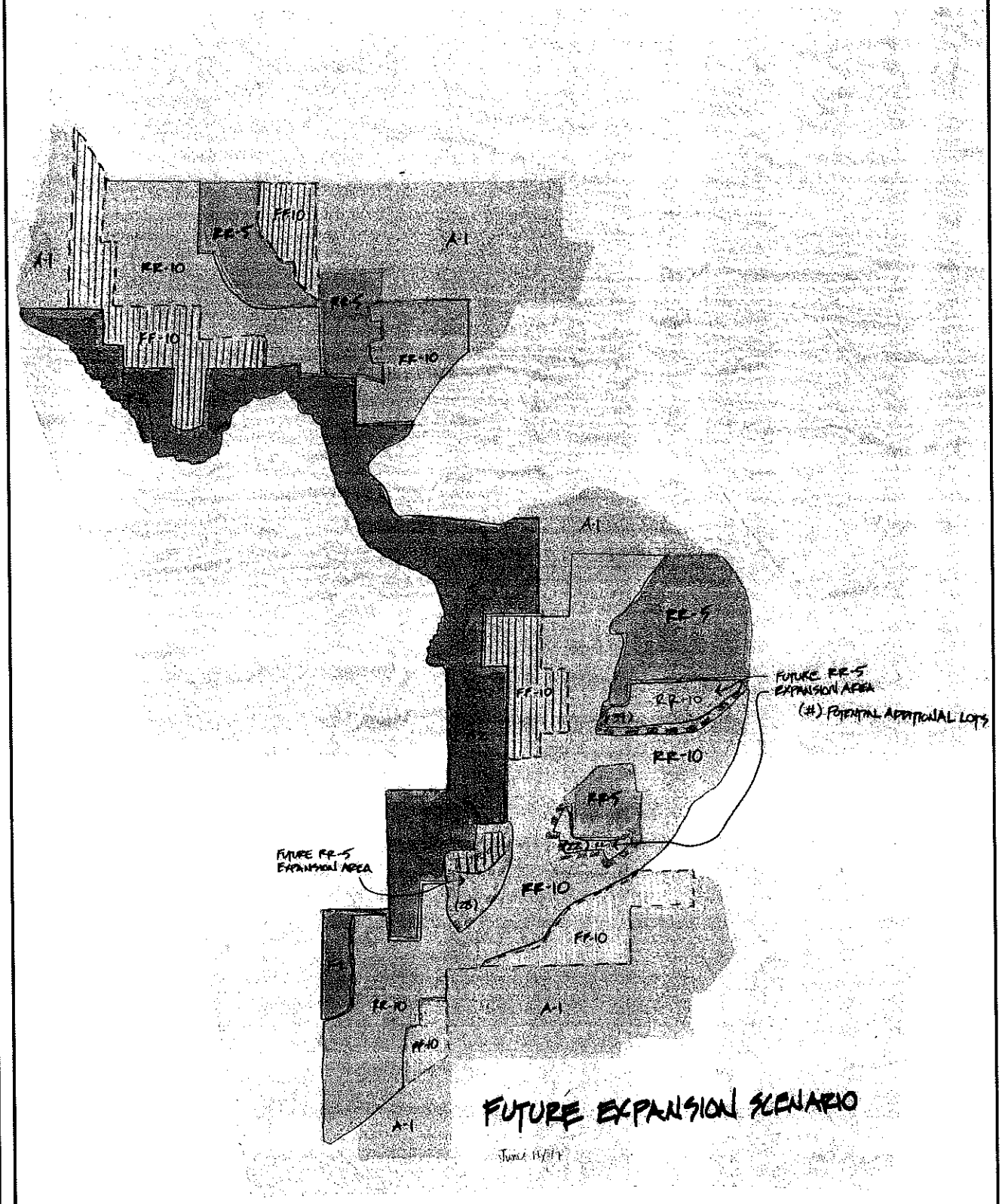
6.3.1 Intent and Impacts of the Future Expansion Alternative

What is the intent of the Future Expansion Alternative?

- Does not increase number of homesites above what current zoning allows at this time.
- Identifies those areas where development is most suitable for future growth.
- Has no immediate impacts.

What are the impacts of the Future Expansion Alternative?

- The number of homesites would not increase at this time.
- As need for homesites increases, areas for future upzones have been identified.



Map from Wasco County, OR, 1997 7961032 9/12/97

Wasco County Transition Lands Study Area
Future Expansion Alternative

FIGURE 18

SRI/SHAPIRO/AGCO INCORPORATED

7.0 FINAL RECOMMENDATION

The final preferred alternative recommendation combines features of both the Transfer of Development Rights and the Limited Upzone (Figure 3). It identifies Area 1 for an immediate upzone from F-F (10) to R-R (5) and it identifies Area 2 as a test case area to receive Transfers of Development Rights.

7.1 Seven Mile Hill Area

In the Seven Mile Hill Area the Final Recommendation would be:

- Retain the existing R-R (5) and A-1 (80) EFU zoning.
- Retain the existing F-F (10) areas that have a higher resource value or a low development value (for instance, in areas where water availability is unknown).
- Rezone the remainder of the F-F (10) lands to R-R (10). F-F (10) areas would be able to transfer development rights to the area identified as the test area (Figure 3).

7.2 Mill Creek/Cherry Heights Area

In the Mill Creek/Cherry Heights Area the Final Recommendation would be:

- Retain the areas with R-R (5) zoning.
- Retain a small area of F-F (10) and areas of F-2 (80) along the western area boundary.
- Upzone Area 1 - south of the existing R-R (5) - from F-F (10) to R-R (5). Rezoning this area would result in approximately 39 additional homesites.
- Identify Area 2 - south of Lutz Lane, existing R-R (5) zone - as a test case receiving area for the Transfer of Development Rights.
- Rezone the remainder of lands currently zoned F-F (10) to R-R (10).

7.3 Intent and Impacts of the Final Recommendation

What is the intent?

- The overall density (number of new homes above current zoning) would increase by 39 and be directed in the most appropriate area.
- Transfer of Development Rights concept could be tested to determine its success.
- Rural character would be maintained.
- Development would proceed with caution, and allow time for water monitoring data to be completed.

What are the impacts of the limited Upzone Alternative?

- The number of homesites would increase by 39 and provide some additional housing opportunities.
- There is no guarantee that development rights will be purchased and built out in the test area. However, it allows an opportunity to explore a new concept which creates incentives for development to occur in an appropriate place rather than regulating development through such methods as downzoning.
- Transfer of Development Rights densities in "receiving areas" at higher densities that zoning would indicate.

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TRANSITION LANDS STUDY AREA
GROUND WATER EVALUATION
WASCO COUNTY, OREGON

Gay M. Jervey

EXHIBIT 4

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TRANSITION LANDS STUDY AREA GROUND WATER EVALUATION WASCO COUNTY, OREGON

Gay M. Jervey

SUMMARY

The evaluation of ground water quantity is important to residents of the Transition Lands Study Area (TLSA). Assessment of the volume available has been difficult because of one major problem; regardless of the method of assessment used or the assumptions made in estimating available ground water, none of the ground water models used to date explain the declines seen in some wells in the TLSA or the fact that some wells have had to be deepened due to lack of water in the wellbore.

The purpose of this report is to examine this one issue in detail using available information. The conclusions presented are:

- all of the aquifers in the TLSA are water table aquifers or hydraulically tied to water table aquifers
- these aquifers can be identified and mapped
- there is no obvious overall trend of aquifer depletion in the TLSA
- declines observed occur primarily in basalt aquifer wells and appear to be linked to the internal structure of the basalts
- deepenings (where related to lowering of static water level) are due to specific negative situations having to do with the geology adjacent to the wellbore
- more work needs to be done to better understand basalt aquifer performance
- close observation of wells in densely drilled areas is necessary to improve estimation of appropriate well spacing
- well spacing should not exceed what has been demonstrated to be effective within the TLSA unless additional information is provided to the Wasco County TLSA Steering Committee or other County representatives

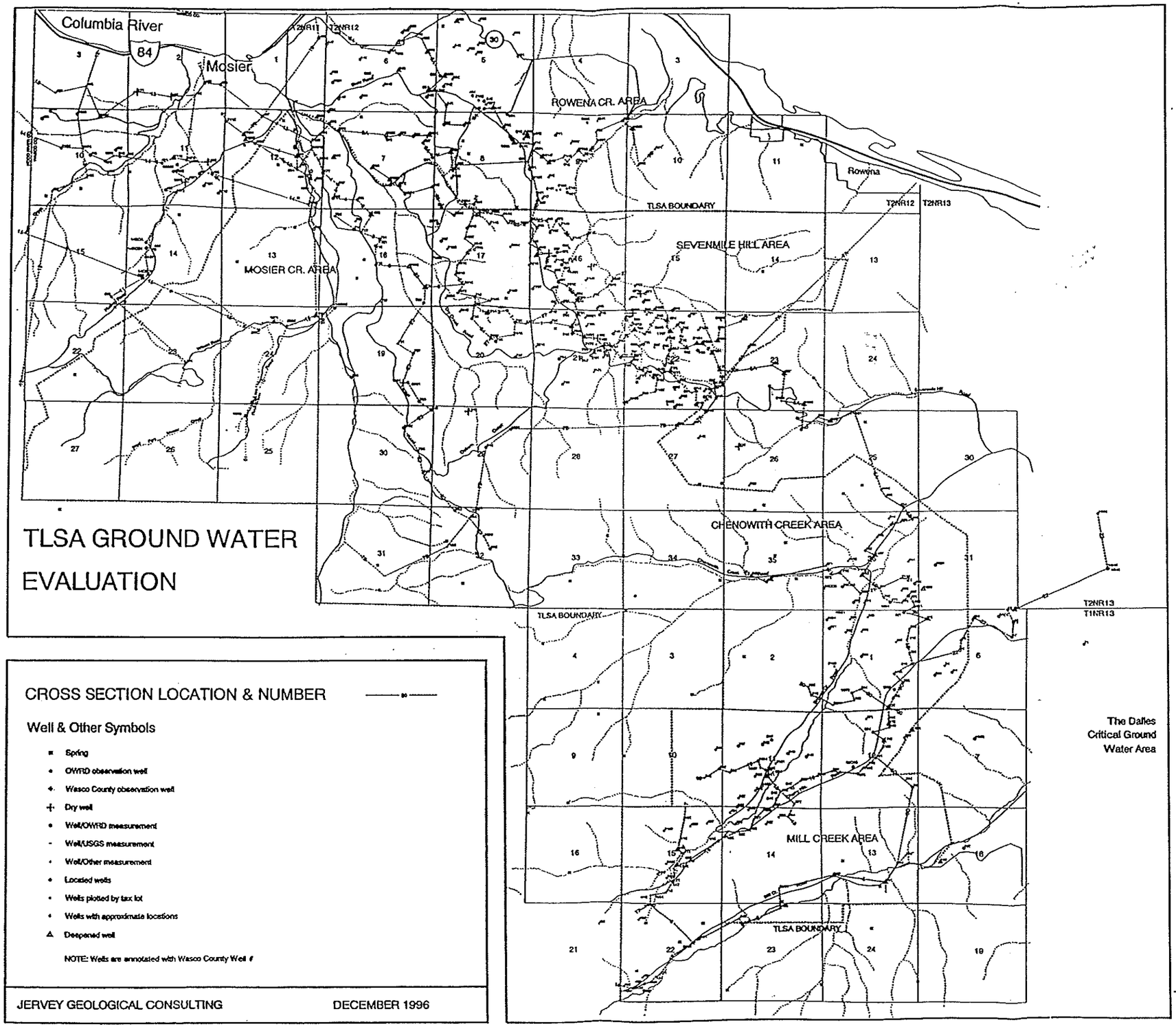
INTRODUCTION

The main questions which must be addressed in order to better understand aquifer behavior and availability of ground water in the TLSA are:

- 1) How much ground water is available to the individual land owner?
- 2) Why do some wells have to be deepened?
- 3) Why do some wells show water level declines?
- 4) How close together can wells be and still operate properly (without undue interference)?

In order to address these questions, a detailed study of water wells in the TLSA was conducted. Records for a total of about 817 wells in and adjacent to the TLSA were included in this review. It is estimated that there are an additional 40 to 60 wells within this area that have no well records and were not included. The lack of this information is probably not critical to this review, since it is a small proportion of the data set which has been examined.

An initial and ongoing problem is the uncertain geographic location of a number of the water wells within the TLSA. Work done by the Wasco County Watermaster has contributed a great deal toward



TLSA GROUND WATER EVALUATION

CROSS SECTION LOCATION & NUMBER

Well & Other Symbols

- Spring
- OWRD observation well
- Wasco County observation well
- Dry well
- Well/OWRD measurement
- Well/USGS measurement
- Well/Other measurement
- Located wells
- Wells plotted by tax lot
- Wells with approximate locations
- Deepened well

NOTE: Wells are annotated with Wasco County Well #

JERVEY GEOLOGICAL CONSULTING DECEMBER 1996

locating existing wells. Of the well records mentioned above, 592 wells were located and are shown on the map on the preceeding page (a large version of this map with topography added is also available). Almost all of the wells inside the TLSA area were located, at least approximately (by tax lot). Most of the 225 unlocated wells lie outside the TLSA boundary, mainly in the Rowena and west The Dalles areas. Within and immediately adjacent to the TLSA, 58 deepened wells were identified and studied in detail. The data collected for the wells in this review is in Table A at the end of this report (Appendix A). Included in this table are multiple measures of static water levels made in certain wells. Multiple static water level measures are also included in Tables A1, D and E (Appendix A).

Sources of information for this report are primarily the extensive previous studies done in this area and referenced at the end of this report (Lite and Grondin, 1988, and Kienle, 1995). Important additional information was contributed by the people listed in acknowledgment at the end of this report who work or reside in Wasco County or have a general or specific interest in the topic covered. However, errors in data or interpretation present in this report text are entirely the responsibility of the author.

The data and interpretations in this report are provided as a service by Jervey Geological Consulting in response to questions raised by the TLSA Steering Committee. Jervey Geological Consulting is primarily involved in oil and gas exploration and has no special qualifications in the evaluation of ground water resources. Therefore, this document should be primarily used as a basis for evaluating the data and observations it records. It is not specifically designed to be used in formulating public policy. The material collected here may also be helpful for use in future studies by qualified hydrogeologists.

GROUND WATER AVAILABILITY

An estimate of available recharge volume is necessary to evaluate how many wells per unit area an aquifer can support. For the most part, the aquifer systems in the TLSA are recharged by precipitation (diffuse) and intermittent runoff in valleys. The lowest aquifer systems, are also probably recharged and maintained by perennial streams (Mill Creek, Chenowith Creek, and Mosier Creek).

A key factor in recharge to the TLSA area is its precipitation pattern. The area lies in an intermediate position between humid and arid climates. The cycles of heavy and low precipitation that occur over many years reflect this intermediate position. Because of this, a range of recharge volumes should be calculated that reflect both normal (or average) conditions and low precipitation conditions over specific time intervals.

The graph in Figure 1 shows precipitation volumes in Hood River and The Dalles. The longest dry cycle in recorded history is the period from 1922 to 1944 (23 years) overlapping the occurrence of The Great Dust Bowl in the central United States. The average precipitation in Hood River during this period was 26 inches (84% of normal values). On the average, rainfall in The Dalles is about 48% of the amount recorded in Hood River.

Figure 2 is derived from Oregon Water Resources Department Ground Water Report #33 on the Mosier area (Lite and Grondin, 1988) showing the most probable change in precipitation levels across the TLSA. The western boundary, closer to Hood River, probably receives over 25 inches per year; the eastern boundary near The Dalles, about 15 inches.

A recent report on the Columbia Plateau aquifer system issued by the U.S.G.S. (Whiteman, et al, 1994) includes part of the TLSA on the extreme southwestern margin of the report area. The estimate for recharge for the TLSA from this report would be 2 to 15 inches per year, depending on total precipitation. In effect, the lower the rainfall, the smaller the percentage of water that is available for recharge. Using an average of 20 inches of precipitation per year, an example estimate of recharge can now be calculated. At this level of precipitation, the proportion returned as recharge is around 30% (values presented in the Whiteman report are 6.82" of recharge for 21.06" of precipitation in a temperate climate). Under dry conditions over several years, this percentage probably drops to about 26%. The overall calculation for recharge in this example is shown in Table 1 (page 5).

The estimates used were drawn from several sources; but primarily from U.S.G.S. Professional Paper 1413-B on the Columbia Plateau Aquifer System (Whiteman, et al, 1994).

DOMESTIC WELL USAGE

Water usage per average household has been estimated by several authors working in this general area:

- Lite and Grondin (1988)
  288,350 gallons/year
- Kienle (1995)
  191,760 gallons/year
- OWRD information pamphlet for well owners (1993) average of values cited:
  217,500 gallons/year
- Local utilities, Chenowith and The Dalles:
  90,000 to 350,000 gallons per year

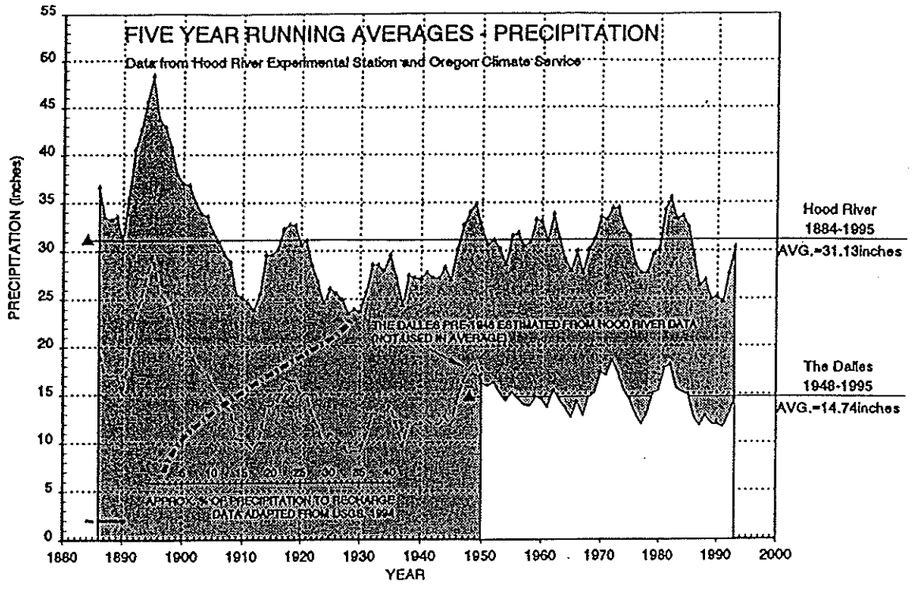


Figure 1. Precipitation for Hood River and The Dalles, Oregon, five year running averages.

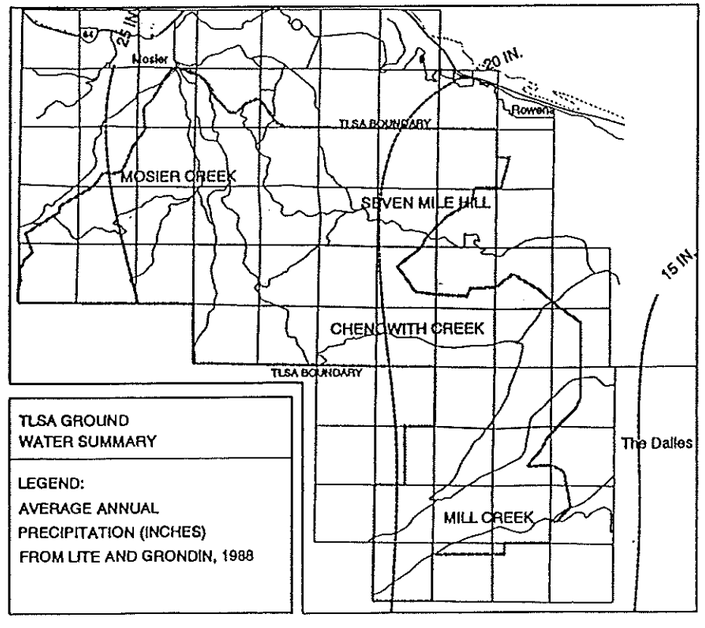


Figure 2. Average annual precipitation, TLSA (from Lite and Grondin, 1988).

CALCULATION OF RECHARGE

EXAMPLE	A PRECIPITATION PER YEAR (INCHES)	B % TO RECHARGE	C RECHARGE PER YEAR (INCHES) A*B	D RECHARGE PER YEAR (FEET) C/12	E CUBIC FEET PER ACRE D*43560	F GALLONS PER ACRE PER YEAR E*7.482
TLSA AVERAGE	20.0	30%	6.0	0.5	21,780	162,958
TLSA DRY CYCLE	16.8	26%	4.4	0.4	15,856	118,633
NGS REPORT MAXIMUM		5.6%				09,100
NGS REPORT MINIMUM		5.6%				13,800

COMPARISON OF USAGE & RECHARGE/DOMESTIC WELLS

	A DOMESTIC USE, GROSS GALLONS/ YEAR	B % RETURN TO RECHARGE	C DOMESTIC USE, NET GALLONS/ YEAR A*(1-B)	D GALLONS PER ACRE PER YEAR RECHARGE (FROM ABOVE)	E ALLOWABLE ACRES PER DOMESTIC WELL C/D
TLSA AVERAGE	200,000	30%	140,000	162,958	0.9
TLSA DRY CYCLE	200,000	26%	152,000	118,633	1.3
NGS REPORT MAXIMUM	191,625	0	191,625	89,100	2.2
NGS REPORT MINIMUM	191,625	0	191,625	13,800	13.9

COMPARISON OF USAGE & RECHARGE/IRRIGATION WELLS

	A IRRIGATION USE, GROSS GALLONS/ YEAR PER ACRE	B % RETURN TO RECHARGE	C IRRIGATION USE, NET GALLONS/ YEAR PER ACRE- A*(1-B)	D GALLONS PER ACRE PER YEAR RECHARGE (FROM ABOVE)	E RECHARGE ACRES TO SUPPORT ONE ACRE OF IRRIGATION PER YEAR [C/D]
TLSA AVERAGE (16"PER ACRE)	434,555	30%	304,189	162,958	1.9
TLSA DRY CYCLE (19"PER ACRE)	516,034	26%	392,186	118,633	3.3
NGS REPORT MAXIMUM (30"PER ACRE)	814,790	0	814,790	89,100	9.1
NGS REPORT MINIMUM (30"PER ACRE)	814,790	0	814,790	13,800	59.0

Table 1. Examples of recharge and discharge calculations using different assumptions.

It is evident that there is a range of usage, but on the average over a large group, a figure of 100,000 to 300,000 gallons per year is probably a reasonable range.

Of the ground water used, a percentage of household waste water and lawn irrigation is returned as recharge. Designs for most domestic systems (in houses) assume an average volume of around 200 gallons per day per household (73,000 gallons per year) is produced as waste water. In addition, a small percentage of the water used in the lawn and garden will return as recharge to the aquifer.

The amount returned is extremely difficult to estimate, because it depends on precipitation levels, time of year, type of waste water,and the amount of water usage of the household. Under favorable conditions of rainfall, water use, soil type and other factors, 50% or more of water extracted from an aquifer may return as recharge (Stephens, 1996). However, because there is no data in the TLSA area that can support an estimate of this magnitude, it is better at this time to simply use the same percent of recharge that was used in the estimate of natural recharge.

The calculations for usage can be compared with average recharge to yield an approximation of well densities (Table 1) which could perhaps be supported by the aquifers in the TLSA. In addition to these figures the estimates made for minimum to maximum elevations in the NGS, Inc. TLSA study (Kienle, 1995) are provided for comparison. There is a range of volumes presented; neither case can be definitively proven at this point in time.

There is a problem that appears at once; even at far lesser well density than the most conservative figures in Table 1, TLSA domestic wells show declines and some have to be deepened. This observation will have to be addressed before any ground water model can be considered acceptable.

Even with very conservative estimates for recharge such as those used in the NGS, Inc. study of the TLSA (Kienle, 1995), there is no indication that current levels of usage have exceeded recharge. The reason that a number of sections appeared to be in an overdraft situation was due to the maximum permitted water usage used in the model calculations (about 816,790 gallons per acre per year for sections with water right acres). This is far in excess of what has been documented as actual irrigation usage (Lite and Grondin, 1988, and Whiteman et al, 1994). The actual use of ground water in irrigation is summarized in the next discussion.

IRRIGATION USAGE

The same procedure used for domestic wells can be used when assessing irrigation usage versus recharge. Previous reports (Lite and Grondin, 1988 and Kienle, 1995) estimated actual irrigation use at about 1.1 to 1.5 acre feet per acre of orchard per year, or about 488,000 gallons per acre per year. This was based on an estimate of 36" of water required per year by orchard crops, 18" of which was supplied by rainfall in the orchard area around Mosier. The calculations shown in Table 1 assume that if the average rainfall is 20", average usage for irrigation would be around 16" of water per acre. The following calculations assume that the majority of ground water available for irrigation is replaced by diffuse recharge. It is likely that additional recharge by local sources such as perennial streams is available to the lowest aquifers in the TLSA. It is also important to note that a substantial fraction of irrigation (20-50%) is from surface water sources.

To reiterate; the central issue that needs to be examined is that of the declines and well deepenings observed in wells throughout the TLSA. A corollary observation that must also be addressed is that other wells do not seem to show the effects of decline.

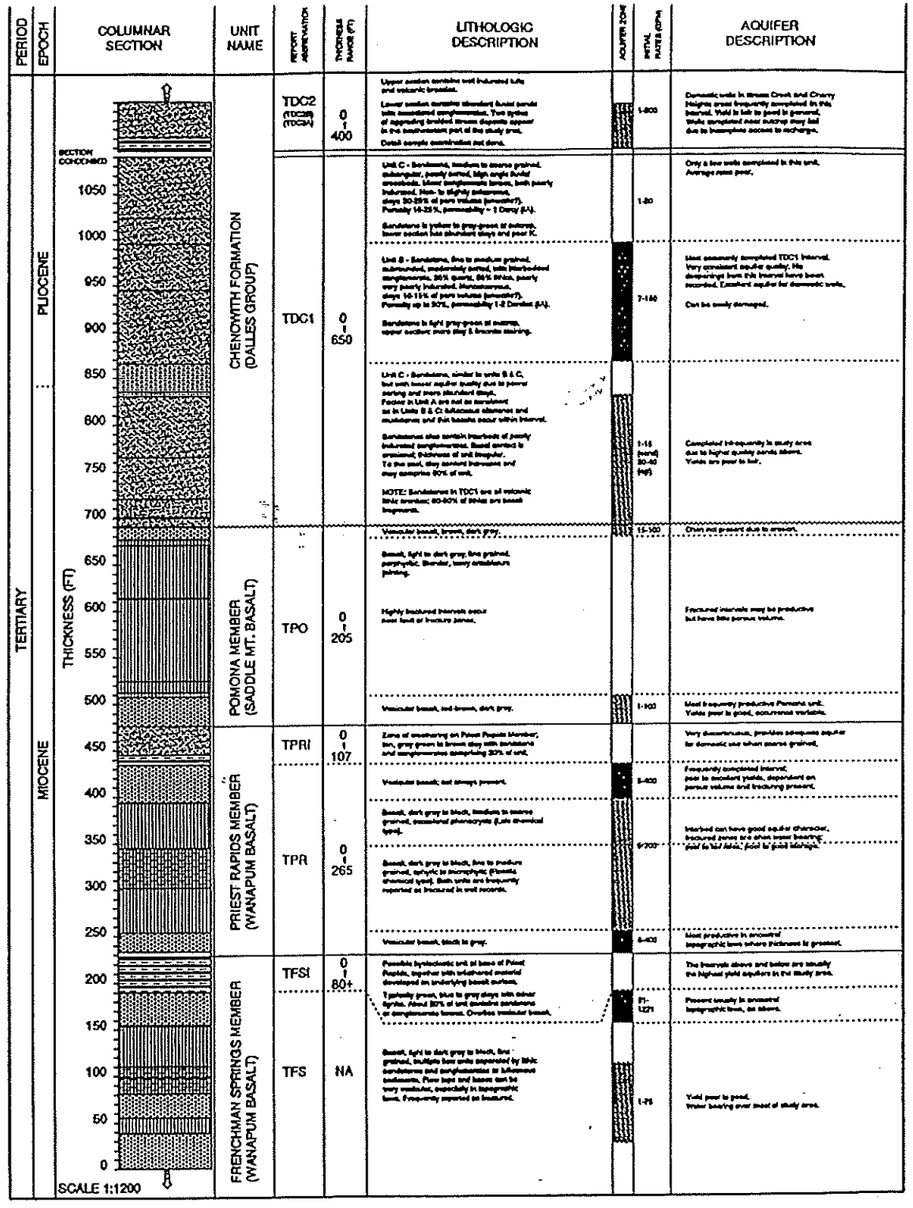
At this point, it is necessary to briefly describe aquifer types and their characteristics. Once this information is presented, an assessment of the assumptions concerning recharge and discharge can be made.

GENERAL GEOLOGY - AQUIFERS

The descriptions in this part of the report are drawn from a variety of sources, primarily Lite and Grondin, 1988, Kienle, 1995 and others which are listed at the end of the report text and from field work in parts of the study area. There are some indications that differences between basalt aquifers and sedimentary (sandstone and conglomerate) aquifers give rise to differences in water well performance. It is critical to examine the two aquifer types before looking at individual aquifer systems. In addition, there are some important differences among basalt aquifers which need to be introduced at this time. This discussion will be limited to the description of characteristics which affect aquifer behavior. Figure 3 is a columnar description of the sequence of various rock types found in the TLSA and contains brief descriptions of aquifer qualities.

BASALT AQUIFERS

Figure 4 is from the U.S.G.S. Columbia Plateau report previously cited (Whiteman, et al, 1994). It shows the internal structures in typical basalt flows and some of the physical characteristics, such as porous volume, which affect their performance as aquifers. In



GENERALIZED STRATIGRAPHIC SECTION TLSA, WASCO COUNTY, OREGON

Figure 3. Generalized stratigraphic section, TLSA, Wasco County, Oregon (adapted in part from Keinle, 1995, and Lite and Grondin,1988).

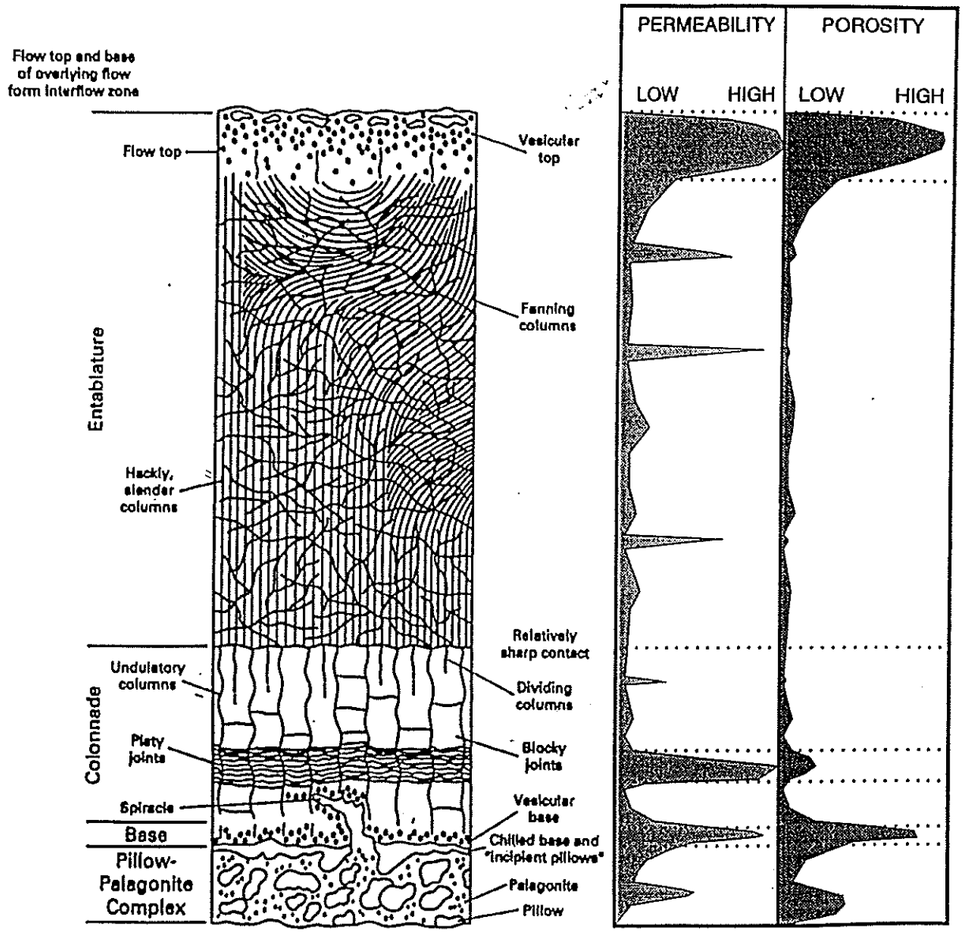


Figure 4. Aquifer quality variation in basalt flow units (diagram on left from Whiteman, et al, 1994).

general, the flow tops and bases, with vesicular (vesicles: openings left by escaping gases when lava cools), and other types of porous volume (breccias: broken rock fragments) can have both high porosity and high permeability. The entablature and colonnade portions of the flows have far less porous volume. Porous volume in these central parts of a lava flow exists mainly in fractures and is very low in comparison with flow tops and bases, in general. The interbeds of basalt flows consist of soils, sands and clays developed on top of flows and the clay-rich pillow palagonite complex formed when the base of the next basalt flow contacts water or moisture bearing soils and sediments.

The curves drawn in Figure 4 show diagrammatically how porous volume and permeability change through the basalt section. None of the section is usually entirely impermeable, but great variations occur from top to bottom of the flows. The best aquifers, which occur in vesicular and/or brecciated flow tops and bases, have internal variations which are also of significance. The porous volume can consist of two types of openings; 1) vesicles and interfragment porosity of breccias, and 2) the porous volume occurring in open fractures connecting them. These two features have very different hydraulic character.

Entablature and colonnade units seem to have very poor lateral (horizontal) permeability, but the fractures in them can have fair vertical permeability. Occasionally, if in the vicinity of a fault or fracture zone, these two basalt types can be completed as aquifers, but their long-term performance is questionable. The interbed sediments may also occasionally act as good aquifers, if they consist of well sorted sands or gravels.

The Pomona, Priest Rapids and Frenchman Springs basalts are the commonly penetrated water bearing units in the central and western parts of the TLSA. The most important differences among them are listed below and shown in Figure 3.

- Pomona (TPO)
  - flow top is often eroded away, vesicular flow base is generally in the order of 5-15 feet thick
  - canyon filling and restricted to lower elevations in the western part of the study area
  - shows an intercalated relationship with Dalles Group sediments at its flow margins
- Priest Rapids (TPR)
  - distinguished by a commonly very thick pillow palagonite (lava erupted into water or water bearing sediment) sequence at its base and well developed vesicular zone
  - in some parts of the report area composed of two flow units; the interbed between them can be an adequate aquifer
- Frenchman Springs (TFS)
  - At least three submembers occur in area: Ginko (oldest), Sand Hollow and Sentinel Gap
  - frequently exhibits a very continuous, thick vesicular flow top in topographic lows
  - highest yield wells in the TLSA are usually completed in the uppermost part of the Frenchman Springs, combined with the overlying Priest Rapids flow base
- Grande Ronde (TGR)
  - very few wells completed in this unit; oldest and deepest basalt exposed in TLSA wells

SEDIMENTARY AQUIFERS

Two sedimentary formations act as aquifers in the report area; the Dalles Group (TDC) and various younger alluvial and flood-deposited sands and gravels, referred to as Quaternary alluvium (QAL) and glacial flood deposits (QGF). Most of the wells in sedimentary rocks are completed in the Dalles Group.

The primary difference between the basalt and sedimentary aquifers is illustrated in Figure 5. The basalts are rigid and brittle: they are easily fractured. The basalt flow tops and bases may contain vesicles or breccias which provide large porous volumes. Together with fractures, this type of rock is a high quality aquifer with high porosity and high permeability. On the other hand, basalt that is fractured but not connected to pore spaces such as vesicles, may have high permeability but very low porous volume. In comparison, sedimentary aquifers tend to be more uniform in porosity and permeability but with lower well yields than the best basalt aquifers.

The Dalles Group consists of several aggrading cycles of braided stream sandstones and gravels and associated floodplain deposits. It also contains ash fall tuffs and abundant tuffaceous material, particularly in the upper third of its thickness. In structure and organization of its rock types, it is very similar to the main producing section in Prudhoe Bay, North Slope, Alaska. Figure 6 shows the vertical sequence in this deposit as an illustration of the environment of deposition similar to that in the lower part of the Dalles Group in the TLSA.

Examination of samples and well records in the Dalles Group also indicates that at the base of the braided stream cycles (Chenowith Creek-TDC1 and Brown Creek-TDC2A and TDC2B, discussed later in this report), permeability and porosity are often very good and fairly consistent across the aquifers. The highest

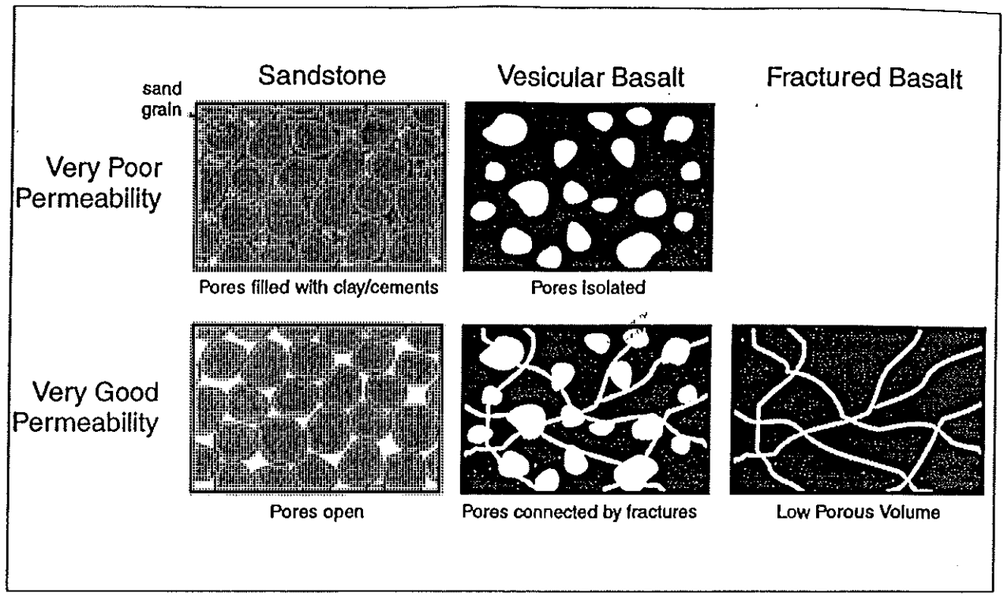


Figure 5. Comparison of basalt and sandstone internal structures, porosity and permeability.

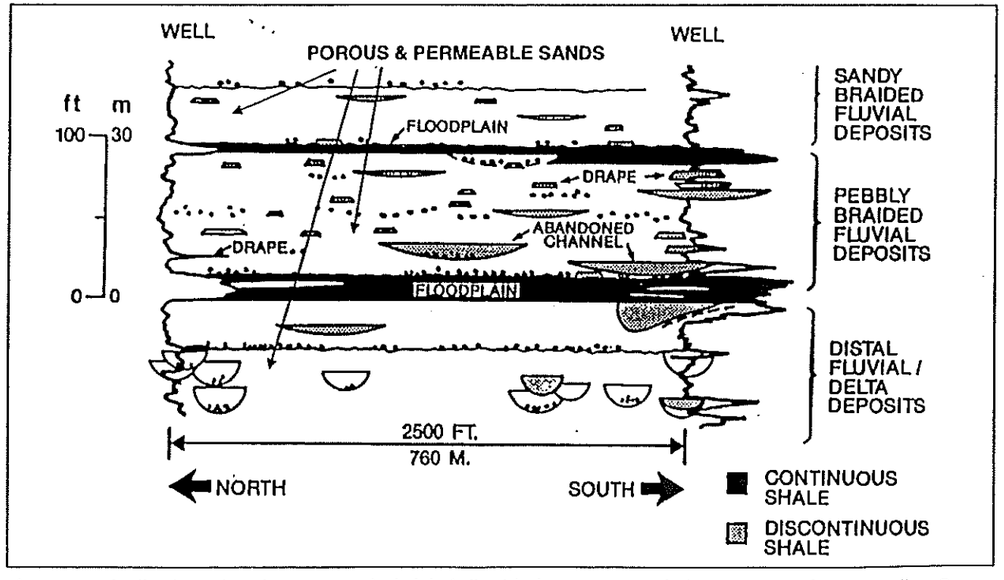


Figure 6. Distribution of rock types, typical deltaic/braided stream association as an analog to Dalles Group aquifers. Diagram is of the Ivishak Sandstone, Prudhoe Bay, North Slope, Alaska (adapted from Atkinson, et al, *in* Barwis, McPherson and Studlick, 1990).

quality basalt aquifers exceed the Dalles Group aquifers in both yield and volume of water in storage per unit area. However, for domestic well development and possibly for irrigation, the Dalles seems to display very stable aquifer behavior. Most of the subunits mentioned above are exposed in layers in the weathered cliffs adjacent to The Dalles, Oregon and in the southern and western part of the study area.

TLSA AQUIFER SYSTEMS

The three maps on the following pages show depth to aquifer, depth to static water level and water yield in the TLSA. T2NR12E sections 9, 16 and 19 have some of the deepest wells in the TLSA. The Mill Creek, Chenowith Creek and Mosier Creek valleys have the most productive wells in the area. The variety seen in these maps can be attributed to the occurrence of water in separate aquifer systems.

A collection of 28 cross sections was constructed to assist in the identification of aquifer systems in the review area. Seven of these sections extend into areas beyond the TLSA. Cross section locations are shown in the location map at the beginning of this report. A selection of the cross sections is used to illustrate points in the remainder of this report.

Formation boundaries were identified using previous studies, surface exposures of the formations and rock types identified in the well records. Aquifer systems were identified using:

- similar rock/formation types,
- similarities in static water level of the aquifers,
- aquifer continuity, and
- similarities in yield, decline and other performance criteria.

When examining the cross sections the following items are of importance:

- Each section is exaggerated vertically; the actual slope of the surface and tilt of the subsurface formations are much more subdued than shown. The sections are exaggerated vertically so that changes from well to well may be more easily seen.
- Patterns on the vertical columns representing a well are based on rock type as described by the driller. A legend describing these patterns is shown in Figure 3 and is also included at the beginning of Appendix B. Speckled patterns are sandstones or conglomerates, generally found in the Dalles Group, alluvial deposits or in interbeds between basalts. Vertical banded patterns are basalts and horizontal banded patterns are usually clays or interbedded clays and basalts. Hexagonal dotted patterns are vesicular basalts.
- Water producing intervals are indicated with this symbol ▣ next to the well column. The static water levels are shown in blue. For more details as to symbols in the cross sections, please refer to the cross section legend at the beginning of Appendix B. The data presented is not altered materially from the original driller's description.

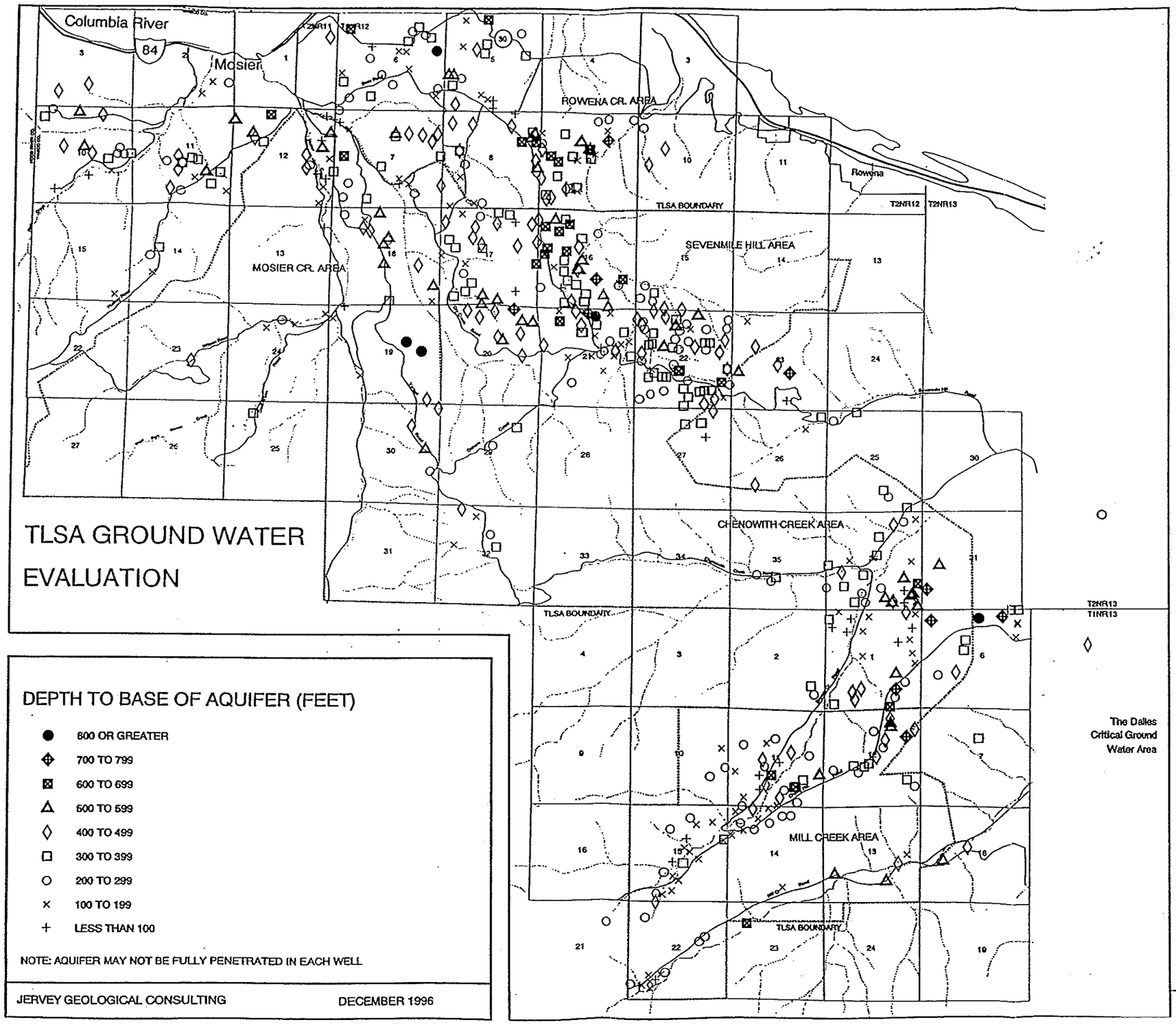
Cross section 26 is a detail section and differs from most of the other sections in that it has very few wells and more descriptive information. However, it is a good example of the kinds of situations that can be discovered by cross section construction. The section is located immediately west of the western TLSA boundary and has a well belonging to a TLSA Steering Committee member on it (W. Huskey).

The aquifers on the section are in basalts; the wells penetrate three separate aquifer systems. The systems can be identified by the change in elevation of the static water level and the change in position of the aquifer zone itself. To the south (right) side of the section, a well penetrates the Pomona, Priest Rapids and the top of the Frenchman Springs basalts. It is water productive only in the Frenchman Springs and is distinguished by a high water column and good production characteristics (yield approximately 25 gpm, drawdown unknown). This aquifer is separated from the adjacent well's aquifer by a fault and there is an almost 200' difference in water level between them.

The two central wells are in the same aquifer and are quite similar in other respects as well as static water level. It is interesting to note that the LeSasso well was originally drilled to the Pomona/Priest Rapids interbed in 1976. At some point not long afterwards the well was deepened to the Priest Rapids/Frenchman Springs interbed. At that time there were only three residences in the entire section and no irrigation wells. Two other wells 1.5 miles away in the Rocky Prairie area are similar to this one (deepened from the Pomona before use). The Pomona in this area is well exposed and forms the cliffs surrounding the town of Mosier. It appears to fill and empty at the outcrop on an annual basis. In wells such as the LeSasso well, in January (when the well was drilled) it would appear to be an adequate aquifer; by August it would be effectively drained. In the adjacent Mazeski well, this zone was not water bearing.

The Huskey well, on the far left side of the section, benefits from being immediately adjacent to a canyon flowing into Rock Creek. Static water levels often rise

TLSA GROUND WATER EVALUATION



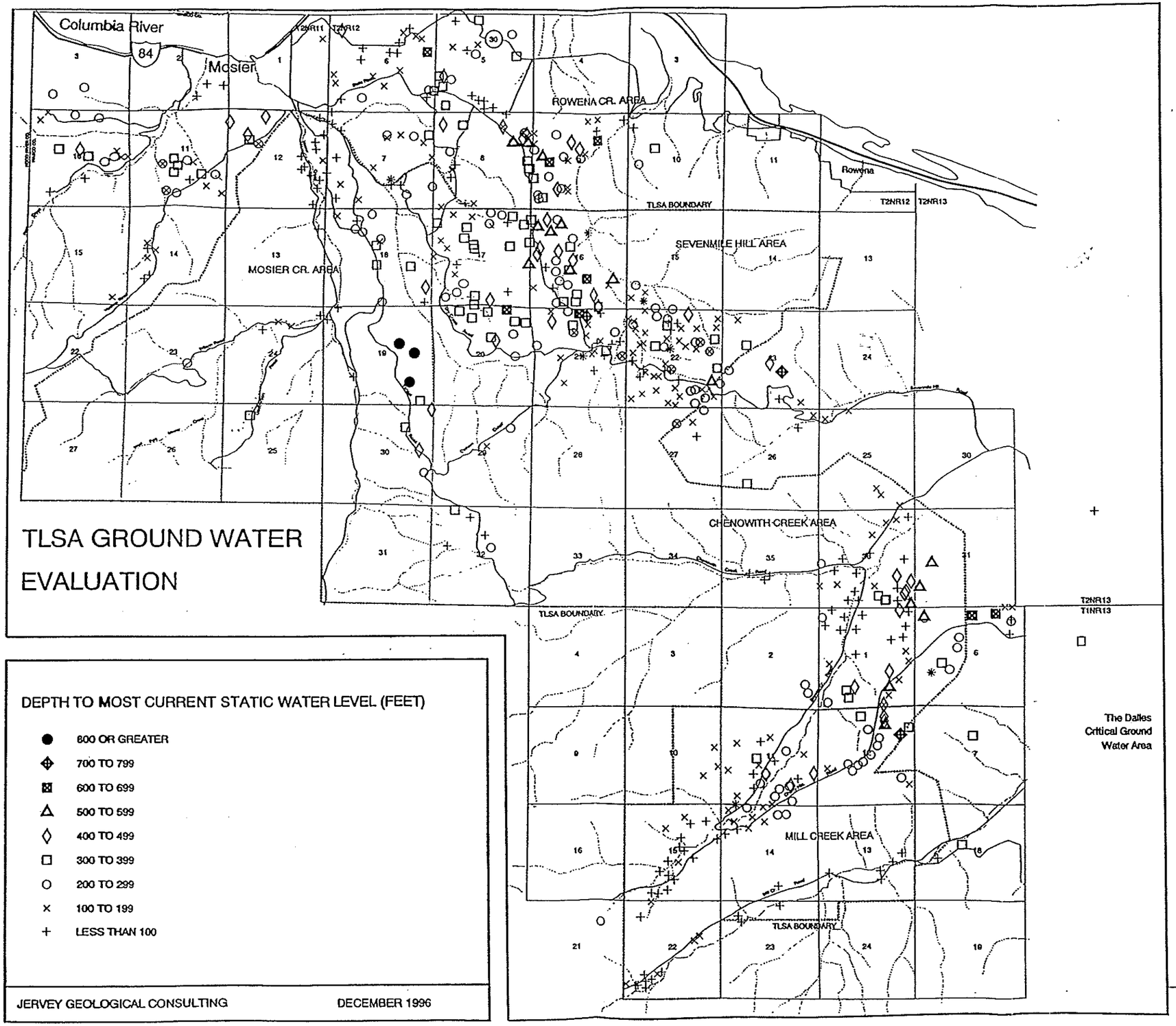
DEPTH TO BASE OF AQUIFER (FEET)

- ● 800 OR GREATER
- ◈ 700 TO 799
- ⊠ 600 TO 699
- △ 500 TO 599
- ◇ 400 TO 499
- □ 300 TO 399
- ○ 200 TO 299
- × 100 TO 199
- \+ LESS THAN 100

NOTE: AQUIFER MAY NOT BE FULLY PENETRATED IN EACH WELL

JERVEY GEOLOGICAL CONSULTING DECEMBER 1996

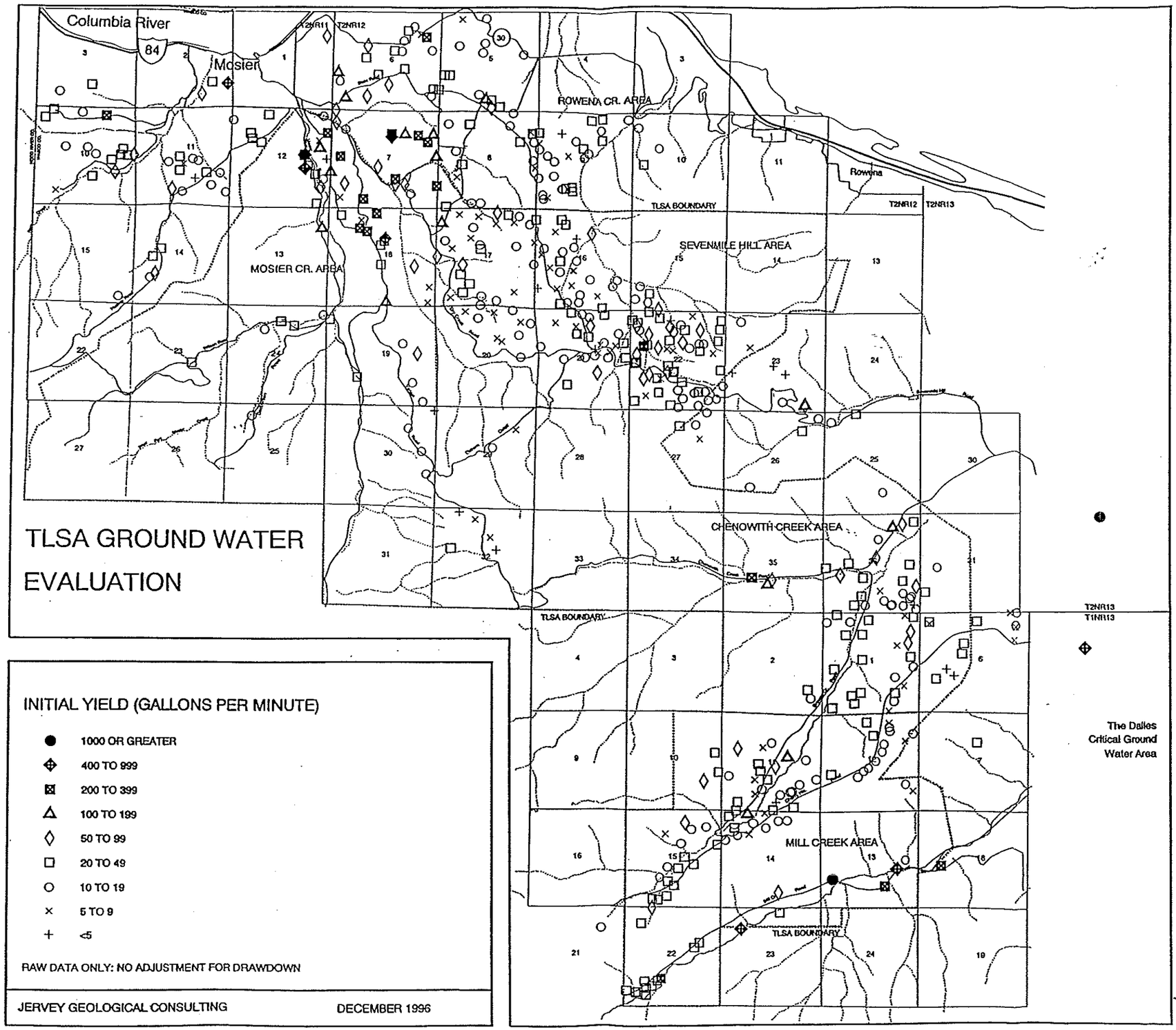
TLSA GROUND WATER EVALUATION



DEPTH TO MOST CURRENT STATIC WATER LEVEL (FEET)

- ● 600 OR GREATER
- ◈ 700 TO 799
- ⊠ 600 TO 699
- △ 500 TO 599
- ◇ 400 TO 499
- □ 300 TO 399
- ○ 200 TO 299
- × 100 TO 199
- \+ LESS THAN 100

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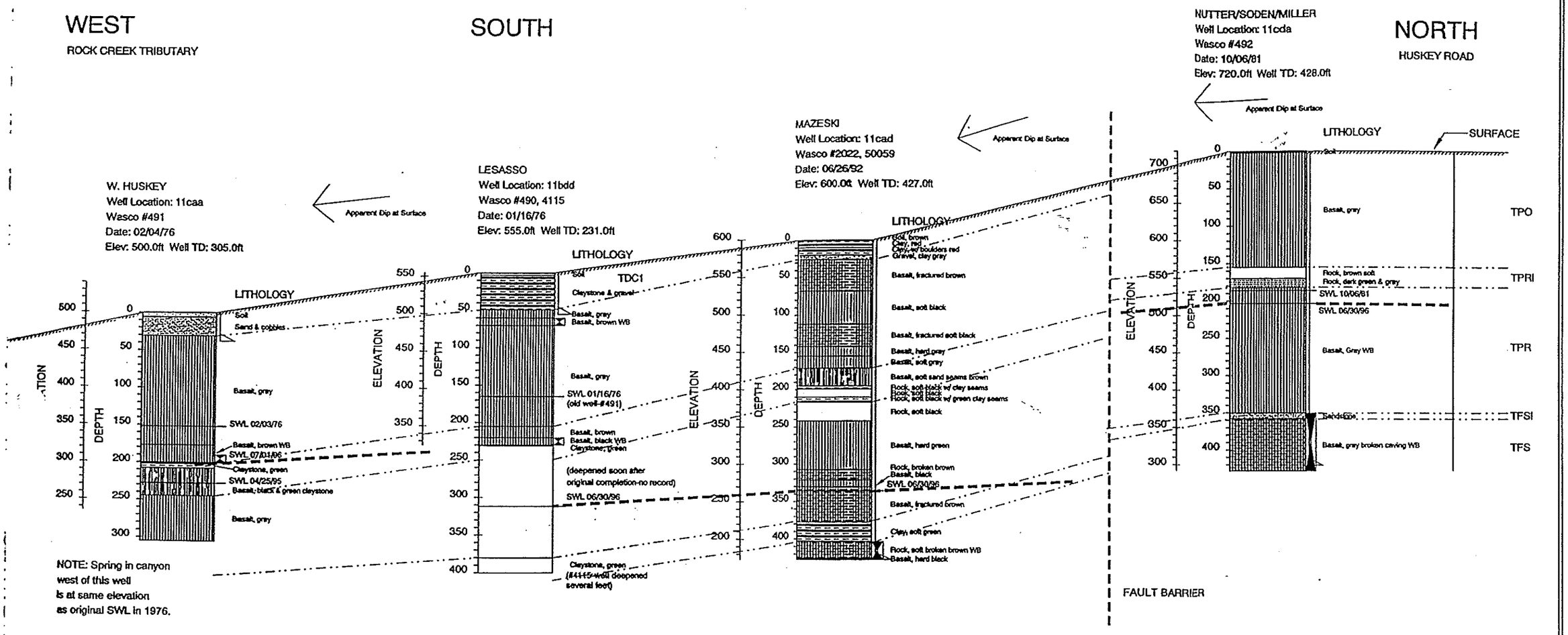
TLSA GROUND WATER EVALUATION

INITIAL YIELD (GALLONS PER MINUTE)

- 1000 OR GREATER
- 400 TO 999
- 200 TO 399
- 100 TO 199
- 50 TO 99
- 20 TO 49
- 10 TO 19
- 5 TO 9
- <5

RAW DATA ONLY: NO ADJUSTMENT FOR DRAWDOWN

JERVEY GEOLOGICAL CONSULTING DECEMBER 1996



TLSA GROUND WATER EVALUATION
T2NR11E S.11 WASCO COUNTY, OREGON
DETAIL SECTION 26
ROCKY PRAIRIE AREA

DIAGRAMMATIC SECTION
STRUCTURE DATUM
JULY 5, 1996

HORIZONTAL SCALE APPROXIMATE 1:2400
VERTICAL SCALE 1:1200
WATER-BEARING ZONE
MOST RECENT STATIC WATER LEVEL
FORMATION BOUNDARY

TDC1=Dalles Formation
TPO=Pomona Basalt
TPRI=Pomona/Priest Rapids Interbed
TPR=Priest Rapids Basalt
TFSI=Priest Rapids/Frenchman Springs Interbed
TFS=Frenchman Springs Basalt

as such a feature is approached. It also appears to be affected by a local fracture trend which delivers water to the wellbore immediately after a rainfall event. The drawback to being in this position is that the behavior of the static water level can be quite erratic; the well is drained in dry seasons as quickly as it fills during wet cycles and the volume available in summer months may be unreliable.

The information above is somewhat interpretive and other investigators may come to different conclusions about this material. But it is important to do this kind of correlation in order to understand the relation of one well to another and the position and distribution of each aquifer. If pump tests were performed on these wells, a great deal more information would be gained by identifying which wells are in direct communication.

Table 2 is a summary of the aquifer systems in the TLSA area and the map on the page following shows their areal distribution. The system names are based on common geographical names. Most of the abbreviations refer to the main producing formations, except in systems where several formations are productive. As can be seen in this table, each system also has characteristic static water level declines and types of well deepenings (or lack of them).

The aquifer systems described are usually separated from other systems by changes in topography or faults. The position of the static water level within each of them is roughly correlative to the surface elevation at the well.

Figure 7, a plot of static water level versus elevation illustrates the point made above. The aquifer static water level elevations show a very close correlation with surface elevation of the well. Each aquifer system develops a gradient unique to its members, but the overall picture is one of aquifers very closely tied to ground level and existing in specific compartments separated by lateral changes (faults, topography, etc.). This is one reason why use of diffuse recharge is probably appropriate in the calculation of the TLSA water budget. Almost all of the TLSA aquifers are water table aquifers. Even the artesian flowing wells seem to be closely linked hydraulically to surrounding water table aquifers above them.

It is perhaps easier to see the relation between ground level and static water level by quickly reviewing the cross sections in Appendix B. In these sections, the static water levels, where continuous, show a distinct relation to ground surface elevation.

STATIC WATER LEVEL (SWL) CHANGES

Table D (Appendix A) contains data from all multiple measures recorded in and adjacent to the TLSA over the last 40 years. Many measures were made by a U.S.G.S. study in 1979 and by Oregon Water Resources Department in the period 1981-1986. The long term hydrographs for wells within the TLSA are included in Figures 8A-8E of this report.

The values shown in Table D are somewhat subjective in that some consideration of time of year of measurement and length of time between measurements has to be made in order to arrive at an estimate of decline or average annual fluctuation. This may introduce error in the estimates of as much as +/- 10-20 feet. But, in general, the overall trend of decline (or lack of it) and annual variation will probably yield the same picture when the group is considered as a whole.

The most striking feature of this collection is the frequent occurrence of SWL declines in the basalt aquifers. All but two of the 21 hydrograph wells in basalts and about 64% of the multiple measures in basalts show declines from 15 to 307 feet from the initial SWL, with a most frequent range of 30 to 80 feet of decline. The amount of decline often appears to be independent of time of drilling, rate of water extraction or height of the water column. Declines in SWL occur in areas with only a few wells per section, early in the history of ground water development and it occurs in recently drilled wells in densely drilled areas. In contrast, about 36% of measured basalt aquifer wells and almost all Dalles Group aquifers do not show declines greater than might be expected from seasonal fluctuation, even in areas of fairly dense drilling.

A corollary and equally important observation is that most of the basalt wells that show significant declines reach a stable position at some point during the life of the well. The position of stabilization is most commonly 30' to 80' below the original driller's static water level. The hydrographs in Figure 8a through 8e illustrate this observation. (Figures 8a-8e show summary hydrographs; individual hydrographs are available in previous Committee documents or in Kienle, 1995.)

Basalt aquifers do not show large declines if:

- they are extremely shallow (10 to 80 feet deep) and in a catchment position (shallow basin, or in an seasonally active drainage),
- occur immediately below a sandstone such as the Dalles Group or a Quaternary gravel or sand,
- occur immediately below a thick clay unit with overlying basalt aquifer units that are not saturated.

These three situations account for all the basalt aquifers which do not show large initial declines. The collection of observations suggests, but does not

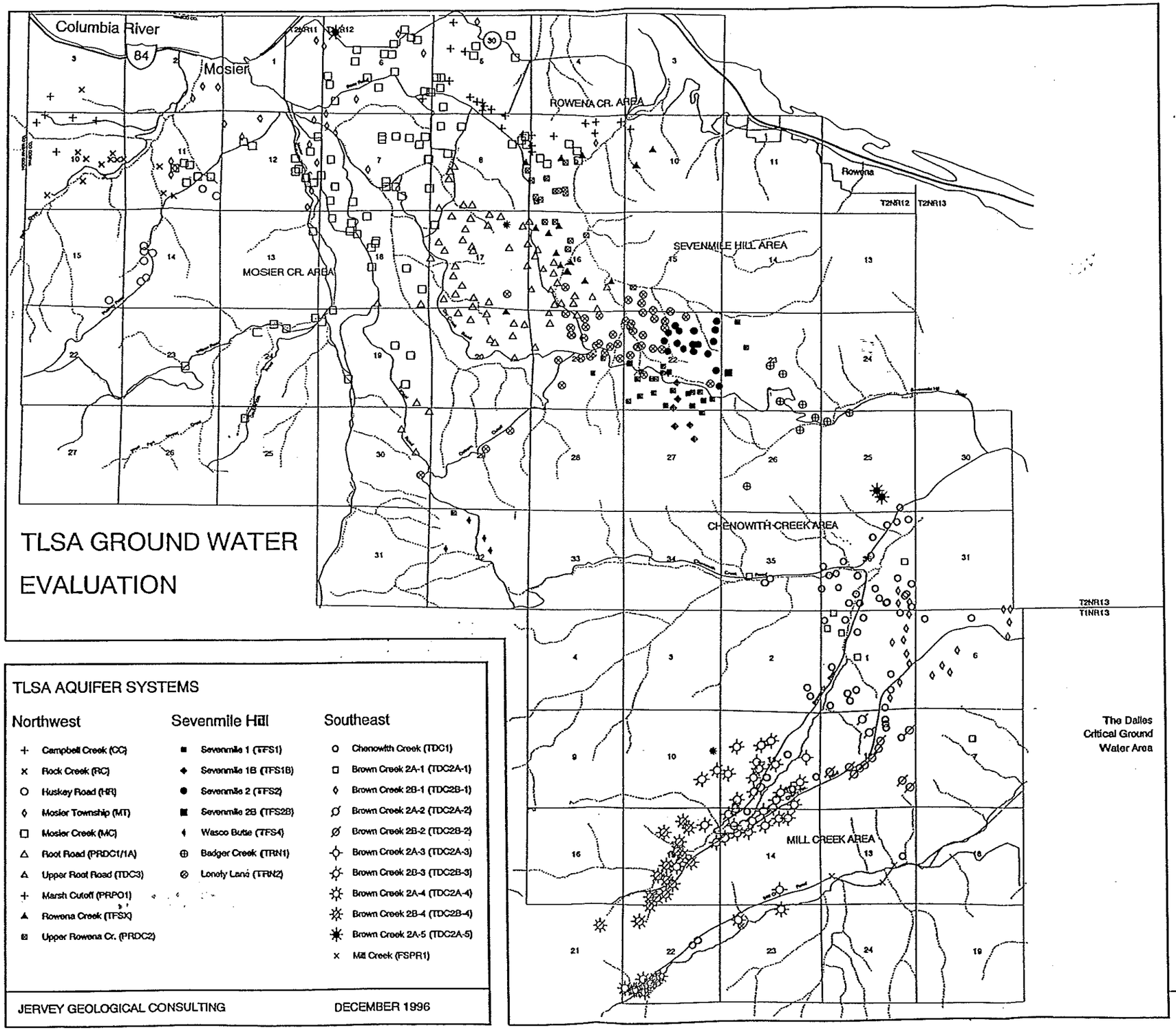
(all data in imperial units)

AQUIFER SYSTEM & ABBREVIATION	MAJOR FORMATIONS	# OF WELLS	AVG ELEV	AVG DPTH	AVG RATE GPM	AVG SWL ELEV	AVG DPTH SWL	AVG H2O CLMN	# OF DEEPENINGS MAJ	MOD	MIN	# OF WELLS MULT SWLS	AVG CHNG SWL	AVG TEMP F	COMMENT
NORTHWEST TLSA															
Campbell Creek (CC)	TFS	6	1005	397	14	778	230	167	0	0	0	1	-32	61	1 WELL @ 200GPM OMITTED
Rock Creek (RC)	TPR	14	719	286	30	545	174	113	0	1	0	4	-26	56	
Huskey Road (HR)	TDC	9	979	236	26	857	122	90	0	0	1	6	5	58	
Mosier Township (MT)	FSPR	23	422	326	32	216	206	120	0	0	0	9	0	*	1 WELL @ 400GPM OMITTED
Mosier Cr (MC) Low Rate	FSPRPO	68	669	360	22	423	242	119	5	5	6	13	-50	58	HIGH VARIABILITY:SWL CHNG
Mosier Cr (MC) High Rate	FSPRPO	26	548	401	219	419	130	204	0	0	4	16	-60	61	HIGH VARIABILITY:SWL CHNG
Root Road 1 (PRDC1)	PRDC	51	1110	399	15	816	291	67	2	1	0	6	-1	60	2 ANOMALOUS SWLS OMITTED
Root Road 1A (PRDC1A)	PRDC	13	1323	386	17	1024	299	87	1	0	0	0	*	60	SIMILAR TO PRDC1?
Upper Root Road (TDC3)	TDC	5	1317	149	9	1219	98	51	0	0	0	1	-1	53	
Marsh Cutoff (PRPO1)	PRPO	23	755	225	21	652	104	122	0	3	0	2	*	56	SWL CHANGES: -257, -12
Rowena Creek (TFSX)	TFS	14	1117	546	13	653	463	96	0	0	0	0	*	61	
Upper Rowena Cr. (PRDC2)	FSPR	17	1078	359	18	821	257	102	1	0	0	1	-58	59	
SEVENMILE HILL															
Lonely Lane (TRN2)	FSPR	47	1469	354	28	1259	210	141	0	1	2	5	-50	57	HIGH VARIABILITY:SWL CHNG
Sevenmile 1 (TFS1)	TFS	25	1718	294	21	1561	156	134	0	1	0	2	-62	55	
Sevenmile 1B (TFS1B)	TFS	7	1792	326	21	1689	103	223	0	0	2	4	-22	53	
Sevenmile 2 (TFS2)	TFS	18	1711	297	28	1533	178	120	0	0	0	8	-18	60	
Sevenmile 2B (TFS2B)	TFS	4	1775	283	10	1619	156	127	4	0	0	0	*	53	ALL 4 WELLS: DEEPENED
Wasco Butte (TFS4)	TFS	4	2021	228	10	1907	115	114	0	0	0	0	*	52	SIMILAR TO TFS1 & TFS2?
Badger Creek (TRN1)	TFS	10	1281	354	21	1009	272	93	1	1	0	0	*	*	SIMILAR TO TRN2?
SOUTHEAST TLSA															
Chenowith Cr. (TDC1)	TDC	61	760	395	30	502	262	136	0	1	4	6	-3	58	
Brown Creek 2A (TDC2A)	TDC	29	820	220	44	699	121	93	2	1	0	4	2	50	
Brown Creek 2B (TDC2B)	TDC	82	1038	217	20	903	135	68	3	3	1	15	2	56	1 SWL CHANGE OMITTED(+122)
Mill Creek (FSPR1)	FSPR	5	511	559	707	666	-155	714	0	0	3	4	-61	77	

NOTE: COMMENTS ARE IN REGARD TO CALCULATION OF AVERAGE VALUES
OR ARE OBSERVATIONS ABOUT AQUIFER CHARACTERISTICS

FOR COMPLETE DATA SEE TABLES IN APPENDIX A

Table 2. Summary of characteristics, aquifer systems, TLSA, Wasco County, Oregon.



TLSA GROUND WATER EVALUATION

TLSA AQUIFER SYSTEMS

Northwest	Sevenmile Hill	Southeast
+ Campbell Creek (CC)	■ Sevenmile 1 (TFS1)	○ Chenowith Creek (TDC1)
× Rock Creek (RC)	◆ Sevenmile 1B (TFS1B)	□ Brown Creek 2A-1 (TDC2A-1)
○ Huskey Road (HR)	● Sevenmile 2 (TFS2)	◊ Brown Creek 2B-1 (TDC2B-1)
◊ Mosier Township (MT)	■ Sevenmile 2B (TFS2B)	∅ Brown Creek 2A-2 (TDC2A-2)
□ Mosier Creek (MC)	♦ Wasco Butte (TFS4)	∅ Brown Creek 2B-2 (TDC2B-2)
△ Root Road (PRDC1/1A)	⊕ Badger Creek (TRN1)	☼ Brown Creek 2A-3 (TDC2A-3)
▲ Upper Root Road (TDC3)	⊘ Lonely Land (TRN2)	☼ Brown Creek 2B-3 (TDC2B-3)
+ Marsh Cutoff (PRPO1)		☼ Brown Creek 2A-4 (TDC2A-4)
▲ Rowena Creek (TFSX)		☼ Brown Creek 2B-4 (TDC2B-4)
⊠ Upper Rowena Cr. (PRDC2)		✷ Brown Creek 2A-5 (TDC2A-5)
		× Mill Creek (FSPR1)

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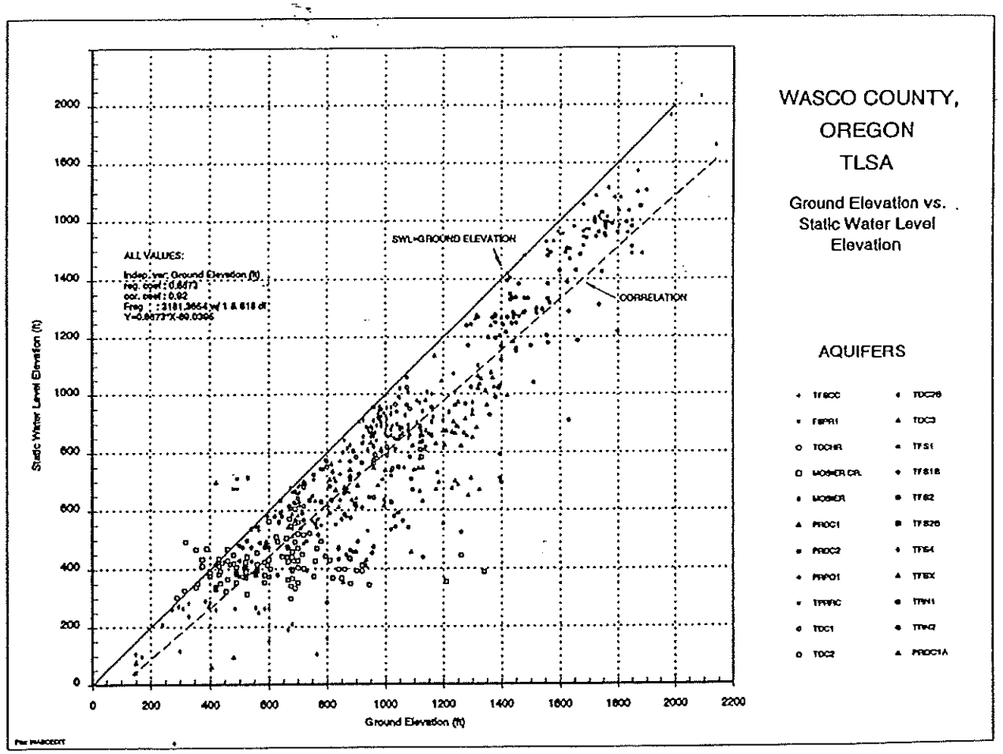


Figure 7. Static water level elevation versus ground elelvation, TLSA, Wasco County, Oregon.

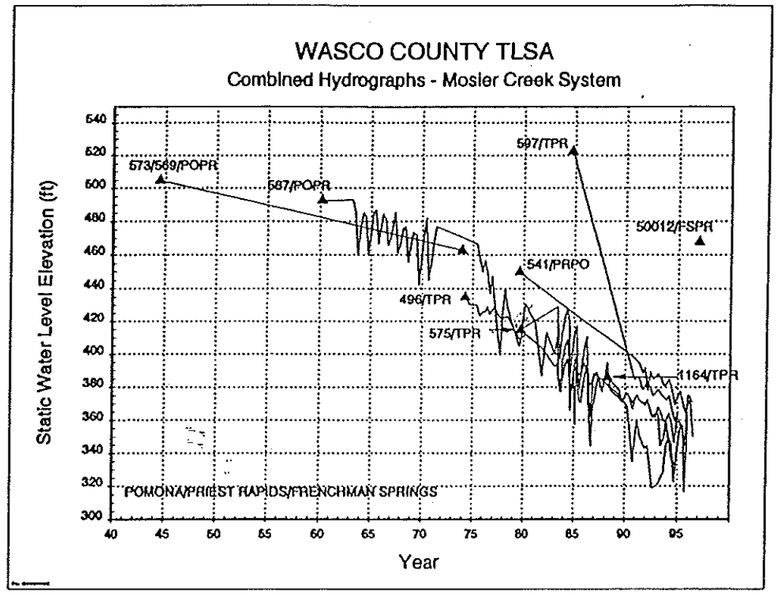


Figure 8A. Combined hydrographs, Mosier Creek System, TLSA, Wasco County, Oregon.

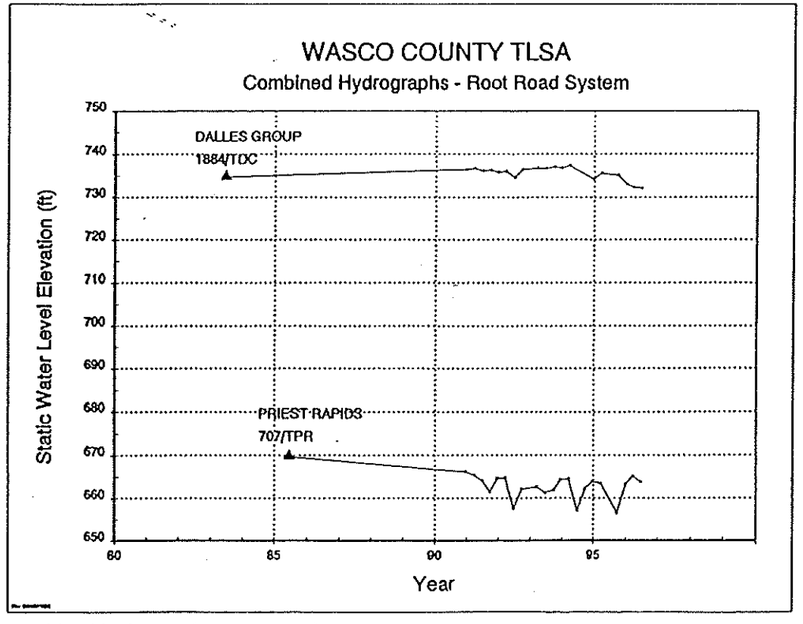


Figure 8B. Combined hydrographs, Root Road System, TLSA, Wasco County, Oregon.

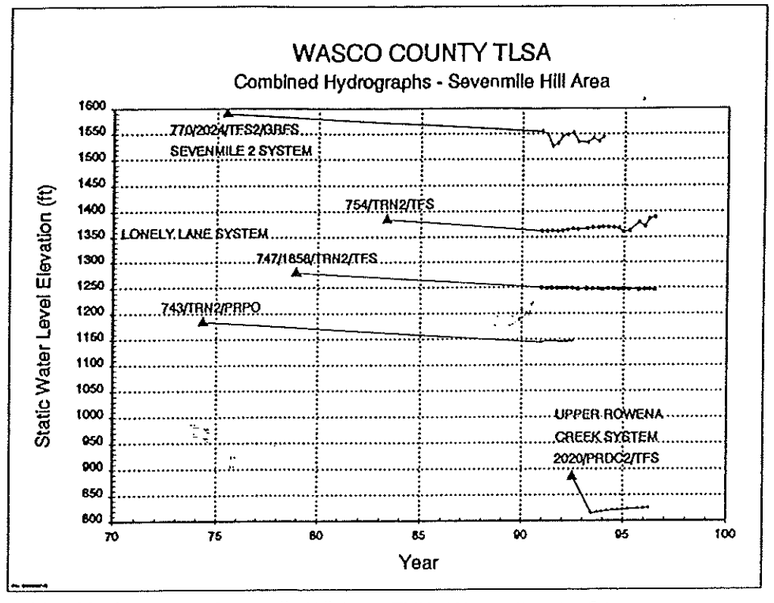


Figure 8C. Combined hydrographs, Sevenmile Hill Area, TLSA, Wasco County, Oregon.

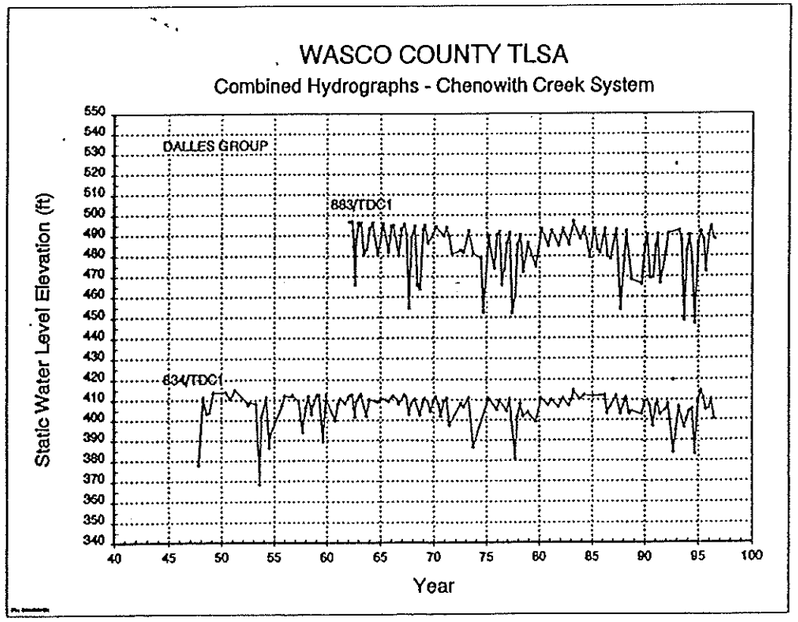


Figure 8D. Combined hydrographs, Chenowith Creek System, TLSA, Wasco County, Oregon.

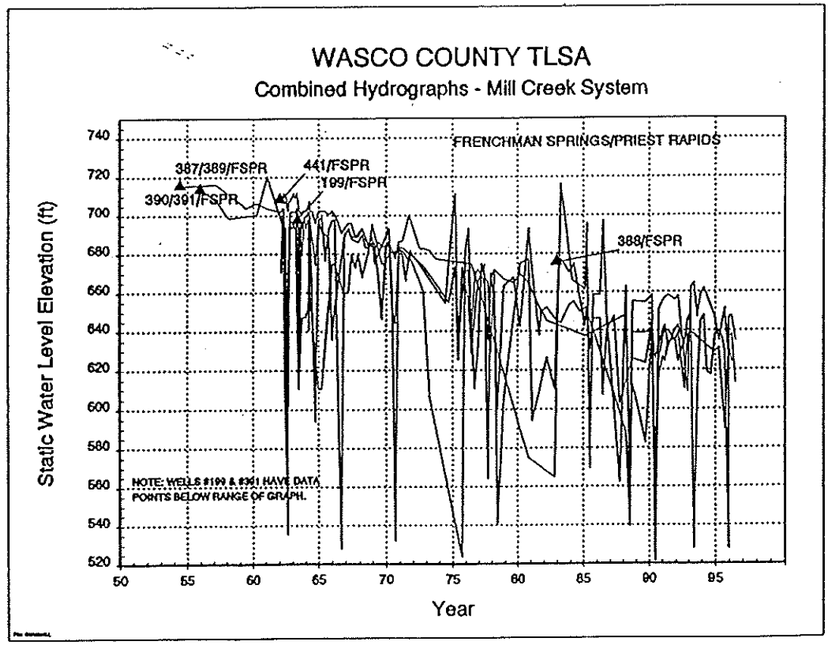


Figure 8E. Combined hydrographs, Mill Creek System, TLSA, Wasco County, Oregon.

prove, that the initial declines seen in basalt aquifers may somehow be related to their internal structure, the dual porosity found in fractures and vesicles or breccias. The diagram in Figure 4 is an illustration of a possible explanation for the rapid initial declines seen in some basalt aquifers. If the zone of saturation below the vadose zone (the transition from no saturation to 100% saturation) occurs in the entablature or colonnade parts of a basalt, the actual volume of water contained in the highest part of an aquifer may be very small. This part of the basalt may have very little horizontal connection with the rest of the aquifer. As the well is produced, decline in this section of the basalt may only recover under conditions of very high recharge. Each time the well is produced the water level will drop slightly and not recover until a point is reached that can be supported by the high volume porous part of the basalt aquifer. The fact that large declines are not seen in basalts that are overlain by Dalles Group or alluvium suggests that this explanation may be valid for some basalt aquifers, particularly those at higher elevations.

An alternative or possibly contributing explanation is in the normal response of fractured reservoirs to fluid withdrawal. The shape of the pressure sink around a well in a fractured rock is often one that shows a rapid but small drop of very large radius, and afterwards very little change in static water level while pumping. Figure 9 is a display of the data on two basalt aquifer tests presented in the Lite and Grondin 1988 report. The recovery curve is roughly an inverted mirror image of the decline during pumping. The shape of the build up curve, shown in Figure 10, indicates that recovery to original static water level may take much longer than the pumping time interval.

The decline in SWL may not be easily detectable after any one pumping period, but during seasons of heavy use, each time the well is pumped, the static water level will fail to rise back to its original position. Over a year the discrepancy may be large (10-20 feet) and unless the well is shut in for a long time, this process will continue until the fracture system pressure drops and equilibrates with the matrix (pore volume) pressure. At this point the well will maintain a reasonably constant static water level, if the volume extracted per unit time remains constant. Figure 10 shows a different type of plot with a logarithmic scale which allows for analysis of aquifer character. The change in slope seen in the Pomona test may be the pressure decline encountering a barrier or it could be the transition period before the fracture system reaches equilibrium with the porous matrix.

The hypotheses above are not necessarily correct. It may simply be that the basalt aquifers have poor storage volume and/or access to recharge and consequently are declining and will fail in the near future. However, there are a few indications that this is not the case. These include:

- the observation that many hydrographs show static water level decline to a specific level, followed by stabilization,
- the continued drilling of new wells which appear to encounter original or near original aquifer pressures (suggesting that SWL declines are tied to individual wellbores), and
- the overall stability of static water levels in each aquifer system over the past 40 years

Each of these points will be illustrated with a specific example.

Figures 8a-8e contained all hydrograph curves in and adjacent to the TLSA. The Mill Creek, Dalles Critical Ground Water area, and Sevenmile Hill curves have declined to specific positions and are not, in general, showing rapid decline at this time. A few of the Mosier Creek wells have reached such an equilibrium position; the rest of them have not been measured for a number of years and cannot be assessed. The Chenowith Creek and Root Road hydrographs are not indicative of a rapidly declining systems.

Almost every cross section in Appendix B that displays basalt aquifers shows at least one example of new wells being drilled adjacent to older wells with higher SWL than the older wells which have demonstrated declines. Figure 11 shows 3 wells in T12NR12E Section 7, Mosier Creek System. The oldest well (#569/573 Root) has developed a cone of depression that makes its static water level lower than the other two, younger wells. The difference between the SWL in the Root well and the Reeves well is around 50 feet. Many of the cross sections show examples of this situation. In these sections, an older well is displayed adjacent to a well drilled long afterward. In many cases, even though the wells are not separated by great distances, the newest well shows a higher static water level than the current SWL of the older well. This suggests that declines are directly the result of producing the well and are not perhaps representative of the state of the aquifer as a whole.

Figures 12 and 13 are displays of the static water levels in the TLSA aquifer systems versus time. The thin lines connecting points are multiple water level measurements in single wells. It is apparent that many of the basalt aquifer systems have wells which show declines. However, the trend of initial static water levels in all of the TLSA aquifer systems has not shown any correlation with time. In other words, there is no

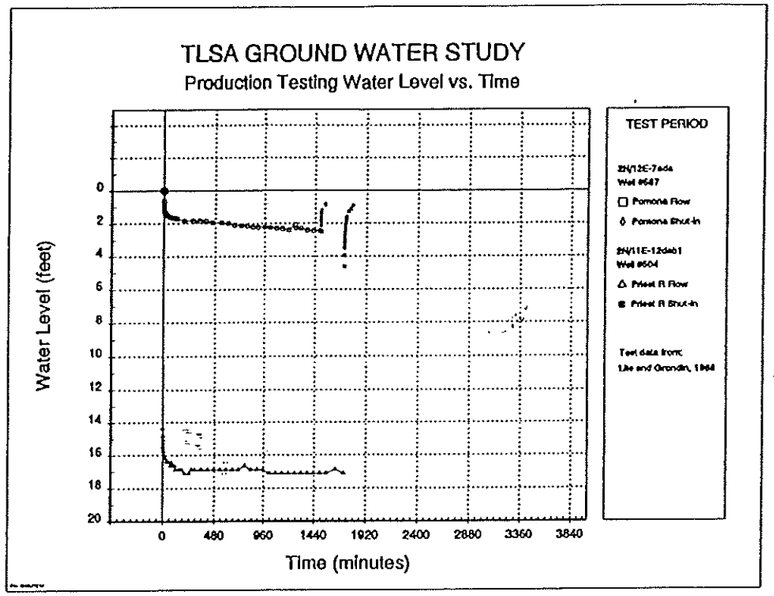


Figure 9. Pomona and Priest Rapids pump test data, Mosier Creek System (data from Lite and Grondin, 1988).

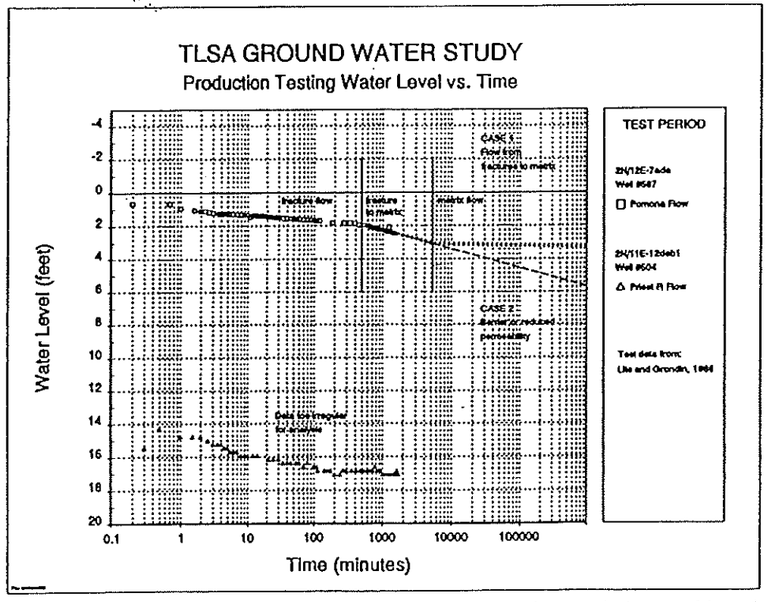


Figure 10. Logarithmic plot, Pomona and Priest Rapids test data, Mosier Creek System (data from Lite and Grondin, 1988).

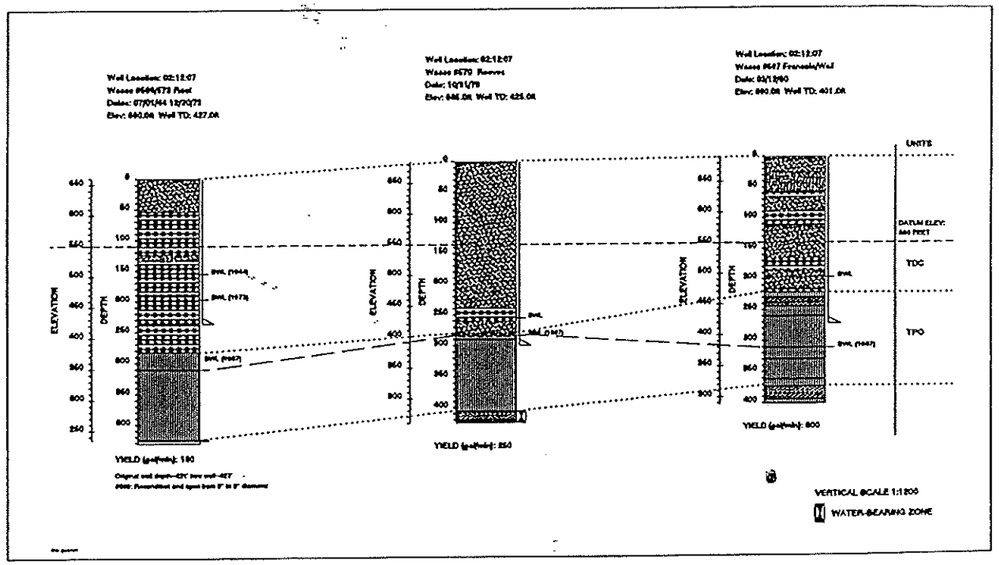


Figure 11. Static water levels, Mosier Creek System, TLSA, Wasco County, Oregon.

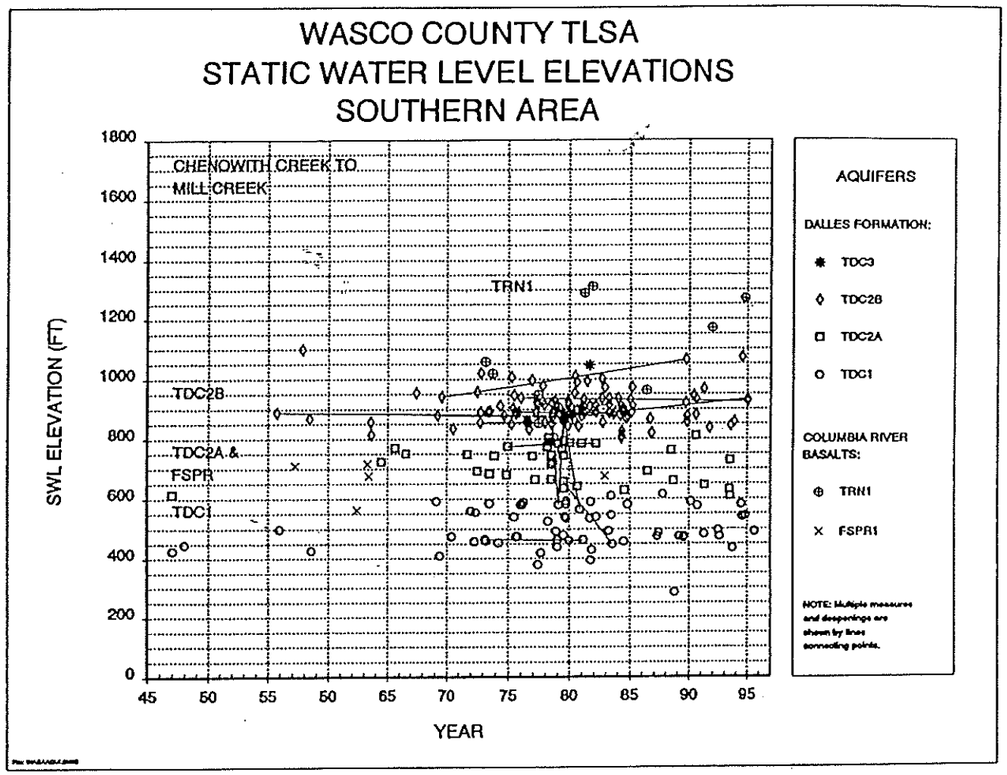


Figure 12. Initial static water level elevations versus time, TLSA southern area. Multiple measures connected with a thin line.

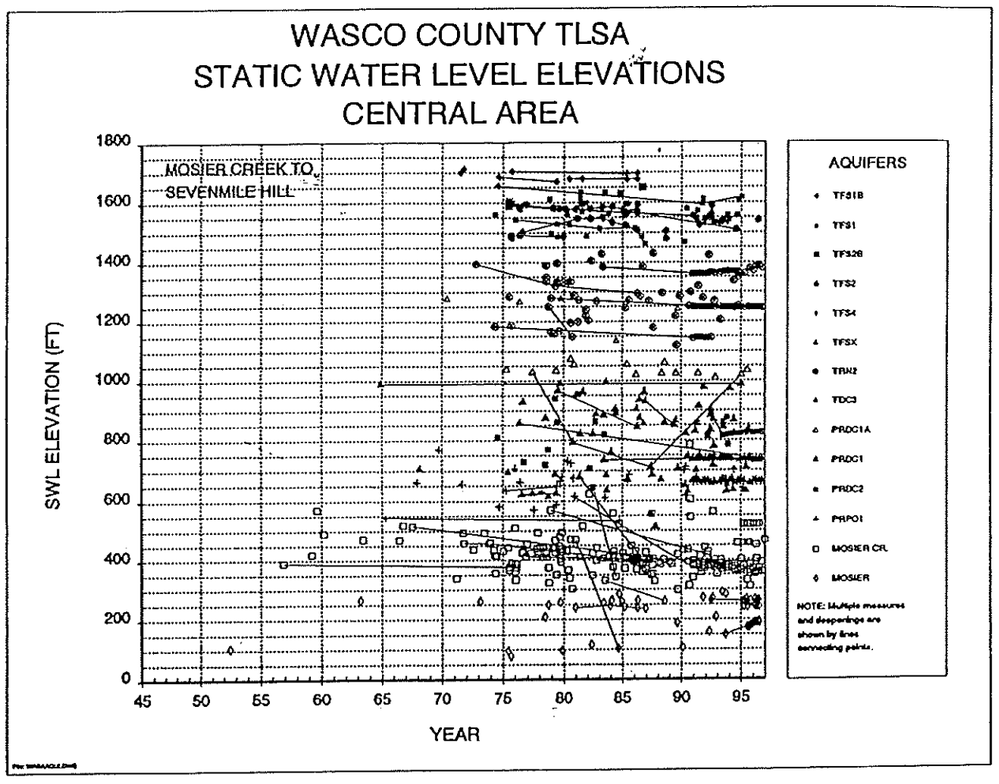


Figure 13. Initial static water level elevations versus time, TLSA central area. Multiple measures connected with a thin line.

significant increase or decline in any of these systems (this also implies that no appreciable co-mingling is occurring between systems). A minor exception to this summary is the Sevenmile Hill TFS2B aquifer. This aquifer is very shallow, of limited extent and three out of four wells in it were deepened to the Sevenmile TFS2 system.

Another significant observation is that in a few wells, recovery to original static water levels has occurred in basalt aquifers with large initial declines. It is notable that only in particular cases does the high rate of initial decline continue, resulting in aquifer failure. Most of the wells showing large declines continue to provide water in a satisfactory manner. The specific reasons for aquifer failure will be discussed in the next section.

In order to assess the previously mentioned observations, it would be useful to look in detail at how the static water level reacts to production and/or rainfall volumes in a well where there is a fairly complete set of data. The Chenowith Co-op Wells #1,2 and 3 provide about 300,000,000 gallons of water per year to customers. Most of the production is from Well #3, which is near The Dalles Racquet Club. Wells #1 and 2 are twins (drilled side by side) and are located a few city blocks from Well #3. The wells are completed in the Priest Rapids/Frenchman Springs basalts and are shown on Cross Section 22. They are very similar to the irrigation wells in Mill Creek (Cross Section 6), excepting that the water column in the Chenowith wells is much smaller. The Chenowith wells are part of the Dalles Critical Ground Water system.

The curves in Figure 14 cover a long time period during which production of water from these wells rose from about 200 million gallons per year to 300 million gallons per year. The first 13 years of production saw a rapid decline of about 50 feet in static water level. Over the next 30 years, static water level seemed to reflect the level of production rather than to decline. In 1975, production was estimated at about 250 million gallons/year. In 1994, production had risen to almost 300 million gallons/year and the stabilized water level dropped, but did not decline appreciably after the initial drop. A point of interest; the bulge in the static water level curve beginning in 1987 does not correlate with rainfall volume during or immediately before that time period.

A more detailed examination of well data is shown in Figure 15. The curves for water level, rainfall and production all seem to have a relationship (although due to time lag, it cannot be quantified easily). The peaks of rainfall, water level and the lowest production volume seem to occur at about the same time. Whether the responses on the water level curve are due to rainfall or production recovery is difficult to say. It may be that both factors affect the water level in this well. It is notable that some of the recovery curves begin before the beginning of increased rainfall. This may mean that the shut in or low production period allows the water level to recover and that this water level increase may be primarily a build up rather than a response to new injection of water volumes after rainfall.

Another example of the water level response to water production volume in basalt aquifers occurs in a very different type of well; the domestic well #492 in Cross Section 26 shown previously in this report. This well had an original static water level of 186'. It was drilled in 1981 and only used intermittently for many years. For most of its early history, there were only a few wells in the section, all of which were domestic wells. In 1995, the next static water level measured was 201'. For most of that year, the water level stayed within one foot of that measure. At that point only one household was using the well on a full time basis. In late 1995, another household was added to the well system. The water level immediately dropped to 204'. Subsequent measures throughout 1996 remained very constant at or near that value.

The point of this discussion is that the specific stable static water level for a particular well may depend entirely on the volume extracted per unit time. If the volume produced is increased, the water will drop to a new equilibrium position. If the production volume is reduced, the water level will show an immediate return to a higher position. The amount of water that can be extracted depends on the porosity and permeability of the specific aquifer and the rocks above it. If the production volume exceeds the capacity of the well, the aquifer will fail in the vicinity of the wellbore, but a shut in period will allow it to recover.

DEEPENED WELLS

Wells which are deepened occur throughout the TLSA, but are most numerous in several areas. The common reasons that a well is deepened are

- land owner wishes to access a larger supply of water,
- the shallowest aquifer present shows a reduction in rate and static water level to the point where deepening the well is required to maintain water in the wellbore, or
- collapse and/or caving of the wellbore damages its ability to provide water

The second reason above has the most interest in the evaluation of ground water supply in the TLSA. A

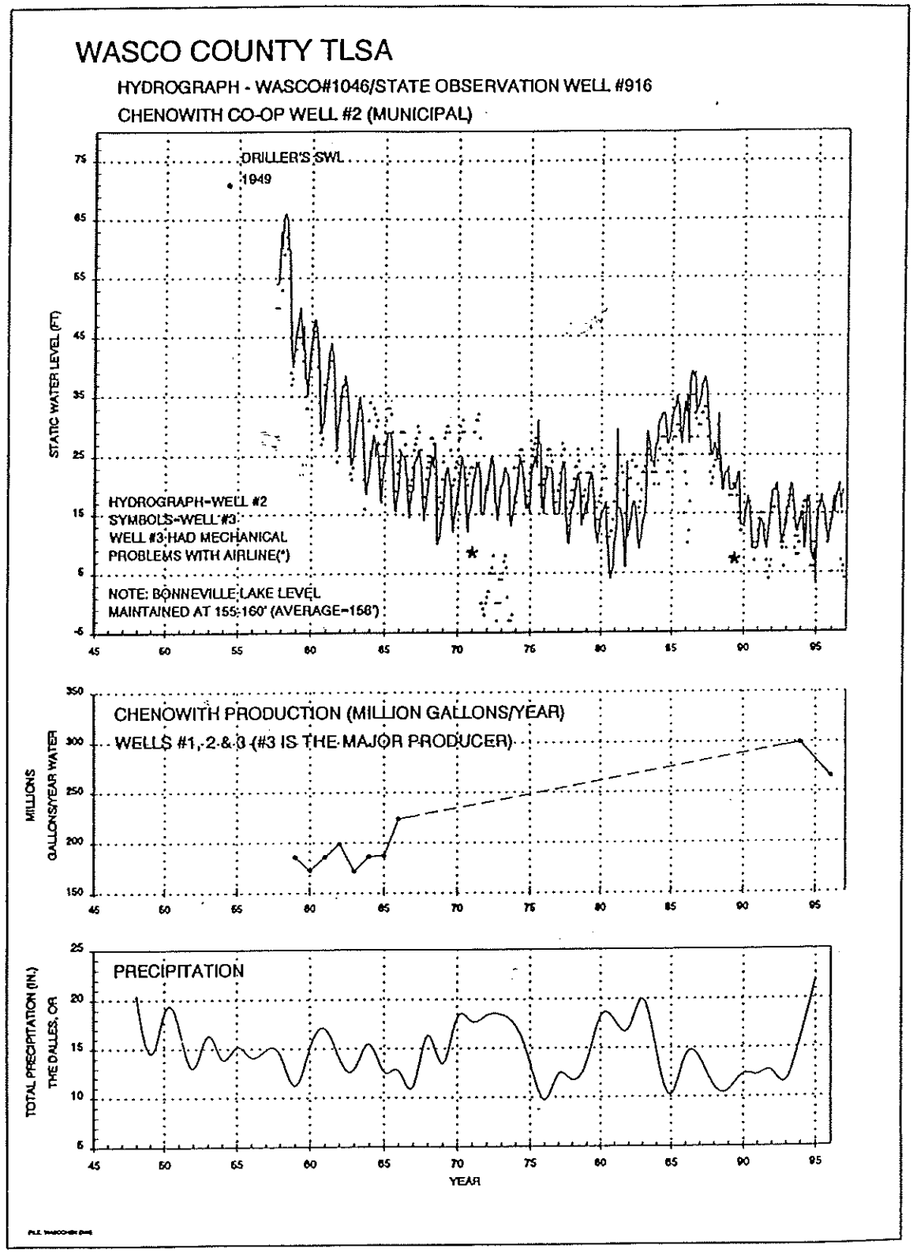


Figure 14. Chenowith Co-op water well data, 1949-1996.

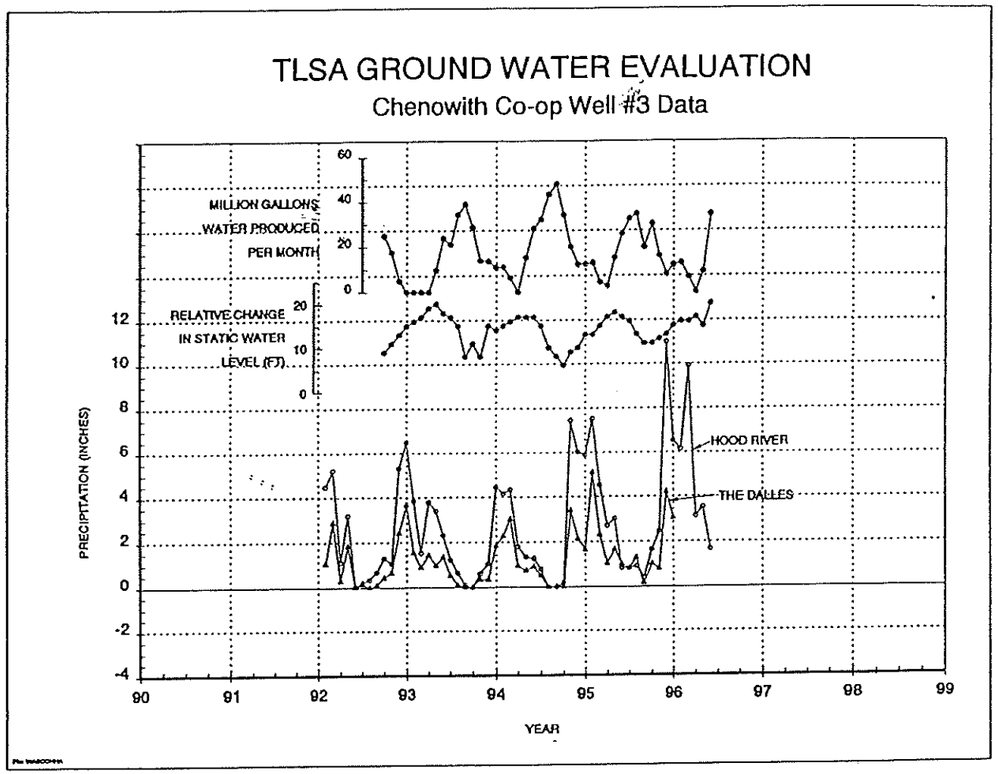


Figure 15. Monthly detail,Chenowith Co-op water well data, 1992-1996.

similar interest pertains in wells that have had multiple static water level measures over time and show significant decline in static water level (>30').

From the previous discussion on basalt aquifer initial decline, it is apparent that in many basalt wells enough water column must be available to accommodate the initial decline that many of them will experience. In many instances of deepened wells, the original well did not penetrate enough aquifer thickness to support water production over time. In these wells, deepening is required to more fully expose the aquifer system to the wellbore. In other instances, the entire system is abandoned and the well is deepened to a new aquifer system. It is now necessary to review available data and summarize how many wells of each type exist and the aquifers in which they tend to occur.

The 58 deepened wells examined may be categorized as follows:

- Minor (22 wells): 3 to 50 foot increase in well depth
  - repairs damage through caving or extended use
  - very little to no new aquifer thickness is exposed
  - static water level does not change
  - may be considered well rejuvenation
- Moderate (17 wells): 20 to 250 foot increase in well depth
  - repairs damage due to partial penetration
  - exposes more central part of aquifer system
  - static water level change is minor and remains within the same aquifer system
- Major (19 wells): 200 to 600 foot increase (or more) in well depth
  - abandonment of original aquifer system
  - static water level is 100 to 400 feet lower than in original well
  - represents a significant failure of shallowest aquifer system.

The deepened wells are listed in Table E (Appendix A). Minor and moderate deepenings may be regarded as fairly normal occurrences in the development of a ground water resource. They are only of concern when the overall rate or percentage of them sharply increases over a particular time period. This may signal the stressing of the shallow ground water systems.

As is shown in Figure 16, deepenings in the TLSA area have occurred at a fairly constant percent of total wells drilled through the history of water well development. It should be noted that wells drilled during high rainfall cycles may have a tendency to be deepened more than wells drilled during normal or dry cycles.

Major deepenings are of serious concern. If no other explanation for them is identified, they signal failure of the shallow aquifer and depletion of the ground water resource. However, in the case of most of the major deepenings within the TLSA area, an explanation for failure can be demonstrated.

The following conditions may cause failure of the shallow aquifer. Each of them is illustrated by a cross section in Appendix B showing the condition described:

1) POOR PERMEABILITY AND/OR POROSITY IN THE VICINITY OF THE WELLBORE

Aquifers are not uniform throughout their occurrence. For a variety of reasons, internal variation within them is normal and can be expected. In some areas, poor performance of an individual aquifer can be identified and mapped. A good example of this occurs in the northern part of the ridge between Mill Creek and Brown Creek and is shown in the northern end of Cross Section 5B. The Brown Creek-TDC2B aquifer (Dalles Group) is a frequently completed unit in this area. However, northeast of T1NR12E Section 11, it gains in clay content (clay lenses) to the point that in some cases, wells were not even completed in this zone, but were drilled deeper to the TDC1 aquifer. Other wells completed in this the TDC2B were later deepened, probably because of insufficient water volume. The TDC2B in this area also has the problems mentioned in #2 and #3 below.

2) DESTRUCTION OF ORIGINAL AQUIFER CONDITIONS BY FRACTURING OR FAULTING

Faults and fractures can be very detrimental to aquifer performance in the following ways:

- Plugging of porous rock by deposits of minerals resulting in low porosity and permeability and poor interconnection with the main body of the aquifer.
- In contrast, fracturing may be seen as an enhancement to aquifer permeability in fault/fracture zones which are not mineralized. However, if it is extreme and continues to an adjacent canyon, fracturing can act as a drain, enhancing permeability to the point where the rock is no longer able to maintain high water volume.

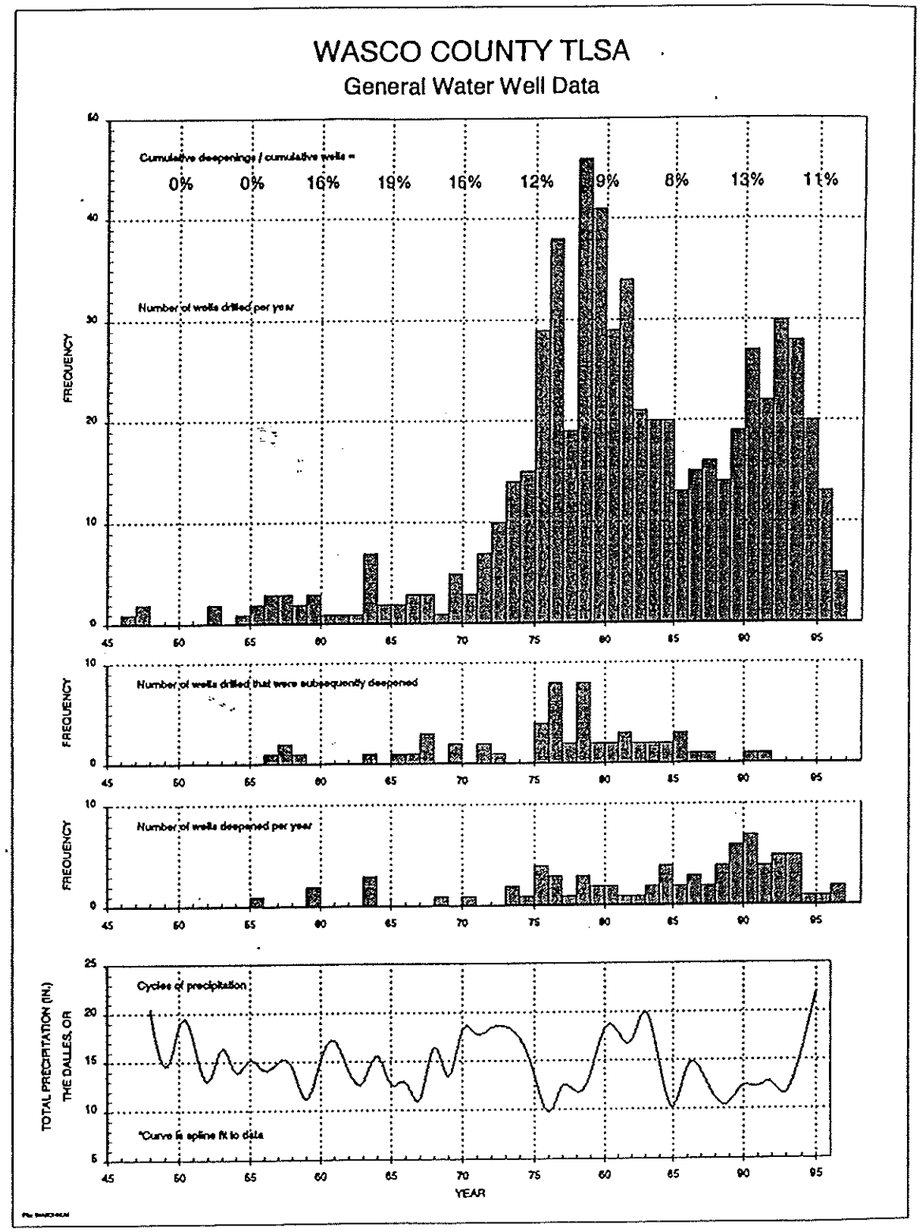


Figure 16. Wells drilled and well deepenings versus time, TLSA, Wasco County.

The detrimental effect of fault/fracture zones can be seen in Cross Section 2 in the Sevenmile Hill area. Two wells in this section are abandoned after encountering no water. The driller's description in both wells indicates that mineralization has destroyed original aquifer quality by allowing mineral-bearing fluids to deposit material in available fractures and pore space. Away from the fault zones, the basalt aquifers here are quite acceptable in terms of rate and productive capability.

A rather serious condition occurs in T2NR12E Section 9 shown in Cross Section 9B. In this area, two major fault zones cross, one going east-west, the other trending northwest-southeast. Some wells in the vicinity of this intersection are either very deep originally, or have to be deepened to depths greater than 550 feet. The map on the following page shows trends of wells with drilling problems such as caving, fractures or lost circulation, dry holes, deepened wells and wells with very large declines (>100 feet) and the pattern of major fault and fracture zones identified on surface or in cross section. Figures 17, 18 and 19 are aerial photographs which show some of the features mapped as fault or fracture zones. The Wasco County Planning Office has complete aerial photo coverage in the TLSA for those who have an interest in this topic.

The presence of a fault or fracture zone is shown on the report cross sections as a vertical line. The faults in this general area are high-angle reverse, lateral or normal faults. If actual displacement is seen in cross section or in outcrop, the formations on either side of the fault line will be offset on the cross sections. A quick review of any selection of the cross sections will show how faults or fractures can depress static water levels in their vicinity.

3) WELL IS LOCATED TOO CLOSE TO THE MARGIN OF AN AQUIFER SYSTEM

In cross section 5B discussed previously, the TDC2B aquifer was becoming very shallow and close to its exposure at surface on adjacent slopes. Cross section 3 shows the Upper Dry Creek aquifer system (PRDC1) as it approaches its exposure on the slopes of Dry Creek valley. This aquifer system occurs in basalts immediately below the Dalles Group or in the base of the Dalles Group itself. Wells #726/714 and 713/715/2068 are on the margin of the system and their initial water columns are intermediate between the Root Road and Mosier Creek systems. These wells were deepened in 1986 and 1992, respectively, to the Mosier Creek system (elevation about 350-400 feet). If a well is drilled in a marginal position, it receives recharge from perhaps only about half the area of a normal aquifer. In addition, diffuse recharge on slopes is probably less than diffuse recharge in flatter areas.

In all of the instances of major deepenings, one or more of these conditions existed. The detrimental features described above all reduce the ability of an aquifer to gain recharge from the area surrounding it. In essence, these wells are deepened because they were produced at rates that exceeded their capacity to supply water. The aquifer conditions in each of them would not support water production at even low rates for an extended period of time.

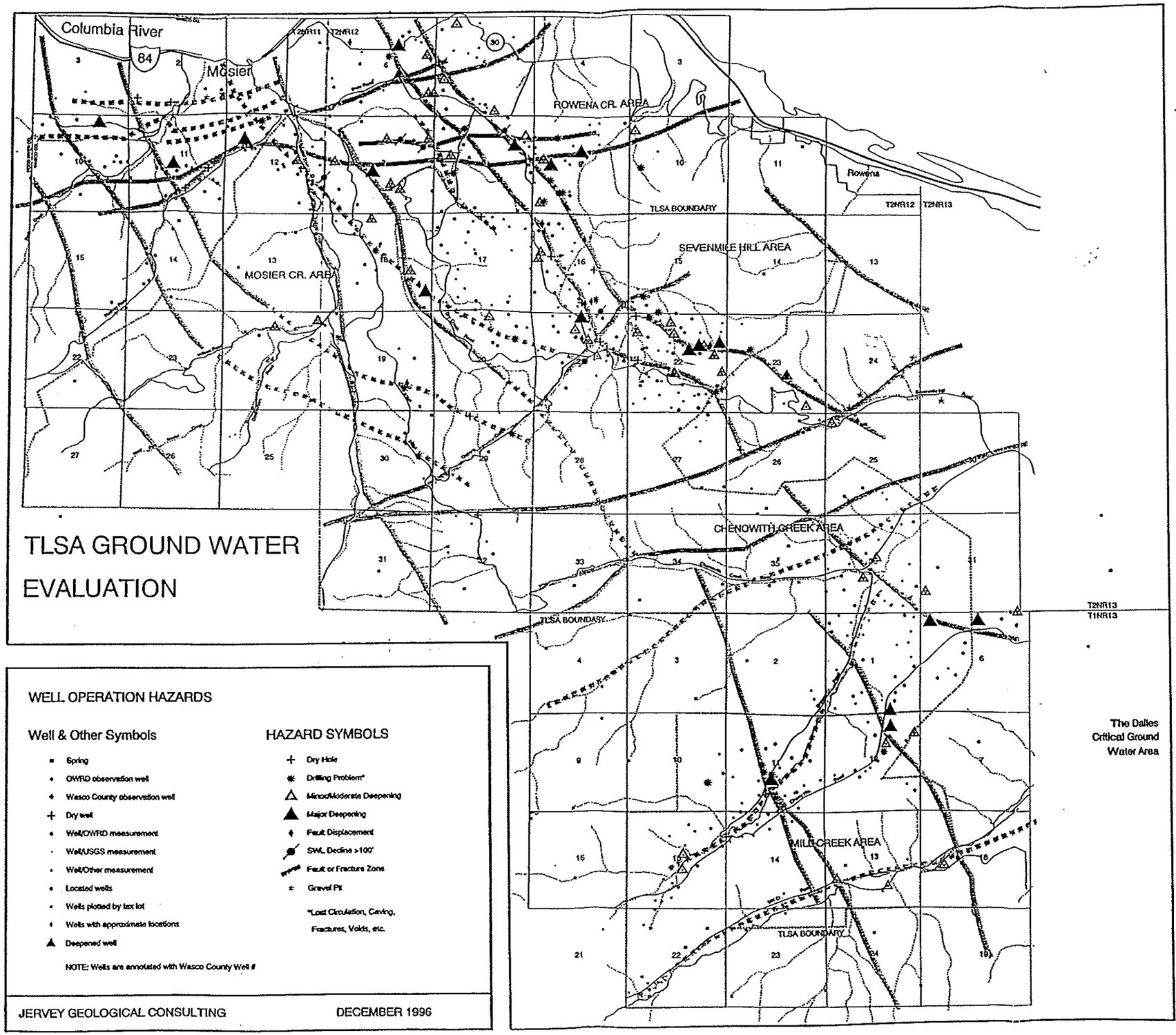
Other conditions which may cause water level decline and lead to deepening are:

- Partial penetration of the upper part of an aquifer system. The Root well in Figure 11 is possibly affected by this condition.
- Damage caused by bacteria and/or deposition of fine sediment, both of which occlude porosity and permeability.
- The presence of ductile clays (often adjacent to basalt aquifers which can deform plastically over time. The result is an eventual "choking off" of the aquifer interval.
- Wells may also be affected by composite cones of depression, but this subject will be covered in the section below on well spacing.

In Figure 20 three unrelated wells are shown to illustrate an important problem. The Wilds well (T2NR12E Section 21) at the left, was deepened twice and now is at a depth of 799 feet. The two upper aquifers which have been subsequently abandoned were evidently of low quality. The 1995 measurement of static water level (NGS, Inc.) may be only apparent because the well measure also reported cascading water. What is certain is; the two upper zones could not support domestic requirements. This well is on trend with two dry holes, #753 and #4103, near one of the fault zones shown in the drilling hazard map. The third aquifer at the base of the well appears to be of higher quality than the other two. Other wells in the vicinty, including Wasco County Observation Well #743, appear to be stable and are about one half the depth of this well.

Also displayed in Figure 20 are two other wells in T2NR12E (Sections 16 and 9) which are abnormally deep for the area, and have abnormally low static water level elevations. It is this type of well which requires the most future investigation. There are many questions about such wells to be answered:

- Does the great depth to static water level reflect a restricted access to diffuse recharge?



TLSA GROUND WATER EVALUATION

WELL OPERATION HAZARDS

Well & Other Symbols

- Spring
- OWRD observation well
- Wasco County observation well
- Dry well
- Well/OWRD measurement
- Well/USGS measurement
- Well/Other measurement
- Located wells
- Wells plotted by tax lot
- Wells with approximate locations
- Deepened well

NOTE: Wells are annotated with Wasco County Well #

HAZARD SYMBOLS

- Dry Hole
- Drilling Problem*
- Minor/Moderate Deepening
- Major Deepening
- Fault Displacement
- SWL Decline >100'
- Fault or Fracture Zone
- Gravel Pit

*Lost Circulation, Caving, Fractures, Voids, etc.

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Figure 17. Aerial photograph showing fault zone near Cherry Heights Road, Wasco County, Oregon.

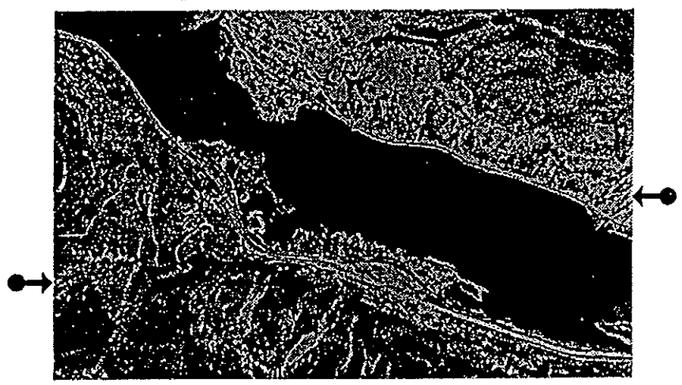


Figure 18. Aerial photograph showing fault zone visible from Interstate 84 at Rowena.



Figure 19. High altitude aerial photograph showing fault displacements, northern Wasco and Hood River Counties, Oregon.

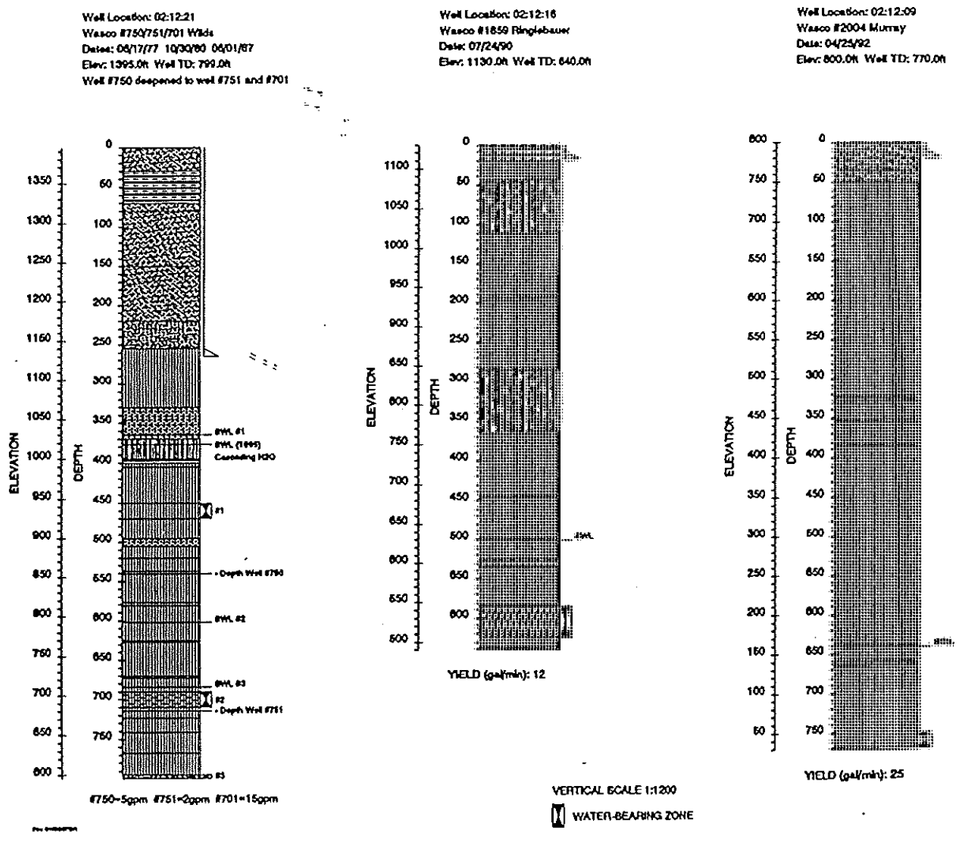


Figure 20. Examples of deep wells with deep static water levels, TLSA, Wasco County.

- Are these wells stable in regard to static water level?
- Should areas with a high proportion of these wells have more restricted allowable well spacing?

To date, there are no hydrograph wells are very few multiple measures in this type of well. This issue will be discussed again in the report recommendations.

The problem for both individual land owners and for Wasco County is that the prediction of well performance is highly dependent on individual well conditions. The best course to follow under these circumstances is close monitoring of existing densely spaced and deep wells and pump testing in a variety of aquifers. The following discussion attempts to answer in part, how closely spaced wells may be for optimum performance.

WELL SPACING - DOMESTIC

The subject of appropriate well spacing is a controversial one. In order to clarify points made in this discussion, proper well spacing is defined as spacing required in order to allow good operation of a domestic well in the shallowest perennial aquifer available. High rate irrigation wells will be addressed separately at the end of this section.

Regardless of aquifer type, most wells outside of the agricultural areas of TLSA show similar characteristics of rate and capacity (5 to 60 gpm at 100% drawdown in one hour). Under these conditions, observations may be made about the area of influence of any individual low rate, low specific capacity domestic well.

Since production (pump) tests are not available, at the present time it is necessary to use other observations to estimate the area affected by a single domestic well. A review of the 28 cross sections in this report shows the minimum horizontal distance to outcrop that can be maintained by several typical TLSA aquifers. On average, most low rate aquifers (basalts and sandstones) can maintain a distance to outcrop of 300-400 feet before failure. This distance is approximately the radius that would be affected by these wells if they were at 100% drawdown. Under most conditions, wells are only operated at 60% or less of maximum drawdown. Ideally, then, on the average, minimum well spacing should be in the range of 360 to 500 feet. Well spacing closer than one half this range should be avoided.

This somewhat vague estimation can be supplemented by other data. The map on the following page shows areas (called units) where well spacing is densest in the TLSA. These units can be important tools in planning for conservation of ground water resource.

Table 3 shows each unit, the aquifers present in its wells, well densities, age.of wells and average well spacing and average of the closest one third well spacing. These areas can provide the best information possible to support ground water development (or limitations on development). It is obvious that current average well spacing is controlled by zoning. But in each unit, some wells are very closely spaced, and it is this group which should be used to direct future development.

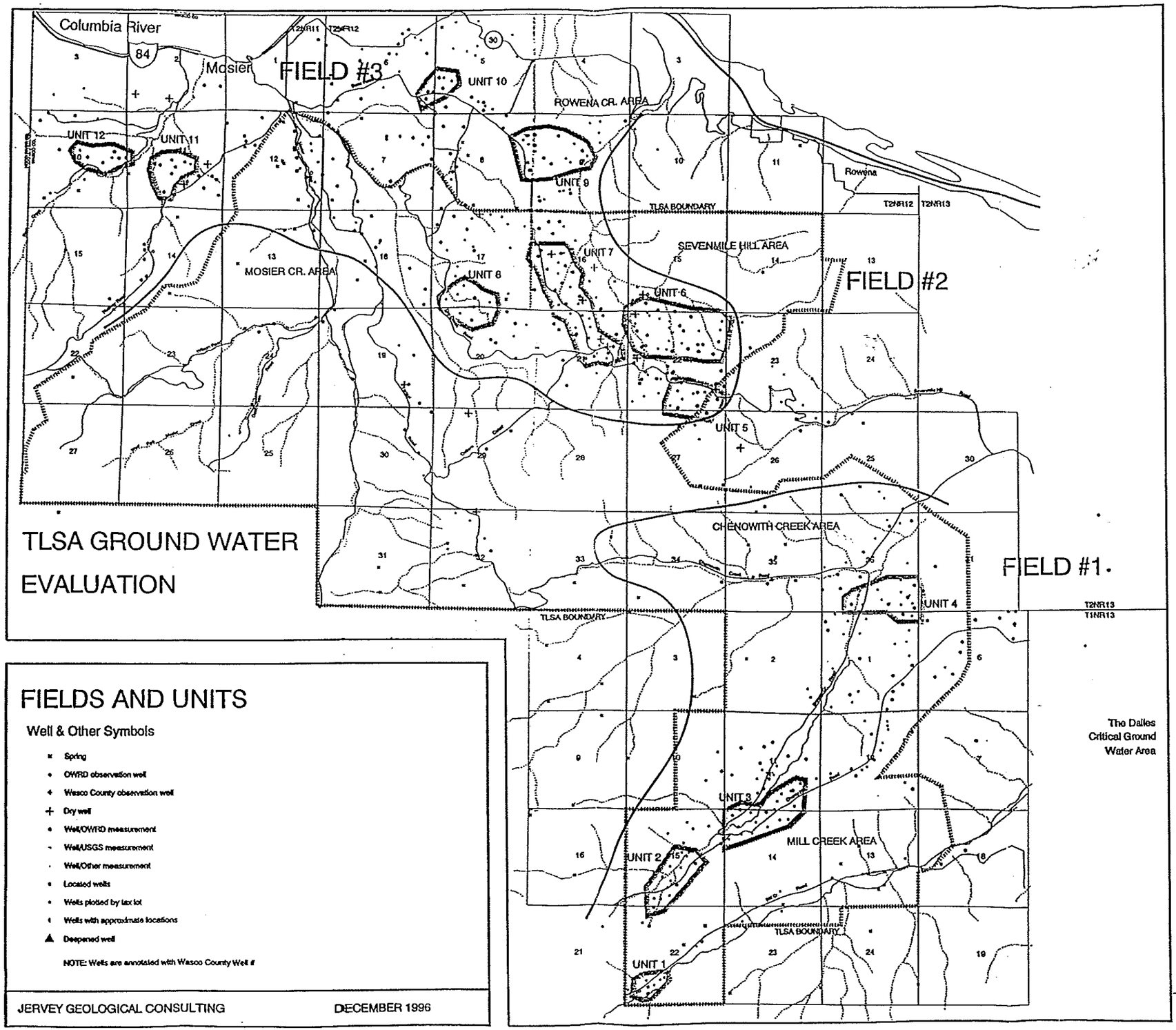
Going back to the beginning of this report, clearly there is a wide spread of theoretical estimates of how much recharge might be available. There is no inexpensive way to determine by these methods an accurate estimate of recharge or discharge. The biggest problem is in accurately estimating the amount of recharge any individual aquifer can receive, not how much is available. The best sources of information about this subject are actual wells that have been operated successfully over a reasonable period of time at a particular well density.

REDUCE RISK BY USING EXISTING WELL SPACING AS A GUIDELINE

Table 3 shows that for the most part, the units considered appear to support one well per 10 acre spacing. In addition, there are wells that are more closely spaced and give guidelines about what possible minimum spacing could be supported.

From this information, a simple planning tool can be developed. For sections where aquifer type and performance are known and drilling density is highest, well spacing may be one well per 10 acres (optimum) without undue risk. Because there are indications that higher densities may be feasible, an additional 10% of locations may be at closer spacing, for a total of about 70 wells per section allowable, with a 10 acre optimum and a 5 acre minimum spacing. Obviously there should be flexibility in applying this as a guideline.

In sections which have few wells, and especially in such sections with deep wells and static water levels a more conservative guideline should be set. A suggestion is that this type of section be limited to twenty acre per well spacing until such time as more is known about aquifers present and their performance. When that well density is approached, a section or area can be reviewed to see if a closer spacing is feasible. Or, if enough data exists, to compare it with other more densely drilled areas, which may be used as a rationale to increase drilling density.



TLSA GROUND WATER EVALUATION

FIELDS AND UNITS

Well & Other Symbols

- Spring
- OWRD observation well
- Wasco County observation well
- Dry well
- Well/OWRD measurement
- Well/USGS measurement
- Well/Other measurement
- Located wells
- Wells plotted by tax lot
- Wells with approximate locations
- Deepened well

NOTE: Wells are annotated with Wasco County Well #

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REVIEW WELL DATA AS MORE INFORMATION IS AVAILABLE

When sections or areas reach about the maximum density described above, further subdivision should be reviewed in view of well performance. If the wells over time have not responded adversely to the closest current spacing, a slight increase in well density may be prudent. On the other hand if well performance has negative warning flags new drilling (or subdivision) may be restricted.

At this point it would be extremely useful to look at analogs in other areas, if they exist. Comparable development in conditions of similar rainfall and in similar aquifer types would also be helpful in assessing risk of increased well density.

This type of process should be in a deliberate manner for the best and most successful result. If well drilling were to immediately proceed from no wells in a section to one or two acre density, many errors and some severe problems would be unavoidable. This type of risk is unacceptable both to county residents using ground water and county taxpayers who must pay for court costs incurred by the county to defend permitted subdivision.

The following recommendations can be made to assist Wasco County in planning ground water development:

- In the short term, the recommended and minimum spacing discussed previously could provide a guideline for planning.
- Guidelines should be reviewed periodically as new information may affect them.
- The unit areas indicated (or some version of them) should be the sites for further collection of data. At least two measured wells and several pump tests in each of them would be a goal for the next two years. This information could be used to further refine the estimated wells allowed per acre above.
- Most of this effort should be made by landowners as volunteered work. Wasco County may be able to coordinate the collection of data and verify it, but the manpower requirement to survey these units is onerous and perhaps not primarily the responsibility of the county. It is possible that interested individuals may be able to do a great deal more in the area of data collection

UNIT #	AQUIFER SYSTEM	TOTAL WELLS	TOTAL AREA ACRES	ACRES PER WELL	AVERAGE WELL DISTANCE FEET	AVERAGE LOWER 1/3 WELL DISTANCE FEET	DENSEST ACRES PER WELL	PRIORITY
1	TDC2A	8	49	6	388	318	3	
2	TDC2A&B	12	142	12	604	416	4	
3	TDC2B	19	212	11	653	478	5	
4	TDC1&2B	17	177	10	708	491	5	HIGH
5	TPS1&1B	12	123	10	602	393	4	
6	TPS2/TRN2	33	342	10	599	386	3	HIGH
7	TRN2 PRDC1A TPSX	32	322	10	563	333	3	HIGH
8	PRDC1	9	138	15	798	580	8	
9	PRPO1 MC TPSX	18	216	12	-	-	-	HIGH
10	MC	7	68	10	-	-	-	
11	MT/RC	7	97	14	-	-	-	
12	RC	7	91	13	-	-	-	

Table 3. Summary of well spacing in TLSA units.

than local or state government could afford to do.

- The effort above would have many positive rewards; one of the most important of these would be the emphasis on knowledge and control for the individual well owners. The more they know about their own situation and ground water as a whole, the better off the entire community will be.
- Continued effort on a number of fronts to improve well location accuracy; particularly important are dry holes, deepened wells and any wells with multiple static water level measurements.
- A manner of well naming so that one location would have one designation for all of its history. Many problems are caused by renumbering a well any time anything happens to it. The clerical problems this will create in the next ten to twenty years could be enormous.

The reason it is important to commit to this type of project is actually for the long term. At some point in future, one to two acre spacing for wells may be requested by development. At this extreme, it is best to use actual examples of well development to either permit or restrict denser drilling. Wasco County has done an exemplary job of data collection and should continue this effort.

WELL SPACING - IRRIGATION AREAS

Wells with high rates occur in the following areas: Mill Creek, Chenowith Creek, Mosier Creek and adjacent orchard area. Wells with sustainable rates of greater than 60 gpm can, if operated continuously, easily affect water levels in areas of 1 to 5 square miles in the same aquifer system. In view of the possibility that these wells establish a more or less permanent cone of depression, it is probable that they have an impact on some domestic wells around them, if they are in the same aquifer system.

The cone of depression formed will, in the case of fracture controlled aquifers, not be circular but will have dimensions controlled by fracture trends. The domestic well owner should be aware of this and understand the possibility that his well may be affected by irrigation wells. For this and a variety of other reasons, production testing of a sampling of irrigation wells is strongly recommended in order to improve understanding of their performance characteristics and potential for interference over distance. This testing could also identify wells that have incurred significant damage over time, resulting in reduced rates. An important relationship to develop would be the graph of well capacity versus radius of influence as a guideline to both irrigators and domestic well owners. This type of activity is probably best pursued by Oregon Water Resources Department.

The restriction of irrigation usage is not the domain of county regulation. However, the nomograph of capacity versus radius of influence should be used to control, at least to some extent, well spacing in irrigation wells. The detrimental effect of composite cones of depression could in many instances, be avoided with better information and spacing recommendations to water right holders. This matter has little to do with volume of water used; rather the proper and most efficient use of ground water available for irrigation.

WATER QUALITY

The evaluation of quality of ground water was not a primary goal of this report, however there are two general observations which may be made:

In the original TLSA questionnaire responses, more complaints were voiced about water quality than amount of water available. The most common objection was to water with high iron content and/or unpleasant odor. These wells are almost always located very close to fault or fracture zones. The ground water in them may be mixing with upward percolating warmer waters which also carry more minerals in solution. The most likely solution to this type of problem is in the purchase of equipment which will filter or remove offending minerals.

From the first section of this report, it may be surmised that septic fields might contaminate local water supplies in shallow aquifers. Periodic inexpensive testing for contamination is recommended to anyone concerned about this potential problem.

CONCLUSION

It is hoped that the information presented in this report will be helpful in the process of assessing the TLSA ground water resource. The current tendency toward higher precipitation offers an ideal time to gather data and learn more about TLSA aquifers. However, it is only a temporary reprieve from the average conditions that have to be incorporated into resource planning.

Many of the best observations and ideas in this report were based on comments by the TLSA Technical and Steering Committees, the interested public and the Wasco County Planning Staff. Together with well drillers and the local land owners, they can arrive at a reasonable approach to ground water development in the TLSA.

ACKNOWLEDGEMENTS

The people listed below were generous with ideas, suggestions and observations that are used in this study. The author wishes to thank them for their time and efforts.

RESIDENTS/LAND OWNERS OF WASCO COUNTY:

Sue Bennett
Frans Bosman
Steven Cain
Brenda and Ron Carroll
Linda Cartwright
Janine and Joseph Czerniecki
Betty Daniel
Jim Deaton
Jackie Fulps
Carol Goter
Wayne Haythorn
Delbert and Elaine Huskey
Jack and Betty Huskey
Ken and Wendy Huskey
Wayne and Helen Huskey
Greg Koonce
Frank and Mary Kurz
Nick and Mary Linebarger
Mark and Diane Mazeski
Sandra and Deane Preston
Bill and Jeanne Reeves
Mike Sandoz
Carole Schmidt
Tamara Shannon
Mary Soden
Fred and Sylvian Stewart

PUBLIC AGENCIES/PRIVATE COMPANIES

Larry Toll/Staff
Wasco County Watermasters Office

Ken Lite
Oregon Water Resources Department

Rick Kienle
Northwest Geological Services, Inc.

Staff
Wasco County Planning Office

Members
TLSA Steering Committee

Members
TLSA Technical Committee

Jerry Schmidt
Oregon Water Consultants, Inc.

James Toole
Toole and Sons Drilling

Ervin Sverdrup
A & A Sales

Jim Johns/Staff
Chenowith Irrigation Co-op

Project Office/The Dalles Dam
Army Corps of Engineers

WATER WELL DRILLERS

All well drillers in the past and present have contributed information to this study. Those who were especially helpful (in the detail of their well records and/or their comments on the subject) include:

Charles Austin
Greg Byrd
Gilbert Clayton, Jr. and Sr.
Harry Douthit
Leonard Marinelli
Charles Moore
Richard Murray
Clyde Root

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Exhibit B

Betzing Conditions

1) The permit shall allow one single family dwelling and attached garage only.

2) At a minimum all conditions required pursuant to the existing County ordinances regulating dwellings in RR-10 zone shall be applied as a condition of development.

3) The rear yard set back shall be the greater of 75 feet or the amount required by applicable County ordinance.

4) Betzing shall develop and maintain a water source which is capable of delivering water at the rate of 20 gallons per minute continuously for 50 minutes (1,000 gallons) on a year around basis.

5) Compliance with these conditions shall be checked though an on-site review by a qualified person selected by the County Planning Department.

ATTACHMENT D – EXHIBIT 2

"Settlement Agreement"

SETTLEMENT AGREEMENT

This settlement agreement dated as of January 5, 2000, and the parties to this agreement are Kenneth A. Thomas ("Thomas"), Wasco County (the "County"), and Joseph Betzing ("Betzing").

Recitals

A. In LUBA Case No. 99-178 Thomas filed an appeal with the Land Use Board of Appeals regarding County Ordinance No. 99–111. This appeal is stayed pending mediation.

B. In LUBA Case No. 99-109 Thomas filed an appeal with the Land Use Board of Appeals regarding County Ordinance 99-114. This appeal is stayed pending mediation.

C. In LUBA Case No. 98-043 Thomas appealed a permit for a dwelling issued by the County to Betzing. This case has been remanded by the Land Use Board of Appeals for further proceedings consistent with their opinion.

D. The parties to this agreement mutually wish to agree to a framework for resolution of the above cases and all disputes arising out of those cases. Therefore in exchange for their mutual promises, the parties agree as follows:

Terms

1. The County Department Staff, acting in good faith shall use best efforts in supporting a legislative zone change and comprehensive plan change to modify to zoning and comprehensive plan designation of the property marked in exhibit A, from F-2 to FF-10. The changes will be initiated by the County unless Thomas elects to initiate them. If property owners other than Thomas elect not to participate then Thomas and the County will proceed and exclude the other property owners' land from the change.

2. Thomas acting through his attorney Michael J. Lilly shall assist the County staff by submitting evidence, drafting staff reports, and drafting findings for the zone and plan changes referenced above.

3. Betzing hereby waives all rights to remonstrate against the zone and plan changes referenced above.

4. Thomas hereby waives all rights to remonstrate against Betzing's application for a single family dwelling if the conditions set forth exhibit B are imposed on the dwelling permit for Betzing. Betzing agrees to accept the conditions set forth in Exhibit B and agrees to abide by the terms and conditions of the permit.

5. If the zone change and plan change applications referenced in paragraph 1 are approved by the County Court, and become final without an appeal or are affirmed on appeal, then Thomas will withdraw the appeals referenced above in paragraphs A and B. If the zone change applications are not

EXHIBIT 5

approved by the Wasco County Court then Thomas and the County agree to enter non-binding mediation but Thomas will be free to continue the appeals referenced in paragraphs A and B if the mediation fails to result in a settlement.

6. If the zone and plan changes are approved by the County Court and the approvals are appealed then the County shall support its decision, but not be obligated to prepare or file briefs in opposition to the appeal. Thomas will file briefs in opposition to the appeal, but shall not be obligated to file briefs regarding issues that are not relevant to property in his ownership.

7. If the zone change or plan change are reversed or remanded on appeal, and if Thomas and the County are unable to agree on an appropriate course of further action, then Thomas and the County will enter into non-binding mediation. If the mediation does not result in a settlement then Thomas may continue the appeals referenced in paragraphs A and B.

Miscellaneous Provisions

8. Binding Effect. This Agreement shall be binding on and inure to the benefit of the parties and their heirs, personal representatives, successors, and assigns.

9. Attorney Fees. If any suit or action is filed by any party to enforce this Agreement or otherwise with respect to the subject matter of this Agreement, the prevailing party shall be entitled to recover reasonable attorney fees incurred in preparation or in prosecution or defense of such suit or action as fixed by the trial court, and if any appeal is taken from the decision of the trial court, reasonable attorney fees as fixed by the appellate court.

10. Amendments. This Agreement may be amended only by an instrument in writing executed by all the parties.

11. Entire Agreement. This Agreement (including the exhibits) sets forth the entire understanding of the parties with respect to the subject matter of this Agreement and supersedes any and all prior understandings and agreements, whether written or oral, between the parties with respect to such subject matter.

12. Counterparts. This Agreement may be executed by the parties in separate counterparts, each of which when executed and delivered shall be an original, but all of which together shall constitute one and the same instrument.

13. Waiver. A provision of this Agreement may be waived only by a written instrument executed by the party waiving compliance. No waiver of any provision of this Agreement shall constitute a waiver of any other provision, whether or not similar, nor shall any waiver constitute a continuing waiver. Failure to enforce any provision of this Agreement shall not operate as a waiver of such provision or any other provision.

14. Further Assurances. From time to time, each of the parties shall execute, acknowledge, and deliver any instruments or documents necessary to carry out the purposes of this Agreement.

15. Time of Essence. Time is of the essence for each and every provision of this Agreement.

16. No Third-Party Beneficiaries. Nothing in this Agreement, express or implied, is intended to confer on any person, other than the parties to this Agreement, any right or remedy of any nature whatsoever.

17. Exhibits. The exhibits referenced in this Agreement are a part of this Agreement as if fully set forth in this Agreement.

18. Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the state of Oregon.

Dated: 1/5/00

Kenneth A. Thomas

Kenneth Thomas

Wasco County Planning Director

Joseph Betzing

ATTACHMENT D – EXHIBIT 3

"Original Application"

PLANNING DEPARTMENT

2705 East Second Street • The Dalles, OR 97058
p: [541] 506-2560 • f: [541] 506-2561 • www.co.wasco.or.us

Pioneering pathways to prosperity.

FILE NUMBER: 921-18-000086-PLNG

FEE: 0 (paid previously)

LAND USE APPLICATION COVERPAGE

Date Received: **Planner Initials:** **Date Complete:** **Planner Initials:**

APPLICANT INFORMATION

Name: David W. Wilson

Address: 7100 Seven Mile Hill Road

City/State/Zip: The Dalles, Oregon 97058

Phone: (541) 490-3730

Email:

OWNER INFORMATION

Name: Same

Address:

City/State/Zip:

Phone:

Email:

PROPERTY INFORMATION

Township/Range/Section/Tax Lot(s)	Acct #	Acres	Zoning
2N 12E 22 4400	884	40.1	F-2

Property address (or location): 7100 Seven Mile Hill Road

Zoning Designation: F-2 **Environmental Protection District:** EPD 8

Proposed Use: F-F **Permitted Subject to Section:**

Water source: Well **Sewage disposal method:** Septic

Are there wetlands/waterways on your property? ■ NO ❑ YES (description)

Name of road providing access: Seven Mile Hill Road

Current use of property: Residential **Use of surrounding properties:** Residential, farm

Do you own neighboring property? ❑ NO ■ YES (description) Tax lots 4800, 2100

DETAILED PROJECT DESCRIPTION (proposed use, structures, dimensions, etc.):

Zone change from F-2 to F-F

❑ **Additional description/maps/pictures attached**

LEGAL PARCEL STATUS
Partition, Subdivision, OR
***Most Recent* Pre-9/4/1974 Deed #:** PLAPAR-17-05-0002 **Date Filed:** September 8,2017

Current Deed #: _____ **Date Filed:** _____

The deed and a map showing the property described in the deed(s) must accompany this application.

SIGNATURES

Applicant(s): _____ **Date:** 5/4/18

_____ **Date:** _____

Property Owner(s): _____ **Date:** 5/4/18

_____ **Date:** _____

_____ **Date:** _____

PLEASE NOTE: Before this application will be processed, you **must** supply all requested information and forms, and address **all listed or referenced criteria**. Pursuant to ORS 215.428, this office will review the application for completeness and notify Applicant of any deficiencies within 30 days of submission. By signing this form, the property owner or property owner's agent is granting permission for Planning Staff to conduct site inspections on the property.

ALL LAND USE APPLICATIONS MUST INCLUDE:

- ☐ Application Fee – Cash or Check (credit cards now accepted with additional fee)
- ☐ Site Plan
- ☐ Elevation Drawing
- ☐ Fire Safety Self-Certification
- ☐ Other applicable information/application(s):
  - ☐ _____
  - ☐ _____

APPLICATIONS FOR PROPERTIES IN THE NATIONAL SCENIC AREA MUST *ALSO* INCLUDE:

- ☐ Scenic Area Application/Expedited Review
- ☐ Color and Material Samples
- ☐ Landscaping Plan
- ☐ Grading Plan
- ☐ Other applicable information/application(s):
  - ☐ _____
  - ☐ _____

SHADED AREA TO BE COMPLETED BY PLANNING DEPARTMENT

Legal Parcel ❑ NO ❑ YES
Deed/Land Use Action: _____

Previous Map and Tax Lot: _____

Past Land Use Actions: If yes, list file #(s) _____ ❑ NO ❑ YES

_____

_____

Subject to previous conditions? ❑ NO ❑ YES

Assessor Property Class: _____

Zoning: _____

Environmental Protection Districts – List applicable EPDs:

❑ EPD # _____

❑ EPD # _____

❑ EPD # _____

❑ EPD # _____

Water Resources
Are there bodies of water or wetlands (seasonal or permanent) on property or adjacent properties? ❑ NO ❑ YES

Describe (include setback distances): _____
❑ Fish bearing ❑ Non fish bearing ❑ Seasonal Creek
❑ Irrigation ditch ❑ Wetland ❑ Pond/Lake ❑ Not identified
(Note: Check buffers. Different zones have different setback requirements that may require a more extensive permitting process.)

Access:
County or ODOT approach permit on file? ❑ NO ❑ YES, # _____

Address:
Address exists and has been verified to be correct? ❑ NO ❑ YES
Address needs to be assigned after approval? ❑ NO ❑ YES

Fire District: _____

Fees (List Review Type and Cost): _____

_____

_____

PLANNING DEPARTMENT

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FILE NUMBER: PLAZNC

FEE: _____

ZONE CHANGE APPLICATION

Date Received: **Planner Initials:** **Date Complete:** **Planner Initials:**

Current Zoning

Comprehensive Plan Map Designation: Forest

Zoning Designation: F-2 (80)

Proposed Zoning

Comprehensive Plan Map Designation: Forest-Farm

Zoning Designation: F-F (10)

Total Acreage to be Rezoned: 40.10

FINDINGS OF FACT

The following shall be addressed by the applicant. Response (findings of fact) to the following questions shall be typewritten and attached to the application.

1. What is the purpose of the proposed change?
2. Describe how the original zoning was the product of a mistake; or
3. Establish that:
   a. The rezoning will conform with the Comprehensive Plan (including but not limited to all applicable goals and policies); and,

      Goal 1: Citizen Involvement
      Goal 2: Land Use Planning
      Goal 3: Agricultural Lands
      Goal 4: Forest Lands
      Goal 5: Open Spaces, Scenic and Historic Areas and Natural Resources
      Goal 6: Air, Water and Land Resources Quality
      Goal 7: Areas Subject to Natural Disasters and Hazards
      Goal 8: Recreational Needs
      Goal 9: Economy of the State
      Goal 10: Housing
      Goal 11: Public Facilities and Services
      Goal 12: Transportation
      Goal 13: Energy Conservation
      Goal 14: Urbanization

b. The site is suitable to the proposed zone (taking into consideration among other things slope, access, flooding, traffic, availability of public facilities and services, and impact to adjacent properties); and

c. There has been a conscious consideration of the public health, safety and welfare in applying the specific zoning regulations.

4. What effect would the proposed change have on surrounding properties? Include a description of the existing land uses within 1,000 feet of the proposed zone change.

5. Is there a public need or demand to support this requested zone change? ❑ No ❑ Yes. If YES, please describe.

6. Fire Safety. If converting Farm or Forest zoned land to a non-resource zone, include an analysis of how future division and residential development could meet fire safety standards.

7. Any other information which may add to the viability of the request.

SITE INFORMATION

The following maps shall be required for a complete application:

Zoning Map: Show area of proposed re-zoning.

Soils Map: If converting Forest or Farm zoned land to a non-resource zone include a soils map. These are available at the Wasco County GIS Department or the Farm Services Agency.

Site Plan Map for the area to be rezoned and lands within at least 1000' that includes the following:

- ❑ North Arrow
- ❑ Scale
- ❑ Boundaries or properties proposed to be rezoned (dimensions)
- ❑ All waterways, wetlands, noticeable landforms and drainage of property
- ❑ Structures (including dwelling, accessory buildings, barns, walls and fences) with location and size
- ❑ Utilities (existing)
  - Electric/Communication corridors including poles
  - Septic tanks & drain fields (primary and reserve)/Wells and supply lines
- ❑ All points of ingress and egress (roads and driveways) and whether they are public or private with their length, width and surface type
- ❑ Significant terrain features and land forms including slopes over 20%

REVIEW PROCESS

Before this application will be processed, you must supply all the requested information. Pursuant to ORS 215.427 this office will review the application for completeness and notify the applicant of any deficiencies within 30 days of submission. If you have questions, the following pages provide directions and helpful information in order to complete the application. Other questions can be addressed in the pre-application conference.

A request for a Zone Change will be reviewed by the Wasco County Planning Commission at a public hearing. Upon receipt of a completed application, hearing dates will be set. A recommendation on the proposal will be made by the Planning Commission and forwarded to the Wasco County Board of Commissioners where a final decision will be issued.

The decision of the Board of Commissioners may be appealed to the Land Use Board of Appeals (LUBA). Information regarding appeals to LUBA is available at the Wasco County Planning Department.

In case of Appeal: Written notice of the appeal must be filed with the Planning Director, within twelve (12) days of the subject decision. Forms are available at the Wasco County Planning Department.

PLANNING DEPARTMENT

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FILE NUMBER: PLACPA-_____

FEE: _____

COMPREHENSIVE PLAN AMENDMENT

Date Received: **Planner Initials:** **Date Complete:** **Planner Initials:**

PROPOSED CHANGE

Indicate specific Comprehensive Plan section(s) or element(s) proposed to be amended or added:

Amend Comprehensive Plan to re-zone tax lot 2N 12E 22 4400 from F-2(80) to F-F(10)

FINDS OF FACT

The following shall be addressed by the applicant. Response (findings of fact) to the following questions shall be typewritten and attached to the application.

1. What is the purpose of the proposed change?
2. A landowner or their representative may only initiate a quasi-judicial plan amendment. Describe how the proposal meets the standard of a quasi-judicial amendment and not a legislative amendment.

   Quasi-Judicial revisions are those which do not have significant effect beyond the immediate area of the change, i.e., narrow in scope and focusing on specific situations.

   Legislative revisions include land use changes that have widespread and significant impact beyond the immediate area such as quantitative changes producing large volumes of traffic; a qualitative change in the character of the land use itself, such as conversion of residential to industrial use; or a spatial change that affects large areas or much different ownership.
3. The amendment will be in compliance with the statewide land use goals as provided by the Land Conservation and Development Commission, where applicable and substantial proof that such change shall not be detrimental to the spirit and intent of such goals. These goals include:

   Goal 1: Citizen Involvement
   Goal 2: Land Use Planning
   Goal 3: Agricultural Lands
   Goal 4: Forest Lands
   Goal 5: Open Spaces, Scenic and Historic Areas and Natural Resources
   Goal 6: Air, Water and Land Resources Quality
   Goal 7: Areas Subject to Natural Disasters and Hazards
   Goal 8: Recreational Needs
   Goal 9: Economy of the State
   Goal 10: Housing
   Goal 11: Public Facilities and Services
   Goal 12: Transportation
   Goal 13: Energy Conservation
   Goal 14: Urbanization

4. Demonstrate there was a mistake in the original comprehensive plan or change in the character of the neighborhood.

5. Address factors which relate to the public need for healthful, safe and aesthetic surrounding and conditions.

6. Include proof of change in the inventories originally developed.

7. Amendment shall be based on special studies or other information which will serve as the factual basis to support the change. The public need and justification for the particular change must be established. Provide additional studies and established need to justify the amendment.

A response (findings of fact) to each of the questions above has been submitted? ❑ No ■ YES

REVIEW PROCESS

Before this application will be processed, you must supply all the requested information. Pursuant to ORS 215.427 this office will review the application for completeness and notify the applicant of any deficiencies within 30 days of submission. If you have questions, the following pages provide directions and helpful information in order to complete the application. Other questions can be addressed in the pre-application conference.

A request for a Comprehensive Plan Amendment will be reviewed by the Wasco County Planning Commission at a public hearing. Upon receipt of a completed application, hearing dates will be set.

A recommendation on the proposal will be made by the Planning Commission and forwarded to the Wasco County Board of Commissioners where a final decision will be issued.

The decision of the Board of Commissioners may be appealed to the Land Use Board of Appeals (LUBA). Information regarding appeals to LUBA is available at the Wasco County Planning Department.

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FILE NUMBER: PLAEXC

FEE: _____

GOAL EXCEPTION APPLICATION

Date Received: **Planner Initials:** **Date Complete:** **Planner Initials:**

PROPOSED EXCEPTION

Indicate the Goal(s) for which the exception is requested:

Goal 4 - Forest Lands

FINDINGS OF FACT

The following shall be addressed by the applicant. Response (findings of fact) to the following questions shall be typewritten and attached to the application.

1. What is the purpose of the proposed goal exception?
2. Is there a public need or demand to support this requested Goal Exception? ❑ No ❑ Yes. If YES, please describe.
3. An exception is a decision to exclude certain land from the requirements of one or more applicable statewide goals. Goal Exceptions fall into three categories: Physically Developed; Irrevocably Committed; and Reasons.

   Indicate which type of goal exception is being proposed and include findings for the review criteria listed below and any additional referenced criteria. These are directly from Oregon Administrative Rule and are available at http://arcweb.sos.state.or.us/rules/OARS_600/OAR_660/660_004.html. Oregon Revised Statute criteria are available at http://landru.leg.state.or.us/ors/

   a. Exception Requirements for Land Physically Developed to Other Uses
      (1) A local government may adopt an exception to a goal when the land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal.
      (2) Whether land has been physically developed with uses not allowed by an applicable Goal, will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception.

b. Exception Requirements for Land Irrevocably Committed to Other Uses

(1) A local government may adopt an exception to a goal when the land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable:
   (a) A "committed exception" is an exception taken in accordance with ORS 197.732(1)(b), Goal 2, Part II(b), and with the provisions of this rule;
   (b) For the purposes of this rule, an "exception area" is that area of land for which a "committed exception" is taken;
   (c) An "applicable goal," as used in this section, is a statewide planning goal or goal requirement that would apply to the exception area if an exception were not taken.

(2) Whether land is irrevocably committed depends on the relationship between the exception area and the lands adjacent to it. The findings for a committed exception therefore must address the following:
   (a) The characteristics of the exception area;
   (b) The characteristics of the adjacent lands;
   (c) The relationship between the exception area and the lands adjacent to it; and
   (d) The other relevant factors set forth in OAR 660-004-0028(6).

(3) Whether uses or activities allowed by an applicable goal are impracticable as that term is used in ORS 197.732(1)(b), in Goal 2, Part II(b), and in this rule shall be determined through consideration of factors set forth in this rule. Compliance with this rule shall constitute compliance with the requirements of Goal 2, Part II. It is the purpose of this rule to permit irrevocably committed exceptions where justified so as to provide flexibility in the application of broad resource protection goals. It shall not be required that local governments demonstrate that every use allowed by the applicable goal is "impossible." For exceptions to Goals 3 or 4, local governments are required to demonstrate that only the following uses or activities are impracticable:
   (a) Farm use as defined in ORS 215.203;
   (b) Propagation or harvesting of a forest product as specified in OAR 660-033-0120; and
   (c) Forest operations or forest practices as specified in OAR 660-006-0025(2)(a).

(4) A conclusion that an exception area is irrevocably committed shall be supported by findings of fact which address all applicable factors of section (6) of this rule and by a statement of reasons explaining why the facts support the conclusion that uses allowed by the applicable goal are impracticable in the exception area.

(5) Findings of fact and a statement of reasons that land subject to an exception is irrevocably committed need not be prepared for each individual parcel in the exception area. Lands which are found to be irrevocably committed under this rule may include physically developed lands.

(6) Findings of fact for a committed exception shall address the following factors:
   (a) Existing adjacent uses;
   (b) Existing public facilities and services (water and sewer lines, etc.);
   (c) Parcel size and ownership patterns of the exception area and adjacent lands:
      (i) Consideration of parcel size and ownership patterns under subsection (6)(c) of this rule shall include an analysis of how the existing development pattern came about and whether findings against the Goals were made at the time of partitioning or subdivision. Past land divisions made without application of the Goals do not in themselves demonstrate irrevocable commitment of the exception area. Only if development (e.g., physical improvements such as roads and underground facilities) on the resulting parcels or other factors make unsuitable their resource use or the resource use of nearby lands can the parcels be considered to be irrevocably committed. Resource and nonresource parcels created pursuant to the applicable goals shall not be used to justify a committed exception. For example, the presence of several parcels created for nonfarm dwellings or an intensive commercial agricultural operation under the provisions of an exclusive farm use zone cannot be used to justify a committed exception for land adjoining those parcels;

(ii) Existing parcel sizes and contiguous ownerships shall be considered together in relation to the land's actual use. For example, several contiguous undeveloped parcels (including parcels separated only by a road or highway) under one ownership shall be considered as one farm or forest operation. The mere fact that small parcels exist does not in itself constitute irrevocable commitment. Small parcels in separate ownerships are more likely to be irrevocably committed if the parcels are developed, clustered in a large group or clustered around a road designed to serve these parcels. Small parcels in separate ownerships are not likely to be irrevocably committed if they stand alone amidst larger farm or forest operations, or are buffered from such operations.

(d) Neighborhood and regional characteristics;

(e) Natural or man-made features or other impediments separating the exception area from adjacent resource land. Such features or impediments include but are not limited to roads, watercourses, utility lines, easements, or rights-of-way that effectively impede practicable resource use of all or part of the exception area;

(f) Physical development according to OAR 660-004-0025; and

(g) Other relevant factors.

(7) The evidence submitted to support any committed exception shall, at a minimum, include a current map, or aerial photograph which shows the exception area and adjoining lands, and any other means needed to convey information about the factors set forth in this rule. For example, a local government may use tables, charts, summaries, or narratives to supplement the maps or photos. The applicable factors set forth in section (6) of this rule shall be shown on the map or aerial photograph.

(8) The requirement for a map or aerial photograph in section (7) of this rule only applies to the following committed exceptions:

(a) Those adopted or amended as required by a Continuance Order dated after the effective date of section (7) of this rule; and

(b) Those adopted or amended after the effective date of section (7) of this rule by a jurisdiction with an acknowledged comprehensive plan and land use regulations.

c. Reasons Necessary to Justify an Exception Under Goal 2, Part II(c)

An exception Under Goal 2, Part II(c) can be taken for any use not allowed by the applicable goal(s). The types of reasons that may or may not be used to justify certain types of uses not allowed on resource lands are set forth in the following sections of this rule:

(1) For uses not specifically provided for in subsequent sections of this rule or in OAR 660-012-0070 or chapter 660, division 14, the reasons shall justify why the state policy embodied in the applicable goals should not apply. Such reasons include but are not limited to the following:

(a) There is a demonstrated need for the proposed use or activity, based on one or more of the requirements of Goals 3 to 19; and either

(b) A resource upon which the proposed use or activity is dependent can be reasonably obtained only at the proposed exception site and the use or activity requires a location near the resource. An exception based on this subsection must include an analysis of the market area to be served by the proposed use or activity. That analysis must demonstrate that the proposed exception site is the only one within that market area at which the resource depended upon can reasonably be obtained; or

(c) The proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site.

(2) Rural Residential Development: For rural residential development the reasons cannot be based on market demand for housing, except as provided for in this section of this rule, assumed continuation of past urban and rural population distributions, or housing types and cost characteristics. A county must show why, based on the economic analysis in the plan, there are reasons for the type and density of housing planned which require this particular location on resource lands. A jurisdiction could justify an exception to allow residential development on resource land outside an urban growth boundary by determining that the rural

location of the proposed residential development is necessary to satisfy the market demand for housing generated by existing or planned rural industrial, commercial, or other economic activity in the area.

(3) Rural Industrial Development: For the siting of industrial development on resource land outside an urban growth boundary, appropriate reasons and facts include, but are not limited to, the following:

- **(a)** The use is significantly dependent upon a unique resource located on agricultural or forest land. Examples of such resources and resource sites include geothermal wells, mineral or aggregate deposits, water reservoirs, natural features, or river or ocean ports; or
- **(b)** The use cannot be located inside an urban growth boundary due to impacts that are hazardous or incompatible in densely populated areas; or
- **(c)** The use would have a significant comparative advantage due to its location (e.g., near existing industrial activity, an energy facility, or products available from other rural activities), which would benefit the county economy and cause only minimal loss of productive resource lands. Reasons for such a decision should include a discussion of the lost resource productivity and values in relation to the county's gain from the industrial use, and the specific transportation and resource advantages which support the decision.

(4) Expansion of Unincorporated Communities: For the expansion of an Unincorporated Community defined under OAR 660-022-0010(10), appropriate reasons and facts include but are not limited to the following:

- **(a)** A demonstrated need for additional land in the community to accommodate a specific rural use based on Goals 3-19 and a demonstration that either:
  - **(i)** The use requires a location near a resource located on rural land; or
  - **(ii)** The use has special features necessitating its location in an expanded area of an existing unincorporated community, including:
    - **(a)** For industrial use, it would have a significant comparative advantage due to its location (i.e., near a rural energy facility, or near products available from other activities only in the surrounding area; or it is reliant on an existing work force in an existing unincorporated community);
    - **(b)** For residential use, the additional land is necessary to satisfy the need for additional housing in the community generated by existing industrial, commercial, or other economic activity in the surrounding area. The plan must include an economic analysis showing why the type and density of planned housing cannot be accommodated in an existing exception area or UGB, and is most appropriate at the particular proposed location. The reasons cannot be based on market demand for housing, nor on a projected continuation of past rural population distributions.
- **(b)** Need must be coordinated and consistent with the comprehensive plan for other exception areas, unincorporated communities, and UGBs in the area. Area encompasses those communities, exception areas, and UGBs which may be affected by an expansion of a community boundary, taking into account market, economic, and other relevant factors;
- **(c)** Expansion requires demonstrated ability to serve both the expanded area and any remaining infill development potential in the community at time of development with the level of facilities determined to be appropriate for the existing unincorporated community.

(5) Expansion of Urban Unincorporated Communities: Expansion of an urban unincorporated community defined under OAR 660-022-0010(9) shall comply with OAR 660-022-0040.

REVIEW PROCESS

Before this application will be processed, you must supply all the requested information pursuant to the attached instructions. Pursuant to ORS 215.427 this office will review the application for completeness and notify the applicant of any deficiencies within 30 days of submission. If you have questions, the following pages provide directions and helpful information in order to complete the application. Other questions can be addressed in the pre-application conference.

A request for a Goal Exception will be reviewed by the Wasco County Planning Commission at a public hearing. Upon receipt of a completed application, hearing dates will be set.

A recommendation on the proposal will be made by the Planning Commission and forwarded to the Wasco County Board of Commissioners where a final decision will be issued.

The decision of the Board of Commissioners may be appealed to the Land Use Board of Appeals (LUBA). Information regarding appeals to LUBA is available at the Wasco County Planning Department.

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P:\Development Applications\GoalException.docx **Last Updated 7/13/2017**

TO: WASCO COUNTY PLANNING COMMISSION

FROM: WASCO COUNTY PLANNING & ECONOMIC DEVELOPMENT OFFICE

SUBJECT: Request for Comprehensive Plan Amendment and Zone Change for a single 40 acre parcel in the Sevenmile Hill Area Committed to Residential Use; Exception to Goal 4.

HEARING DATE:

APPLICANT: David Wilson

NATURE OF REQUEST:

The request is for:

- Amendment to the County's Comprehensive Plan and plan map establishing an exception to Goal 4, "Forest Lands," for Applicant's tax lot 4400 consisting of 40.10 acres; and
- A change in the zone designation of tax lot 4400 from F-2 (80) "Forest Use" to F-F (10) "Forest-Farm."

RECOMMENDATION: The Planning Office recommends that the Planning Commission approve the request for a zone change, comprehensive plan amendment, and exception as set forth below. The subject property is both physically developed and irrevocably committed to non-forest uses, because residential uses both on and surrounding the subject property make forest uses impracticable. The criteria for the requested zone and plan changes are met, as explained in this submittal and the attached Exhibits.

BACKGROUND INFORMATION

PROPERTY OWNERS:

This request is for tax lot 2N 12E 22 4400, owned by applicant David Wilson, as shown on the maps in Exhibit 1. Tax lot 4400 is a legally created lot of record, and is referred to in this submittal as the "subject property."

COMPREHENSIVE PLAN AND ZONING DESIGNATIONS:

The subject property is designated forest use on the comprehensive plan map and currently zoned F-2 (80) for forest use.

PUBLIC FACILITIES AND SERVICES:

Transportation

The subject property lies south of Sevenmile Hill Road at the point where it intersects with Old Sevenmile Hill Road and Richard Road. At the point of the intersection of Sevenmile Hill Road and Dry Creek Road, and proceeding toward the northwest from the intersection, Sevenmile Hill Road becomes State Road. The primary access to the subject property is from Sevenmile Hill Road.

From the records of the Wasco County Road Department, State Road/Sevenmile Hill Road is a Functional Class RC Rural Major Collector with a 2009 ADT of 480 and a V/C Ratio of 0.01 [Data taken from Wasco County Transportation System Plan, 2009] The Planning Office prepared a memorandum to the County Court dated 2/18/98 as a staff report for the Transition Lands Study Area (TLSA) Rezoning Hearing. The TLSA memo listed a capacity for State Road/Sevenmile Hill Road of 1,500/day.

According to the latest version of the ITE Trip Generation Manual, a detached single family dwelling produces 9.57 Average Daily Trips (Land Use 210). The proposed zone change could potentially add 3 dwellings to the area's traffic load, producing 29 daily trips at maximum buildout. The addition of those trips to the existing ADT would result in 509 daily trips for the area. Based on the carrying capacity of State Road/Sevenmile Hill Road, the addition of 3 dwellings would not cause the V/C ratio to rise above 0.5. Wasco County has not established a mobility standard for Sevenmile Hill Road. However, in the 2009 Transportation System Plan the county used the ODOT mobility standard of 0.70 as a comparison figure. Using that standard, should the proposed zone change produce the maximum development allowed, it would not have a significant impact on the transportation facilities.

Water and Sewer

There is no public water system that would be available to serve existing or future residences on the subject property or surrounding lands, because of the rural nature of the area. A

Geologic Survey was published in 1996 as part of the TLSA study (see below under general history and prior land use actions) which included a survey of wells and groundwater levels to determine the capacity for development in the Sevenmile Hill area. The land around the subject property was found to have groundwater in relatively good quantities. The static water levels were found to be less than 50' and the depth to base of aquifer was found to be between 100' and 199.' (See Appendix 4 to the TLSA -- Ground Water Evaluation and Background Materials ("Groundwater Study") at pages 12-13.)

The predominant source of water in this area is from wells, and there is a well on the subject property serving the existing residence and associated accessory buildings. The general conclusion of the Groundwater Study is that this area has capacity to support additional residential development. See additional findings below regarding the TLSA study.

There are no public sewer facilities available in the area. Each residence would be required to handle its own sewage as required by law. At the permitting stage, each residential development would have to go through the site evaluation process for an individual septic system and private well. A maximum overall density of 1 residence per 10 acres has provided the necessary land area for adequate handling of sewage for individual properties in areas surrounding the subject property.

Electricity

Power lines are located on Sevenmile Hill Road, in close proximity to the site. Electric power is available to serve the subject property and currently serves the residence and associated accessory buildings located on the subject property.

Fire Protection and Prevention

The subject property is within the Mid-Columbia Fire and Rescue District (Structural) and Oregon Department of Forestry (Wildfire). The District has cooperation agreements with the Oregon Department of Forestry and with the Mosier Fire Protection District. When an alarm is received in one agency, it is also transferred to the other two, and when necessary, there is a combined, coordinated response to fire emergencies.

GENERAL HISTORY AND PRIOR LAND USE ACTIONS:

In 1993, Wasco County began work on the Transition Lands Study Area Project ("TLSA") in response to concerns about development in northern Wasco County, and particularly in the area surrounding the subject property, which area is known as the Sevenmile Hill area. The concerns included "availability of groundwater to serve domestic needs, fire hazard, conflict with wildlife, and available lands for rural residential lifestyle in this developing area."

The first phase of the project was a groundwater study. The initial study was published in December 1996 as the "TLSA Ground Water Evaluation, Wasco County, Oregon" by Jervey Geological Consulting (The Groundwater Study"). On September 12, 1997, the final report for the

TLSA was published, incorporating the Groundwater Study. The TLSA report included recommendations outlining the sub-areas within the study area that were suitable for residential development, rating them with scores for resource values and development values. Referring to Figure 11 in that report, which is a map indicating the combined values of the two scales, the subject property was rated "L/H," meaning that it scored low for Resource Values and high for Development Values.

The final Recommendation of the TLSA for the Sevenmile Hill area included:

- Retain the existing R-R(5) and A-1 (80) EFU zoning
- Retain the existing R-R(5) and A-1 (80) EFU zoning .
- Retain the existing F-F(10) areas that have a higher resource value or a low development value (for instance, in areas where water availability is unknown).
- Rezone the remainder of the F-F(10) lands to R-R(10). F-F(10) areas would be able to transfer development rights to the area identified as the test area.

As a result of the TLSA study, eight parcels of F-F(10) land in the Sevenmile Hill area north of the subject property were converted to R-R(10), removing the requirement for conditional use review of proposed non-farm/forest dwellings (ZNC 99-101 ZO-L and CPA 99-103-CP-L). In recent years the County has approved single family dwellings that have subsequently been built on nearly every lot surrounding the subject property.

Additional detailed area history is contained in Section 2 of this submittal.

JUSTIFICATION FOR REQUEST:

1. Wasco County Comprehensive Plan Revision Procedures and Standards.

1.1. The Comprehensive Plan's "Definitions-Existing Land Use Map" identify the subject property as: "Forestry – this designation includes all commercial forest land, both publicly and privately owned. Productivity is greater than 20 cubic feet per acre per year." Page 232 of the plan lists "Purpose Definitions of Map Classifications on the Comprehensive Plan Map." The existing plan classification, "Forest," states: "Purpose: To provide for all commercial and multiple use forest activities compatible with sustained forest yield."

1.2. This request is to change the classification of the subject property on the planning map to "Forest-Farm:" "Purpose: To provide for the continuation of forest and farm uses on soils which are predominantly class 7 and forest site class 6 and 7; and to preserve open space for forest uses (other than strictly commercial timber production) and for scenic value in the Gorge."

1.3. The following provisions apply and are addressed in the following sections.

1.4. Chapter 11 of the Comprehensive Plan establishes procedures and standards for revision of the plan and plan map. This request requires amendment of the text of the plan, to justify an exception to Goal 4, and an amendment to the plan map to designate the subject property for Forest-Farm (non-resource) uses.

1.5. Chapter 11 states that a comprehensive plan revision may be initiated by the property owner or his authorized representative. This amendment has been initiated by property owner David Wilson.

1.6. The proposal is quasi-judicial in character, and hearings in this matter are being conducted with quasi-judicial procedures and safeguards. Notice of the hearing on this action was provided to the Department of Land Conservation and Development as specified in ORS 197.610 and 615. (See attached Exhibit _)

1.7. General Criteria for a Plan Amendment.

Subsection H. of Chapter 11 of the comprehensive plan states:

"The following are general criteria which must be considered before approval of an amendment to the Comprehensive Plan is given:

1. Compliance with the statewide land use goals as provided by Chapter 15 or further amended by the Land Conservation and Development Commission, where applicable.

2. Substantial proof that such change shall not be detrimental to the spirit and intent of such goals.

3. A mistake in the original comprehensive plan or change in the character of the neighborhood can be demonstrated.

4. Factors which relate to the public need for healthful, safe and aesthetic surroundings and conditions.

5. Proof of change in the inventories originally developed.

6. Revisions shall be based on special studies or other information which will serve as the factual basis to support the change. The public need and justification for the particular change must be established."

1.7.1 As set forth by the County Court in Exhibit B of the Big Muddy Ranch – Young Life Youth and Family Camp Exception (September 1997), these are factors for consideration and not standards that must each be strictly met. Thus, the Planning Commission need only consider these criteria and determine whether they are generally satisfied.

1.7.2 The following findings demonstrate compliance with statewide land use planning goals that may apply to the request, as required by subsections 1 and 2 of the plan amendment general factors:

Goal 1 - Citizen Involvement. The purpose of Goal 1 is to ensure the "opportunity for citizens to be involved in all phases of the planning process." Wasco County has incorporated opportunities for citizen involvement in its Comprehensive Plan and zoning ordinance procedures. These proceedings are being conducted with notice and hearings with opportunity for public input as required by law and local ordinance. Compliance with Goal 1 is demonstrated by compliance with the applicable Plan and zoning ordinance provisions.

Goal 2 - Land Use Planning. The purpose of Goal 2 is "to establish a planning process and policy framework as a basis for all decisions and actions related to use of the land and to assure an adequate factual base for such decisions and actions." The County's planning process has been acknowledged as being in compliance with the goals, and was followed in consideration of the proposal. An adequate factual base is provided by this narrative, the attached exhibits, and testimony received through the hearing process. As discussed in greater detail below, the proposal also complies with Goal 2 requirements for the adoption of exceptions to a statewide goal, in this case, Goal 4. The proposal complies with Goal 2.

Goal 3 – Agricultural Lands. Goal 3 provides for the preservation of Agricultural Lands for farm use. The subject property has been designated for forest uses, not farm uses, although small scale (non-commercial) farm uses are possible in the area. Because the subject property has not been identified or inventoried as agricultural land, Goal 3 does not apply to the proposal; however small-scale farming activities possible in the area are promoted by the allowance of the proposal.

Goal 4 - Forest Lands. Goal 4 provides for the preservation of Forest Lands. The subject property is currently designated Forest Land. The intention of this proposal is to accurately reflect the nature of the subject property by changing the zoning to F-F(10). Because Goal 4 applies, and the requested plan and zone designations would allow development of non-forest uses, an "exception" must be taken to Goal 4. The exception is justified in part 2 of this narrative addressing LCDC's administrative rule requirements for "physically developed" and "irrevocably committed" exceptions.

Goal 5 -Open Spaces, Scenic and Historic Areas, and Natural Resources. Goal 5 is to protect natural resources and conserve scenic and historic areas and open spaces. The county zoning ordinances contain siting and development criteria, found in zoning ordinance section 3.920, for lands within Division 8 - Sensitive Wildlife Habitat Overlay designated areas in the county. The subject property is within the Sensitive Wildlife Habitat Overlay. Goal 5 is met by the application of these standards to any development of the subject property. No other inventoried Goal 5 resources are affected by the proposal. The proposal complies with Goal 5.

Goal 6 - Air, Water, and Land Resources Quality. Goal 6 is "To maintain and improve the quality of the air, water and land resources of the state." The proposal is consistent with Goal 6. The subject property is not located in or near a federal air quality attainment area, and will not generate significant additional air pollution. Sewage disposal from potential additional new dwellings must comply with all state and local requirements. Those requirements ensure that such discharges will be properly treated and disposed of, and will not threaten to exceed the carrying capacity of, or degrade or threaten the availability of, area natural resources. The proposal complies with Goal 6.

Goal 7 – Areas Subject to Natural Disasters and Hazards. Goal 7 is "To protect people and property from natural hazards." Goal 7 calls for local governments to adopt measures "to reduce risk to people and property from natural hazards." The subject property is not within any of the areas identified as being subject to natural disaster. The proposal complies with Goal 7.

Goal 8 – Recreational Needs. Goal 8 is "To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts." If the zoning is changed to F-F(10), "Parks, playgrounds, hunting and fishing preserves and campgrounds" would be allowed as conditional uses within the exception area. To the extent Goal 8 applies, the proposal is consistent with Goal 8.

Goal 9 – Economic Development. Goal 9 is "To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens." The proposal promotes Goal 9 by allowing residential uses, which the County considers to be the appropriate use of the subject property in view of existing development. The proposal is consistent with, and promotes Goal 9.

Goal 10 – Housing. Goal 10 is "To provide for the housing needs of citizens of the state." The rule is directed to lands in urban and urbanizable areas. However, the proposal will allow development of additional homes in an area that is already built and irrevocably committed to residential uses. Consistent with Goal 10, the proposal will improve housing opportunities in an area where such uses are appropriate.

Goal 11 - Public Facilities and Services. Goal 11 is "To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development." In this case, the proposed rural development is supported by facilities and services that are appropriate for, and limited to, the needs of the rural area to be served. Because the area is rural, public facilities such as water and sewer services are not considered necessary or appropriate. Public roads are available and adequate. Local fire and police services are provided by Mid- Columbia Fire and Rescue Department and the Wasco County Sheriff's Office. Neither water nor sewer services are provided to the area, but both are available on the subject property through individual well and septic tank systems. Electric and phone services are available in the area. The increased housing potential in the area is not great enough to have a significant impact on any facilities planned for under Goal 11. The density allowed by the change (1 residence per 10 acres) is less than the maximum density recommended by the TLSA study. The proposal complies with Goal 11.

Goal 12 - Transportation. Goal 12 is "To provide and encourage a safe, convenient and economic transportation system." The proposal will have little if any impact on the transportation system serving the subject property because there will be a minimal increase in traffic generated by development that might occur as a result of the plan amendment and zone change. Current estimates of use indicate that roads in the area are operating now well below their capacity, with Volume-to-Capacity ratios of 0.01. It is estimated that a maximum of 3 additional residences could be developed. Each residence is predicted to generate an average of 9.57 trips/day, which will not significantly affect the functionality, capacity, or level of service of Sevenmile Hill Road or other local roads.

In connection with Goal 12, the County is required to apply the Transportation Planning Rule in Chapter 660, Division 12 of the Oregon Administrative Rules. OAR 660-12-060 requires, as to amendments to a comprehensive plan or zoning ordinance that "significantly affect a transportation facility," that the County "assure that allowed land uses are consistent with the identified function, capacity, and level of service of the facility." The proposed action does not significantly affect a transportation facility, and is in conformance with Goal 12 and the Goal 12 rule.

Goal 13 - Energy Conservation. Goal 13 is "To conserve energy." Policy 3 directs the County to minimize energy consumption through the use of zoning and subdivision standards. In this case, Goal 13 is promoted by encouraging development near existing residential development and along established roads. The proposal conforms with and promotes Goal 13.

Goal 14 - Urbanization. Goal 14 is to "provide for an orderly and efficient transition from rural to urban land use." Goal 14 lists seven factors to be considered when establishing and changing urban growth boundaries, and four considerations for converting urbanizable land to urban uses. The subject property is not near or within an urban growth boundary, and is not urban or urbanizable. The density of housing that could occur in the

area following the requested plan amendment and zone change is one dwelling per ten acres, which is not an urban density. No decidedly "urban" services will be required to allow the maximum amount of development contemplated by this proposal. Water is available in the area in sufficient quantities to serve the proposed housing density (see Groundwater Evaluation). The proposed density will also allow sewage disposal through construction of on-site septic drainfields in accordance with DEQ and local health department requirements. To the extent Goal 14 applies to this proposal, conformance is demonstrated through detailed findings in this submittal addressing Goal 14 as required by Oregon Administrative Rules governing the exceptions process.

Goals 15 through 19 do not apply.

1.7.3 As noted above, subsection 3 of the County's plan revision factors requires consideration of whether: "A mistake in the original comprehensive plan or change in the character of the neighborhood can be demonstrated." As outlined in detail in the subsequent sections of this discussion, the subject property is the only parcel which touches Sevenmile Hill Road which is currently in resource zoning. The subject property is for all intents and purposes surrounded completely by residential development. It is not producing any marketable timber, and as outlined in the subsequent sections of this submittal, is unlikely to do so in the future. Comprehensive Plan Chapter 14 -- Findings and Recommendations outlines the anticipated uses for lands zoned F-2(80) as follows: "The 'F-2 (40)' and 'F-2 (80)' forest zones have very limited permitted uses and conditional uses that are generally compatible with primary timber management. Due to the high cost of these lands, the forty (40) and eighty (80) acre minimum lot sizes will be more than adequate to keep them in forest uses. Most of the lands zoned "F-2 (80)" is in either the Mt. Hood National Forest, White River Game Management Area or are private timber company holdings. These lands are adequately managed for forest, recreational and open space uses."

Merriam-Webster's defines "mistake" as "to identify wrongly; confuse with another" or "a misunderstanding of the meaning or implication of something." This proposal is being reviewed in a quasi-judicial proceeding, in which the County is considering whether proposed plan and zone designations for the subject property are more appropriate than the original designations. Based on the materials in this submittal, the County's original characterization of the area as most appropriate for commercial forest uses appears to have been incorrect. The area now appears not to be suitable for forestry uses, but to be more suitable for rural residential use. The TLSA study supports a conclusion that the original comprehensive plan was incorrect, and that the most appropriate zoning of the property is F-F(10), allowing for rural residences. The County's rezoning of several parcels north of Sevenmile Hill Road from F-F(10) to RR-10, allowing development of nonfarm or forest dwellings as uses permitted outright, also supports this conclusion. The approval of dwellings on, around, and immediately adjacent to the subject property also supports a finding that the character of the neighborhood has changed, toward residential, and away from forestry use.

1.7.4 As noted above, subsection 4 of the County's plan revision factors requires consideration of "Factors which relate to the public need for healthful, safe and aesthetic surroundings and conditions." This requirement is satisfied by the proposal, which is purposefully designed to allow limited residential development, and small-scale farm and forest uses, on land that is suited for such uses.

1.7.5 As noted above, Subsection 5 of the County's plan revision factors requires consideration of "Proof of change in the inventories originally developed." The proof required by this section is provided by these findings, the attached exhibits, and testimony and evidence obtained by the County through the hearing process. The County's original inventory of forest lands included the subject property. That inventory has changed, because housing has been allowed on, and in close proximity to the subject property, in a manner that diminishes its suitability for forest uses. The most appropriate manner of addressing this change is as proposed-demonstrate that the land is built and committed to non-resource uses, and justify an exception to Goal 4 that will officially remove the property from the County's Goal 4 inventory. The property can then be dedicated to small scale farm and forest uses with limited density housing in a manner that is consistent with adjacent uses and which is compatible to those forest resource lands nearby.

1.7.6 Subsection 6 of the County's plan revision factors states: "Revisions shall be based on special studies or other information which will serve as the factual basis to support the change. The public need and justification for the particular change must be established." As described throughout these findings, the proposed revisions are based on the TLSA study, previous County land use decisions affecting the area, as well as the information, justification and evidence contained and referenced in these findings and in the attached exhibits. These materials, and the County's plan, demonstrate that there is a public need for low-density rural residential uses and for small scale farm and forest uses in the county generally and in the Sevenmile Hill area. The justification for the particular change, addressed throughout these findings, is that the subject property is more properly designated for low density residential use than for commercial forestry uses. There is therefore a public need for the requested change, which has been fully justified by these findings and exhibits.

1.8 Transportation Planning Rule Compliance

Subsection I. of Chapter 11 of the comprehensive plan states:

"1. Review of Applications for Effect on Transportation Facilities - A proposed plan amendment, whether initiated by the County or by a private interest, shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with Oregon Administrative Rule (OAR) 660-012-0060 (the Transportation Planning Rule - "TPR"). 'Significant' means the proposal would:

a. Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan);

b. Change standards implementing a functional classification system; or

c. As measured at the end of the planning period identified in the adopted transportation system plan:

1. Allow land uses or levels of development that would result in types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility;

2. Reduce the performance of an existing or planned transportation facility below the minimum acceptable performance standard identified in the TSP; or

3. Worsen the performance of an existing or planned transportation facility that is otherwise projected to perform below the minimum acceptable performance standard identified in the TSP or comprehensive plan.

2. Amendments That Affect Transportation Facilities - Amendments to the land use regulations that significantly affect a transportation facility shall ensure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the TSP. This shall be accomplished by one or a combination of the following:

a. Adopting measures that demonstrate allowed land uses are consistent with the planned function, capacity, and performance standards of the transportation facility.

b. Amending the TSP or comprehensive plan to provide transportation facilities, improvements or services adequate to support the proposed land uses consistent with the requirements of Section -0060 of the TPR.

c. Altering land use designations, densities, or design requirements to reduce demand for vehicle travel and meet travel needs through other modes of transportation.

d. Amending the TSP to modify the planned function, capacity or performance standards of the transportation facility.

3. Traffic Impact Analysis - A Traffic Impact Analysis shall be submitted with a plan amendment application pursuant to Section 4.140 Traffic Impact Analysis (TIA)) of the Land Use and Development Ordinance."

1.8.1 A separate Traffic Impact Analysis is not required for this proposal because there is not a "significant impact" under the TPR (OAR 660-12-0060(1)).

1.9 Procedures for a Plan Amendment.

Subsection J. of Chapter 11 of the Comprehensive Plan states, in relevant part:

1. A petition must be filed with the Planning Offices on forms prescribed by the Commission.

2. Notice of a proposed revision within, or to, the urban growth boundary will be given to the appropriate city at least thirty (30) days before the County public hearing.

3. Notification of Hearing:

1) Notices of public hearings shall summarize the issues in an understandable and meaningful manner.

2) Notice of hearing of a legislative or judicial public hearing shall be given as prescribed in ORS 215.503 subject to ORS 215.508. In any event, notice shall be given by publishing notice in newspapers of general circulation at least twenty (20) days, but not more than forty (40) days, prior to the date of the hearing.

3) A quorum of the Planning Commission must be present before a public hearing can be held. If the majority of the County Planning Commission cannot agree on a proposed change, the Commission will hold another public hearing in an attempt to resolve the difference or send the proposed change to the County Governing Body with no recommendation.

4) After the public hearing, the Planning Commission shall recommend to the County Governing Body that the revision be granted or denied, and the facts and reasons supporting their decision. In all cases the Planning Commission shall enter findings based on the record before it to justify the decision. If the Planning Commission sends the proposed change with no recommendation, the findings shall reflect those items agreed upon and those items not agreed upon that resulted in no recommendation.

5) Upon receiving the Planning Commission's recommendation, the County Governing Body shall take such action as they deem appropriate. The County Governing Body may or may not hold a public hearing. In no event shall the County Governing Body approve the amendment until at least twenty (20) days have passed since the mailing of the recommendation to parties."

These procedures and all other applicable statutory and local procedures have been or will be followed in consideration of the proposal.

2. Justification for Taking an Exception to Goal 4:

2.1 Introduction.

In order to amend its plan to change the subject property's designation from Forestry to Forest-Farm, and to implement that designation through its zoning ordinance, the County must adopt an exception to Goal 4.

Statewide Land Use Planning Goal 4, "Forest Lands" is:

> "To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture."

ORS 197 .932(1) states, in relevant part:

> "(1) A local government may adopt an exception to a goal if:
>
> (a) The land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal; [or]
>
> (b) The land subject to the exception is irrevocably committed as described by Land Conservation and Development Commission rule to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable;
>
> * * *
>
> (4) A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the standards of subsection (1) of this section have or have not been met.
>
> (5) Each notice of a public hearing on a proposed exception shall specifically note that a goal exception is proposed and shall summarize the issues in an understandable manner.
>
> * * *
>
> (8) As used in this section, 'exception' means a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that:
>
> (a) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general applicability;
>
> (b) Does not comply with some or all goal requirements applicable to the subject properties or situations; and

(c) Complies with standards under subsection (1) of this section."

2.1.1 In like manner, Planning Goal 2, part II, states, in relevant part:

"A local government may adopt an exception to a goal when:

(a) The land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable Goal; [or]

(b) The land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable;"

2.1.2 Both the goal and the rule adopt the legislative definition of an exception with minor variation-subsection (c) is modified in the goal to state "Complies with standards for an exception" and in the rule to state "Complies with the provisions of this Division." OAR 660-004-0010 states that the "process is generally applicable to all or part of those statewide goals which prescribe or restrict certain uses of resource land," including: "Goal 4 'Forest Lands.'"

2.1.3 Goal 4 provides that:

"Where a * * * plan amendment involving forest lands is proposed, forest land shall include lands which are suitable for commercial forest uses including adjacent or nearby lands which are necessary to permit forest operations or practices and other forested lands that maintain soil, air, water and fish and wildlife resources."

2.1.4 Rule definitions of "resource land" and "non-resource land" support a conclusion that, in this instance, an exception is necessary before the subject property can be plan and zone designated for forest-farm uses, a rural residential, non-resource category of uses under the County's plan and zoning ordinance. To justify an exception, the County must address all applicable criteria in LCDC's rule for exceptions, OAR 660, Division 4.2.2.

This request is for both "physically developed" and "irrevocably committed" exceptions to Goal 4, "Forest Lands," which seeks to conserve forest lands by promoting efficient forest practices and sound management of the state's forest land base.

2.2 Exception Requirements for Land Physically Developed to Other Uses.

OAR 660-004-0025 contains standards for adoption of a "physically developed" exception.

OAR 660-004-0025 states:

(1) A local government may adopt an exception to a goal when the land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal. Other rules may also apply, as described in OAR 660-004-0000(1)

(2) Whether land has been physically developed with uses not allowed by an applicable goal will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception.

FINDING: The proposed exception area consists of a 40.10 acre piece identified as tax lot 4400 located in T2N, R12E, and in the southwestern quarter of Section 22 (the subject property). The north line of the subject property abuts Sevenmile Hill Road, and the northwest corner of the subject property is at the intersection of Sevenmile Hill Road and Old Sevenmile Hill Road. The subject property is rectangle measuring roughly 1,600 feet east/west and 1,500 north south. It is generally sloping downward to the north, with the northern boundary along Sevenmile Hill Road as the low point.

The subject property is improved with a log home with surrounding decks covering approximately 2,680 ft^2 and a 720 ft^2 basement located approximately halfway between the north and south boundaries and in the western one third of the property. A driveway serving the residence and properties to the south extends from the northwest corner of the subject property southward, generally paralleling the western boundary. There are two barns with stalls located generally east of the log home, each covering approximately 1,110 ft^2 for total coverage of 2,220 ft^2.

Further east of the hay loft and barn there is an original home site with cabin covering 1,980 ft^2 located generally east of the log home. There is an old barn located south of the cabin covering 1,200 ft^2.

The log home was built pursuant to a conditional use permit, the conditions of which required decommissioning the original cabin as a residential structure; however, the cabin legally exists and may be used for other uses consistent with the existing zoning.

A good portion of the southeastern portion of the subject property consists of a cleared area growing grass hay which previously served as a pasture for the cabin and now is baled each year. Most of the northern two thirds of the subject property has been cleared at some point in the past and remains clear at this time. There is no merchantable timber on the property, and the property has never supported merchantable timber. There are scrub oaks and pine trees growing on the southern portion and eastern boundary of the property. There are no fir trees of any size larger than a seedling on the property, and historically firs do not survive. Grasses and shrubs create moderately dense underbrush.

Soils on the subject property are Class 4, predominately 49C and 50D Wamic Loam, 5-12% slope. This soil type represents more gently sloping areas where the exposure is toward the north. On the subject property, this particular range of the soil class is characterized by smaller oak and scattered pine forest. These soils are suitable for dry farm small grain, grass hay, and pasture. The woodland site index designation of 70 for Ponderosa Pine indicates low productivity with no significant limitations or restrictions. This capability class is also designated under the pine-oak-fescue range and as such it is possible that it could be used for fruit orchards or other crops. In its uncultivated state, however, special management is required to reduce oak and shrub growth that will curtail stabilizing plant growth beneath what amounts to a thin, mainly pine canopy.

The area has no history of crop use with the exception of grass hay grown the pasture area. Due to the terrain and rocky soil, and because the elevation creates climatic extremes, crop agriculture is uneconomical and otherwise impracticable.

The subject property does not have a history of commercially successful grazing for sheep or cattle. Grazing was occasionally tried in the area in the 1940's, but the terrain, thin soil and climate have limited the activities to an occasional attempt rather than a sustained commercial success. There are no properties in the immediate area being used for commercial grazing.

Although the soils on the subject property could, at first glance, appear to indicate a potential for agricultural use, particularly small-scale orchards, that potential is severely reduced due to climatic conditions. The subject property is in current use for a residence, along with pasture and wildlife habitat in the scrub oak section. It has never been successfully utilized for agricultural purposes and has very limited value as forestland due to the dwellings on the site. The soils indicate low timber productivity. There are no productive orchards or other agricultural uses in the area immediately surrounding the subject property.

The residential development surrounding the subject property has occurred mainly in proximity to Sevenmile Hill Road that runs along the northern boundary of the subject property. Because of this development and ownership pattern, and because of the small average and odd shaped lot sizes, it would be impracticable to manage any of the property in the area as a commercial forestry operation or as part of such an operation.

2.3 Exception Requirements for Land Irrevocably Committed to Other Uses.

OAR 660-004-0028 contains standards for adoption of an "irrevocably committed" exception.

2.3.1 OAR 660-004-0028(1) provides:

(1) "A local government may adopt an exception to a goal when the land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable:

(a) A 'committed exception' is an exception taken in accordance with ORS 197.732(1)(b), Goal 2, Part II(b), and with the provisions of this rule;

(b) For the purposes of this rule, an 'exception area' is that area for which a 'committed exception' is taken;

(c) An 'applicable goal,' as used in this section, is a statewide planning goal or goal requirement that would apply to the exception area if an exception were not taken.

FINDING: The subject property contains a legal residence, and is surrounded on 2 sides by small residential tracts, and by a residence to the south. The subject property is irrevocably committed to non-resource use. All of the large forested tracts currently producing merchantable timber are located well south of the subject property, and adopting this exception for the subject property will not negatively impact those uses.

2.3.2 OAR 660-004-0028(2) provides: "Whether land is irrevocably committed depends on the relationship between the exception area and the lands adjacent to it. The findings for a committed exception therefore must address the following:

(a) The characteristics of the exception area;"

FINDING: The characteristics of the subject property are fully discussed in the findings above in response to OAR 660-004-0025 (Physically Developed).

2.3.3 (b) "the characteristics of the adjacent lands;"

FINDING:

In general, the areas to the East and North of the subject property have been for the most part divided into smaller lots relative to rural development (10 acres or less). A large majority of the parcels were created long before the area was subject to statewide or even county-wide zoning regulation. Of the three subdivisions in the immediate area of the subject parcel, two were platted in the early part of the 20th century, and the third in 1979 (Fairmont Orchard Tracts-1911;

Sunnydale Orchards-1912; Flyby Night Subdivision-1979). The majority of the lots in these subdivisions are approximately 5 acres in size. The County has recognized the existing parcelization by zoning the area for rural residential development (R-R(5) and R-R(10)) and for small-scale agriculture or forestry uses in conjunction with a rural residence (F-F(10)). As a result of this parcelization and in keeping with the zoning, there has been a significant amount of rural residential development, particularly along the county roads and within the platted subdivisions. There have also been several applications for rural residences in the areas zoned F-F(10).

Specific adjacent lands analysis is as follows:

East: Directly to the east of and abutting the subject parcel are two parcels zoned F-F(10): T2N R12E, Section 22, Lots 4300 and 4200. Both of these lots have residences.

Properties further east along Wits End Drive and Sevenmile High South Road are zoned R-R(10) and all have residences (tax lots 3600, 3400, 3800, 3900, 4000). These properties average approximately 5 acres in size and are part of the Fairmont Orchard Tracts subdivision which was platted in 1911.

North: To the north of the subject property across Sevenmile Hill Road is a lot zoned R-R(5), Tax Lot 4600 (7.35 ac.), and a small lot owned by Wasco County (Tax Lot 4500, .7 acres). 4600 has a residence. Tax Lot 4700 meets the subject property on its northeast corner, is zoned F-F(10), and has a residence.

Properties north of the subject property lying along Richard Road are small acreages zoned R-R(5), all with residences.

All of the area north of the subject property is built and committed to low and medium density rural residential uses. There are two platted subdivisions: Sunnydale Orchards, platted in 1912, and Flyby Night, platted 1979.

The Sunnydale Orchards Subdivision was recorded on March 8, 1912. It consisted of 25 lots averaging about five acres each, with the largest at 11.4 acres. Lots in the subdivision are for the most part less than ten acres each. The County has recognized that development has increased in this area over the years, and rezoned several lots in the southern part of Sunnydale Orchards from F-F(10) to R-R(10) (Pursuant to Ordinance 99-111).

The plat for the Flyby Night Subdivision was recorded November 8, 1979. The Flyby Night lots average approximately five acres each, with two larger, approximately 20-acre parcels as the exceptions. The zoning for the Flyby Night subdivision is R-R(5).

The areas to the north and east are the most heavily developed areas surrounding the subject property. As can be seen by the maps in Exhibits 1, virtually all lots to the north and east of the subject property have been improved with a residence or a manufactured home.

The County has recognized that development has increased in this area over the years, and rezoned several lots in the southern part of Sunnydale Orchards from F-F(10) to R-R(10) (Pursuant to Ordinance 99-111).

West: Tax lot 2N 10E 21 900, which abuts the west property line of the subject parcel, is split zoned, with the northern portion which abuts Sevenmile Hill Road zoned F-F(10) and the southern portion zoned F-2(80). The southern portion has not been commercially logged, and is slowly being cleared. Tax Lot 2900, a 439 acre parcel, abuts the southwest portion and corner of the subject property and is zoned F-2(80). It has a residence located on the western portion along Osburn Cutoff Road. This property has a creek running generally north-south which forms a clear line of demarcation between the more vibrant, productive land to the west and the scrubbier soils to the east. The land west of the creek supports the growth of Douglas Fir trees; the land to the east is predominantly scrub oak and pine similar to the subject property. The commercial logging on this piece has been confined to the area west of the creek.

In general, the parcels to the west of the subject property lying both north and south of and abutting Sevenmile Hill Road consist of small acreages zoned F-F(10), almost all improved with residences.

The subject property is the only parcel which touches Sevenmile Hill Road which is zoned F-2(80). The only other parcels similarly zoned which touch any road are large, unimproved parcels located well west of the subject property which lie south of and touch Dry Creek Road or which lie along Osburn Cutoff Road.

South: Tax lot 2N 10E 22 4100 abutting the subject property to the south is zoned F-2(80). It is owned by the owner of the subject property, and has a legal residence, and together with tax lot 2800 to the south, also in common ownership, comprises approximately 70 acres. It is not used for timber production. This parcel is transected by the BPA Bonneville-The Dalles power line right-of-way/easement, which forms a natural boundary between this parcel and the larger, commercially forested tracts to the south.

Soils: The subject property soils are 49C and 50D Wamic Loam. The parcels immediately north of the subject property are generally 51D Wamic Loam soils. Adjacent properties to the south and east are 49C and 50D, like the subject property. (See soils maps and productivity indices) 49C and 50D soils both have a site index of 70 for Ponderosa Pine, indicating a potential yield of 20-49 cubic feet per acre. However, with the exception of the 439 acre parcel adjoining the southwest corner of the subject property, none of the adjacent properties are supporting commercial timber production, and logging on the 439 acre parcel takes place west of the creek which runs parallel to the common boundary. All commercial timber production occurs well south of the subject property, generally south of the BPA power line transecting the area. The subject property has never produced merchantable timber or been logged commercially.

2.3.4 (c) The relationship between the exception area and the lands adjacent to it;

FINDING: As described in the preceding sections of this submittal, the subject property is surrounded on two sides by residential lots in the F-F(10), R-R(10), and R-R(5) zones. None of

these zones are resource zones. The subject property also has a residence located on the parcel immediately south of it; and even the large resource zoned tract abutting the southwest corner of the subject property is improved with a residence, although it is located some distance from the subject property. Thus, the subject parcel has residences surrounding it on all 4 sides, non-resource zoning designations on parcels abutting it on 3 sides, and intensive residential development on parcels abutting on 2 sides.

In general, all of the properties which adjoin Sevenmile Hill Road are committed to residential development and uses and are zoned accordingly. The subject parcel stands out as an anomaly in this pattern. Particularly in light of the fact that the subject property is already improved with a residence, the F-F(10) designation is far more consistent with the uses of adjacent lands than the F-2(80) designation. There is no evidence, historically or recently, that the subject property is or could be used for commercial timber production, and attempting to do so now would inevitably lead to conflicts with the immediately adjacent residential uses. Looking at the existing zoning map, it is clear that the large forestry designations are intentionally and more properly sited well away from the residential development which lies along a rural arterial road such as Sevenmile Hill.

2.3.5 (d) The other relevant factors set forth in OAR 660-004-0028(6).

FINDING: These factors are discussed in the following sections.

2.3.6 OAR 660-004-0028(3) provides: "Whether uses or activities allowed by an applicable goal are impracticable as that term is used in ORS 197.732(2)(b), in goal 2, Part II(b), and in this rule shall be determined through consideration of factors set forth in this rule. Compliance with this rule shall constitute compliance with the requirements of Goal 2, Part II. It is the purpose of this rule to permit irrevocably committed exceptions where justified so as to provide flexibility in the application of broad resource protection goals. It shall not be required that local governments demonstrate that every use allowed by the applicable goal is 'impossible.' For exceptions to Goals 3 or 4, local governments are required to demonstrate that only the following uses or activities are impracticable;

(a) Farm use as defined in ORS 215.203;

(b) Propagation or harvesting of a forest product as specified in OAR 660-033-0120;

(c) Forest operations or forest practices as specified in OAR 660-006-0025(2)(a)."

In turn, ORS 215.203(2)(a) states:

"[F]arm use" means the current employment of land for the primary purpose of obtaining a profit in money by raising, harvesting and selling crops or the feeding, breeding, management and sale of, or the produce of, livestock, poultry, fur-bearing animals or honeybees or for dairying and the sale of dairy products or any other

agricultural or horticultural use or animal husbandry or any combination thereof. "Farm use" includes the preparation, storage and disposal by marketing or otherwise of the products or by-products raised on such land for human or animal use. "Farm use" also includes the current employment of land for the primary purpose of obtaining a profit in money by stabling or training equines including but not limited to providing riding lessons, training clinics and schooling shows. "Farm use" also includes the propagation, cultivation, maintenance and harvesting of aquatic, bird and animal species that are under the jurisdiction of the State Fish and Wildlife Commission, to the extent allowed by the rules adopted by the commission. "Farm use" includes the on-site construction and maintenance of equipment and facilities used for the activities described in this subsection. "Farm use" does not include the use of land subject to the provisions of ORS chapter 321, except land used exclusively for growing cultured Christmas trees as defined in subsection (3) of this section or land described in ORS 321.267 (3) or 321.824 (3).)

OAR 660-033-0120 contains a chart of uses that are allowed outright, conditionally, or not authorized on agricultural lands, including "farm use" and "propagation or harvesting of a forest product," and OAR 660-006-0025(2)(a) states:

(a) Forest operations or forest practices including, but not limited to, reforestation of forest land, road construction and maintenance, harvesting of a forest tree species, application of chemicals, and disposal of slash;

FINDING: The rule does not require that the listed resource uses be impossible in the exception area; rather, it requires that they be impracticable. Impracticable means "not capable of being carried out in practice." Webster's New World Dictionary, 2nd College Edition, 1980. Capable means "having ability" or "able to do things well." Id. Finally, "in practice" means by the usual method, custom or convention. Id. Webster's Third New International Dictionary, (unabridged ed., 1993) defines "impracticable" as "**1a** : not practicable : incapable of being performed or accomplished by the means employed or at command : INFEASIBLE * * * **c** : IMPRACTICAL, UNWISE, IMPRUDENT * * *"

Based on the foregoing, the County must evaluate to what extent the adjacent uses and other factors affect the ability of property owners to carry out resource uses in practice on the subject parcel. The rule only requires evaluating whether the resource use can be carried out by the usual, available methods or customs. Consequently, just because a farm or forest use can be attained by methods that are not usual or customary does not mean that the farm or forest use is practicable. Using the area for commercial agricultural or forestry uses—in a manner capable of generating a profit or return from those activities—is not practicable on the subject parcel for all of the reasons stated in this submittal. Resource designation is not necessary to preserve the area for small scale farm or forestry uses in conjunction with residential use.

A definition of "forest products" can be found in ORS 532.010(4), which states that forest products are "any form, including but not limited to logs, poles and piles, into which a fallen tree may be cut before it undergoes manufacturing, but not including peeler cores."

The current level of residential development has increased to the point that commercial resource use has become impracticable. The subject property is surrounded on three sides by existing residential development, with the potential for additional residential development in the future. Conflicts caused by the proximity of residential neighbors on three sides require added expense related to fire protection, fencing and general control of the area, and prevent the use of spraying to control insects and vegetation that compete with commercial tree species. Further conflicts with residences arise because of the noise associated with commercial operations and the safety risks of logging near residential property.

The effects of these conflicts and impacts from residential uses combined with the long cycle for trees to reach maturity (100-125 years) make commercial forestry and commercial agriculture impracticable at this location. As explained throughout this submittal, residential development abutting and in close proximity to the subject property, coupled with the relatively small size of the subject property and local topography and climate, supports a conclusion that there is an inadequate buffer between the subject property and nearby rural residences. The steps that would need to be taken to efficiently and effectively manage timber in the area makes such uses impracticable.

To the extent this section requires that a justification for an exception to Goal 4 also requires consideration of the suitability of the area for farm uses, the record of this proceeding and the attached exhibits demonstrate the lack of suitability of the area for farm uses. The soils in the area are not generally suitable for farm use, nor is the climate conducive to those uses. At no time has the County considered the subject parcel to be farmland or to be suitable for farming, and at no time in the history of the area has farming taken place. Due to the existing parcelization, soils, climate and development in the area, it cannot be, and is not currently employed for the primary purpose of obtaining a profit from agricultural uses. The history of the area also supports this conclusion. At best, the area can support the small-scale, "peripheral" farm activities now taking place on adjacent F-F and R-R zoned properties, under circumstances in which residential use represents the primary and most highly valued use.

2.3.7 OAR 660-004-0028(4) provides: "A conclusion that an exception area is irrevocably committed shall be supported by findings of fact which address all applicable factors of section (6) of this rule and by a statement of reasons explaining why the facts support the conclusion that uses allowed by the applicable goal are impracticable in the exception area."

FINDING: This submittal, including this statement and all attached exhibits, addresses all applicable factors and reasons why, in this case, the facts support the conclusion that uses allowed by Goals 3 and 4 are impracticable in the exception area. See especially, the immediately preceding sections of this submittal, and sections addressing section (6) of the rule, below.

2.3.8 OAR 660-004-0028(5) provides: "Findings of fact and a statement of reasons that land subject to an exception is irrevocably committed need not be prepared

for each individual parcel in the exception area. Lands which are found to be irrevocably committed under this rule may include physically developed lands."

FINDING: As discussed elsewhere in this submittal, the subject property includes a legal residence, other buildings, and associated physical development. The presence of the dwelling, and of the other dwellings immediately adjacent to the subject property, each contribute to the irrevocable commitment of the area to rural residential uses, and the impracticability of using the area for farm or forest uses.

2.3.9 OAR 660-004-0028(6) provides: Findings of fact for a committed exception shall address the following factors:

2.3.9.1 (a) Existing adjacent uses;

FINDING: The existing adjacent uses are discussed and considered in great detail in the sections above. Existing adjacent uses to the West, North and East are all residential.

2.3.9.2 (b) Existing public facilities and services (water and sewer lines, etc.);

FINDING: There are no public water or sewer facilities on the subject property. An existing well provides water to the dwelling. Electric power and phone service are available to the area. The property can be adequately served by existing fire, police and school facilities.

2.3.9.3 "(c) Parcel size and ownership patterns of the exception area and adjacent lands:

(A) Consideration of parcel size and ownership patterns under subsection (6)(c) of this rule shall include an analysis of how the existing development pattern came about and whether findings against the Goals were made at the time of partitioning or subdivision. Past land divisions made without application of the Goals do not in themselves demonstrate irrevocable commitment of the exception area. Only if development (e.g., physical improvements such as roads and underground facilities on the resulting parcels) or other factors make unsuitable their resource use or the resource use of nearby lands can the parcels be considered to be irrevocably committed. Resource and nonresource parcels created pursuant to the applicable goals shall not be used to justify a committed exception. For example, the presence of several parcels created for nonfarm dwellings or an intensive agricultural operation under the provisions of an exclusive farm use zone cannot be used to justify a committed exception for land adjoining those parcels."

FINDING: As discussed in great detail above and in the attached exhibits, the existing development pattern for the Sevenmile Hill area was established prior to the adoption of the goals. Many of the small parcels that characterize the area were created between 1900 and 1920 and were marketed as orchard sites that could support a family. The lots in the vicinity of the subject

property were not successful because of the cold and dry weather at this location and elevation. Virtually all of the existing lots have been developed and now have non-resource residences located on them. Only two parcels in the immediate area were created via exceptions to the goals: 7.35 acres located at 6955 Sevenmile Hill Road (Comprehensive Plan Amendment from F-2(40) to Rural Residential, CPA 89-104, October, 1989); and 9.87 acres located at the intersection of Sevenmile Hill Road and Sevenmile High Hill Road (Comprehensive Plan Amendment from FF-10 to Rural Residential, CPA 90-101, June 1990). Neither of these goal exception parcels are pivotal to the analysis of parcel size and ownership patterns in the immediate area. As noted, the local parcelization occurred long before the development of the goals, and the parcels created by that process have now been almost entirely developed.

(B) "Existing parcel sizes and contiguous ownerships shall be considered together in relation to the land's actual use. For example, several contiguous undeveloped parcels (including parcels separated only by a road or highway) under one ownership shall be considered as one farm or forest operation. The mere fact that small parcels exist does not in itself constitute irrevocable commitment. Small parcels in separate ownerships are more likely to be irrevocably committed if the parcels are developed, clustered in a large group or clustered around a road designed to serve these parcels. Small parcels in separate ownership are not likely to be irrevocably committed if they stand alone amidst larger farm or forest operations, or are buffered from such operations."

FINDING: This provision is not applicable to this single parcel proposal; however, ownership patterns in the general area are discussed in detail in preceding sections of this narrative addressing OAR 660-004-0028(2)(a)-(c). The parcels are clustered along roads serving the area, as is the subject property, and virtually all parcels in the area are in separate ownerships. This parcelization pre-dates the adoption of the county zoning ordinance and comprehensive plan.

2.3.9.4 "(d) Neighborhood and regional characteristics;"

FINDING: Based on the descriptions already provided in this submittal, the neighborhood and regional characteristics can best be described as non-resource, small acreage rural residential development clustered along Sevenmile Hill Road. Considering these characteristics, the current designation of the subject property as the only resource designated property touching Sevenmile Hill Road stands out as an anomaly. The exception will serve to make the subject property more conforming with existing neighborhood and regional characteristics.

2.3.9.5 "(e) Natural or man-made features or other impediments separating the exception area from resource land. Such features or impediments include but are not limited to roads, watercourses, utility lines, easements, or rights-of-way that effectively impede practicable resource use of all or part of the exception area;"

FINDING: In general, the BPA Bonneville-The Dalles power line right-of-way/easement, which transects the local area south of the subject property, serves to separate the more residential areas

to the north from the commercial forest areas to the south. As noted, most of the residential development lies in the immediate area along Sevenmile Hill Road, with most of the commercial forest areas lying well to the south and being served by secondary or primitive roads.

2.3.9.6 (f) "Physical development according to OAR 660-004-0025." OAR 660-004-0025 sets forth the "Exception Requirements for Land Physically Developed to Other Uses" as follows:

(1) A local government may adopt an exception to a goal when the land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal.

(2) Whether land has been physically developed with uses not allowed by an applicable Goal, will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception."

FINDING: Part of the justification for this exception is that the subject property is already physically developed with a dwelling, outbuildings, and associated access roads and other infrastructure. The minimum lot size for a forest dwelling is currently 240 acres, and the subject property is approximately 40 acres.

2.3.9.7 "(g) Other relevant factors;"

To the extent there are other relevant factors, they are discussed throughout this submittal and not repeated here.

2.3.10 OAR 660-004-0028(7) provides: The evidence submitted to support any committed exception shall, at a minimum, include a current map, or aerial photograph which shows the exception area and adjoining lands, and any other means needed to convey information about the factors set forth in this rule. For example, a local government may use tables, charts, summaries, or narratives to supplement the maps or photos. The applicable factors set forth in section (6) of this rule shall be shown on the map or aerial photograph.

FINDING: The submittal complies with this requirement, and includes current maps as Exhibit 1 showing the subject property and adjoining lands.

2.3.11 OAR 660-004-0040 concerns the:

"Application of Goal 14 Urbanization to Rural Residential Areas," the purpose of which: "is to specify how Statewide Planning Goal 14, Urbanization, applies to rural lands in acknowledged exception areas planned for residential uses."

Subsections -0040(1) through (3) explain what the rule does. It does not apply to land within an urban growth boundary; unincorporated community; urban reserve area; destination resort; resource land; and "nonresource land, as defined in OAR 660-004-0005(3)." The following sections of this submittal demonstrate compliance with Goal 14 as and to the extent specified in OAR 660-004-0040.

2.3.11.1 Although it is not entirely clear, OAR 660-004-0040 does not appear to include standards that apply to the land use decisions requested by this submittal. The land in question is currently classified as resource land, and the request is to establish an exception to Goal 4 that will allow rural residential development on lots that are a minimum of ten acres per dwelling, or otherwise at a density that cannot exceed one dwelling for every ten acres in the area. The F-F(10) zoning to be applied will ensure that the requested housing density is not exceeded. The proposed housing density is not an urban density. No sewer or water services exist near the area or are proposed, and there are no other "urban" attributes of development that could occur if the request is granted.

2.3.11.2 OAR 660-004-0040(4) and (5) provide:

> "(4) The rural residential areas described in Subsection (2)(a) of this rule are rural lands. Division and development of such lands are subject to Statewide Planning Goal 14, Urbanization which prohibits urban use of rural lands.
>
> (5)(a) A rural residential zone currently in effect shall be deemed to comply with Goal 14 if that zone requires any new lot or parcel to have an area of at least two acres.
>
> (b) A rural residential zone does not comply with Goal 14 if that zone allows the creation of any new lots or parcels smaller than two acres. For such a zone, a local government must either amend the zone's minimum lot and parcel size provisions to require a minimum of at least two acres or take an exception to Goal 14. Until a local government amends its land use regulations to comply with this subsection, any new lot or parcel created in such a zone must have an area of at least two acres.

(c) For purposes of this section, 'rural residential zone currently in effect' means a zone applied to a rural residential area, in effect on the effective date of this rule, and acknowledged to comply with the statewide planning goals."

FINDING: This section does not appear to be an approval standard applicable to the request. However, the proposed zone will not allow the creation of any new lots or parcels within the exception area smaller than two acres, in conformance with this section.

2.3.11.3 OAR 660-004-0040(6) and (7) provide:

"(6) After October 4, 2000, a local government's requirements for minimum lot or parcel sizes in rural residential areas shall not be amended to allow a smaller minimum for any individual lot or parcel without taking an exception to Goal 14 pursuant to OAR chapter 660, division 14, and applicable requirements of this division."

FINDING: The County recognizes the requirements of this section. No request has been made to allow smaller minimum lot sizes than allowed by the rule.

"(7)(a) The creation of any new lot or parcel smaller than two acres in a rural residential area shall be considered an urban use. Such a lot or parcel may be created only if an exception to Goal 14 is taken. This subsection shall not be construed to imply that creation of new lots or parcels two acres or larger always complies with Goal 14. The question of whether the creation of such lots or parcels complies with Goal 14 depends upon compliance with all provisions of this rule."

FINDING: The underlying zone will prevent the creation of any new lot or parcel in the subject property smaller than two acres. Lot sizes allowed in the area comply with all provisions of the Goal 2 rule for exceptions.

(b) Each local government must specify a minimum area for any new lot or parcel that is to be created in a rural residential area. For purposes of this rule, that minimum area shall be referred to as the minimum lot size.

FINDING: The minimum lot size proposed is ten acres.

(c) If, on October 4, 2000, a local government's land use regulations specify a minimum lot size of two acres or more, the area of any new lot or parcel shall equal or exceed that minimum lot size which is already in effect.

FINDING: As stated, the minimum lot size of the underlying zone is currently ten acres, and that minimum lot size will apply on the subject property area.

(d) If, on October 4, 2000, a local government's land use regulations specify a minimum lot size smaller than two acres, the area of any new lot or parcel created shall equal or exceed two acres.

FINDING: As stated, the County's land use regulations do not specify a minimum lot size smaller than two acres.

(e) A local government may authorize a planned unit development (PUD), specify the size of lots or parcels by averaging density across a parent parcel, or allow clustering of new dwellings in a rural residential area only if all conditions set fo1th in paragraphs (7)(e)(A) through (7)(e)(H) are met:

*****

FINDING: The current proposal does not include a Planned Unit Development.

(f) Except as provided in subsection (e) of this section, a local government shall not allow more than one permanent single-family dwelling to be placed on a lot or parcel in a rural residential area. Where a medical hardship creates a need for a second household to reside temporarily on a lot or parcel where one dwelling already exists, a local government may authorize the temporary placement of a manufactured dwelling or recreational vehicle."

FINDING: In conformance with this section, the County is not proposing to allow more than one permanent single-family dwelling to be placed on any lot or parcel in the proposed rural residential area.

(g) In rural residential areas, the establishment of a new mobile home park or manufactured dwelling park as defined in ORS 446.003(32) shall be considered an urban use if the density of manufactured dwellings in the park exceeds the density for residential development set by this rule's requirements for minimum lot and parcel sizes. Such a park may be established only if an exception to Goal 14 is taken.

FINDING: The current proposal does not include a mobile home park or manufactured dwelling park.

(h) A local government may allow the creation of a new parcel or parcels smaller than a minimum lot size required under subsections (a) through (d) of this section without an exception to Goal 14 only if the conditions described in paragraphs (A) through (D) of this subsection exist:

(A) The parcel to be divided has two or more permanent habitable dwellings on it;

(B) The permanent habitable dwellings on the parcel to be divided were established there before the effective date of this rule;

(C) Each new parcel created by the partition would have at least one of those permanent habitable dwellings on it;

(D) The partition would not create any vacant parcels on which a new dwelling could be established.

(E) For purposes of this rule, habitable dwelling means a dwelling that meets the criteria set forth in ORS 215.283(t)(A)-(t)(D).

FINDING: Because the County is not allowing the creation of new parcels smaller than the minimum lot size required under subsections (a) through (d), subsections (A) through (E) of this section do not apply to the proposal.

(i) For rural residential areas designated after the effective date of this rule, the affected county shall either:

(A) Require that any new lot or parcel have an area of at least ten acres, or

(B) Establish a minimum lot size of at least two acres for new lots or parcels in accordance with the requirements of Section (6). The minimum lot size adopted by the county shall be consistent with OAR 660-004-0018, 'Planning and Zoning for Exception Areas.'"

FINDING: In this case, the County is establishing an overall density of residential development allowed as a ratio of one dwelling for every ten acres.

3. Justification for a Zone Change:

3.1 Zoning Ordinance - Chapter 9:

Chapter 9 of the Wasco County Land Use and Development Ordinance (zoning ordinance), entitled "Zone Change and Ordinance Amendment," includes standards and procedures for zone changes. Section 9.010 states:

"Application for a zone change may be initiated as follows:

*****

C. By application filed with the Director of Planning upon forms prescribed by the Director of Planning and signed by a property owner with the area of the proposed change, and containing such information as may be required by the [Director of Planning][1] to establish the criteria for the change (quasi-judicial only);"

[1] Missing text in published version of Section 9.010.

As indicated previously, this zone change was initiated by property owner David Wilson. Planning staff is presenting the proposal with a recommendation for approval.

3.2 Zoning Ordinance - Section 9.020

Section 9.020, entitled "Criteria for Decision," provides as follows:

"The Approving Authority may grant a zone change only if the following circumstances are found to exist:

A. The original zoning was the product of a mistake; or

B. It is established that

1. The rezoning will conform with the Comprehensive Plan; and,

2. The site is suitable to the proposed zone;

3. There has been a conscious consideration of the public health, safety and welfare in applying the specific zoning regulations."

3.2.1 This request is for a plan amendment and an exception to Goal 4. The previous section of this discussion establishes that the current F-2(80) zoning can be considered a mistake given the location and characteristics of the subject property and its relationship to surrounding residential uses.

3.2.2. This narrative and the attached exhibits also establish that the requirements of subsection B. have been met: B(l) is met because the Comprehensive Plan is being amended specifically to support the proposed zoning designation; B(2) is met because the site is suitable to the proposed F-F(10) zone; and B(3) is met because through this zone change application and process there has been a conscious consideration of the public health, safety and welfare in applying the specific zoning regulations.

3.2.3. The Wasco County Comprehensive Plan contains goals that mirror the statewide goals, and policies to carry them out. Except as discussed in these findings, the plan does not contain approval standards that apply to the requested zone change. The zone change is proposed with due consideration of all relevant comprehensive plan goals and policies, as required by section B(1):

Goal 1 - Citizen Involvement.

The purpose of Goal 1 is to ensure the "opportunity for citizens to be involved in all phases of the planning process." Wasco County has incorporated opportunities in its Comprehensive Plan and the zoning ordinance. Compliance with Goal 1 is demonstrated by compliance with the applicable

plan and zoning ordinance provisions with opportunity for public input and by the public hearings required as part of this application and process.

Goal 2 – Land Use Planning.

The County's land use planning goal requires that procedures be established and followed to ensure public participation in land use decision making, and that there is an "adequate factual base" for land use decisions. All applicable procedures have or will be complied with in the consideration of this proposal. These findings and the record of this proceeding are a more than adequate factual base for the decision.

Goal 3 - Agricultural Lands.

Goal 3 provides for the preservation of Agricultural Lands for farm use. There are no Goal 3 designated Agricultural Lands on the subject property and Goal 3 therefore does not apply.

Goal 4 -- Forest Lands.

Goal 4 provides for the preservation of Forest Lands. The subject property is currently designated Forest Land, but is not now in timber production and has not historically been in timber production. As discussed in the preceding sections of this discussion, the subject property is not generally suitable for commercial forestry due to its development and use as residential property; its proximity to other residential properties; and its soil characteristics and historic uses. The proposal is to redesignate the property for rural residential uses, which will not have any impact on lands actually being used for commercial forestry.

Goal 5 - Open Spaces, Scenic and Historic Areas and Natural Resources.

The County zoning ordinances contain siting and development criteria, found in zoning ordinance section 3.920, for lands within Division 8 - Sensitive Wildlife Habitat Overlay designated areas in the County. The subject property is within the Sensitive Wildlife Habitat Overlay. Goal 5 is met by the application of these standards to any development of the subject property. No other inventoried Goal 5 resources are affected by the proposal. The proposal complies with Goal 5.

Goal 6 - Air, Land and Water Quality.

Goal 6 is "To maintain and improve the quality of the air, water and land resources of the state." The proposal is consistent with Goal 6. The subject property is not located in or near a federal air quality attainment area, and will not generate significant additional air pollution. Sewage disposal from potential additional new dwellings must comply with all state and local requirements. Those requirements ensure that such discharges will be properly treated and disposed of, and will not threaten to exceed the carrying capacity of, or degrade or threaten the availability of, area natural resources. The proposal complies with Goal 6.

Goal 7 -- Areas Subject to Natural Disasters and Hazards.

The subject property is not within any areas identified by the County as Natural Hazard Areas.

Goal 8 -Recreational Needs.

Goal 8 is "To satisfy the recreational needs of the citizens of Wasco County and visitors." None of the policies of Goal 8 apply to the proposal.

Goal 9 -- Economy of the State.

Goal 9 is "To diversify and improve the economy of Wasco County." The proposal promotes Goal 9 by allowing residential uses, which the County considers to be the appropriate use of the subject property in view of existing development. The proposal is consistent with, and promotes Goal 9.

Goal 10 -- Housing.

Goal 10 is "To provide for the housing needs of the citizens of Wasco County." There is an ongoing need for developable rural residential lots, and corresponding pressure on resource lands to fill that need. The proposed zone change helps to ameliorate that pressure by creating potential rural residential lots while having no impact on lands actually in forest production.

Goal 11 -- Public Facilities and Services.

Goal 11 is to "plan and develop a timely, orderly, and efficient arrangement of public facilities and services to provide a framework for urban and rural development." The existing services and facilities in the area of the subject property are adequate for the proposal. The subject property adjoins Sevenmile Hill Road. Local fire and police services are provided by the rural fire protection district and the sheriff s office. Neither water nor sewer services are provided to the subject property, but are available on the subject property through individual well(s) and septic tank systems.

Goal 12 -Transportation.

Goal 12 is 'To provide and encourage a safe, convenient and economic transportation system." The goal does not have approval standards, and is otherwise implemented through County transportation planning. The proposal will have little if any impact on the transportation system serving the subject property because there will be minimal increase in traffic generated by development that might occur as a result of the zone change. It is estimated that a maximum of 3 additional residences could be developed. Each residence is predicted to generate an average of 9.57 trips/day, which will not significantly affect the functionality, capacity, or level of service of Sevenmile Hill Road or other local roads. In connection with Goal 12, the County is required to apply the Transportation Planning Rule located in Chapter 660, Division 12 of the Oregon Administrative Rules. OAR 660-12-060 requires amendments to comprehensive plans that "significantly affect a transportation facility...assure that allowed land uses are consistent with the identified function, capacity, and level of service of the facility." Sevenmile Hill/State Road

is classified as a Rural Major Collector, which is consistent with the level of traffic from the rural residential uses that feed into it.

Goal 13 - Energy Conservation.

This Goal is met by application of development standards contained in the zoning ordinance.

Goal 14 -Urbanization.

The level of existing development and possible development does not constitute "urban use." Goal 14 does not, therefore, apply. It should be noted, however, that Policy 3 of Goal 14 encourages "subdivisions to be developed by a planned development approach, maximizing physical design, the retention of open space and reducing adverse impacts. The proposed zone change for the subject property is consistent with that policy.

3.2.5 Subsection B(2) of zoning ordinance section 9.020 requires that the site be shown to be "suitable to the proposed use." The proposed zone would allow, outright, farm and forest uses and dwellings on parcels of at least ten acres in conjunction with farm or forest uses. In discussing the Forest-Farm zone, zoning ordinance section 3.220.A. states:

"The purpose of the Forest-farm zone is to permit those lands which have not been in commercial agriculture or timber production to be used for small-scale, part-time farm or forest units by allowing residential dwellings in conjunction with a farm use while preserving open space and other forest uses."

3.2.5..1. The Forest-Farm zone is not a resource zone. (See October 11, 1995 non-resource determination letter Exhibit WC-Q, Betzing Record). In this case, it is the most suitable designation for the subject property, which has been physically developed and entirely committed to nonresource use due to its location in close proximity to major county rural residential areas. The area is suitable to the proposed use as described in the attached exhibits and otherwise as described in the reports and testimony received in this proceeding.

3.2.5..2. The history of the area is also relevant to addressing this standard. As discussed in the Irrevocably Committed section of this discussion, the extensive parcelization that took place to the west, north, and east of the subject property has resulted, over time, in the building and commitment of the surrounding area to non-resource, rural residential uses. As explained in previous sections of this narrative, the presence of dwellings in and adjacent to the subject property complicates and

increases the cost of commercial forestry in that area in a manner rendering commercial forestry impracticable.

3.2.6 Subsection B(3) of zoning ordinance section 9.020 requires, prior to approval of a zone change, that it be established that "There has been a conscious consideration of the public health, safety and welfare in applying the specific zoning regulations." The exhibits and record of this proceeding support a finding of compliance with this requirement. This requirement for rezoning has been met.

3.3 Zoning Ordinance – Section 9.030

Section 9.030 requires review of the proposed action to determine whether it significantly affects a transportation facility. As discussed in Section 1.8, the proposed zone change will not significantly affect a transportation facility.

3.4 Zoning Ordinance – Section 9.040

Section 9.040 allows for the imposition of such reasonable conditions "as are necessary to insure the compatibility of a zone change to surrounding uses and as are necessary to fulfill the general and specific purposes of this Ordinance." The Section lists without limitation eight general categories of areas which may be conditioned to achieve the desired compatibility. Because the minimum lot size in the proposed zone change is 10 acres, because the uses surrounding the subject property are almost entirely rural residential, and because any future development will require compliance with applicable building and development standards, no conditions are necessary as part of this application to ensure the compatibility of the subject property to the surrounding uses.

3.5 Zoning Ordinance – Section 9.060 – 9.080

Sections 9.060 through 9.080 require that the Planning Commission hold a hearing on the proposed zone change and make a recommendation to the County Board of Commissioners, which shall then take such action as it deems appropriate no sooner than twenty days after receipt of the Planning Commission's recommendation.

CONCLUSION

Because of the unique circumstances of the relationship between the subject property and surrounding land as explained above, the proposed residential uses will not commit adjacent or nearby resource land to nonresource use. The rural residential uses allowed are compatible with nearby resource use. Based upon all of the findings of fact and conclusions of law set forth above, the Planning Director recommends approval of the exception and zone change and recommends that the subject property be rezoned to F-F(10), and that the corresponding Plan, map and ordinance changes be made.

SOIL INTERPRETATIONS RECORD

49C WAMIC LOAM 5 TO 12 PERCENT NORTH SLOPES

THE WAMIC SERIES CONSISTS OF DEEP WELL DRAINED SOILS FORMED IN AEOLIAN MATERIALS ON RIDGETOPS AND PLATEAUS. TYPICALLY, THE SURFACE LAYER IS VERY DARK GRAYISH BROWN LOAM ABOUT 7 INCHES THICK. THE SUBSOIL IS DARK BROWN LOAM ABOUT 21 INCHES THICK. THE SUBSTRATUM IS DARK BROWN LOAM ABOUT 16 INCHES THICK. DEPTH TO BEDROCK IS 40 TO 60 INCHES OR MORE. ELEVATION IS 1000 TO 3600 FEET. MEAN ANNUAL PRECIP. IS 14 TO 20 INCHES. MEAN ANNUAL AIR TEMP. IS 46 TO 50 DEGREES F. THE FROST-FREE PERIOD IS 100 TO 150 DAYS.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-7	L	ML, CL-ML	A-4	0	95-100	95-100	90-95	55-75	20-25	NP-5
7-28	L, SIL	ML, CL-ML	A-4	0	95-100	95-100	90-95	55-75	20-25	NP-5
28-44	L, SCL	ML	A-4	0	95-100	95-100	90-95	55-75	30-35	5-10
44	UWB									

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-7	15-25	1.10-1.30	0.6-2.0	0.19-0.22	6.6-7.3	-	LOW	.49	4	-	1-2	MODERATE	LOW
7-28	18-27	1.20-1.35	0.6-2.0	0.19-0.22	6.6-7.3	-	LOW	.43					
28-44	20-30	1.30-1.45	0.2-0.6	0.13-0.15	6.6-7.3	-	LOW	.43					
44													

FLOODING FREQUENCY	FLOODING DURATION	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENTIAL FROST ACTION
NONE		>6.0			-		40-60	HARD	-		B	MODERATE

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-PERCS SLOWLY
SEWAGE LAGOON AREAS	SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	SEVERE-DEPTH TO ROCK
SANITARY LANDFILL (AREA)	MODERATE-DEPTH TO ROCK,SLOPE
DAILY COVER FOR LANDFILL	FAIR-AREA RECLAIM,SLOPE,THIN LAYER

CONSTRUCTION MATERIAL

ROADFILL	FAIR-AREA RECLAIM,THIN LAYER
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	FAIR-SLOPE

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-PIPING
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	SLOPE,ERODES EASILY
TERRACES AND DIVERSIONS	SLOPE,ERODES EASILY
GRASSED WATERWAYS	SLOPE,ERODES EASILY

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	MODERATE-DEPTH TO ROCK,SLOPE
DWELLINGS WITHOUT BASEMENTS	MODERATE-SLOPE
DWELLINGS WITH BASEMENTS	MODERATE-DEPTH TO ROCK,SLOPE
SMALL COMMERCIAL BUILDINGS	SEVERE-SLOPE
LOCAL ROADS AND STREETS	MODERATE-SLOPE,FROST ACTION
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	MODERATE-SLOPE

RECREATIONAL DEVELOPMENT

CAMP AREAS	MODERATE-SLOPE,DUSTY	PLAYGROUNDS	SEVERE-SLOPE
PICNIC AREAS	MODERATE-SLOPE,DUSTY	PATHS AND TRAILS	SEVERE-ERODES EASILY

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPABILITY	WHEAT, WINTER (BU)		GRASS HAY (TONS)											
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
	4E		35		1.5											

Severe limitations (e) erosion

WOODLAND SUITABILITY

	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORTY.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
	4A	MODERATE	SLIGHT	MODERATE	SLIGHT	SEVERE	PONDEROSA PINE OREGON WHITE OAK	70.*	PONDEROSA PINE

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

WILDLIFE HABITAT SUITABILITY

	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
	FAIR	GOOD	GOOD	FAIR	FAIR	FAIR	V. POOR	V. POOR	FAIR	FAIR	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)
IDAHO FESCUE	FEID	45
BLUEBUNCH WHEATGRASS	AGSP	10
SANDBERG BLUEGRASS	POSE	5
ARROWLEAF BALSAMROOT	BASA3	2
ANTELOPE BITTERBRUSH	PUTR2	10
OREGON WHITE OAK	QUGA4	5
PONDEROSA PINE	PIPO	5
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		950
NORMAL YEARS		800
UNFAVORABLE YEARS		450

FOOTNOTES

* SITE INDEX IS A SUMMARY OF 5 OR MORE MEASUREMENTS ON THIS SOIL.

SOIL INTERPRETATIONS RECORD

500 WAMIC LOAM, 12 TO 20 PERCENT SLOPES

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7-28	L, SIL	ML, CL-ML	A-4	0	95-100	95-100	90-95	55-75	20-25	NP-5
28-44	L, SCL	ML	A-4	0	95-100	95-100	90-95	55-75	30-35	5-10
44	UWB									

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0-7	15-25	1.10-1.30	0.6-2.0	0.19-0.22	6.6-7.3	-	LOW	.49	4	-	1-2	MODERATE	LOW
7-28	18-27	1.20-1.35	0.6-2.0	0.19-0.22	6.6-7.3	-	LOW	.43					
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44													

FLOODING			HIGH WATER TABLE			CEMENTED PAN		BEDROCK		SUBSIDENCE		HYD GRP	POTENTIAL FROST ACTION
FREQUENCY	DURATION	MONTHS	DEPTH (FT)	KIND	MONTHS	DEPTH (IN)	HARDNESS	DEPTH (IN)	HARDNESS	INIT. (IN)	TOTAL (IN)		
NONE			>6.0			-		40-60	HARD	-		B	MODERATE

SANITARY FACILITIES

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SEWAGE LAGOON AREAS	SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	SEVERE-DEPTH TO ROCK,SLOPE
SANITARY LANDFILL (AREA)	SEVERE-SLOPE
DAILY COVER FOR LANDFILL	POOR-SLOPE

CONSTRUCTION MATERIAL

ROADFILL	FAIR-AREA RECLAIM,THIN LAYER,SLOPE
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GRAVEL	IMPROBABLE-EXCESS FINES
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WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-PIPING
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LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-SLOPE

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-SLOPE	PLAYGROUNDS	SEVERE-SLOPE
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	4E		35		1.5											

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	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
	4A	MODERATE	MODERATE	MODERATE	SLIGHT	SEVERE	PONDEROSA PINE OREGON WHITE OAK	70 *	PONDEROSA PINE

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

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POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
POOR	FAIR	GOOD	FAIR	FAIR	FAIR	V. POOR	V. POOR	FAIR	FAIR	V. POOR	-

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OREGON WHITE OAK	QUGA4	5
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POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		950
NORMAL YEARS		800
UNFAVORABLE YEARS		450

FOOTNOTES

* SITE INDEX IS A SUMMARY OF 5 OR MORE MEASUREMENTS ON THIS SOIL.

RECEIVED 9-25-92
From ODF

Ponderosa Pine Site Classes and Site Index Table
Compared with Cubic Foot Site Classes

	Site Index										
Site Index →	40	50	60	70	80	90	100	110	120	130	140	150	160
ential Yield bic Feet Per Acre Gross Cubic Foot	20	20-49			50-84		85-119		120-164		165-224		225+
bic Foot e Class	7	6			5		4		3		2		1

Red Fir - Noble Fir - Pacific Silver Fir Site Index and
Cubic Foot Site Class Table (Forest Survey)

	Site Index				
	20	30	40	50	60
ential Yield Cubic Feet/Acre	50-84	85-119	120-164	165-224	
Cubic Foot Site Class	5	4	3	2	

Sitka Spruce Site Index and Cubic Foot
Site Class Table (Forest Survey)

	Site Index										
	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190
Potential Yield Cubic Feet/Acre	20-49	50-84		85-119		120-164		165-224			225+				
Cubic Foot Site Class	6	5		4		3		2			1				

TO: WASCO COUNTY PLANNING COMMISSION

FROM: WASCO COUNTY PLANNING & ECONOMIC DEVELOPMENT OFFICE

SUBJECT: Request for Comprehensive Plan Amendment and Zone Change for a single 40 acre parcel in the Sevenmile Hill Area Committed to Residential Use; Exception to Goal 4.

HEARING DATE:

APPLICANT: David Wilson

NATURE OF REQUEST:

The request is for:

- Amendment to the County's Comprehensive Plan and plan map establishing an exception to Goal 4, "Forest Lands," for Applicant's tax lot 4400 consisting of 40.10 acres; and
- A change in the zone designation of tax lot 4400 from F-2 (80) "Forest Use" to F-F (10) "Forest-Farm."

RECOMMENDATION: The Planning Office recommends that the Planning Commission approve the request for a zone change, comprehensive plan amendment, and exception as set forth below. The subject property is both physically developed and irrevocably committed to non-forest uses, because residential uses both on and surrounding the subject property make forest uses impracticable. The criteria for the requested zone and plan changes are met, as explained in this submittal and the attached Exhibits.

BACKGROUND INFORMATION

PROPERTY OWNERS:

This request is for tax lot 2N 12E 22 4400, owned by applicant David Wilson, as shown on the maps in Exhibit 1. Tax lot 4400 is a legally created lot of record, and is referred to in this submittal as the "subject property."

COMPREHENSIVE PLAN AND ZONING DESIGNATIONS:

The subject property is designated forest use on the comprehensive plan map and currently zoned F-2 (80) for forest use.

PUBLIC FACILITIES AND SERVICES:

Transportation

The subject property lies south of Sevenmile Hill Road at the point where it intersects with Old Sevenmile Hill Road and Richard Road. At the point of the intersection of Sevenmile Hill Road and Dry Creek Road, and proceeding toward the northwest from the intersection, Sevenmile Hill Road becomes State Road. The primary access to the subject property is from Sevenmile Hill Road.

From the records of the Wasco County Road Department, State Road/Sevenmile Hill Road is a Functional Class RC Rural Major Collector with a 2009 ADT of 480 and a V/C Ratio of 0.01 [Data taken from Wasco County Transportation System Plan, 2009] The Planning Office prepared a memorandum to the County Court dated 2/18/98 as a staff report for the Transition Lands Study Area (TLSA) Rezoning Hearing. The TLSA memo listed a capacity for State Road/Sevenmile Hill Road of 1,500/day.

According to the latest version of the ITE Trip Generation Manual, a detached single family dwelling produces 9.57 Average Daily Trips (Land Use 210). The proposed zone change could potentially add 3 dwellings to the area's traffic load, producing 29 daily trips at maximum buildout. The addition of those trips to the existing ADT would result in 509 daily trips for the area. Based on the carrying capacity of State Road/Sevenmile Hill Road, the addition of 3 dwellings would not cause the V/C ratio to rise above 0.5. Wasco County has not established a mobility standard for Sevenmile Hill Road. However, in the 2009 Transportation System Plan the county used the ODOT mobility standard of 0.70 as a comparison figure. Using that standard, should the proposed zone change produce the maximum development allowed, it would not have a significant impact on the transportation facilities.

Water and Sewer

There is no public water system that would be available to serve existing or future residences on the subject property or surrounding lands, because of the rural nature of the area. A

Geologic Survey was published in 1996 as part of the TLSA study (see below under general history and prior land use actions) which included a survey of wells and groundwater levels to determine the capacity for development in the Sevenmile Hill area. The land around the subject property was found to have groundwater in relatively good quantities. The static water levels were found to be less than 50' and the depth to base of aquifer was found to be between 100' and 199.' (See Appendix 4 to the TLSA -- Ground Water Evaluation and Background Materials ("Groundwater Study") at pages 12-13.)

The predominant source of water in this area is from wells. There are two wells on the subject property (see Well Reports WASC 003131, WASC 003111, & WASC 003105). Yields are 50 & 60 GPM. There is also a well located on applicant's property to the south of the subject property yielding 35 GPM (see Well Report WASC 1609). The wells on the subject property have the capacity to support additional residential development, and the yields of all wells indicate adequate groundwater supply in the area. See additional findings below regarding the TLSA study.

There are no public sewer facilities available in the area. Each residence would be required to handle its own sewage as required by law. At the permitting stage, each residential development would have to go through the site evaluation process for an individual septic system and private well. A maximum overall density of 1 residence per 10 acres has provided the necessary land area for adequate handling of sewage for individual properties in areas surrounding the subject property.

Electricity

Power lines are located on Sevenmile Hill Road, in close proximity to the site. Electric power is available to serve the subject property and currently serves the residence and associated accessory buildings located on the subject property.

Fire Protection and Prevention

The subject property is within the Mid-Columbia Fire and Rescue District (Structural) and Oregon Department of Forestry (Wildfire). The District has cooperation agreements with the Oregon Department of Forestry and with the Mosier Fire Protection District. When an alarm is received in one agency, it is also transferred to the other two, and when necessary, there is a combined, coordinated response to fire emergencies.

GENERAL HISTORY AND PRIOR LAND USE ACTIONS:

In 1993, Wasco County began work on the Transition Lands Study Area Project ("TLSA") in response to concerns about development in northern Wasco County, and particularly in the area surrounding the subject property, which area is known as the Sevenmile Hill area. The concerns included "availability of groundwater to serve domestic needs, fire hazard, conflict with wildlife, and available lands for rural residential lifestyle in this developing area."

The first phase of the project was a groundwater study. The initial study was published in December 1996 as the "TLSA Ground Water Evaluation, Wasco County, Oregon" by Jervey Geological Consulting (The Groundwater Study"). On September 12, 1997, the final report for the TLSA was published, incorporating the Groundwater Study. The TLSA report included recommendations outlining the sub-areas within the study area that were suitable for residential development, rating them with scores for resource values and development values. Referring to Figure 11 in that report, which is a map indicating the combined values of the two scales, the subject property was rated "L/H," meaning that it scored low for Resource Values and high for Development Values.

The final Recommendation of the TLSA for the Sevenmile Hill area included:

- Retain the existing R-R(5) and A-1 (80) EFU zoning
- Retain the existing R-R(5) and A-1 (80) EFU zoning .
- Retain the existing F-F(10) areas that have a higher resource value or a low development value (for instance, in areas where water availability is unknown).
- Rezone the remainder of the F-F(10) lands to R-R(10). F-F(10) areas would be able to transfer development rights to the area identified as the test area.

As a result of the TLSA study, eight parcels of F-F(10) land in the Sevenmile Hill area north of the subject property were converted to R-R(10), removing the requirement for conditional use review of proposed non-farm/forest dwellings (ZNC 99-101 ZO-L and CPA 99-103-CP-L). In recent years the County has approved single family dwellings that have subsequently been built on nearly every lot surrounding the subject property.

Additional detailed area history is contained in Section 2 of this submittal.

JUSTIFICATION FOR REQUEST:

1. Wasco County Comprehensive Plan Revision Procedures and Standards.

1.1. The Comprehensive Plan's "Definitions-Existing Land Use Map" identify the subject property as: "Forestry – this designation includes all commercial forest land, both publicly and privately owned. Productivity is greater than 20 cubic feet per acre per year." Page 232 of the plan lists "Purpose Definitions of Map Classifications on the Comprehensive Plan Map." The existing plan classification, "Forest," states: "Purpose: To provide for all commercial and multiple use forest activities compatible with sustained forest yield."

1.2. This request is to change the classification of the subject property on the planning map to "Forest-Farm:" "Purpose: To provide for the continuation of forest and farm

uses on soils which are predominantly class 7 and forest site class 6 and 7; and to preserve open space for forest uses (other than strictly commercial timber production) and for scenic value in the Gorge."

1.3. The following provisions apply and are addressed in the following sections.

1.4. Chapter 11 of the Comprehensive Plan establishes procedures and standards for revision of the plan and plan map. This request requires amendment of the text of the plan, to justify an exception to Goal 4, and an amendment to the plan map to designate the subject property for Forest-Farm (non-resource) uses.

1.5. Chapter 11 states that a comprehensive plan revision may be initiated by the property owner or his authorized representative. This amendment has been initiated by property owner David Wilson.

1.6. The proposal is quasi-judicial in character, and hearings in this matter are being conducted with quasi-judicial procedures and safeguards. Notice of the hearing on this action was provided to the Department of Land Conservation and Development as specified in ORS 197.610 and 615. (See attached Exhibit _____)

1.7. General Criteria for a Plan Amendment.

Subsection H. of Chapter 11 of the comprehensive plan states:

"The following are general criteria which must be considered before approval of an amendment to the Comprehensive Plan is given:

1. Compliance with the statewide land use goals as provided by Chapter 15 or further amended by the Land Conservation and Development Commission, where applicable.

2. Substantial proof that such change shall not be detrimental to the spirit and intent of such goals.

3. A mistake in the original comprehensive plan or change in the character of the neighborhood can be demonstrated.

4. Factors which relate to the public need for healthful, safe and aesthetic surroundings and conditions.

5. Proof of change in the inventories originally developed.

6. Revisions shall be based on special studies or other information which will serve as the factual basis to support the change. The public need and justification for the particular change must be established."

1.7.1 As set forth by the County Court in Exhibit B of the Big Muddy Ranch – Young Life Youth and Family Camp Exception (September 1997), these are factors for consideration and not standards that must each be strictly met. Thus, the Planning Commission need only consider these criteria and determine whether they are generally satisfied.

1.7.2 The following findings demonstrate compliance with statewide land use planning goals that may apply to the request, as required by subsections 1 and 2 of the plan amendment general factors:

Goal 1 - Citizen Involvement. The purpose of Goal 1 is to ensure the "opportunity for citizens to be involved in all phases of the planning process." Wasco County has incorporated opportunities for citizen involvement in its Comprehensive Plan and zoning ordinance procedures. These proceedings are being conducted with notice and hearings with opportunity for public input as required by law and local ordinance. Compliance with Goal 1 is demonstrated by compliance with the applicable Plan and zoning ordinance provisions.

Goal 2 - Land Use Planning. The purpose of Goal 2 is "to establish a planning process and policy framework as a basis for all decisions and actions related to use of the land and to assure an adequate factual base for such decisions and actions." The County's planning process has been acknowledged as being in compliance with the goals, and was followed in consideration of the proposal. An adequate factual base is provided by this narrative, the attached exhibits, and testimony received through the hearing process. As discussed in greater detail below, the proposal also complies with Goal 2 requirements for the adoption of exceptions to a statewide goal, in this case, Goal 4. The proposal complies with Goal 2.

Goal 3 – Agricultural Lands. Goal 3 provides for the preservation of Agricultural Lands for farm use. The subject property has been designated for forest uses, not farm uses, although small scale (non-commercial) farm uses are possible in the area. Because the subject property has not been identified or inventoried as agricultural land, Goal 3 does not apply to the proposal; however small-scale farming activities possible in the area are promoted by the allowance of the proposal.

Goal 4 - Forest Lands. Goal 4 provides for the preservation of Forest Lands. The subject property is currently designated Forest Land. The intention of this proposal is to accurately reflect the nature of the subject property by changing the zoning to F-F(10). Because Goal 4 applies, and the requested plan and zone designations would allow development of non-forest uses, an "exception" must be taken to Goal 4. The exception

is justified in part 2 of this narrative addressing LCDC's administrative rule requirements for "physically developed" and "irrevocably committed" exceptions.

Goal 5 -Open Spaces, Scenic and Historic Areas, and Natural Resources. Goal 5 is to protect natural resources and conserve scenic and historic areas and open spaces. The county zoning ordinances contain siting and development criteria, found in zoning ordinance section 3.920, for lands within Division 8 - Sensitive Wildlife Habitat Overlay designated areas in the county. The subject property is within the Sensitive Wildlife Habitat Overlay. Goal 5 is met by the application of these standards to any development of the subject property. No other inventoried Goal 5 resources are affected by the proposal. The proposal complies with Goal 5.

Goal 6 - Air, Water, and Land Resources Quality. Goal 6 is "To maintain and improve the quality of the air, water and land resources of the state." The proposal is consistent with Goal 6. The subject property is not located in or near a federal air quality attainment area, and will not generate significant additional air pollution. Sewage disposal from potential additional new dwellings must comply with all state and local requirements. Those requirements ensure that such discharges will be properly treated and disposed of, and will not threaten to exceed the carrying capacity of, or degrade or threaten the availability of, area natural resources. The proposal complies with Goal 6.

Goal 7 – Areas Subject to Natural Disasters and Hazards. Goal 7 is "To protect people and property from natural hazards." Goal 7 calls for local governments to adopt measures "to reduce risk to people and property from natural hazards." The subject property is not within any of the areas identified as being subject to natural disaster. The proposal complies with Goal 7.

Goal 8 – Recreational Needs. Goal 8 is "To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts." If the zoning is changed to F-F(10), "Parks, playgrounds, hunting and fishing preserves and campgrounds" would be allowed as conditional uses within the exception area. To the extent Goal 8 applies, the proposal is consistent with Goal 8.

Goal 9 – Economic Development. Goal 9 is "To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens." The proposal promotes Goal 9 by allowing residential uses, which the County considers to be the appropriate use of the subject property in view of existing development. The proposal is consistent with, and promotes Goal 9.

Goal 10 – Housing. Goal 10 is "To provide for the housing needs of citizens of the state." The rule is directed to lands in urban and urbanizable areas. However, the proposal will allow development of additional homes in an area that is already built

and irrevocably committed to residential uses. Consistent with Goal 10, the proposal will improve housing opportunities in an area where such uses are appropriate.

Goal 11 - Public Facilities and Services. Goal 11 is "To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development." In this case, the proposed rural development is supported by facilities and services that are appropriate for, and limited to, the needs of the rural area to be served. Because the area is rural, public facilities such as water and sewer services are not considered necessary or appropriate. Public roads are available and adequate. Local fire and police services are provided by Mid-Columbia Fire and Rescue Department and the Wasco County Sheriff's Office. Neither water nor sewer services are provided to the area, but both are available on the subject property through individual well and septic tank systems. Electric and phone services are available in the area. The increased housing potential in the area is not great enough to have a significant impact on any facilities planned for under Goal 11. The density allowed by the change (1 residence per 10 acres) is less than the maximum density recommended by the TLSA study. The proposal complies with Goal 11.

Goal 12 - Transportation. Goal 12 is "To provide and encourage a safe, convenient and economic transportation system." The proposal will have little if any impact on the transportation system serving the subject property because there will be a minimal increase in traffic generated by development that might occur as a result of the plan amendment and zone change. Current estimates of use indicate that roads in the area are operating now well below their capacity, with Volume-to-Capacity ratios of 0.01. It is estimated that a maximum of 3 additional residences could be developed. Each residence is predicted to generate an average of 9.57 trips/day, which will not significantly affect the functionality, capacity, or level of service of Sevenmile Hill Road or other local roads.

In connection with Goal 12, the County is required to apply the Transportation Planning Rule in Chapter 660, Division 12 of the Oregon Administrative Rules. OAR 660-12-060 requires, as to amendments to a comprehensive plan or zoning ordinance that "significantly affect a transportation facility," that the County "assure that allowed land uses are consistent with the identified function, capacity, and level of service of the facility." The proposed action does not significantly affect a transportation facility, and is in conformance with Goal 12 and the Goal 12 rule.

Goal 13 - Energy Conservation. Goal 13 is "To conserve energy." Policy 3 directs the County to minimize energy consumption through the use of zoning and subdivision standards. In this case, Goal 13 is promoted by encouraging development near existing residential development and along established roads. The proposal conforms with and promotes Goal 13.

Goal 14 - Urbanization. Goal 14 is to "provide for an orderly and efficient transition from rural to urban land use." Goal 14 lists seven factors to be considered when establishing and changing urban growth boundaries, and four considerations for converting urbanizable land to urban uses. The subject property is not near or within an urban growth boundary, and is not urban or urbanizable. The density of housing that could occur in the area following the requested plan amendment and zone change is one dwelling per ten acres, which is not an urban density. No decidedly "urban" services will be required to allow the maximum amount of development contemplated by this proposal. Water is available in the area in sufficient quantities to serve the proposed housing density (see Groundwater Evaluation). The proposed density will also allow sewage disposal through construction of on-site septic drainfields in accordance with DEQ and local health department requirements. To the extent Goal 14 applies to this proposal, conformance is demonstrated through detailed findings in this submittal addressing Goal 14 as required by Oregon Administrative Rules governing the exceptions process.

Goals 15 through 19 do not apply.

1.7.3 As noted above, subsection 3 of the County's plan revision factors requires consideration of whether: "A mistake in the original comprehensive plan or change in the character of the neighborhood can be demonstrated." As outlined in detail in the subsequent sections of this discussion, the subject property is the only parcel which touches Sevenmile Hill Road which is currently in resource zoning. The subject property is for all intents and purposes surrounded completely by residential development. It is not producing any marketable timber, and as outlined in the subsequent sections of this submittal, is unlikely to do so in the future. Comprehensive Plan Chapter 14 -- Findings and Recommendations outlines the anticipated uses for lands zoned F-2(80) as follows: "The 'F-2 (40)' and 'F-2 (80)' forest zones have very limited permitted uses and conditional uses that are generally compatible with primary timber management. Due to the high cost of these lands, the forty (40) and eighty (80) acre minimum lot sizes will be more than adequate to keep them in forest uses. Most of the lands zoned "F-2 (80)" is in either the Mt. Hood National Forest, White River Game Management Area or are private timber company holdings. These lands are adequately managed for forest, recreational and open space uses."

Merriam-Webster's defines "mistake" as "to identify wrongly; confuse with another" or "a misunderstanding of the meaning or implication of something." This proposal is being reviewed in a quasi-judicial proceeding, in which the County is considering whether proposed plan and zone designations for the subject property are more appropriate than the original designations. Based on the materials in this submittal, the County's original characterization of the area as most appropriate for commercial forest uses appears to have been incorrect. The area now appears not to be suitable for forestry uses, but to be more suitable for rural residential use. The TLSA study supports a conclusion that the original comprehensive plan was incorrect, and that the most

appropriate zoning of the property is F-F(10), allowing for rural residences. The County's rezoning of several parcels north of Sevenmile Hill Road from F-F(10) to RR-10, allowing development of nonfarm or forest dwellings as uses permitted outright, also supports this conclusion. The approval of dwellings on, around, and immediately adjacent to the subject property also supports a finding that the character of the neighborhood has changed, toward residential, and away from forestry use.

1.7.4 As noted above, subsection 4 of the County's plan revision factors requires consideration of "Factors which relate to the public need for healthful, safe and aesthetic surroundings and conditions." This requirement is satisfied by the proposal, which is purposefully designed to allow limited residential development, and small-scale farm and forest uses, on land that is suited for such uses.

1.7.5 As noted above, Subsection 5 of the County's plan revision factors requires consideration of "Proof of change in the inventories originally developed." The proof required by this section is provided by these findings, the attached exhibits, and testimony and evidence obtained by the County through the hearing process. The County's original inventory of forest lands included the subject property. That inventory has changed, because housing has been allowed on, and in close proximity to the subject property, in a manner that diminishes its suitability for forest uses. The most appropriate manner of addressing this change is as proposed-demonstrate that the land is built and committed to non-resource uses, and justify an exception to Goal 4 that will officially remove the property from the County's Goal 4 inventory. The property can then be dedicated to small scale farm and forest uses with limited density housing in a manner that is consistent with adjacent uses and which is compatible to those forest resource lands nearby.

1.7.6 Subsection 6 of the County's plan revision factors states: "Revisions shall be based on special studies or other information which will serve as the factual basis to support the change. The public need and justification for the particular change must be established." As described throughout these findings, the proposed revisions are based on the TLSA study, previous County land use decisions affecting the area, as well as the information, justification and evidence contained and referenced in these findings and in the attached exhibits. These materials, and the County's plan, demonstrate that there is a public need for low-density rural residential uses and for small scale farm and forest uses in the county generally and in the Sevenmile Hill area. The justification for the particular change, addressed throughout these findings, is that the subject property is more properly designated for low density residential use than for commercial forestry uses. There is therefore a public need for the requested change, which has been fully justified by these findings and exhibits.

1.8 Transportation Planning Rule Compliance

Subsection I. of Chapter 11 of the comprehensive plan states:

"1. Review of Applications for Effect on Transportation Facilities - A proposed plan amendment, whether initiated by the County or by a private interest, shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with Oregon Administrative Rule (OAR) 660-012-0060 (the Transportation Planning Rule - "TPR"). 'Significant' means the proposal would:

a. Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan);

b. Change standards implementing a functional classification system; or.

c. As measured at the end of the planning period identified in the adopted transportation system plan:

1. Allow land uses or levels of development that would result in types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility;

2. Reduce the performance of an existing or planned transportation facility below the minimum acceptable performance standard identified in the TSP; or

3. Worsen the performance of an existing or planned transportation facility that is otherwise projected to perform below the minimum acceptable performance standard identified in the TSP or comprehensive plan.

2. Amendments That Affect Transportation Facilities - Amendments to the land use regulations that significantly affect a transportation facility shall ensure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the TSP. This shall be accomplished by one or a combination of the following:

a. Adopting measures that demonstrate allowed land uses are consistent with the planned function, capacity, and performance standards of the transportation facility.

b. Amending the TSP or comprehensive plan to provide transportation facilities, improvements or services adequate to support the proposed land uses consistent with the requirements of Section -0060 of the TPR.

c. Altering land use designations, densities, or design requirements to reduce demand for vehicle travel and meet travel needs through other modes of transportation.

d. Amending the TSP to modify the planned function, capacity or performance standards of the transportation facility.

3. Traffic Impact Analysis - A Traffic Impact Analysis shall be submitted with a plan amendment application pursuant to Section 4.140 Traffic Impact Analysis (TIA)) of the Land Use and Development Ordinance."

1.8.1 A separate Traffic Impact Analysis is not required for this proposal because there is not a "significant impact" under the TPR (OAR 660-12-0060(1)).

1.9 Procedures for a Plan Amendment.

Subsection J. of Chapter 11 of the Comprehensive Plan states, in relevant part:

1. A petition must be filed with the Planning Offices on forms prescribed by the Commission.

2. Notice of a proposed revision within, or to, the urban growth boundary will be given to the appropriate city at least thirty (30) days before the County public hearing.

3. Notification of Hearing:

1) Notices of public hearings shall summarize the issues in an understandable and meaningful manner.

2) Notice of hearing of a legislative or judicial public hearing shall be given as prescribed in ORS 215.503 subject to ORS 215.508. In any event, notice shall be given by publishing notice in newspapers of general circulation at least twenty (20) days, but not more than forty (40) days, prior to the date of the hearing.

3) A quorum of the Planning Commission must be present before a public hearing can be held. If the majority of the County Planning Commission cannot agree on a proposed change, the Commission will hold another public hearing in an attempt to resolve the difference or send the proposed change to the County Governing Body with no recommendation.

4) After the public hearing, the Planning Commission shall recommend to the County Governing Body that the revision be granted or denied, and the facts and reasons supporting their decision. In all cases the Planning Commission shall enter findings based on the record before it to justify the decision. If the Planning Commission sends the proposed change with no recommendation, the findings shall reflect those items agreed upon and those items not agreed upon that resulted in no recommendation.

5) Upon receiving the Planning Commission's recommendation, the County Governing Body shall take such action as they deem appropriate. The County Governing Body may or may not hold a public hearing. In no event shall the County Governing Body approve the amendment until at least twenty (20) days have passed since the mailing of the recommendation to parties."

These procedures and all other applicable statutory and local procedures have been or will be followed in consideration of the proposal.

2. Justification for Taking an Exception to Goal 4:

2.1 Introduction.

In order to amend its plan to change the subject property's designation from Forestry to Forest-Farm, and to implement that designation through its zoning ordinance, the County must adopt an exception to Goal 4.

Statewide Land Use Planning Goal 4, "Forest Lands" is:

> "To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture."

ORS 197 .932(1) states, in relevant part:

> "(1) A local government may adopt an exception to a goal if:
>
> (a) The land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal; [or]
>
> (b) The land subject to the exception is irrevocably committed as described by Land Conservation and Development Commission rule to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable;
>
> * * *
>
> (4) A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the standards of subsection (1) of this section have or have not been met.
>
> (5) Each notice of a public hearing on a proposed exception shall specifically note that a goal exception is proposed and shall summarize the issues in an understandable manner.
>
> * * *
>
> (8) As used in this section, 'exception' means a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that:
>
> (a) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general applicability;
>
> (b) Does not comply with some or all goal requirements applicable to the subject properties or situations; and

(c) Complies with standards under subsection (1) of this section."

2.1.1 In like manner, Planning Goal 2, part II, states, in relevant part:

"A local government may adopt an exception to a goal when:

(a) The land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable Goal; [or]

(b) The land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable;"

2.1.2 Both the goal and the rule adopt the legislative definition of an exception with minor variation-subsection (c) is modified in the goal to state "Complies with standards for an exception" and in the rule to state "Complies with the provisions of this Division." OAR 660-004-0010 states that the "process is generally applicable to all or part of those statewide goals which prescribe or restrict certain uses of resource land," including: "Goal 4 'Forest Lands.'"

2.1.3 Goal 4 provides that:

"Where a * * * plan amendment involving forest lands is proposed, forest land shall include lands which are suitable for commercial forest uses including adjacent or nearby lands which are necessary to permit forest operations or practices and other forested lands that maintain soil, air, water and fish and wildlife resources."

2.1.4 Rule definitions of "resource land" and "non-resource land" support a conclusion that, in this instance, an exception is necessary before the subject property can be plan and zone designated for forest-farm uses, a rural residential, non-resource category of uses under the County's plan and zoning ordinance. To justify an exception, the County must address all applicable criteria in LCDC's rule for exceptions, OAR 660, Division 4.2.2.

This request is for both "physically developed" and "irrevocably committed" exceptions to Goal 4, "Forest Lands," which seeks to conserve forest lands by promoting efficient forest practices and sound management of the state's forest land base.

2.2 Exception Requirements for Land Physically Developed to Other Uses.

OAR 660-004-0025 contains standards for adoption of a "physically developed" exception.

OAR 660-004-0025 states:

(1) A local government may adopt an exception to a goal when the land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal. Other rules may also apply, as described in OAR 660-004-0000(1)

(2) Whether land has been physically developed with uses not allowed by an applicable goal will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception.

FINDING: The proposed exception area consists of a 40.10 acre piece identified as tax lot 4400 located in T2N, R12E, and in the southwestern quarter of Section 22 (the subject property). The north line of the subject property abuts Sevenmile Hill Road, and the northwest corner of the subject property is at the intersection of Sevenmile Hill Road and Old Sevenmile Hill Road. The subject property is rectangle measuring roughly 1,600 feet east/west and 1,500 feet north/south. It is generally sloping downward to the north, with the northern boundary along Sevenmile Hill Road as the low point.

The subject property is improved with a log home with surrounding decks covering approximately 2,680 ft^2 and a 720 ft^2 basement located approximately halfway between the north and south boundaries and in the western one third of the property. A driveway serving the residence and properties to the south extends from the northwest corner of the subject property southward, generally paralleling the western boundary. There are two barns with stalls located generally east of the log home, each covering approximately 1,110 ft^2 for total coverage of 2,220 ft^2.

Further east of the hay loft and barn there is an original home site with cabin covering 1,980 ft^2 located generally east of the log home. There is an old barn located south of the cabin covering 1,200 ft^2.

The log home was built pursuant to a conditional use permit, the conditions of which required decommissioning the original cabin as a residential structure; however, the cabin legally exists and may be used for other uses consistent with the existing zoning.

A good portion of the southeastern portion of the subject property consists of a cleared area growing grass hay which previously served as a pasture for the cabin and now is baled each year. Most of the northern two thirds of the subject property has been cleared at some point in the past and remains clear at this time. There is no merchantable timber on the property, and the property has never supported merchantable timber. There are scrub oaks and pine trees growing on the southern portion and eastern boundary of the property. There are no fir trees of any size larger than a seedling on the property, and historically firs do not survive. Grasses and shrubs create moderately dense underbrush.

Soils on the subject property are Class 4, predominately 49C and 50D Wamic Loam, 5-12% slope. This soil type represents more gently sloping areas where the exposure is toward the north. On the subject property, this particular range of the soil class is characterized by smaller oak and scattered pine forest. These soils are suitable for dry farm small grain, grass hay, and pasture. The woodland site index designation of 70 for Ponderosa Pine indicates low productivity with no significant limitations or restrictions. This capability class is also designated under the pine-oak-fescue range and as such it is possible that it could be used for fruit orchards or other crops. In its uncultivated state, however, special management is required to reduce oak and shrub growth that will curtail stabilizing plant growth beneath what amounts to a thin, mainly pine canopy.

The area has no history of crop use with the exception of grass hay grown the pasture area. Due to the terrain and rocky soil, and because the elevation creates climatic extremes, crop agriculture is uneconomical and otherwise impracticable.

The subject property does not have a history of commercially successful grazing for sheep or cattle. Grazing was occasionally tried in the area in the 1940's, but the terrain, thin soil and climate have limited the activities to an occasional attempt rather than a sustained commercial success. There are no properties in the immediate area being used for commercial grazing.

Although the soils on the subject property could, at first glance, appear to indicate a potential for agricultural use, particularly small-scale orchards, that potential is severely reduced due to climatic conditions. The subject property is in current use for a residence, along with pasture and wildlife habitat in the scrub oak section. It has never been successfully utilized for agricultural purposes and has very limited value as forestland due to the dwellings on the site. The soils indicate low timber productivity. There are no productive orchards or other commercial agricultural uses in the area immediately surrounding the subject property.

The residential development surrounding the subject property has occurred mainly in proximity to Sevenmile Hill Road that runs along the northern boundary of the subject property. Because of this development and ownership pattern, and because of the small average and odd shaped lot

sizes, it would be impracticable to manage any of the property in the area as a commercial forestry operation or as part of such an operation.

2.3 Exception Requirements for Land Irrevocably Committed to Other Uses.

OAR 660-004-0028 contains standards for adoption of an "irrevocably committed" exception.

2.3.1 OAR 660-004-0028(1) provides:

(1) "A local government may adopt an exception to a goal when the land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable:

(a) A 'committed exception' is an exception taken in accordance with ORS 197.732(1)(b), Goal 2, Part II(b), and with the provisions of this rule;

(b) For the purposes of this rule, an 'exception area' is that area for which a 'committed exception' is taken;

(c) An 'applicable goal,' as used in this section, is a statewide planning goal or goal requirement that would apply to the exception area if an exception were not taken.

FINDING: The subject property contains a legal residence, and is surrounded on 2 sides by small residential tracts, and by a residence to the south. The subject property is irrevocably committed to non-resource use. All of the large forested tracts currently producing merchantable timber are located well south of the subject property, and adopting this exception for the subject property will not negatively impact those uses.

2.3.2 OAR 660-004-0028(2) provides: "Whether land is irrevocably committed depends on the relationship between the exception area and the lands adjacent to it. The findings for a committed exception therefore must address the following:

(a) The characteristics of the exception area;"

FINDING: The characteristics of the subject property are fully discussed in the findings above in response to OAR 660-004-0025 (Physically Developed).

2.3.3 (b) "the characteristics of the adjacent lands;"

FINDING:

In general, the areas to the East and North of the subject property have been for the most part divided into smaller lots relative to rural development (10 acres or less). A large majority of the

parcels were created long before the area was subject to statewide or even county-wide zoning regulation. Of the three subdivisions in the immediate area of the subject parcel, two were platted in the early part of the 20th century, and the third in 1979 (Fairmont Orchard Tracts-1911; Sunnydale Orchards-1912; Flyby Night Subdivision-1979). The majority of the lots in these subdivisions are approximately 5 acres in size. The County has recognized the existing parcelization by zoning the area for rural residential development (R-R(5) and R-R(10)) and for small-scale agriculture or forestry uses in conjunction with a rural residence (F-F(10)). As a result of this parcelization and in keeping with the zoning, there has been a significant amount of rural residential development, particularly along the county roads and within the platted subdivisions. There have also been several applications for rural residences in the areas zoned F-F(10).

Specific adjacent lands analysis is as follows:

East: Directly to the east of and abutting the subject parcel are two parcels zoned F-F(10): T2N R12E, Section 22, Lots 4300 and 4200. Both of these lots have residences.

Properties further east along Wits End Drive and Sevenmile High South Road are zoned R-R(10) and all have residences (tax lots 3600, 3400, 3800, 3900, 4000). These properties average approximately 5 acres in size and are part of the Fairmont Orchard Tracts subdivision which was platted in 1911.

North: To the north of the subject property across Sevenmile Hill Road is a lot zoned R-R(5), Tax Lot 4600 (7.35 ac.), and a small lot owned by Wasco County (Tax Lot 4500, .7 acres). 4600 has a residence. Tax Lot 4700 meets the subject property on its northeast corner, is zoned F-F(10), and has a residence.

Properties north of the subject property lying along Richard Road are small acreages zoned R-R(5), all with residences.

All of the area north of the subject property is built and committed to low and medium density rural residential uses. There are two platted subdivisions: Sunnydale Orchards, platted in 1912, and Flyby Night, platted 1979.

The Sunnydale Orchards Subdivision was recorded on March 8, 1912. It consisted of 25 lots averaging about five acres each, with the largest at 11.4 acres. Lots in the subdivision are for the most part less than ten acres each. The County has recognized that development has increased in this area over the years, and rezoned several lots in the southern part of Sunnydale Orchards from F-F(10) to R-R(10) (Pursuant to Ordinance 99-111).

The plat for the Flyby Night Subdivision was recorded November 8, 1979. The Flyby Night lots average approximately five acres each, with two larger, approximately 20-acre parcels as the exceptions. The zoning for the Flyby Night subdivision is R-R(5).

The areas to the north and east are the most heavily developed areas surrounding the subject property. As can be seen by the maps in Exhibits 1, virtually all lots to the north and east of the subject property have been improved with a residence or a manufactured home.

The County has recognized that development has increased in this area over the years, and rezoned several lots in the southern part of Sunnydale Orchards from F-F(10) to R-R(10) (Pursuant to Ordinance 99-111).

West: Tax lot 2N 10E 21 900, which abuts the west property line of the subject parcel, is split zoned, with the northern portion which abuts Sevenmile Hill Road zoned F-F(10) and the southern portion zoned F-2(80). The southern portion has not been commercially logged, and is slowly being cleared. Tax Lot 2900, a 439 acre parcel, abuts the southwest portion and corner of the subject property and is zoned F-2(80). It has a residence located on the western portion along Osburn Cutoff Road. This property has a creek running generally north-south which forms a clear line of demarcation between the more vibrant, productive land to the west and the scrubbier soils to the east. The land west of the creek supports the growth of Douglas Fir trees; the land to the east is predominantly scrub oak and pine similar to the subject property. The commercial logging on this piece has been confined to the area west of the creek.

In general, the parcels to the west of the subject property lying both north and south of and abutting Sevenmile Hill Road consist of small acreages zoned F-F(10), almost all improved with residences.

The subject property is the only parcel which touches Sevenmile Hill Road which is zoned F-2(80). The only other parcels similarly zoned which touch any road are large, unimproved parcels located well west of the subject property which lie south of and touch Dry Creek Road or which lie along Osburn Cutoff Road.

South: Tax lot 2N 10E 22 4100 abutting the subject property to the south is zoned F-2(80). It is owned by the owner of the subject property, and has a legal residence, and together with tax lot 2800 to the south, also in common ownership, comprises approximately 70 acres. It is not used for timber production. This parcel is transected by the BPA Bonneville-The Dalles power line right-of-way/easement, which forms a natural boundary between this parcel and the larger, commercially forested tracts to the south.

Soils: The subject property soils are 49C and 50D Wamic Loam. The parcels immediately north of the subject property are generally 51D Wamic Loam soils. Adjacent properties to the south and east are 49C and 50D, like the subject property. (See soils maps and productivity indices) 49C and 50D soils both have a site index of 70 for Ponderosa Pine, indicating a potential yield of 20-49 cubic feet per acre. However, with the exception of the 439 acre parcel adjoining the southwest corner of the subject property, none of the adjacent properties are supporting commercial timber production, and logging on the 439 acre parcel takes place west of the creek which runs parallel to the common boundary. All commercial timber production occurs well south of the subject property, generally south of the BPA power line transecting the

area. The subject property has never produced merchantable timber or been logged commercially.

2.3.4 (c) The relationship between the exception area and the lands adjacent to it;

FINDING: As described in the preceding sections of this submittal, the subject property is surrounded on two sides by residential lots in the F-F(10), R-R(10), and R-R(5) zones. None of these zones are resource zones. The subject property also has a residence located on the parcel immediately south of it; and even the large resource zoned tract abutting the southwest corner of the subject property is improved with a residence, although it is located some distance from the subject property. Thus, the subject parcel has residences surrounding it on all 4 sides, non-resource zoning designations on parcels abutting it on 3 sides, and intensive residential development on parcels abutting on 2 sides.

In general, all of the properties which adjoin Sevenmile Hill Road are committed to residential development and uses and are zoned accordingly. The subject parcel stands out as an anomaly in this pattern. Particularly in light of the fact that the subject property is already improved with a residence, the F-F(10) designation is far more consistent with the uses of adjacent lands than the F-2(80) designation. There is no evidence, historically or recently, that the subject property is or could be used for commercial timber production, and attempting to do so now would inevitably lead to conflicts with the immediately adjacent residential uses. Looking at the existing zoning map, it is clear that the large forestry designations are intentionally and more properly sited well away from the residential development which lies along a rural arterial road such as Sevenmile Hill.

2.3.5 (d) The other relevant factors set forth in OAR 660-004-0028(6).

FINDING: These factors are discussed in the following sections.

2.3.6 OAR 660-004-0028(3) provides: "Whether uses or activities allowed by an applicable goal are impracticable as that term is used in ORS 197.732(2)(b), in goal 2, Part II(b), and in this rule shall be determined through consideration of factors set forth in this rule. Compliance with this rule shall constitute compliance with the requirements of Goal 2, Part II. It is the purpose of this rule to permit irrevocably committed exceptions where justified so as to provide flexibility in the application of broad resource protection goals. It shall not be required that local governments demonstrate that every use allowed by the applicable goal is 'impossible.' For exceptions to Goals 3 or 4, local governments are required to demonstrate that only the following uses or activities are impracticable;

(a) Farm use as defined in ORS 215.203;

(b) Propagation or harvesting of a forest product as specified in OAR 660-033-0120;

(c) Forest operations or forest practices as specified in OAR 660-006-0025(2)(a)."

In turn, ORS 215.203(2)(a) states:

"[F]arm use" means the current employment of land for the primary purpose of obtaining a profit in money by raising, harvesting and selling crops or the feeding, breeding, management and sale of, or the produce of, livestock, poultry, fur-bearing animals or honeybees or for dairying and the sale of dairy products or any other agricultural or horticultural use or animal husbandry or any combination thereof. "Farm use" includes the preparation, storage and disposal by marketing or otherwise of the products or by-products raised on such land for human or animal use. "Farm use" also includes the current employment of land for the primary purpose of obtaining a profit in money by stabling or training equines including but not limited to providing riding lessons, training clinics and schooling shows. "Farm use" also includes the propagation, cultivation, maintenance and harvesting of aquatic, bird and animal species that are under the jurisdiction of the State Fish and Wildlife Commission, to the extent allowed by the rules adopted by the commission. "Farm use" includes the on-site construction and maintenance of equipment and facilities used for the activities described in this subsection. "Farm use" does not include the use of land subject to the provisions of ORS chapter 321, except land used exclusively for growing cultured Christmas trees as defined in subsection (3) of this section or land described in ORS 321.267 (3) or 321.824 (3).)

OAR 660-033-0120 contains a chart of uses that are allowed outright, conditionally, or not authorized on agricultural lands, including "farm use" and "propagation or harvesting of a forest product," and OAR 660-006-0025(2)(a) states:

(a) Forest operations or forest practices including, but not limited to, reforestation of forest land, road construction and maintenance, harvesting of a forest tree species, application of chemicals, and disposal of slash;

FINDING: The rule does not require that the listed resource uses be impossible in the exception area; rather, it requires that they be impracticable. Impracticable means "not capable of being carried out in practice." Webster's New World Dictionary, 2nd College Edition, 1980. Capable means "having ability" or "able to do things well." Id. Finally, "in practice" means by the usual method, custom or convention. Id. Webster's Third New International Dictionary, (unabridged ed., 1993) defines "impracticable" as "**1a** : not practicable : incapable of being performed or accomplished by the means employed or at command : INFEASIBLE * * * **c** : IMPRACTICAL, UNWISE, IMPRUDENT * * *"

Based on the foregoing, the County must evaluate to what extent the adjacent uses and other factors affect the ability of property owners to carry out resource uses in practice on the subject

parcel. The rule only requires evaluating whether the resource use can be carried out by the usual, available methods or customs. Consequently, just because a farm or forest use can be attained by methods that are not usual or customary does not mean that the farm or forest use is practicable. Using the area for commercial agricultural or forestry uses—in a manner capable of generating a profit or return from those activities—is not practicable on the subject parcel for all of the reasons stated in this submittal. Resource designation is not necessary to preserve the area for small scale farm or forestry uses in conjunction with residential use.

A definition of "forest products" can be found in ORS 532.010(4), which states that forest products are "any form, including but not limited to logs, poles and piles, into which a fallen tree may be cut before it undergoes manufacturing, but not including peeler cores."

The current level of residential development has increased to the point that commercial resource use has become impracticable. The subject property is surrounded on three sides by existing residential development, with the potential for additional residential development in the future. Conflicts caused by the proximity of residential neighbors on three sides require added expense related to fire protection, fencing and general control of the area, and prevent the use of spraying to control insects and vegetation that compete with commercial tree species. Further conflicts with residences arise because of the noise associated with commercial operations and the safety risks of logging near residential property.

The effects of these conflicts and impacts from residential uses combined with the long cycle for trees to reach maturity (100-125 years) make commercial forestry and commercial agriculture impracticable at this location. As explained throughout this submittal, residential development abutting and in close proximity to the subject property, coupled with the relatively small size of the subject property and local topography and climate, supports a conclusion that there is an inadequate buffer between the subject property and nearby rural residences. The steps that would need to be taken to efficiently and effectively manage timber in the area makes such uses impracticable.

To the extent this section requires that a justification for an exception to Goal 4 also requires consideration of the suitability of the area for farm uses, the record of this proceeding and the attached exhibits demonstrate the lack of suitability of the area for farm uses. The soils in the area are not generally suitable for farm use, nor is the climate conducive to those uses. At no time has the County considered the subject parcel to be farmland or to be suitable for farming, and at no time in the history of the area has farming taken place. Due to the existing parcelization, soils, climate and development in the area, it cannot be, and is not currently employed for the primary purpose of obtaining a profit from agricultural uses. The history of the area also supports this conclusion. At best, the area can support the small-scale, "peripheral" farm activities now taking place on adjacent F-F and R-R zoned properties, under circumstances in which residential use represents the primary and most highly valued use.

2.3.7 OAR 660-004-0028(4) provides: "A conclusion that an exception area is irrevocably committed shall be supported by findings of fact which address all applicable factors of section (6) of this rule and by a statement of reasons

explaining why the facts support the conclusion that uses allowed by the applicable goal are impracticable in the exception area."

FINDING: This submittal, including this statement and all attached exhibits, addresses all applicable factors and reasons why, in this case, the facts support the conclusion that uses allowed by Goals 3 and 4 are impracticable in the exception area. See especially, the immediately preceding sections of this submittal, and sections addressing section (6) of the rule, below.

2.3.8 OAR 660-004-0028(5) provides: "Findings of fact and a statement of reasons that land subject to an exception is irrevocably committed need not be prepared for each individual parcel in the exception area. Lands which are found to be irrevocably committed under this rule may include physically developed lands."

FINDING: As discussed elsewhere in this submittal, the subject property includes a legal residence, other buildings, and associated physical development. The presence of the dwelling, and of the other dwellings immediately adjacent to the subject property, each contribute to the irrevocable commitment of the area to rural residential uses, and the impracticability of using the area for farm or forest uses.

2.3.9 OAR 660-004-0028(6) provides: Findings of fact for a committed exception shall address the following factors:

2.3.9.1 (a) Existing adjacent uses;

FINDING: The existing adjacent uses are discussed and considered in great detail in the sections above. Existing adjacent uses to the West, North and East are all residential.

2.3.9.2 (b) Existing public facilities and services (water and sewer lines, etc.);

FINDING: There are no public water or sewer facilities on the subject property. An existing well provides water to the dwelling. Electric power and phone service are available to the area. The property can be adequately served by existing fire, police and school facilities.

2.3.9.3 "(c) Parcel size and ownership patterns of the exception area and adjacent lands:

(A) Consideration of parcel size and ownership patterns under subsection (6)(c) of this rule shall include an analysis of how the existing development pattern came about and whether findings against the Goals were made at the time of partitioning or subdivision. Past land divisions made without application of the Goals do not in themselves demonstrate irrevocable commitment of the exception area. Only if development (e.g., physical improvements such as roads and underground facilities on the resulting parcels) or other factors make unsuitable their resource use or the resource use of nearby lands can the parcels be considered to be

irrevocably committed. Resource and nonresource parcels created pursuant to the applicable goals shall not be used to justify a committed exception. For example, the presence of several parcels created for nonfarm dwellings or an intensive agricultural operation under the provisions of an exclusive farm use zone cannot be used to justify a committed exception for land adjoining those parcels."

FINDING: As discussed in great detail above and in the attached exhibits, the existing development pattern for the Sevenmile Hill area was established prior to the adoption of the goals. Many of the small parcels that characterize the area were created between 1900 and 1920 and were marketed as orchard sites that could support a family. The lots in the vicinity of the subject property were not successful because of the cold and dry weather at this location and elevation. Virtually all of the existing lots have been developed and now have non-resource residences located on them. Only two parcels in the immediate area were created via exceptions to the goals: 7.35 acres located at 6955 Sevenmile Hill Road (Comprehensive Plan Amendment from F-2(40) to Rural Residential, CPA 89-104, October, 1989); and 9.87 acres located at the intersection of Sevenmile Hill Road and Sevenmile High Hill Road (Comprehensive Plan Amendment from FF-10 to Rural Residential, CPA 90-101, June 1990). Neither of these goal exception parcels are pivotal to the analysis of parcel size and ownership patterns in the immediate area. As noted, the local parcelization occurred long before the development of the goals, and the parcels created by that process have now been almost entirely developed.

(B) "Existing parcel sizes and contiguous ownerships shall be considered together in relation to the land's actual use. For example, several contiguous undeveloped parcels (including parcels separated only by a road or highway) under one ownership shall be considered as one farm or forest operation. The mere fact that small parcels exist does not in itself constitute irrevocable commitment. Small parcels in separate ownerships are more likely to be irrevocably committed if the parcels are developed, clustered in a large group or clustered around a road designed to serve these parcels. Small parcels in separate ownership are not likely to be irrevocably committed if they stand alone amidst larger farm or forest operations, or are buffered from such operations."

FINDING: This provision is not applicable to this single parcel proposal; however, ownership patterns in the general area are discussed in detail in preceding sections of this narrative addressing OAR 660-004-0028(2)(a)-(c). The parcels are clustered along roads serving the area, as is the subject property, and virtually all parcels in the area are in separate ownerships. This parcelization pre-dates the adoption of the county zoning ordinance and comprehensive plan.

2.3.9.4 "(d) Neighborhood and regional characteristics;"

FINDING: Based on the descriptions already provided in this submittal, the neighborhood and regional characteristics can best be described as non-resource, small acreage rural residential development clustered along Sevenmile Hill Road. Considering these characteristics, the current

designation of the subject property as the only resource designated property touching Sevenmile Hill Road stands out as an anomaly. The exception will serve to make the subject property more conforming with existing neighborhood and regional characteristics.

2.3.9.5 "(e) Natural or man-made features or other impediments separating the exception area from resource land. Such features or impediments include but are not limited to roads, watercourses, utility lines, easements, or rights-of-way that effectively impede practicable resource use of all or part of the exception area;"

FINDING: In general, the BPA Bonneville-The Dalles power line right-of-way/easement, which transects the local area south of the subject property, serves to separate the more residential areas to the north from the commercial forest areas to the south. As noted, most of the residential development lies in the immediate area along Sevenmile Hill Road, with most of the commercial forest areas lying well to the south and being served by secondary or primitive roads.

2.3.9.6 (f) "Physical development according to OAR 660-004-0025." OAR 660-004-0025 sets forth the "Exception Requirements for Land Physically Developed to Other Uses" as follows:

(1) A local government may adopt an exception to a goal when the land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal.

(2) Whether land has been physically developed with uses not allowed by an applicable Goal, will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception."

FINDING: Part of the justification for this exception is that the subject property is already physically developed with a dwelling, outbuildings, and associated access roads and other infrastructure. The minimum lot size for a forest dwelling is currently 240 acres, and the subject property is approximately 40 acres.

2.3.9.7 "(g) Other relevant factors;"

To the extent there are other relevant factors, they are discussed throughout this submittal and not repeated here.

2.3.10 OAR 660-004-0028(7) provides: The evidence submitted to support any committed exception shall, at a minimum, include a current map, or aerial photograph which shows the exception area and adjoining lands, and any other means needed to convey information about the factors set forth in this rule. For example, a local government may use tables, charts, summaries, or narratives to supplement the maps or photos. The applicable factors set forth in section (6) of this rule shall be shown on the map or aerial photograph.

FINDING: The submittal complies with this requirement, and includes current maps as Exhibit 1 showing the subject property and adjoining lands.

2.3.11 OAR 660-004-0040 concerns the:

"Application of Goal 14 Urbanization to Rural Residential Areas," the purpose of which: "is to specify how Statewide Planning Goal 14, Urbanization, applies to rural lands in acknowledged exception areas planned for residential uses."

Subsections -0040(1) through (3) explain what the rule does. It does not apply to land within an urban growth boundary; unincorporated community; urban reserve area; destination resort; resource land; and "nonresource land, as defined in OAR 660-004-0005(3)." The following sections of this submittal demonstrate compliance with Goal 14 as and to the extent specified in OAR 660-004-0040.

2.3.11.1 Although it is not entirely clear, OAR 660-004-0040 does not appear to include standards that apply to the land use decisions requested by this submittal. The land in question is currently classified as resource land, and the request is to establish an exception to Goal 4 that will allow rural residential development on lots that are a minimum of ten acres per dwelling, or otherwise at a density that cannot exceed one dwelling for every ten acres in the area. The F-F(10) zoning to be applied will ensure that the requested housing density is not exceeded. The proposed housing density is not an urban density. No sewer or water services exist near the area or are proposed, and there are no other "urban" attributes of development that could occur if the request is granted.

2.3.11.2 OAR 660-004-0040(4) and (5) provide:

"(4) The rural residential areas described in Subsection (2)(a) of this rule are rural lands. Division and development of such lands are subject to Statewide Planning Goal 14, Urbanization which prohibits urban use of rural lands.

(5)(a) A rural residential zone currently in effect shall be deemed to comply with Goal 14 if that zone requires any new lot or parcel to have an area of at least two acres.

(b) A rural residential zone does not comply with Goal 14 if that zone allows the creation of any new lots or parcels smaller than two acres. For such a zone, a local government must either amend the zone's minimum lot and parcel size provisions to require a minimum of at least two acres or take an exception to Goal 14. Until a local government amends its land use regulations to comply with this subsection, any new lot or parcel created in such a zone must have an area of at least two acres.

(c) For purposes of this section, 'rural residential zone currently in effect' means a zone applied to a rural residential area, in effect on the effective date of this rule, and acknowledged to comply with the statewide planning goals."

FINDING: This section does not appear to be an approval standard applicable to the request. However, the proposed zone will not allow the creation of any new lots or parcels within the exception area smaller than two acres, in conformance with this section.

2.3.11.3 OAR 660-004-0040(6) and (7) provide:

"(6) After October 4, 2000, a local government's requirements for minimum lot or parcel sizes in rural residential areas shall not be amended to allow a smaller minimum for any individual lot or parcel without taking an exception to Goal 14 pursuant to OAR chapter 660, division 14, and applicable requirements of this division."

FINDING: The County recognizes the requirements of this section. No request has been made to allow smaller minimum lot sizes than allowed by the rule.

"(7)(a) The creation of any new lot or parcel smaller than two acres in a rural residential area shall be considered an urban use. Such a lot or parcel may be created only if an exception to Goal 14 is taken. This subsection shall not be construed to imply that creation of new lots or parcels two acres or larger always complies with Goal 14. The question of whether the creation of such lots or parcels complies with Goal 14 depends upon compliance with all provisions of this rule."

FINDING: The underlying zone will prevent the creation of any new lot or parcel in the subject property smaller than two acres. Lot sizes allowed in the area comply with all provisions of the Goal 2 rule for exceptions.

(b) Each local government must specify a minimum area for any new lot or parcel that is to be created in a rural residential area. For purposes of this rule, that minimum area shall be referred to as the minimum lot size.

FINDING: The minimum lot size proposed is ten acres.

(c) If, on October 4, 2000, a local government's land use regulations specify a minimum lot size of two acres or more, the area of any new lot or parcel shall equal or exceed that minimum lot size which is already in effect.

FINDING: As stated, the minimum lot size of the underlying zone is currently ten acres, and that minimum lot size will apply on the subject property area.

(d) If, on October 4, 2000, a local government's land use regulations specify a minimum lot size smaller than two acres, the area of any new lot or parcel created shall equal or exceed two acres.

FINDING: As stated, the County's land use regulations do not specify a minimum lot size smaller than two acres.

(e) A local government may authorize a planned unit development (PUD), specify the size of lots or parcels by averaging density across a parent parcel, or allow clustering of new dwellings in a rural residential area only if all conditions set fo1th in paragraphs (7)(e)(A) through (7)(e)(H) are met:

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FINDING: The current proposal does not include a Planned Unit Development.

(f) Except as provided in subsection (e) of this section, a local government shall not allow more than one permanent single-family dwelling to be placed on a lot or parcel in a rural residential area. Where a medical hardship creates a need for a second household to reside
temporarily on a lot or parcel where one dwelling already exists, a local government may authorize the temporary placement of a manufactured dwelling or recreational vehicle."

FINDING: In conformance with this section, the County is not proposing to allow more than one permanent single-family dwelling to be placed on any lot or parcel in the proposed rural residential area.

(g) In rural residential areas, the establishment of a new mobile home park or manufactured dwelling park as defined in ORS 446.003(32) shall be considered an urban use if the density of manufactured dwellings in the park exceeds the density for residential development set by this rule's requirements for minimum lot and parcel sizes. Such a park may be established only if an exception to Goal 14 is taken.

FINDING: The current proposal does not include a mobile home park or manufactured dwelling park.

(h) A local government may allow the creation of a new parcel or parcels smaller than a minimum lot size required under subsections (a) through (d) of this section without an exception to Goal 14 only if the conditions described in paragraphs (A) through (D) of this subsection exist:

(A) The parcel to be divided has two or more permanent habitable dwellings on it;

(B) The permanent habitable dwellings on the parcel to be divided were established there before the effective date of this rule;

(C) Each new parcel created by the partition would have at least one of those permanent habitable dwellings on it;

(D) The partition would not create any vacant parcels on which a new dwelling could be established.

(E) For purposes of this rule, habitable dwelling means a dwelling that meets the criteria set forth in ORS 215.283(t)(A)-(t)(D).

FINDING: Because the County is not allowing the creation of new parcels smaller than the minimum lot size required under subsections (a) through (d), subsections (A) through (E) of this section do not apply to the proposal.

(i) For rural residential areas designated after the effective date of this rule, the affected county shall either:

(A) Require that any new lot or parcel have an area of at least ten acres, or

(B) Establish a minimum lot size of at least two acres for new lots or parcels in accordance with the requirements of Section (6). The minimum lot size adopted by the county shall be consistent with OAR 660-004-0018, 'Planning and Zoning for Exception Areas.'"

FINDING: In this case, the County is establishing an overall density of residential development allowed as a ratio of one dwelling for every ten acres.

3. Justification for a Zone Change:

3.1 Zoning Ordinance - Chapter 9:

Chapter 9 of the Wasco County Land Use and Development Ordinance (zoning ordinance), entitled "Zone Change and Ordinance Amendment," includes standards and procedures for zone changes. Section 9.010 states:

"Application for a zone change may be initiated as follows:

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C. By application filed with the Director of Planning upon forms prescribed by the Director of Planning and signed by a property owner with the area of the proposed change, and containing such information as may be required by the [Director of Planning][1] to establish the criteria for the change (quasi-judicial only);"

As indicated previously, this zone change was initiated by property owner David Wilson. Planning staff is presenting the proposal with a recommendation for approval.

3.2 Zoning Ordinance - Section 9.020

Section 9.020, entitled "Criteria for Decision," provides as follows:

"The Approving Authority may grant a zone change only if the following circumstances are found to exist:

A. The original zoning was the product of a mistake; or

B. It is established that

1. The rezoning will conform with the Comprehensive Plan; and,

2. The site is suitable to the proposed zone;

3. There has been a conscious consideration of the public health, safety and welfare in applying the specific zoning regulations."

3.2.1 This request is for a plan amendment and an exception to Goal 4. The previous section of this discussion establishes that the current F-2(80) zoning can be considered a mistake given the location and characteristics of the subject property and its relationship to surrounding residential uses.

3.2.2. This narrative and the attached exhibits also establish that the requirements of subsection B. have been met: B(l) is met because the Comprehensive Plan is being amended specifically to support the proposed zoning designation; B(2) is met because the site is suitable to the proposed F-F(10) zone; and B(3) is met because through this zone change application and process

[1] Missing text in published version of Section 9.010.

there has been a conscious consideration of the public health, safety and welfare in applying the specific zoning regulations.

3.2.3. The Wasco County Comprehensive Plan contains goals that mirror the statewide goals, and policies to carry them out. Except as discussed in these findings, the plan does not contain approval standards that apply to the requested zone change. The zone change is proposed with due consideration of all relevant comprehensive plan goals and policies, as required by section B(1):

Goal 1 - Citizen Involvement.

The purpose of Goal 1 is to ensure the "opportunity for citizens to be involved in all phases of the planning process." Wasco County has incorporated opportunities in its Comprehensive Plan and the zoning ordinance. Compliance with Goal 1 is demonstrated by compliance with the applicable plan and zoning ordinance provisions with opportunity for public input and by the public hearings required as part of this application and process.

Goal 2 – Land Use Planning.

The County's land use planning goal requires that procedures be established and followed to ensure public participation in land use decision making, and that there is an "adequate factual base" for land use decisions. All applicable procedures have or will be complied with in the consideration of this proposal. These findings and the record of this proceeding are a more than adequate factual base for the decision.

Goal 3 - Agricultural Lands.

Goal 3 provides for the preservation of Agricultural Lands for farm use. There are no Goal 3 designated Agricultural Lands on the subject property and Goal 3 therefore does not apply.

Goal 4 -- Forest Lands.

Goal 4 provides for the preservation of Forest Lands. The subject property is currently designated Forest Land, but is not now in timber production and has not historically been in timber production. As discussed in the preceding sections of this discussion, the subject property is not generally suitable for commercial forestry due to its development and use as residential property; its proximity to other residential properties; and its soil characteristics and historic uses. The proposal is to redesignate the property for rural residential uses, which will not have any impact on lands actually being used for commercial forestry.

Goal 5 - Open Spaces, Scenic and Historic Areas and Natural Resources.

The County zoning ordinances contain siting and development criteria, found in zoning ordinance section 3.920, for lands within Division 8 - Sensitive Wildlife Habitat Overlay designated areas in the County. The subject property is within the Sensitive Wildlife Habitat Overlay. Goal 5 is met by the application of these standards to any development of the subject

property. No other inventoried Goal 5 resources are affected by the proposal. The proposal complies with Goal 5.

Goal 6 - Air, Land and Water Quality.

Goal 6 is "To maintain and improve the quality of the air, water and land resources of the state." The proposal is consistent with Goal 6. The subject property is not located in or near a federal air quality attainment area, and will not generate significant additional air pollution. Sewage disposal from potential additional new dwellings must comply with all state and local requirements. Those requirements ensure that such discharges will be properly treated and disposed of, and will not threaten to exceed the carrying capacity of, or degrade or threaten the availability of, area natural resources. The proposal complies with Goal 6.

Goal 7 -- Areas Subject to Natural Disasters and Hazards.

The subject property is not within any areas identified by the County as Natural Hazard Areas.

Goal 8 -Recreational Needs.

Goal 8 is "To satisfy the recreational needs of the citizens of Wasco County and visitors." None of the policies of Goal 8 apply to the proposal.

Goal 9 -- Economy of the State.

Goal 9 is "To diversify and improve the economy of Wasco County." The proposal promotes Goal 9 by allowing residential uses, which the County considers to be the appropriate use of the subject property in view of existing development. The proposal is consistent with, and promotes Goal 9.

Goal 10 -- Housing.

Goal 10 is "To provide for the housing needs of the citizens of Wasco County." There is an ongoing need for developable rural residential lots, and corresponding pressure on resource lands to fill that need. The proposed zone change helps to ameliorate that pressure by creating potential rural residential lots while having no impact on lands actually in forest production.

Goal 11 -- Public Facilities and Services.

Goal 11 is to "plan and develop a timely, orderly, and efficient arrangement of public facilities and services to provide a framework for urban and rural development." The existing services and facilities in the area of the subject property are adequate for the proposal. The subject property adjoins Sevenmile Hill Road. Local fire and police services are provided by the rural fire protection district and the sheriff s office. Neither water nor sewer services are provided to the subject property, but are available on the subject property through individual well(s) and septic tank systems.

Goal 12 -Transportation.

Goal 12 is "To provide and encourage a safe, convenient and economic transportation system." The goal does not have approval standards, and is otherwise implemented through County transportation planning. The proposal will have little if any impact on the transportation system serving the subject property because there will be minimal increase in traffic generated by development that might occur as a result of the zone change. It is estimated that a maximum of 3 additional residences could be developed. Each residence is predicted to generate an average of 9.57 trips/day, which will not significantly affect the functionality, capacity, or level of service of Sevenmile Hill Road or other local roads. In connection with Goal 12, the County is required to apply the Transportation Planning Rule located in Chapter 660, Division 12 of the Oregon Administrative Rules. OAR 660-12-060 requires amendments to comprehensive plans that "significantly affect a transportation facility...assure that allowed land uses are consistent with the identified function, capacity, and level of service of the facility." Sevenmile Hill/State Road is classified as a Rural Major Collector, which is consistent with the level of traffic from the rural residential uses that feed into it.

Goal 13 - Energy Conservation.

This Goal is met by application of development standards contained in the zoning ordinance.

Goal 14-Urbanization.

The level of existing development and possible development does not constitute "urban use." Goal 14 does not, therefore, apply. It should be noted, however, that Policy 3 of Goal 14 encourages "subdivisions to be developed by a planned development approach, maximizing physical design, the retention of open space and reducing adverse impacts. The proposed zone change for the subject property is consistent with that policy.

3.2.5 Subsection B(2) of zoning ordinance section 9.020 requires that the site be shown to be "suitable to the proposed use." The proposed zone would allow, outright, farm and forest uses and dwellings on parcels of at least ten acres in conjunction with farm or forest uses. In discussing the Forest-Farm zone, zoning ordinance section 3.220.A. states:

"The purpose of the Forest-farm zone is to permit those lands which have not been in commercial agriculture or timber production to be used for small-scale, part-time farm or forest units by allowing residential dwellings in conjunction with a farm use while preserving open space and other forest uses."

3.2.5..1. The Forest-Farm zone is not a resource zone. (See October 11, 1995 non-resource determination letter Exhibit WC-Q, Betzing Record). In this case, it is the most suitable designation for the subject property,

which has been physically developed and entirely committed to nonresource use due to its location in close proximity to major county rural residential areas. The area is suitable to the proposed use as described in the attached exhibits and otherwise as described in the reports and testimony received in this proceeding.

3.2.5..2. The history of the area is also relevant to addressing this standard. As discussed in the Irrevocably Committed section of this discussion, the extensive parcelization that took place to the west, north, and east of the subject property has resulted, over time, in the building and commitment of the surrounding area to non-resource, rural residential uses. As explained in previous sections of this narrative, the presence of dwellings in and adjacent to the subject property complicates and increases the cost of commercial forestry in that area in a manner rendering commercial forestry impracticable.

3.2.6 Subsection B(3) of zoning ordinance section 9.020 requires, prior to approval of a zone change, that it be established that "There has been a conscious consideration of the public health, safety and welfare in applying the specific zoning regulations." The exhibits and record of this proceeding support a finding of compliance with this requirement. This requirement for rezoning has been met.

3.3 Zoning Ordinance – Section 9.030

Section 9.030 requires review of the proposed action to determine whether it significantly affects a transportation facility. As discussed in Section 1.8, the proposed zone change will not significantly affect a transportation facility.

3.4 Zoning Ordinance – Section 9.040

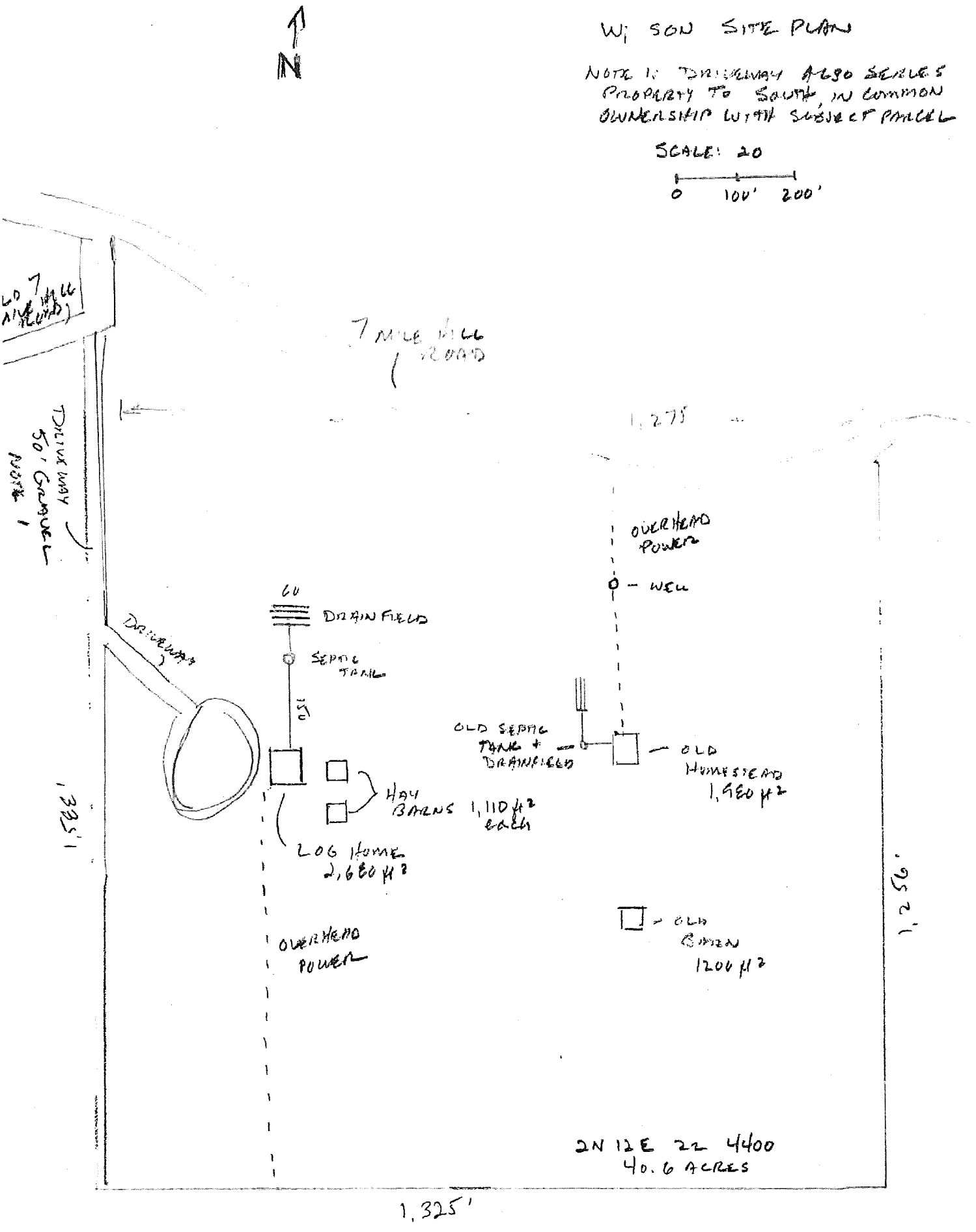
Section 9.040 allows for the imposition of such reasonable conditions "as are necessary to insure the compatibility of a zone change to surrounding uses and as are necessary to fulfill the general and specific purposes of this Ordinance." The Section lists without limitation eight general categories of areas which may be conditioned to achieve the desired compatibility. Because the minimum lot size in the proposed zone change is 10 acres, because the uses surrounding the subject property are almost entirely rural residential, and because any future development will require compliance with applicable building and development standards, no conditions are necessary as part of this application to ensure the compatibility of the subject property to the surrounding uses.

3.5 Zoning Ordinance – Section 9.060 – 9.080

Sections 9.060 through 9.080 require that the Planning Commission hold a hearing on the proposed zone change and make a recommendation to the County Board of Commissioners, which shall then take such action as it deems appropriate no sooner than twenty days after receipt of the Planning Commission's recommendation.

CONCLUSION

Because of the unique circumstances of the relationship between the subject property and surrounding land as explained above, the proposed residential uses will not commit adjacent or nearby resource land to nonresource use. The rural residential uses allowed are compatible with nearby resource use. Based upon all of the findings of fact and conclusions of law set forth above, the Planning Director recommends approval of the exception and zone change and recommends that the subject property be rezoned to F-F(10), and that the corresponding Plan, map and ordinance changes be made.


N
WILSON SITE PLAN
NOTE: DRIVEWAY ALSO SERVES PROPERTY TO SOUTH IN COMMON OWNERSHIP WITH SUBJECT PARCEL
SCALE: 20
0 100' 200'
7 MILE HILL ROAD
1,275'
DRIVEWAY
50' GRAVEL
PORTE
CO
DRAIN FIELD
SEPTIC TANK
25'
DRIVEWAY
OVERHEAD POWER
WELL
OLD SEPTIC TANK + DRAINFIELD
OLD HOMESTEAD 1,960 ft²
HAY BARNS 1,110 ft² EACH
LOG HOME 2,660 ft²
OLD BARN 1200 ft²
OVERHEAD POWER
2N 12E 22 4400
40.6 ACRES
1,325'
1,325'
1,256'

#3

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

WRD 1909

2N/12E/22CC

(START CARD) # 21248

(1) OWNER:

Well Number:

Name James Hubbard

Address 7100 Seven Mile Rd

City The Dalles State Ore Zip 97058

(2) TYPE OF WORK:

☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD

☒ Rotary Air ☐ Rotary Mud ☐ Cable

☐ Other

(4) PROPOSED USE:

☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval Yes ☐ No ☒ Depth of Completed Well 308 ft.

Explosives used Yes ☐ No ☒ Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
10	0	19	Bentonite	0	19	7
6	19	308				

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E

☐ Other Rodded

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6	+1	19	250	☒	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

☐ Perforations Method

☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
35	100%	308	1 hr.

Temperature of water 58 Depth Artesian Flow Found

Was a water analysis done? ☐ Yes By whom

Did any strata contain water not suitable for intended use? ☐ Too little

☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other

Depth of strata:

(9) LOCATION OF WELL by legal description:

County Wasco Latitude ' " Longitude ' "

Township 2N N or S, Range 12E E or W, WM.

Section 22 SW ¼ SW ¼

Tax Lot 901 Lot Block Subdivision

Street Address of Well (or nearest address)

7100 Seven Mile Rd

(10) STATIC WATER LEVEL:

187 ft. below land surface. Date 29 April

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 274

From	To	Estimated Flow Rate	SWL
274	295	35	187

(12) WELL LOG:

Ground elevation 1600

Material	From	To	SWL
Soil	0	3	
Sandstone & boulders	3	10	
Basalt gray	10	188	
Rock brown	188	202	
Basalt gray	202	274	
Rock brown visicular WB	274	295	187
Basalt gray	295	308	

RECEIVED

MAY 2 8 199

WATER RESOURCES DEPT.
SALEM, OREGON

Date started 27 April Completed 29 April 1991

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number

Signed Date

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. all work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 606

Signed Richard J Mooney Date 27 May 1991

ORIGINAL & FIRST COPY - WATER RESOURCES DEPARTMENT SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 3/88

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

RECEIVED

APR 20 1987

WATER RESOURCES DEPT.
SALEM, OREGON

WWAS C
003105

2N 12E 22cb

(1) OWNER:

Well Number:

Name Richard J. Murray

Address 2175 Ridge Rd

City The Dalles, State Oregon Zip 97058

(2) TYPE OF WORK:

☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD

☒ Rotary Air ☐ Rotary Mud ☐ Cable

☐ Other

(4) PROPOSED USE:

☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval Yes ☐ No ☒ Depth of Completed Well 3/20 ft.

Explosives used Yes ☐ No ☒ Type Amount

Diameter	HOLE From	To	SEAL Material	From	To	Amount sacks or pounds
12	0	24	Bentonite	0	24	700#

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E

☐ Other Rodded

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	8	+2	25	250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Location of shoe(s)

(7) PERFORATIONS/SCREENS:

☐ Perforations Method

☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
50	100%	550	1 hr.

Temperature of water Depth Artesian Flow Found

Was a water analysis done? ☐ Yes By whom No

Did any strata contain water not suitable for intended use? ☒ Too little

☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other

Depth of strata:

(9) LOCATION OF WELL by legal description:

County Wasco Latitude Longitude

Township 2N N or S, Range 12 E E or W, WM.

Section 22 NW ¼ SW ¼

Tax Lot Lot Block Subdivision

Street Address of Well (or nearest address) Seven Mile Rd

(10) STATIC WATER LEVEL:

150 ft. below land surface. Date 3/20

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 240

From	To	Estimated Flow Rate	SWL
230	270	5	
334	350	~~25~~ 50	150

(12) WELL LOG:

Ground elevation 1600

Material	From	To	SWL
Clay brown	0	10	
Basalt gray	10	23	
Clay yellow	23	26	
Basalt gray	26	230	
Basalt black visic WB	230	270	
Basalt gray	270	334	
Rock gray & pink WB	334	350	150
Basalt gray	350	480	
Rock blk. & claystone gray & green	480	495	
Basalt gray with cracks	495	550	

Date started 4 March 1987 Completed 20 March 1087

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number 606

Signed Date 4/17/87

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. all work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 606

Signed Richard J Murray Date 4/17/87

WHITE COPIES - WATER RESOURCES DEPARTMENT YELLOW COPY - CONSTRUCTOR PINK COPY - CUSTOMER 9809C 10/86

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the

STATE ENGINEER, SALEM, OREGON 97310
within 30 days from the date of well completion.

WATER WELL REPORT

STATE OF OREGON

(Please type or print)

(Do not write above this line) 003111

WWASC

State Well No. 2N- 12E-22

State Permit No. .....

(1) OWNER:

Name Samuel Decker

Address Route 4, Box 210
The Dalles, Oregon 97058

(2) TYPE OF WORK (check):

New Well ☐ Deepening ☐ Reconditioning ☒ Abandon ☐

If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary ☒ Driven ☐
Cable ☐ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) CASING INSTALLED:

Threaded ☐ Welded ☒

8 " Diam. from 0 ft. to 43 ft. Gage .250

6 " Diam. from 0 ft. to 110 ft. Gage .250

" Diam. from ..... ft. to ..... ft. Gage .....

(6) PERFORATIONS:

Perforated? ☐ Yes ☒ No.

Type of perforator used .....

Size of perforations ..... in. by ..... in.

..... perforations from ..... ft. to ..... ft.

..... perforations from ..... ft. to ..... ft.

..... perforations from ..... ft. to ..... ft.

(7) SCREENS:

Well screen installed? ☐ Yes ☒ No

Manufacturer's Name .....

Type ..... Model No. .....

Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.

Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.

(8) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? ☒ Yes ☐ No If yes, by whom? driller

Yield: 60 gal./min. with 100 ft. drawdown after 2 hrs.

" " "

" " "

Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.

Artesian flow ..... g.p.m.

Temperature of water 50° Depth artesian flow encountered ..... ft.

(9) CONSTRUCTION:

Well seal—Material used Bentonite - Cement

Well sealed from land surface to 42 ft.

Diameter of well bore to bottom of seal 12 in.

Diameter of well bore below seal 6 in.

Number of sacks of cement used in well seal 4 sacks

Number of sacks of bentonite used in well seal 2 sacks

Brand name of bentonite Yellowstone

Number of pounds of bentonite per 100 gallons of water 65 lbs./100 gals.

Was a drive shoe used? ☒ Yes ☐ No Plugs ..... Size: location ..... ft.

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ..... depth of strata .....

Method of sealing strata off .....

Was well gravel packed? ☐ Yes ☒ No Size of gravel: .....

Gravel placed from ..... ft. to ..... ft.

(10) LOCATION OF WELL:

County Wasco Driller's well number .....

NW ¼ SW ¼ Section 22 T. 2N R. 12 E. E. W.M.

Bearing and distance from section or subdivision corner 120' south from center of Seven Mile Hill county road

(11) WATER LEVEL: Completed well.

Depth at which water was first found 25 ft.

Static level 33 ft. below land surface. Date 7-23-74

Artesian pressure ..... lbs. per square inch. Date .....

(12) WELL LOG:

Diameter of well below casing 6"

Cleaned out

Depth drilled ..... ft. Depth of completed well 320 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. *Report each change in position of Static Water Level and indicate principal water-bearing strata.*

MATERIAL	From	To	SWL
Water slacked rock on wall of well.			
Reamed and cased with 6" casing so as to install 6" frame submersible			

Work started 7-16 19 74 Completed 7-22 19 74

Date well drilling machine moved off of well 7-23 19 74

Drilling Machine Operator's Certification:

This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.

[Signed] Gilbert Clayton (Drilling Machine Operator) Date Oct. 30 19 75

Drilling Machine Operator's License No. 129

Water Well Contractor's Certification:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Name Gilbert Clayton Well Drilling (Person, firm or corporation) (Type or print)

Address Rt 1, Box 61-A, The Dalles, Ore.

[Signed] Gilbert Clayton (Water Well Contractor)

Contractor's License No. 569 Date Oct. 30, 19 75

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the STATE ENGINEER, SALEM, OREGON 97310 within 30 days from the date of well completion.

WASC 003131

RECEIVED
MAY 28 1974
STATE ENGINEER
SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print) (Do not write above this line)

State Well No. 2N/12E-22 cb
State Permit No.

(1) OWNER:
Name Samuel Decker
Address Route 4, Box 210
The Dalles, Oregon 97058

(2) TYPE OF WORK (check):
New Well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary [X] Driven [ ]
Cable [ ] Jetted [ ]
Dug [ ] Bored [ ]

(4) PROPOSED USE (check):
Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [X] Test Well [ ] Other [ ]

(5) CASING INSTALLED:
Threaded [ ] Welded [X]
6" Diam. from 0 ft. to 41 ft. Gage .250
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

(6) PERFORATIONS:
Perforated? [ ] Yes [X] No
Type of perforator used
Size of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS:
Well screen installed? [ ] Yes [X] No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? [ ] Yes [X] No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
Air
Bailer test 50 gal./min. with 100 ft. drawdown after 9 hrs.
Artesian flow g.p.m.
Temperature of water 50° Depth artesian flow encountered ft.

(9) CONSTRUCTION:
Well seal—Material used Bentonite - cement
Well sealed from land surface to 40 ft.
Diameter of well bore to bottom of seal 10 in.
Diameter of well bore below seal 6 in.
Number of sacks of cement used in well seal 4 sacks
Number of sacks of bentonite used in well seal 2 sacks
Brand name of bentonite Yellowstone
Number of pounds of bentonite per 100 gallons of water 65 lbs./100 gals.
Was a drive shoe used? [X] Yes [ ] No Plugs Size: location ft.
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? [ ] Yes [X] No Size of gravel:
Gravel placed from ft. to ft.

(10) LOCATION OF WELL:
County Wasco Driller's well number
NW ¼ SW ¼ Section 22 T. 2N R. 12 E. W.M.
Bearing and distance from section or subdivision corner 120' south from center of Seven Mile Hill county road.

(11) WATER LEVEL: Completed well.
Depth at which water was first found 25 ft.
Static level 33 ft. below land surface. Date 5-14-74
Artesian pressure lbs. per square inch. Date

(12) WELL LOG:
Diameter of well below casing 6"
Depth drilled 320 ft. Depth of completed well 320 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. *Report each change in position of Static Water Level and indicate principal water-bearing strata.*

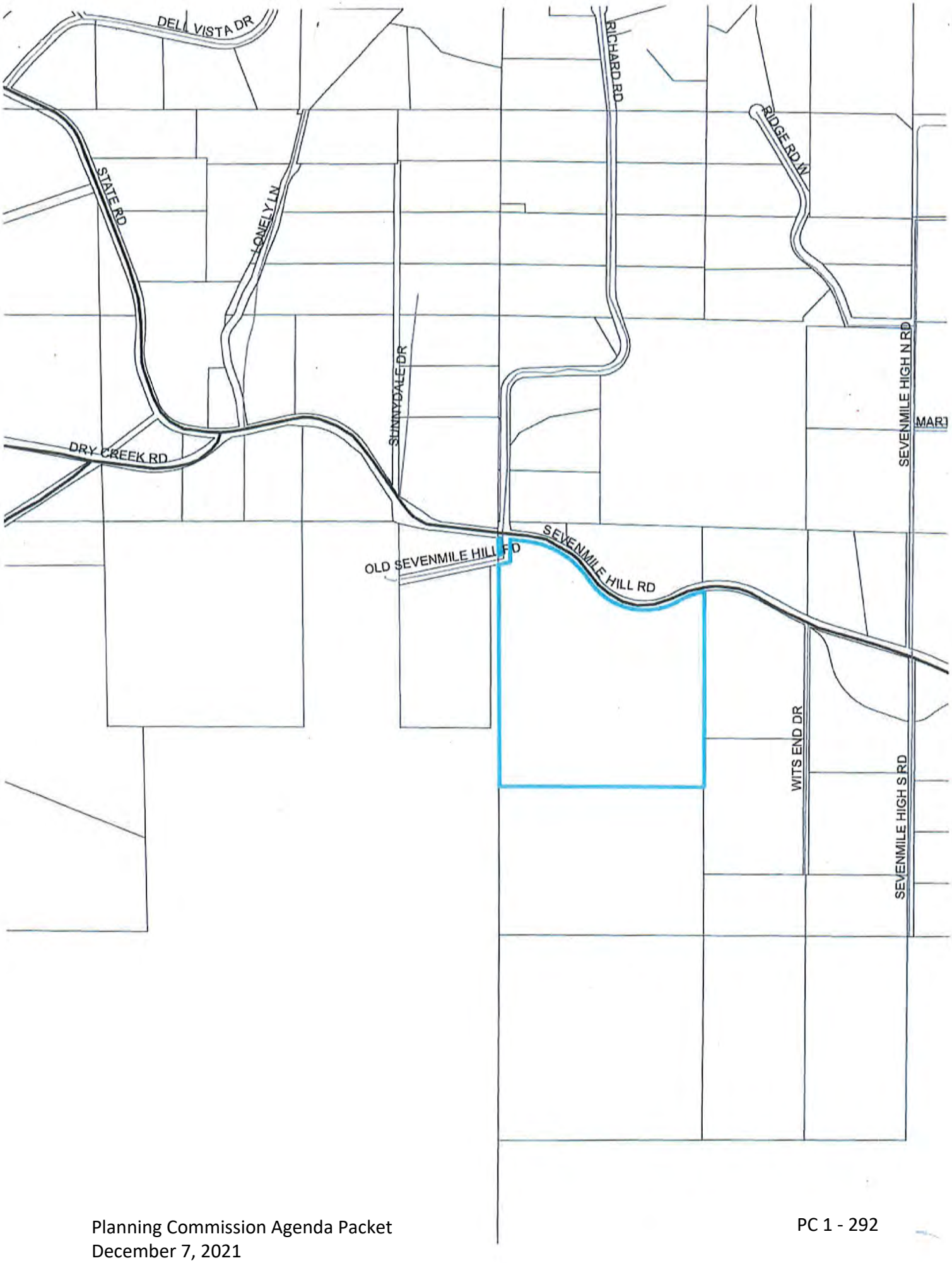
MATERIAL	From	To	SWL
Soil, brown clay	0	4	
Rock, decomposed	4	12	
Rock, broken	12	35	15
Rock, grey	35	65	20
Rock, black	65	120	20
Rock, grey	120	180	20
Rock, grey-green, clay seams	180	255	20
Rock, red porous	255	275	33
Rock, grey porous, pyrites	275	308	33
Rock, grey	308	320	33

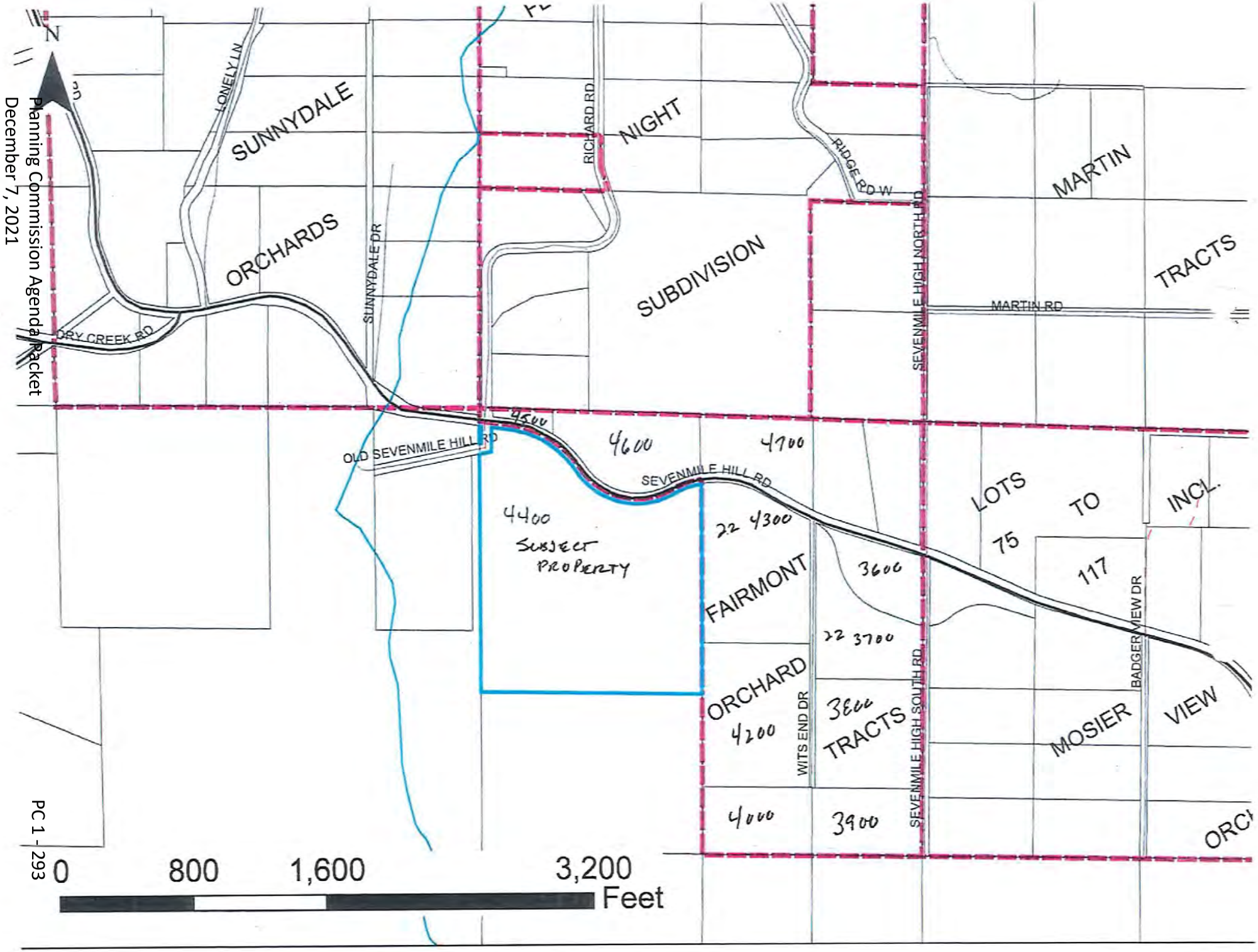
Work started May 2 1974 Completed May 13 1974
Date well drilling machine moved off of well May 14 1974

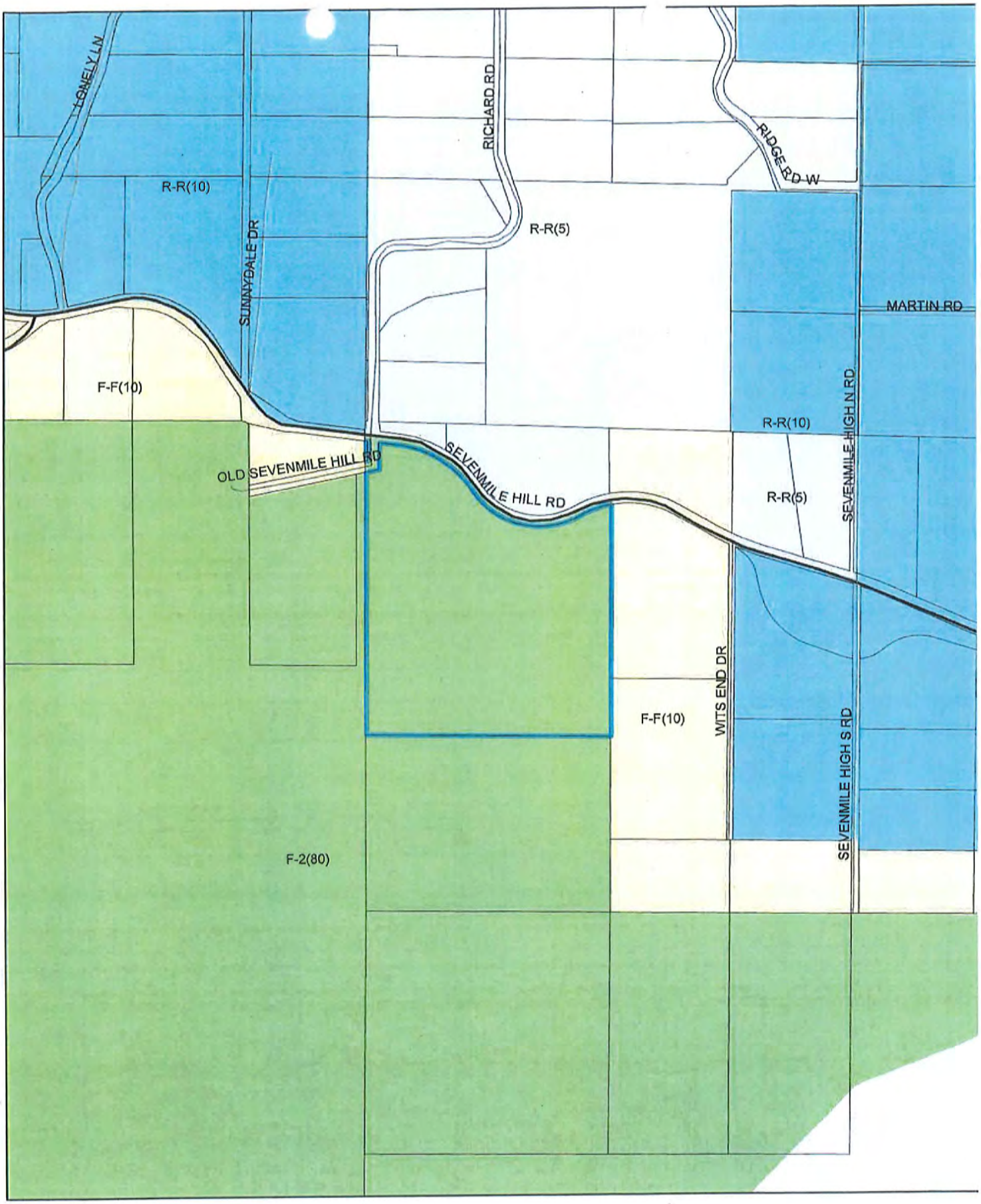
Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] Gilbert Clayton (Drilling Machine Operator) Date May 25, 1974
Drilling Machine Operator's License No. 129

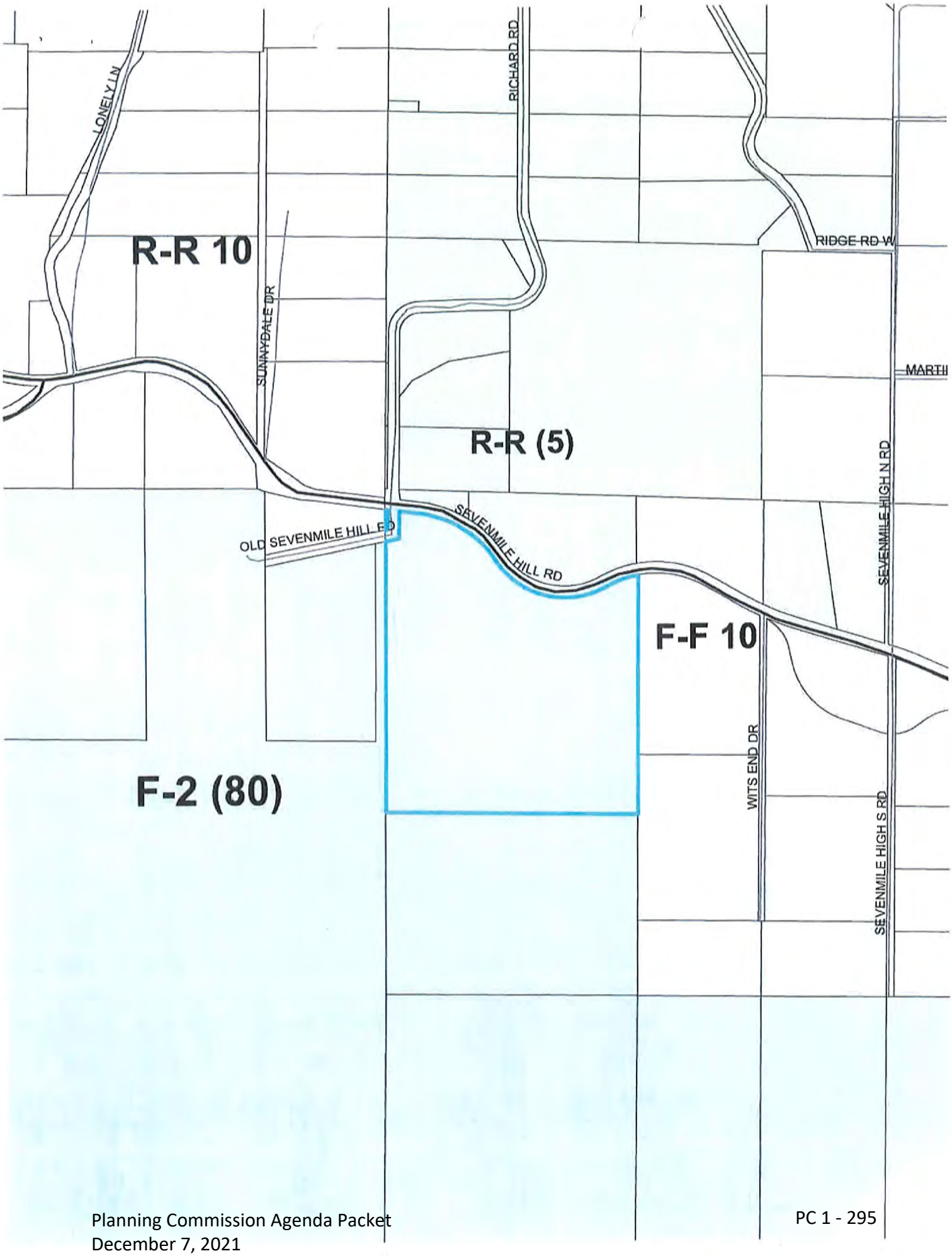
Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name Gilbert Clayton Well Drilling (Person, firm or corporation) (Type or print)
Address Rt 1, Box 61-A, The Dalles, Oregon
[Signed] Gilbert Clayton (Water Well Contractor)
Contractor's License No. 569 Date May 25, 1974

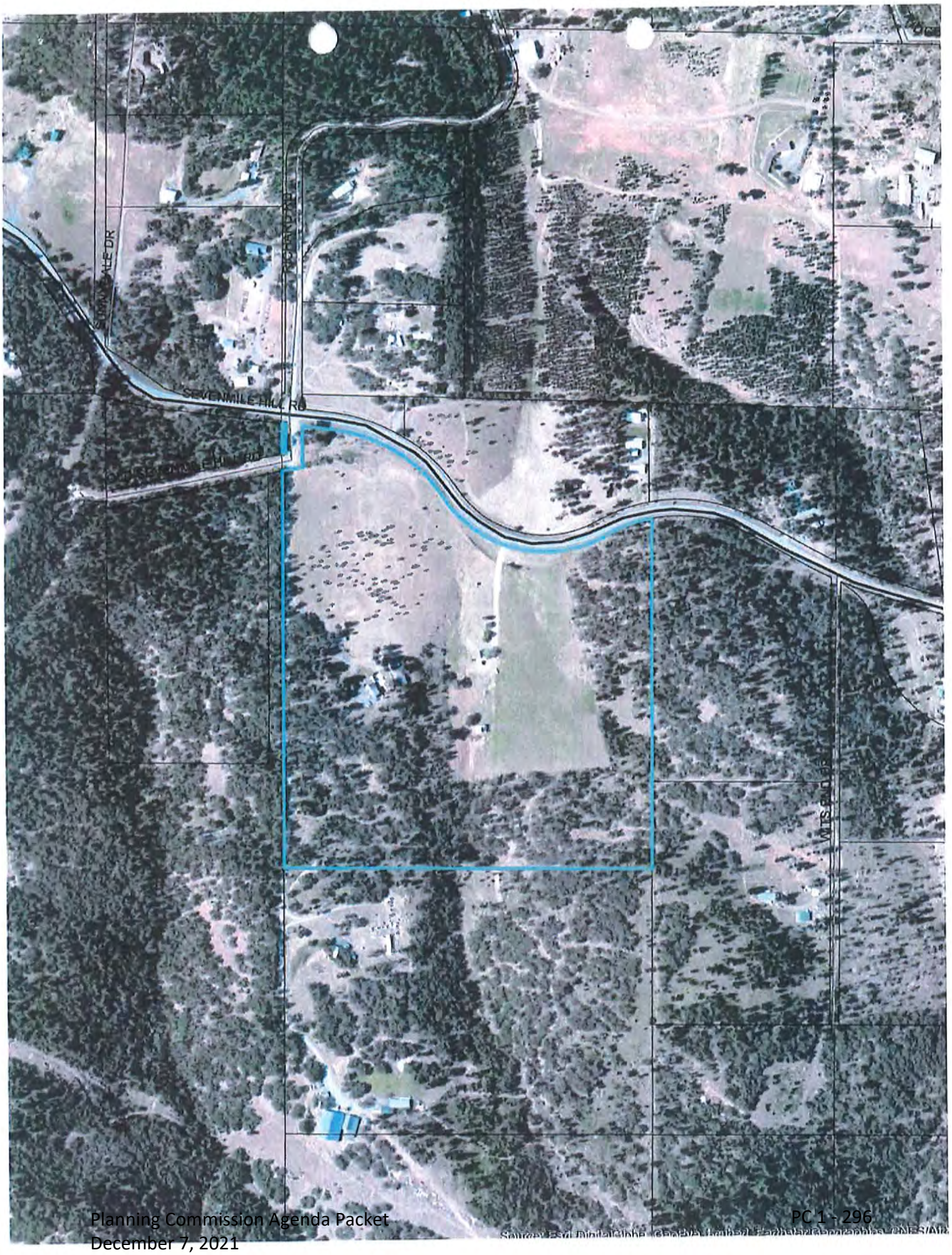
(USE ADDITIONAL SHEETS IF NECESSARY)
SP*45656-119

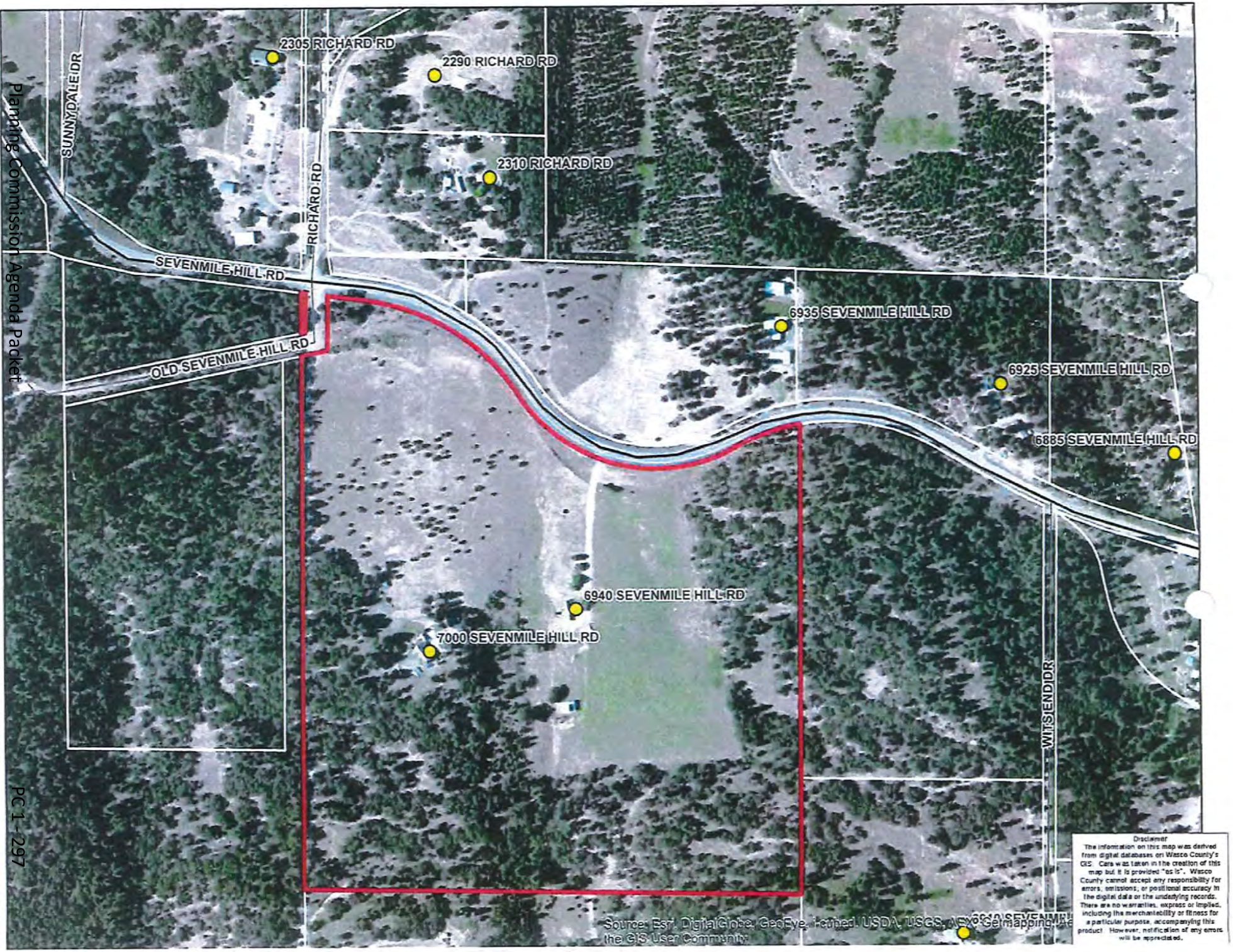

DELL VISTA DR
RICHARD RD
RIDGE RD W
STATE RD
LONELY LN
SUNNYDALE DR
SEVENMILE HIGH N RD
DRY CREEK RD
OLD SEVENMILE HILL RD
SEVENMILE HILL RD
WITS END DR
SEVENMILE HIGH S RD


N
LONELY LN
SUNNYDALE
ORCHARDS
SUNNYDALE DR
RICHARD RD
NIGHT
SUBDIVISION
RIDGE RD W
SEVENMILE HIGH NORTH RD
MARTIN
TRACTS
MARTIN RD
DRY CREEK RD
OLD SEVENMILE HILL RD
4500
4600
4700
SEVENMILE HILL RD
4400
SUBJECT PROPERTY
22 4300
FAIRMONT
3600
22 3700
ORCHARD
4200
WITS END DR
3800
TRACTS
SEVENMILE HIGH SOUTH RD
4000
3900
LOTS
75
TO
117
INCL.
BADGER VIEW DR
MOSIER
VIEW
ORC
0
800
1,600
3,200
Feet


LONELY LN
SUNNYDALE DR
RICHARD RD
RIDGE RD W
MARTIN RD
SEVENMILE HIGH N RD
SEVENMILE HIGH S RD
WITS END DR
OLD SEVENMILE HILL RD
SEVENMILE HILL RD
R-R(10)
R-R(5)
R-R(10)
R-R(5)
F-F(10)
F-F(10)
F-2(80)
N
0
0.15
0.3
Miles

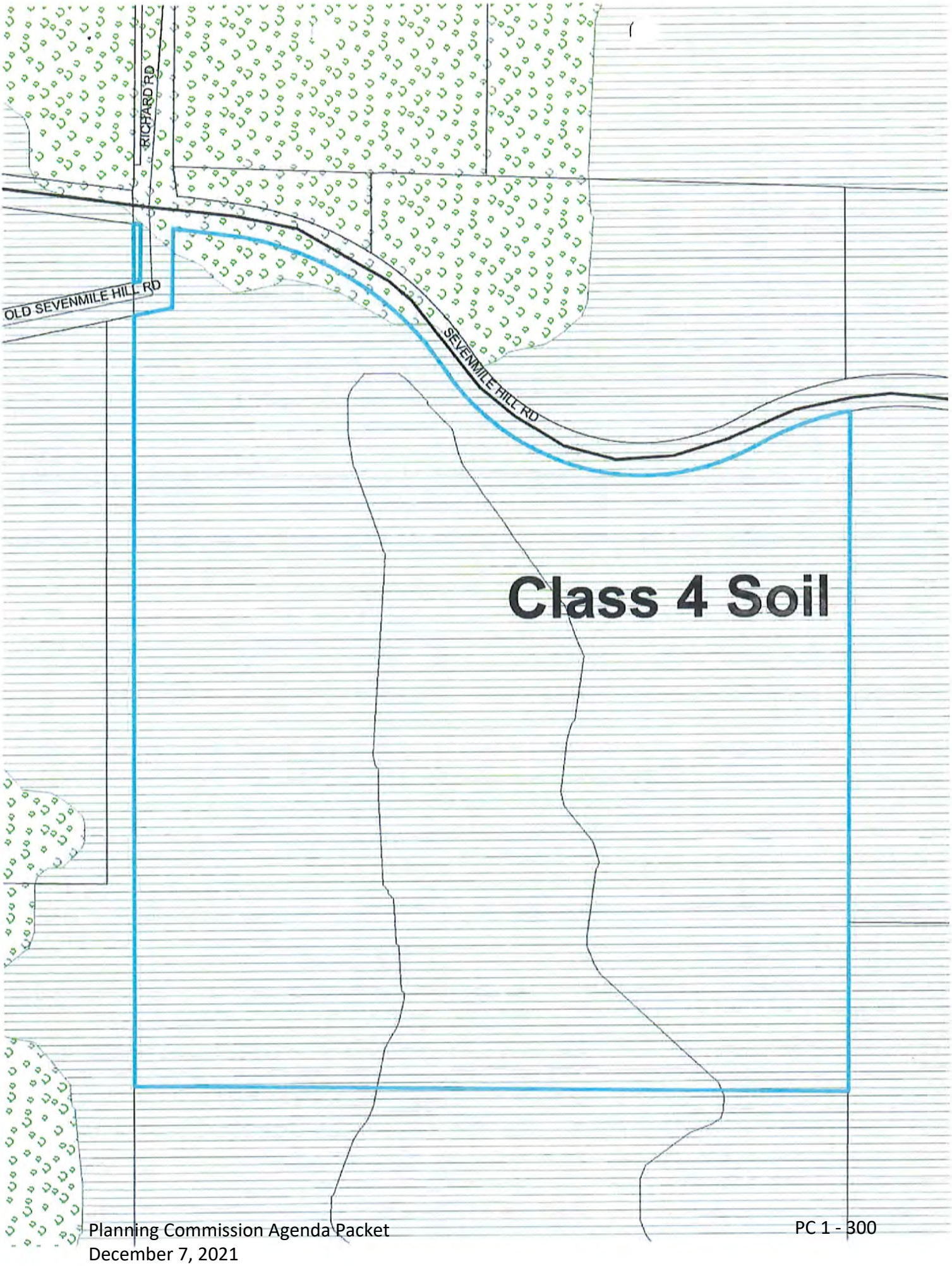

LONELY LN
RICHARD RD
RIDGE RD W
R-R 10
SUNNYDALE DR
MARTI
R-R (5)
SEVENMILE HIGH N RD
OLD SEVENMILE HILL RD
SEVENMILE HILL RD
F-F 10
WITS END DR
SEVENMILE HIGH S RD
F-2 (80)

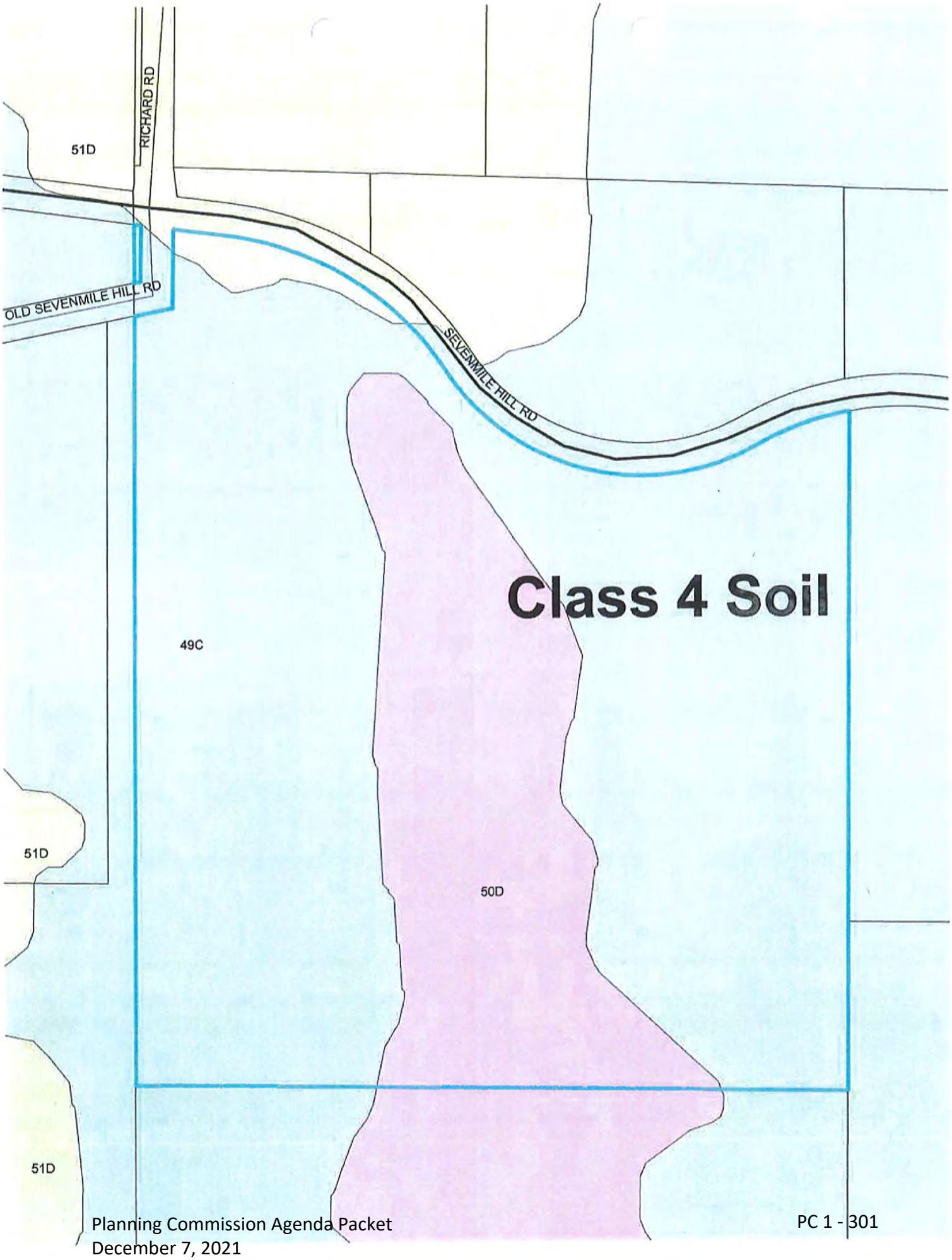

SEVENMILE HILL RD
WILSON DR

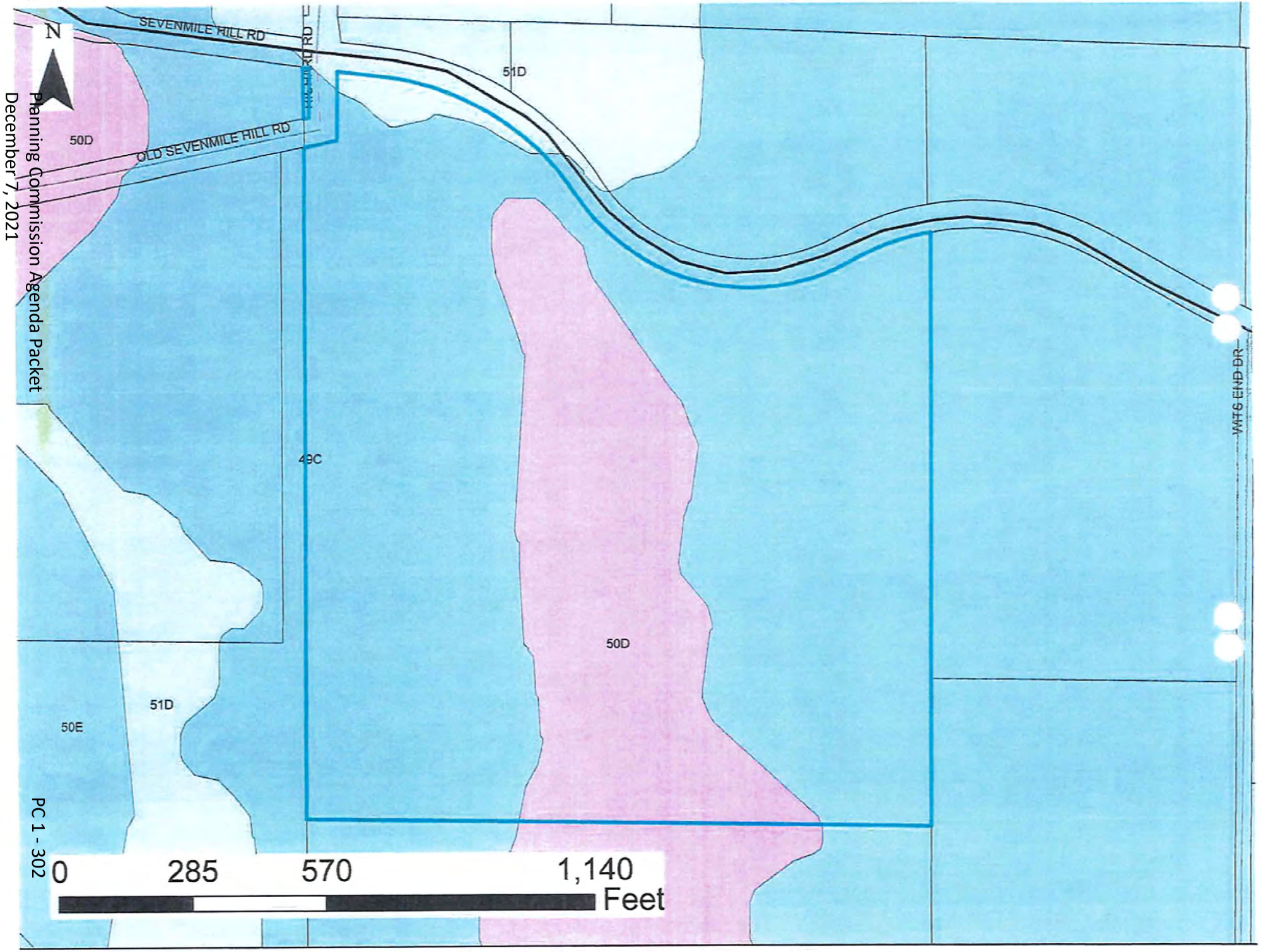

2305 RICHARD RD
2290 RICHARD RD
2310 RICHARD RD
SUNNYDALE DR
RICHARD RD
SEVENMILE HILL RD
OLD SEVENMILE HILL RD
6935 SEVENMILE HILL RD
6925 SEVENMILE HILL RD
6885 SEVENMILE HILL RD
6940 SEVENMILE HILL RD
7000 SEVENMILE HILL RD
WILSEN DR
Disclaimer
The information on this map was derived from digital databases on Wasco County's GIS. Care was taken in the creation of this map but it is provided "as is". Wasco County cannot accept any responsibility for errors, omissions, or positional accuracy in the digital data or the underlying records. There are no warranties, express or implied, including the merchantability or fitness for a particular purpose, accompanying this product. However, notification of any errors will be appreciated.
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

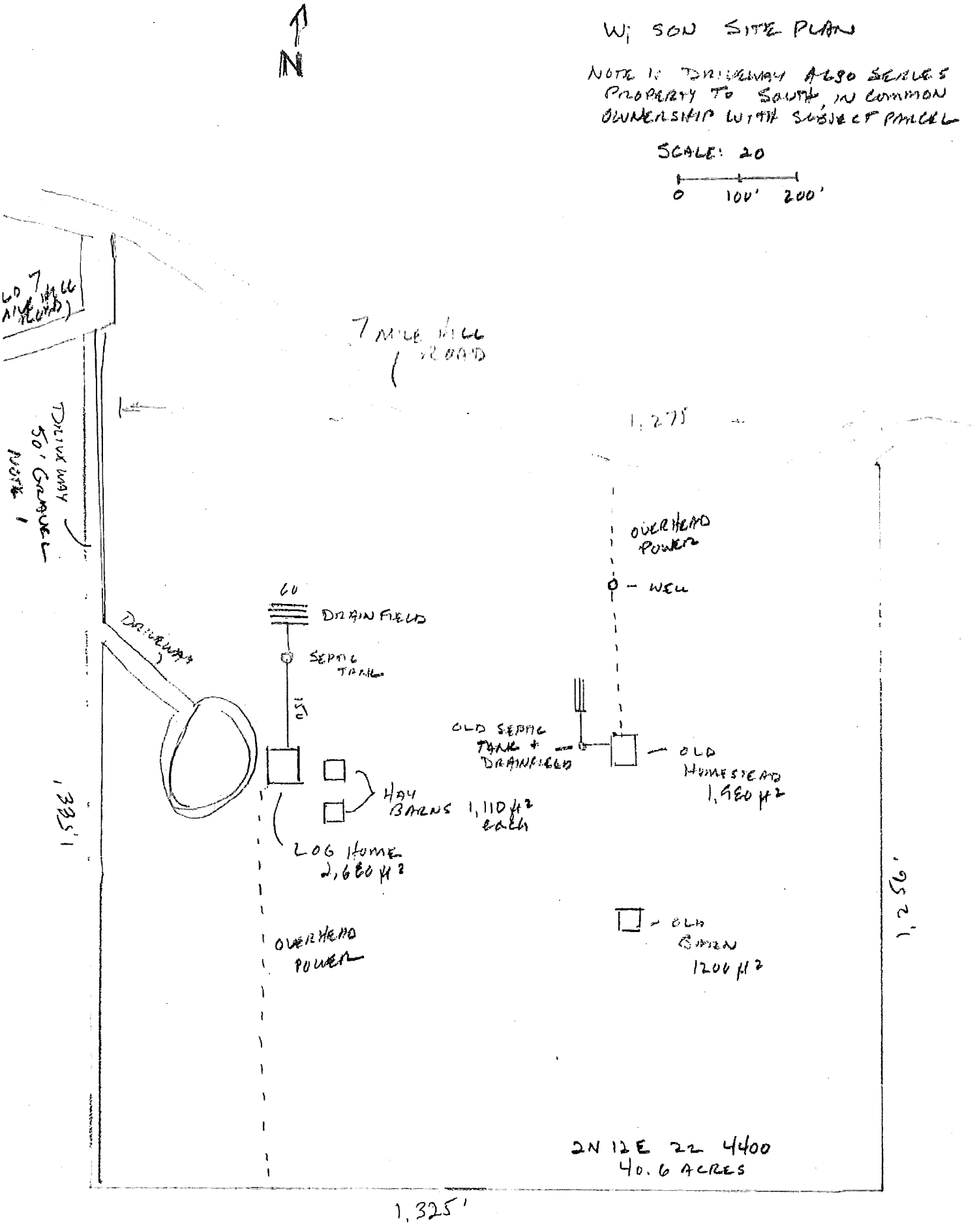

RICHARD RD
OLD SEVENMILE HILL RD
SEVENMILE HILL RD


RICHARD RD


RICHARD RD
OLD SEVENMILE HILL RD
SEVENMILE HILL RD
Class 4 Soil


RICHARD RD
51D
OLD SEVENMILE HILL RD
SEVENMILE HILL RD
Class 4 Soil
49C
51D
50D
51D


N
SEVENMILE HILL RD
OLD SEVENMILE HILL RD
50D
51D
49C
50D
51D
50E
0
285
570
1,140
Feet


N
WILSON SITE PLAN
NOTE 1: DRIVEWAY ALSO SERVES PROPERTY TO SOUTH, IN COMMON OWNERSHIP WITH SUBJECT PARCEL
SCALE: 20
0 100' 200'
7 MILE HILL ROAD
1,275
DRIVEWAY 50' GRAVEL NOTE 1
60
DRAIN FIELD
SEPTIC TANK
DRIVEWAY
OVERHEAD POWER
WELL
OLD SEPTIC TANK + DRAINFIELD
OLD HOMESTEAD 1,960 ft²
HAY BARNS 1,110 ft² EACH
LOG HOME 2,680 ft²
OVERHEAD POWER
OLD GARAGE 1200 ft²
2N 12E 22 4400
40.6 ACRES
1,325'
1,325'
1,256'

ATTACHMENT D – EXHIBIT 4

"Remand Letter"

PHILLIPS REYNIER SUMERFIELD & CLINE, LLP

ATTORNEYS AT LAW

DEBORAH M. PHILLIPS
RONALD H. REYNIER
WILLIAM H. SUMERFIELD
JULIE L. CLINE

P. O. BOX 758
718 STATE STREET
HOOD RIVER, OREGON 97031

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Licensed in Oregon & Washington

July 9, 2021

Kelly Howsley-Glover, Interim Director
Wasco County Planning Department
2705 E. Second Street
The Dalles, OR 97058

Hand Delivered

RE: **PLAQJR-15-09-0002**
921-18-000086-PLNG
LUBA No. 2019-065
David Wilson zone change, comprehensive plan amendment, and goal exception applications – remand hearing

Greetings,

I represent the applicant, David Wilson, in the above matters. By decision dated January 14, 2020, LUBA remanded the above zone change approval. Mr. Wilson is prepared to proceed with the remand hearing, and submits the following new evidence for consideration. Applicant also anticipates submitting written argument prior to the hearing, and appearing at the hearing to present the new evidence and make argument. All of the matters raised in this letter will be addressed in more detail in the written argument to be submitted prior to the hearing.

The remand hearing fee of $350.00 is included with this letter.

Soils Assessment

The application previously proceeded using the Wasco County NCRS soils map for the subject property. That map indicated the subject property contained two Class IV soil types.

On December 18, 2020, Soils Scientist Gary Kitzrow conducted a soils study at the subject property. Mr. Kitzrow found that the subject property consists predominantly of generally unsuitable Class 7 and Class 8 soils. Mr. Kitzrow submitted a report to DLCD on January 23, 2021, which report was reviewed and accepted by Hilary Foote, DLCD Farm, Forest Specialist on March 20, 2021.[1]

On January 15, 2021, Applicant Wilson signed the Soils Assessment Release Form authorizing release of the assessment to Wasco County Planning. Presumably, DLCD provided Wasco County with a copy after Ms. Foote's review and acceptance. A complete copy of Mr.

[1] Ms. Foote's Completeness Review letter is erroneously dated March 29, ***2001.*** This is obviously a typographical error.

Kitzrow's report and DLCD's review is included with this letter for inclusion in evidence and consideration on remand.

Aerial Photo of Subject Property and Adjoining Area

Previous aerial photos submitted tended to focus tightly on the subject property and on the adjoining residential enclaves. There are lands west and south of the subject parcel which are zoned for resource use, and a portion of those lands are in commercial timber production. LUBA faulted the county for failing to adequately address those lands:

> "The findings do not address at all the relationship of the subject property to the adjacent approximately 450 acres of F-2 zoned lands located to the west of the subject property that are in timber production and/or that possess soils suitable for forestry production, or the approximately 2,000 acres of resource land that are in forest use located immediately south of intervenor's 69-acre adjacent F-2 parcel to the south of the subject property, or the potential for resources use of the property in conjunction with the adjacent F-2 zoned properties." *LUBA decision, p. 12, lines 1-8.*

What the local decision-making bodies knew, and what LUBA failed to grasp, is that there is a clear line of demarcation between productive lands further to the west of the subject property, and the subject property and lands immediately adjacent to the south and west of the subject property. This aerial photo, taken with a much wider perspective, clearly shows the literal moonscape nature of the adjoining properties south of the subject property.

Physically Developed Map & Area Calculations

On appeal, Appellants claimed, and LUBA accepted the claim, that only approximately 12 percent of the subject property was physically developed, while more than 87 percent of the property was undeveloped. LUBA cited the administrative rule discussing the necessary findings:

> "Whether land has been physically developed with uses not allowed by an applicable goal, will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception." OAR 660-004-0025(2).

While there is a comprehensive site plan in the record which formed the basis for the County's findings,[2] Applicant submits a more comprehensive map with this letter for additional clarity.

[2] Record on Appeal at 215.

Wasco County Planning Department
July 9, 2021
Wilson Remand Hearing

In the previous hearings, Applicant testified as to his knowledge of applicable buffers, and argued that common sense required recognition of reasonable buffers around such development as power lines, structures, and septic drain fields. The county decision makers accepted that argument. LUBA was not impressed by this application of common sense:

> "Intervenor responds that managing the subject property for commercial forestry would require 'extensive' fire buffers along the eastern and northern borders that are adjacent to developed residential areas and around the existing dwelling on the property. Intervenor's Response Brief 27. Intervenor also points out that 'two strings' of overhead power lines are located on the property, and that forestry uses would require a buffer from those lines. *Id.* We understand intervenor to argue that such extensive buffers mean that the property is 'physically developed to the extent it is no longer available' for forestry uses.
>
> *****
>
> Further, we agree with petitioners that the county's decision is not supported by substantial evidence in the record, where the evidence in the record is that the property has available at least 87 percent of its area for forestry. Intervenor does not attempt to quantify the amount of buffer that would be required to conduct forestry uses or quantify the amount by which that buffer would decrease the amount of property available for forestry uses to such an extent that the property 'is no longer available for forestry uses.' We conclude that the county's findings in support of its approval of a physically developed exception are not supported by substantial evidence in the record."

Applicant takes LUBA up on its invitation to attempt to quantify the amount of land unable to be used due to applicable buffers. Applicant has again discussed the powerline buffer with the power company (15' from centerline), and has applied those in the attached calculations, in addition to a 50' buffer around each structure. Excluding the many roads on the subject property, and ignoring the pond and septic drain fields, the developed area comprises approximately 24.5% of the subject property. Adding 50' buffers along Seven Mile Hill Road and the driveway easement serving properties to the south increases this figure to 32.81%. With over half the property consisting of unsuitable soils, there is virtually no land available to support resource use.

Please add this letter and supporting materials to the record on remand. I look forward to working with you to schedule a hearing.

Sincerely,

William H. Sumerfield

WHS/

Enclosures (*Soils Assessment, Aerial Photo, Development Map, Developed Area Calculations)*

Power Lines

15' either side from center line

10,024 linear feet x 30' = 300,730 ft^2

Structures

50' each side from dimensions below

Log Home 80 x 100 = 36,000 ft^2

Barn #1 24 x 35 = 16,740 ft^2

Barn #2 30 x 30 = 16,900 ft^2

Lean To 16 x 30 = 15,627 ft^2

Old Homestead Home 55 x 55 = 24,025 ft^2

Old Homestead Barn 25 x 55 = 16,875 ft^2

Total square footage developed area 426,887 ft^2

40 acres = 1,742,700 ft^2

426,887/1,740,700 = .2452 (24.52% of total area)

Note: Total does not include roads, natural features, buffers near road or property boundaries, or septic tanks and drainfields

50' buffer along 7 Mile Hill Road = 65,000 ft^2

50' buffer along driveway easement = 79,300 ft^2

571,187/1,740,700 =.3281 (32.81% of total area)

ATTACHMENT D – EXHIBIT 5

Arthur Smith, Wasco County Public Works Director
Melanie Brown, Wasco County Chief Appraiser
Hilary Foote, Oregon Land Conservation and Development (DLCD) Farm Forest Specialist

Daniel Dougherty <danield@co.wasco.or.us>

Fire Fuel Break for County Roads

2 messages

Daniel Dougherty <danield@co.wasco.or.us> Mon, Nov 15, 2021 at 10:00 AM
To: Arthur Smith <arthurs@co.wasco.or.us>

Hi Arthur,

I hope you had a great weekend.

I'm hoping you can help. Do you have rules regarding fire fuel breaks along County Roads? We have a fire fuel break rule (10' from center line) for private access driveways, but nothing regarding public roads (or at least that I can find).

Thanks.

Respectfully,

Daniel

--

Daniel Dougherty | ***Senior Planner***
PLANNING DEPARTMENT

danield@co.wasco.or.us | **http://www.co.wasco.or.usdepartments/planning/index.php**

541-506-2560 | Fax 541-506-2561
2705 E Second Street | The Dalles, OR 97058

Office Notice about COVID-19

Welcome back! We have resumed in-person customer service. Office hours are Tuesday and Thursday, 10am to 4pm with a lunchtime closure. Appointments can be accommodated on Fridays. Masks are required in the office unless you bring your vaccination card to demonstrate you are a full two weeks out from your final COVID-19 vaccination.
Email is still the best way to reach me! Please view our website for office hours and COVID-19 accommodations.

This correspondence does not constitute a Land Use Decision per ORS 197.015.
It is informational only and a matter of public record.

Arthur Smith <arthurs@co.wasco.or.us> Mon, Nov 15, 2021 at 10:19 AM
To: Daniel Dougherty <danield@co.wasco.or.us>

Daniel,

We do not have a fire break rule. The county is obligated to prevent obstruction of a publicly dedicated road, but there is no language about fire protection - people can't block a road, it must remain open for travel. However, the county is not obligated to care for or maintain public or private roads, just county roads.

Most county roads are only 22-24 feet in width, but have a 50-60 foot dedicated right-of-way which we manage. We try to keep a clear zone of 4-6 feet on each side of the county road. This is more for vehicular safety than fire protection. We

have the right to remove trees, bushes and other vegetation if we deem it is necessary for safety or if the tree represents a road hazard.

Hope this helps.

Arthur

[Quoted text hidden]

--

Arthur Smith | ***Director***
PUBLIC WORKS

arthurs@co.wasco.or.us | www.co.wasco.or.us
541-506-2645 | Fax 541-506-2641
2705 East 2nd Street | The Dalles, OR 97058

Daniel Dougherty <danield@co.wasco.or.us>

Farm/Forest Deferral Question

Melanie Brown <melanieb@co.wasco.or.us> Wed, Nov 24, 2021 at 10:11 AM
To: Daniel Dougherty <danield@co.wasco.or.us>

Daniel,

The account you are requesting information about should be in the name of David W Wilson. His property is in applied for Farm Use. He has to support a qualifying income and it can't be a hobby farm. We send out Income Questionnaires every 3 years, which we will be sending them out next month for the 2022-23 tax year. He did meet the income requirement 3 years ago. According to what he does as a farming practice, he raises livestock and sells enough of them to qualify.

I hope this answers your question. Let me know if you have any other questions. Just thought I would let you know that I am working on a new Property Class list. This should be easier to figure out than the one I had previously sent to you.

Have a great Turkey Day!!
[Quoted text hidden]
--
Melanie J. Brown
Wasco County
Chief Appraiser
541-506-2514
MelanieB@co.wasco.or.us

Email is the best way to reach me! In an effort to prevent, slow, and stop the spread of COVID-19 to our citizens and staff, our office will be limiting business to phone, email and online service. Please keep in mind that response time may vary. Thank you for your patience during this time.

Daniel Dougherty <danield@co.wasco.or.us>

Inquiry: Soil Assessment Completeness Review

5 messages

Daniel Dougherty <danield@co.wasco.or.us> Tue, Oct 26, 2021 at 9:05 AM
To: hilary.foote@state.or.us

Good morning,

I hope this email finds you well.

My name is Daniel, a planner with Wasco County. I'm currently reviewing a land use request for a zone/map change for forest lands. The original request was approved, appealed to LUBA, and remanded back to the county in January 2020. The applicant has requested a remand hearing and has provided the following information (see attached Pdf):

(1) Soil Assessment Completeness Review; and
(2) Soil Survey Report & Legal Liability Release Form

Considering that I was not the original reviewing planner, and both the underlying request and soil survey are rare (at least in Wasco County), I wanted to reach out and make sure that the Soil Assessment Completeness Review Letter is all that DLCD provides. From what I've read, I believe that DLCD's role is to ensure the Soil Assessment's report is complete and consistent, and that the local jurisdiction gets to make its own determination as to the survey's accuracy and acceptability.

I appreciate your time and assistance.

Respectfully,

Daniel
--

Daniel Dougherty | ***Senior Planner***
PLANNING DEPARTMENT

danield@co.wasco.or.us | **http://www.co.wasco.or.usdepartments/planning/index.php**

541-506-2560 | Fax 541-506-2561
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Pioneering pathways to prosperity.

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07132021_Remand_Request_Soil_Data_921-18-000086-PLNG.pdf
19529K

FOOTE Hilary * DLCD <Hilary.FOOTE@dlcd.oregon.gov> Tue, Oct 26, 2021 at 9:36 AM
To: Daniel Dougherty <danield@co.wasco.or.us>

Hi Daniel,

Your understanding is correct. We do not review for technical accuracy – only completeness. I note that the report indicates the property is zoned EFU, not Forest however. Is this a changed from EFU to Forest?

I'm attaching the document that is referenced in OAR 660-006-0005 for addressing data sources for determining forest productivity.

Hilary Foote

Farm/Forest Specialist | Community Services Division

Oregon Department of Land Conservation and Development

635 Capitol Street NE, Suite 150 | Salem, OR 97301-2540

Cell: 503-881-9249 hilary.foote@dlcd.oregon.gov | www.oregon.gov/LCD

From: Daniel Dougherty <danield@co.wasco.or.us>
Sent: Tuesday, October 26, 2021 9:05 AM
To: FOOTE Hilary * DLCD <Hilary.FOOTE@dlcd.oregon.gov>
Subject: Inquiry: Soil Assessment Completeness Review

Good morning,

I hope this email finds you well.

My name is Daniel, a planner with Wasco County. I'm currently reviewing a land use request for a zone/map change for forest lands. The original request was approved, appealed to LUBA, and remanded back to the county in January 2020. The applicant has requested a remand hearing and has provided the following information (see attached Pdf):

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(2) Soil Survey Report & Legal Liability Release Form

Considering that I was not the original reviewing planner, and both the underlying request and soil survey are rare (at least in Wasco County), I wanted to reach out and make sure that the Soil Assessment Completeness Review Letter is all

that DLCD provides. From what I've read, I believe that DLCD's role is to ensure the Soil Assessment's report is complete and consistent, and that the local jurisdiction gets to make its own determination as to the survey's accuracy and acceptability.

I appreciate your time and assistance.

Respectfully,

Daniel

--

Daniel Dougherty | ***Senior Planner***

PLANNING DEPARTMENT

danield@co.wasco.or.us | **http://www.co.wasco.or.usdepartments/planning/index.php**

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LandUsePlanningNotes3FINAL.pdf
197K

Daniel Dougherty <danield@co.wasco.or.us> Tue, Oct 26, 2021 at 9:44 AM
To: FOOTE Hilary * DLCD <Hilary.FOOTE@dlcd.oregon.gov>

Hi Hilary,

Thank you for the assistance. The subject parcel is currently zoned F-2 (80) Forest. The request is to take the parcel out of Forest and place it within our non-resource Forest-Farm F-F(10) zone.

Respectfully,

Daniel
[Quoted text hidden]
--

Daniel Dougherty | ***Senior Planner***
PLANNING DEPARTMENT

danield@co.wasco.or.us | http://www.co.wasco.or.usdepartments/planning/index.php

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FOOTE Hilary * DLCD <Hilary.FOOTE@dlcd.oregon.gov> Tue, Oct 26, 2021 at 10:05 AM
To: Daniel Dougherty <danield@co.wasco.or.us>

For nonresource determination, OAR 660-006-0010 and the PDF I attached would apply to evidence addressing a forest land determination and OAR 660-033-0030 and the provided soils report would be evidence addressing an agricultural land determination then.

[Quoted text hidden]

Daniel Dougherty <danield@co.wasco.or.us> Tue, Oct 26, 2021 at 10:19 AM
To: FOOTE Hilary * DLCD <Hilary.FOOTE@dlcd.oregon.gov>

Excellent. Thank you so much.

Respectfully,

Daniel
[Quoted text hidden]
--

Daniel Dougherty | ***Senior Planner***
PLANNING DEPARTMENT

danield@co.wasco.or.us | http://www.co.wasco.or.usdepartments/planning/index.php

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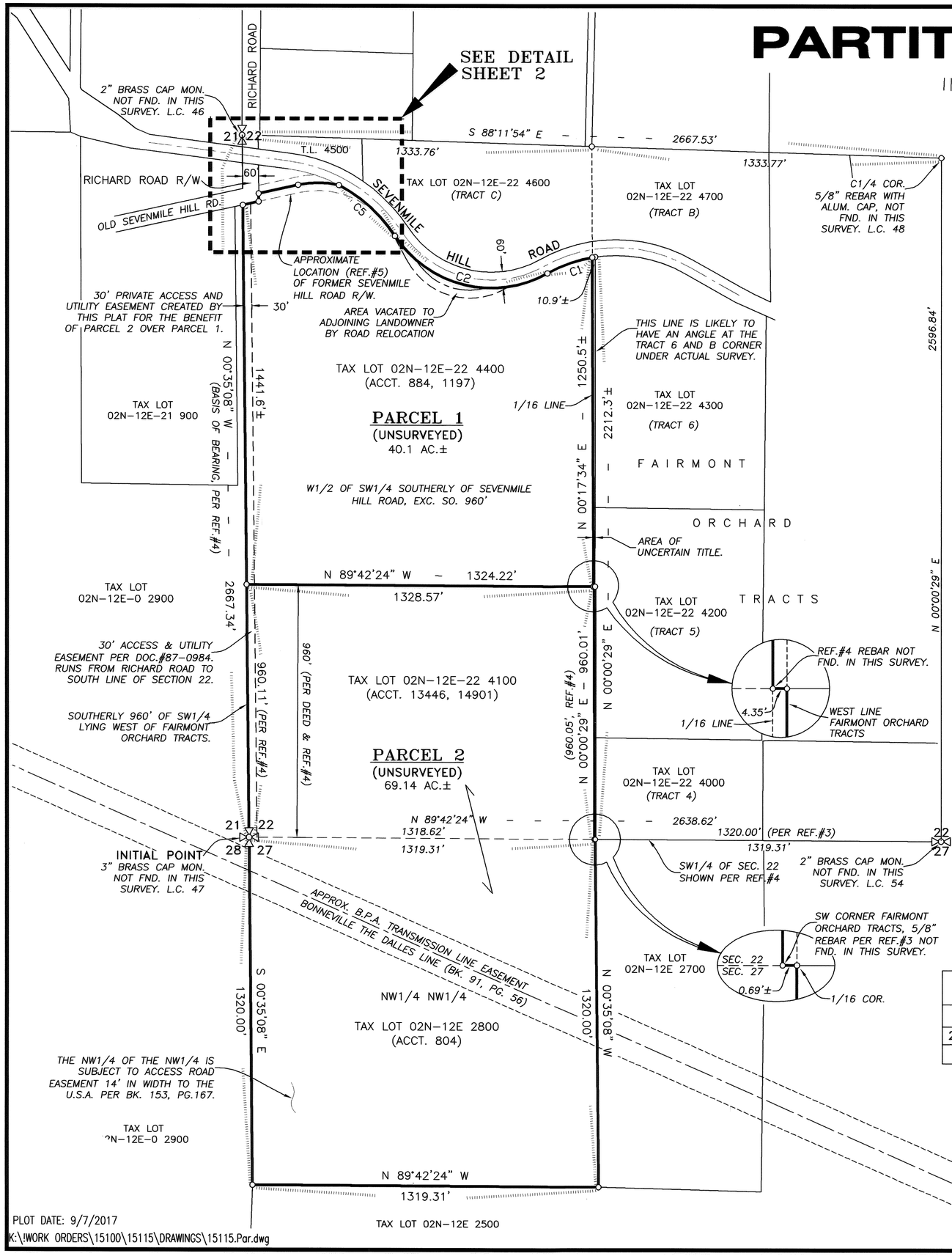
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ATTACHMENT D – EXHIBIT 6

"Partition Plat 2017-003560"

PARTITION PLAT



WASCO COUNTY SURVEYOR'S OFFICE
Survey No. 19-062
Filed 9/8/2017
By

RECORDING INFORMATION
Wasco County Official Records 2017-003560
PLAT-PART
Cnt=1 Stn=1 WASCO COUNTY 09/08/2017 01:46 PM
This is a no fee document NO FEE
00083910201700035600020023
I, Lisa Gambee, County Clerk for Wasco County, Oregon, certify that the instrument identified herein was recorded in the Clerk records.

Document Number 2017-003560
Plat Number 2017-0010
Slide Number D 152A

OWNERS:
DAVID W. & JOLENE WILSON
7100 SEVENMILE HILL ROAD
THE DALLES, OREGON 97058

TAX LOTS 02N-12E-22 4100 (ACCT. #14901, 13446) AND 4400 (ACCT. #884, 1197) AND 02N-12E 2800 (ACCT. #804) IN THE WEST 1/2 OF THE SW1/4, SECTION 22 AND IN THE NW1/4 OF THE NW1/4 SECTION 27, TOWNSHIP 2 N., RANGE 12 E., W.M. WASCO COUNTY, OREGON
SEPTEMBER 7, 2017

L E G E N D :

o	CALCULATED CORNERS, NOT SET.
REF.#	SURVEY REFERENCE NUMBER
FND.	FOUND
CALC.	CALCULATED
( )	RECORD SURVEY OR DEED CALL
MON.	MONUMENT
C.S.#	COUNTY SURVEY NUMBER
(E)	EXISTING
ACCT	ACCOUNT NUMBER
BK/PG	BOOK/PAGE
R/W	RIGHT OF WAY
L.C.	LAND CORNER NUMBER

TAX LOT	EXISTING PROPERTY SIZE	PROPOSED PROPERTY SIZE
2N 12E 4400	40.61 AC.	40.1 AC.±
2N 12E 22 4100	29.16 AC.	69.14 AC.±
2N 12E 0 800	40.16 AC.	0

ENGINEER / SURVEYOR:
TENNESON ENGINEERING CORP.
3775 CRATES WAY
The Dalles, Oregon. 97058
Ph. 541-296-9177
FAX 541-296-6657

09/07/17
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 13, 1999
BENJAMIN B. BESEDA
50800
EXPIRES: 12/31/2017

DECLARATION:
WE, DAVID AND JOLENE WILSON, THE OWNERS OF THE LAND SHOWN HEREIN, HEREBY DECLARE THAT THIS DIVISION OF LAND IS A LEGAL PLAT PARTITIONED IN ACCORDANCE WITH THE PROVISIONS OF ORS CHAPTER 92 AND HAS BEEN MADE WITH OUR FREE CONSENT AND IN ACCORDANCE WITH OUR DESIRES AND BY THIS PLAT CREATE THE PRIVATE EASEMENT SHOWN HEREON FOR THE STATED PURPOSE.

David Wilson 9/7/17
David Wilson Date

Jolene Wilson 9/7/17
Jolene Wilson Date

ACKNOWLEDGEMENT:
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON THE 7TH DAY OF SEPTEMBER, 2017
BY DAVID AND JOLENE WILSON

Notary signature
BENJAMIN B. BESEDA
NOTARY PUBLIC - OREGON
COMMISSION No. 951036
MY COMMISSION EXPIRES MAY 30, 2020

I HEREBY CERTIFY THIS PARTITION WAS EXAMINED AND APPROVED AS OF THIS 8TH DAY OF SEPTEMBER, 2017
WASCO COUNTY SURVEYOR

I HEREBY CERTIFY THIS PARTITION WAS EXAMINED AND APPROVED AS OF THIS 8th DAY OF SEPTEMBER, 2017
PLANNING DIRECTOR FOR AB
PLAPAR-17-05-0002

I HEREBY CERTIFY THIS PARTITION WAS EXAMINED AND APPROVED AS OF THIS 8th DAY OF SEPTEMBER, 2017
WASCO COUNTY ASSESSOR
WASCO COUNTY TAX COLLECTOR

SHEET 1 OF 2

PLOT DATE: 9/7/2017
K:\!WORK ORDERS\15100\15115\DRAWINGS\15115.Par.dwg
S.D.H.
W.O. #15115par

19-062

PARTITION PLAT

TAX LOTS 02N–12E–22 4100 (ACCT. #14901, 13446) & 4400 (ACCT. #884, 1197) AND 02N–12E 2800 (ACCT. #804) IN THE WEST 1/2 OF THE SW1/4, SECTION 22 AND IN THE NW1/4 OF THE NW1/4 SECTION 27, TOWNSHIP 2 N., RANGE 12 E., W.M. WASCO COUNTY, OREGON SEPTEMBER 7, 2017

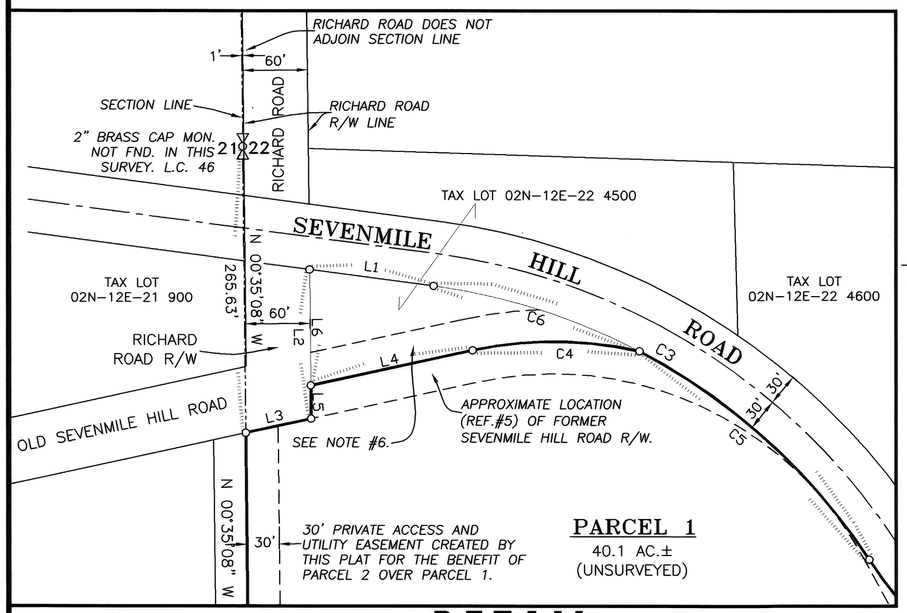
WASCO COUNTY SURVEYOR'S OFFICE
Survey No. 19-062
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By BL

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C.S.#	COUNTY SURVEY NUMBER
(E)	EXISTING
ACCT	ACCOUNT NUMBER
BK/PG	BOOK/PAGE
R/W	RIGHT OF WAY
L.C.	LAND CORNER NUMBER



DETAIL

SCALE: 1"= 100'

TAX LOT	EXISTING PROPERTY SIZE	PROPOSED PROPERTY SIZE
2N 12E 4400	40.61 AC.	40.1 AC.±
2N 12E 22 4100	29.16 AC.	69.14 AC.±
2N 12E 0 800	40.16 AC.	0

N O T E S :

1. BASIS OF BEARING: BEARINGS BASED ON COUNTY SURVEY #8–147 (REFERENCE #4) BETWEEN THE SOUTHWEST CORNER AND WEST 1/4 CORNER OF SECTION 22.
2. NO FIELD SURVEY WORK WAS COMPLETED FOR THIS PARTITION.
3. ZONING: F–2(80) IN WASCO COUNTY. COMPREHENSIVE PLAN DESIGNATION: ~~EXCLUSIVE FARM USE~~ FOREST D.B. IN WASCO COUNTY; ALSO EPD-8 (LOW ELEVATION WINTER RANGE)
4. PARCEL 1 CONTAINS AN EXISTING APPROVED ON–SITE SEWAGE DISPOSAL SYSTEM. PARCEL 2 HAS BEEN EVALUATED AND APPROVED FOR AN ON–SITE SEWAGE DISPOSAL SYSTEM. THE APPROVAL IS ON FILE WITH THE NORTH CENTRAL PUBLIC HEALTH DISTRICT.
5. SEPTIC EVALUATIONS HAVE BEEN PREVIOUSLY COMPLETED FOR EACH SINGLE FAMILY DWELLING AND ARE ON FILE WITH THE NORTH CENTRAL PUBLIC HEALTH DISTRICT.
6. THE SUBJECT PROPERTY DEED DESCRIPTION ORIGINATED PRIOR TO THE SEVENMILE HILL ROAD RELOCATION IN 1989 SO THEREFORE REFERS TO THE ORIGINAL ROAD LOCATION. WE FIND NO RECORD OF CONVEYANCE OF THIS AREA TO THE SUBJECT PROPERTY.
7. EASEMENTS OF RECORD SHOWN OR NOTED PER AMERITITLE STATUS OF RECORD TITLE REPORT COMPLETED UNDER TITLE NUMBER 187102, DATED AUGUST 17, 2017.
8. THE WEST 1/2 OF THE SW1/4 OF SECTION 22 LYING SOUTHERLY OF SEVENMILE HILL ROAD IS SUBJECT TO AN EASEMENT TO WASCO ELECTRIC COOP. PER DOCUMENT #87–1847. EXISTING POWER LINES ON THE SUBJECT PROPERTY WERE NOT MAPPED.
9. SECTION 22 SUBJECT TO AN EASEMENT TO WASCO ELECTRIC COOP. PER DOCUMENT #90–1977. EXISTING POWER LINES ON THE SUBJECT PROPERTY WERE NOT MAPPED.
10. THE SOUTHERLY 960 FEET OF THE SW1/4 OF SECTION 22 LYING WESTERLY OF FAIRMONT ORCHARDS AND THE NW1/4 OF THE NW1/4 OF SECTION 27 SUBJECT TO AN EASEMENT TO WASCO ELECTRIC COOP PER DOC. #96–3346. EXISTING POWER LINES ON THE SUBJECT PROPERTY WERE NOT MAPPED.
11. THE ORIGIN AND LOCATION OF THE RICHARD ROAD RIGHT OF WAY IN THE NW1/4 OF SECTION 22 IS UNCLEAR. IT IS SHOWN 60 FEET WIDE WITH A 1 FOOT OFFSET EAST FROM THE SECTION LINE AS SHOWN ON THE PLAT OF FLYBY NIGHT SUBDIVISION.

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH	TANGENT	CHORD BEARING	CHORD LENGTH
C1	20°41'46"	533.88'	192.84'	97.48'	S 71°02'00" W	191.80'
C2	85°53'54"	439.26'	658.54'	408.89'	S 76°21'56" E	598.57'
C3	49°06'44"	575.37'	493.19'	262.89'	N 57°58'21" W	478.23'
C4	25°03'06"	358.17'	156.61'	79.57'	N 89°43'27" W	155.36'
C5	28°59'25"	575.37'	291.12'	148.75'	N 47°54'42" W	288.03'
C6	20°07'19"	575.37'	202.07'	102.08'	N 72°28'04" W	201.03'

OWNERS:

DAVID W. & JOLENE WILSON
7100 SEVENMILE HILL ROAD
THE DALLES, OREGON 97058

LINE	BEARING	DISTANCE
L1	N 82°31'43" W	117'±
L2	N 00°35'08" W	138.3'±
L3	N 77°45'00" E	62'±
L4	S 77°45'00" W	154.2'±
L5	N 00°35'08" W	30.6'±
L6	S 00°35'08" E	108'±

R E F E R E N C E S :

1) PLAT OF FAIRMONT ORCHARD TRACTS RECORDED AUGUST 3, 1911 SLIDE A–028
2) SEVENMILE HILL ROAD AND "STATE" ROAD SECTIONS BY WASCO COUNTY ROAD DEPT. SUMMER 1989 C.S. #H–03–0
3) SURVEY FOR LARRY BLACK BY BISHOP SURVEYING, INC. SEPTEMBER 14, 1984 C.S. #5–108
4) RECORD OF SURVEY FOR DON HENDERSHOT BY WYEAST SURVEYS SEPTEMBER 7, 1993 C.S. #8–147

N A R R A T I V E :

THE PURPOSE OF THIS SURVEY WAS TO PARTITION TAX LOTS 02N–12E–22 4100 AND 4400 AND 02N–12E 2800 INTO TWO LEGAL LOTS OF RECORD. THE SUBJECT PROPERTY LIES IN THE SOUTHWEST 1/4 OF SECTION 22 AND NORTHWEST 1/4 OF SECTION 27, TOWNSHIP 2 NORTH, RANGE 12 EAST, W.M. PRIOR TO COMPLETING THE MAPPING REQUIRED FOR THIS PROJECT, RESEARCH WAS MADE TO OBTAIN COPIES OF SURVEYS OR PLATS COMPLETED ON OR IN THE VICINITY OF THE SUBJECT PROPERTY. PRIOR SURVEYS UTILIZED AS A PART OF THE RESOLUTION SHOWN HEREON ARE LISTED AS REFERENCES. ALSO AS A PART OF THE RESEARCH FOR THIS PARTITION, A COPY OF THE CURRENT DEED AND A CURRENT TITLE REPORT FOR THE SUBJECT PROPERTY WAS OBTAINED.

THE SUBJECT PROPERTY WAS DIVIDED INTO TWO PARCELS AS SHOWN PER LANDOWNER'S DIRECTION AND IS CONSISTENT WITH THE WASCO COUNTY PLANNING DEPARTMENT NOTICE OF DECISION APPROVING THIS PARTITION. BOTH PARCELS ARE OVER 10 ACRES IN SIZE. THE MAPPING SHOWN HEREON IS PER DEED CALLS, ASSESSOR'S MAP, AND OTHER MAPS OF RECORD. THE SUBJECT PROPERTY AND PARTITION PARCELS BEING OVER 10 ACRES IN SIZE AND DESCRIBED BY ALIQUOT SECTIONAL SUBDIVISION, FIRM DEED CALLS, AND PUBLIC ROAD RIGHTS–OF–WAY WERE NOT SURVEYED.

EASEMENTS OF RECORD, AS INDICATED BY THE TITLE REPORT, ARE NOTED OR MAPPED. THIS PARTITION CREATES THE PRIVATE ACCESS AND UTILITY EASEMENT ALONG THE WEST LINE OF PARCEL 1 AS SHOWN HEREON. THE MAP ALSO NOTES THE POSSIBLE GAP BETWEEN THE EAST LINE OF PARCEL 1 AND THE WEST LINE OF FAIRMONT ORCHARD TRACTS. THE EAST LINE OF PARCEL 1 IS THE EAST LINE OF THE WEST 1/2 OF THE SOUTHWEST 1/4 OF SECTION 22. THE PLAT OF FAIRMONT ORCHARDS IS NOT CLEAR IN WHETHER ITS WEST LINE IS ALSO THE WEST LINE OF THE EAST 1/2 OF THE SOUTHWEST 1/4 OF SECTION 22. THIS POSSIBLE GAP IS CONSISTENT WITH THAT SHOWN ON REFERENCE #4. THIS LOCATION IS LABELED AS "AREA OF UNCERTAIN TITLE" ON THE FACE OF THE MAP.

NO FIELD WORK WAS CONDUCTED FOR THIS PARTITION AND NO MONUMENTS WERE SET.

SURVEYOR'S CERTIFICATE:

I, BENJAMIN B. BESEDA, REGISTERED LAND SURVEYOR #50800 IN THE STATE OF OREGON, BEING FIRST DULY SWORN, DEPOSE AND SAY THAT I HAVE CORRECTLY EXECUTED, ACCORDING TO ORS CHAPTER 92 AND THE WASCO COUNTY LAND USE DEVELOPMENT ORDINANCE, A PARTITION PLAT LYING IN THE SOUTHWEST 1/4 OF SECTION 22 AND THE NORTHWEST 1/4 OF SECTION 27, TOWNSHIP 2 NORTH, RANGE 12 EAST, WILLAMETTE MERIDIAN, WASCO COUNTY, OREGON. THE INITIAL POINT FOR SAID PARTITION IS THE SOUTHWEST CORNER OF SAID SECTION 22. THE PLATTED PROPERTY IS DESCRIBED AS FOLLOWS:

SECTION 22
THE SOUTHERLY 960 FEET OF THE SOUTHWEST 1/4 OF SAID SECTION 22 LYING WEST OF THE WEST LINE OF THE FAIRMONT ORCHARD TRACTS.

THE WEST 1/2 OF THE SOUTHWEST 1/4 OF SECTION 22 LYING SOUTHERLY OF SEVENMILE HILL ROAD, EXCEPTING THEREFROM THE SOUTH 960 FEET THEREOF.

SECTION 27
THE NORTHWEST 1/4 OF THE NORTHWEST 1/4.

CONTAINS 109.75 ACRES, MORE OR LESS.

09/07/17
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 13, 1999
BENJAMIN B. BESEDA
50800
EXPIRES: 12/31/2017

ENGINEER / SURVEYOR:
TENNESON ENGINEERING CORP.
3775 CRATES WAY
The Dalles, Oregon. 97058
Ph. 541–296–9177
FAX 541–296–6657

SHEET 2 OF 2

W.O. #15115par

19-062

ATTACHMENT D – EXHIBIT 7

Dooley et al v. Wasco County, LUBA Opinion No. 2019-065

BEFORE THE LAND USE BOARD OF APPEALS
OF THE STATE OF OREGON

SHEILA DOOLEY and JILL BARKER,
Petitioners,

vs.

WASCO COUNTY,
Respondent,

and

DAVID WILSON,
Intervenor-Respondent.

LUBA No. 2019-065

FINAL OPINION
AND ORDER

Appeal from Wasco County.

Mike J. Sargetakis, Portland, filed the petition for review and a reply brief, and argued on behalf of petitioners. With him on the brief was Oxbow Law Group.

Meredith J. Barnes, The Dalles, filed a response brief and argued on behalf of respondent. With her on the brief was Bradley V. Timmons and Timmons Law PC.

William H. Sumerfield, Hood River, filed a response brief and argued on behalf of intervenor-respondent.

RYAN, Board Member; ZAMUDIO, Board Chair; RUDD, Board Member, participated in the decision.

REMANDED 01/14/2020

You are entitled to judicial review of this Order. Judicial review is governed by the provisions of ORS 197.850.

Opinion by Ryan.

NATURE OF THE DECISION

Petitioners appeal a decision by the board of county commissioners approving physically developed and irrevocably committed exceptions to Statewide Planning Goal 4 (Forest Lands), together with a comprehensive plan map amendment from Forest to Forest-Farm and a zone map amendment from Forest (F-2) (80) to Forest Farm (F-F) (10).

MOTION TO INTERVENE

David Wilson, the applicant below (intervenor) moves to intervene on the side of the respondent. No party opposes the motion and it is allowed.

MOTION TO AMEND PETITION FOR REVIEW

OAR 661-010-0030(4)(d) requires that each assignment of error state the standard of review. In its response brief, the county objected to petitioners' failure to comply with OAR 661-010-0030(4)(d) in their first, third and fourth assignments of error. Petitioners then moved to amend their petition pursuant to OAR 661-010-0030(6) to include sections stating the standard of review for those assignments of error.

We conclude that petitioners' failure to specifically state the standard of review in their first, third and fourth assignments of error is a technical violation that did not prejudice the substantial rights of any other participant in this appeal. OAR 661-010-0005. Accordingly, an amended petition for review is unnecessary and petitioners' motion is denied.

FACTS

The subject property is approximately 40 acres and was created pursuant to a partition approved in 2017. The property slopes from approximately six percent on the north to approximately 10 percent on the south. Record 20. The property includes a single-family dwelling and an accessory structure on the western half of the property, both of which are served by a driveway running along the western property line; a second dwelling that is no longer used as a dwelling that was served by a driveway running through the center of the property; a pump house, a barn and two wells. Record 18. The property contains two soil types, 49C and 50D, which are both Class IV soils in 4A, subclass A. The site index for both soil types is 70, which has a 20 to 49 cubic feet per acre per year potential yield for Ponderosa Pine. Record 19, 1331. The property includes primarily Oregon White Oak trees and Ponderosa Pine, as well as a few Douglas fir trees. Record 20. The remaining unforested portion of the property is grass. An aerial image indicates several acres planted in crops on the western half of the property. Record 20.

The subject property is adjacent to Seven Mile Hill Road.[1] To the north of Seven Mile Hill Road and to the east of the subject property are lots of approximately five acres in size and zoned Rural-Residential (R-R) (5), R-R (10)

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[1] A vacant 0.7-acre property owned by the county and zoned F-2 separates part of the subject property from Seven Mile Hill Road. Record 24.

and F-F (10) that are part of larger subdivisions that largely pre-date zoning.[2] To the south of the subject property is a 69-acre parcel zoned Forest F-2 (80) (F-2) that is owned by intervenor and that includes a single family dwelling and accessory structures. A portion of that 69-acre parcel is currently in farm use. Record 20. To the south of that 69-acre parcel for approximately five miles is that is zoned F-2 and managed for forestry or grazing. Record 25.

To the west of the subject property lies a split-zoned 16.3-acre property with 5 acres zoned F-F (10), and the remaining approximately 11 acres zoned F-2, and a 439-acre parcel zoned F-2 and managed for commercial forestry. All of the parcels that are immediately adjacent to west, east and south of the subject property possess similar soil types and slopes as the subject property.

Intervenor applied for an exception to Statewide Planning Goal 4 (Forest Lands) and a concurrent comprehensive plan amendment from Forest to Forest-Farm and a zone map amendment from F-2 to F-F (10). The F-2 zone is a forest resource zone. The F-F (10) zone is a non-resource zone. Wasco County Land Use and Development Ordinance 3.221. The board of county commissioners approved the application, and this appeal followed.

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[2] Two subdivisions were platted in 1911 and 1912. One subdivision was platted in 1979. Record 24.

FIRST, SECOND AND THIRD ASSIGNMENTS OF ERROR

Because the subject property is designated "Forest," approval of the comprehensive plan amendment and zone change required the board of commissioners to approve an exception to Goal 4 under Goal 2 and OAR chapter 660, division 4. The board of commissioners approved both an irrevocably committed exception and a physically developed exception. Petitioners' first, second, and third assignments of error contain largely overlapping and repetitive arguments that challenge the county's irrevocably committed exception, and for that reason we address those assignments of error together.

A. Introduction

An irrevocably committed exception may be approved where "[t]he land subject to the exception is irrevocably committed as described by Land Conservation and Development Commission rule to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable[.]" ORS 197.732(2)(b); OAR 660-004-0028(1). Under OAR 660-004-0028(2), whether land is irrevocably committed "depends on the relationship between the exception area and the lands adjacent to it," considering the characteristics of the exception area, adjacent lands, the relationship between the two, and other relevant factors.[3] OAR 660-

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[3] OAR 660-004-0028(2) provides:

004-0028(6) requires that the local government's findings consider a miscellany of factors, including existing adjacent uses; existing public facilities; parcel size and ownership patterns in the area; neighborhood and regional characteristics; natural or man-made features separating the exception area from adjacent resource land; and other relevant factors, in order to reach its ultimate conclusion that the property is or is not irrevocably committed.[4] The local government need

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"Whether land is irrevocably committed depends on the relationship between the exception area and the lands adjacent to it. The findings for a committed exception therefore must address the following:

"(a) The characteristics of the exception area;

"(b) The characteristics of the adjacent lands;

"(c) The relationship between the exception area and the lands adjacent to it; and

"(d) The other relevant factors set forth in OAR 660-004-0028(6)."

[4] OAR 660-004-0028(6) provides:

"(6) Findings of fact for a committed exception shall address the following factors:

"(a) Existing adjacent uses;

"(b) Existing public facilities and services (water and sewer lines, etc.);

"(c) Parcel size and ownership patterns of the exception area and adjacent lands:

"(A) Consideration of parcel size and ownership patterns under subsection (6)(c) of this rule shall include an analysis of how the existing development pattern came about and whether findings against the goals were made at the time of partitioning or subdivision. Past land divisions made without application of the goals do not in themselves demonstrate irrevocable commitment of the exception area. Only if development (e.g., physical improvements such as roads and underground facilities) on the resulting parcels or other factors makes unsuitable their resource use or the resource use of nearby lands can the parcels be considered to be irrevocably committed. Resource and nonresource parcels created and uses approved pursuant to the applicable goals shall not be used to justify a committed exception. For example, the presence of several parcels created for nonfarm dwellings or an intensive commercial agricultural operation under the provisions of an exclusive farm use zone cannot be used to justify a committed exception for the subject parcels or land adjoining those parcels.

"(B) Existing parcel sizes and contiguous ownerships shall be considered together in relation to the land's actual use. For example, several contiguous undeveloped parcels (including parcels separated only by a road or highway) under one ownership shall be considered as one farm or forest operation. The mere fact that small parcels exist does not in itself constitute irrevocable commitment. Small parcels in separate ownerships are more likely to be irrevocably committed if the parcels are

not demonstrate that every use allowed by the applicable goal is "impossible," but must demonstrate that, as relevant here, "[p]ropagation or harvesting of a forest product" and "[f]orest operations or forest practices as specified in OAR 660-006-0025(2)(a)" are impracticable. OAR 660-004-0028(3)(b)-(c). Committed exceptions "must be based on facts illustrating how past development has cast a mold for future uses." *1000 Friends of Oregon v. LCDC (Curry Co.)*, 301 Or 447, 501, 724 P2d 268 (1986) (quoting *Halvorson v. Lincoln Co.*, 14 Or LUBA 26, 31 (1985)).

ORS 197.732(6)(b) provides that LUBA "shall determine whether the local government's findings and reasons demonstrate" that the standards of an

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> developed, clustered in a large group or clustered around a road designed to serve these parcels. Small parcels in separate ownerships are not likely to be irrevocably committed if they stand alone amidst larger farm or forest operations, or are buffered from such operations;
>
> "(d) Neighborhood and regional characteristics;
>
> "(e) Natural or man-made features or other impediments separating the exception area from adjacent resource land. Such features or impediments include but are not limited to roads, watercourses, utility lines, easements, or rights-of-way that effectively impede practicable resource use of all or part of the exception area;
>
> "(f) Physical development according to OAR 660-004-0025; and
>
> "(g) Other relevant factors."

irrevocably committed exception "have or have not been met[.]" Contrary to the county's argument in its response brief, we owe no deference to the local governing body's decision or any interpretation of the relevant statutes and rules. *Kenagy v. Benton County*, 115 Or App 131, 838 P2d 1076, *rev den*, 315 Or 271 (1992). Our usual tripartite approach for reviewing decisions adopting irrevocably committed exceptions is to (1) resolve any contentions that the findings fail to address issues relevant under OAR 660-004-0028 or rely on factors that are not properly considered under OAR 660-004-0028, (2) consider any arguments that particular findings are not supported by substantial evidence in the record, and (3) determine whether the findings that are relevant and supported by substantial evidence are sufficient to demonstrate compliance with the standards of ORS 197.732(2)(b) that uses allowed by the goal are impracticable. *1000 Friends of Oregon v. Columbia County*, 27 Or LUBA 474, 476 (1994).

B. Characteristics of and Uses on Adjacent Lands (OAR 660-004-0028(2), (6)(a))

Petitioners argue that the county's findings addressing OAR 660-004-0028(2)(b) and (c) inadequately describe the characteristics of adjacent lands and the relationship of the subject property to adjacent lands by focusing too much attention on the adjacent lands to the east and north of Seven Mile Hill Road that are developed with residences, with only a cursory discussion of the existing forest zoning and timber production occurring on the properties to the south and

the west of the subject property. Petitioners argue that the findings fail to adequately address the existing forest uses on resource lands adjacent to the property, and fail to adequately describe "[p]arcel size and ownership patterns of the exception area and adjacent lands * * * [and] how the existing development pattern came about" as required by OAR 660-004-0028(6)(c)(A).

We agree with petitioners. While the findings appear adequate to describe some of the characteristics of lands adjacent to the subject property by identifying existing uses and zoning, as required by OAR 660-004-0028(2)(b), those findings also spend considerable ink discussing subdivided property located almost a mile away from the subject property (the "Fletcher Tract"), for reasons that are not apparent. Record 25-26. We agree with petitioners that the findings the county adopted are not adequate to describe the relationship of the subject property to adjacent lands as required by OAR 660-004-0028(2)(c). First, in describing the relationship of the subject property to adjacent lands, the findings conclude that because the subject 40-acre property is the only parcel zoned F-2 that fronts on Seven Mile Hill Road "[t]his creates a unique situation where the subject parcel is enclosed on three of its sides by residentially-zoned properties, most of which are used for residential purposes. If the subject parcel was used for aforestry operation it could be potentially disruptive to this residential community."[5]

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[5] In a different finding, the county characterizes the subject property as being "enclosed on three of its sides by existing residential development." Record 28. That statement is more accurate than the quoted statement that the subject

Record 26. The findings do not address at all the relationship of the subject property to the adjacent approximately 450 acres of F-2 zoned lands located to the west of the subject property that are in timber production and/or that possess soils suitable for forestry production, or the approximately 2,000 acres of resource land that are in forest use located immediately south of intervenor's 69-acre adjacent F-2 parcel to the south of the subject property, or the potential for resources use of the property in conjunction with the adjacent F-2 zoned properties.

Second, the mere existence of residential uses near a property proposed for an irrevocably committed exception does not demonstrate that such property is necessarily committed to nonresource use. *Prentice v. LCDC*, 71 Or App 394, 403-04, 692 P2d 642 (1984). The findings explain that most of the residential subdivisions adjacent to and nearby the subject property pre-dated planning and zoning laws, but do not explain why the existence of those pre-existing residential uses means that the subject property is irrevocably committed to nonresource use.

C. Impracticability of Forest Uses (OAR 660-004-0028(3))

In their third assignment of error, petitioners argue that the county's findings are inadequate to explain why the uses listed in OAR 660-004-0028(3) are impracticable. OAR 660-004-0028(3) provides in relevant part that

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property is enclosed on three of its sides by "residentially zoned properties," which the record demonstrates is not accurate, because, although they contain residences, the properties to the west and south of the subject property are zoned F-2, a Goal 4 resource zone. Record 26.

"For exceptions to Goals 3 or 4, local governments are required to demonstrate that only the following uses or activities are impracticable:

"(a) Farm use as defined in ORS 215.203;

"(b) Propagation or harvesting of a forest product as specified in OAR 660-033-0120; and

"(c) Forest operations or forest practices as specified in OAR 660-006-0025(2)(a)."[6]

The county found that

"the current level of residential development has increased to the point that *commercial resource use* has become impracticable. The exception area is surrounded on three sides by existing residential development, with the potential for additional residential development in the future. Conflicts caused by the proximity of residential neighbors on three sides require added expense related to fire protection, fencing and general control of the area, and prevent the use of spraying to control insects and vegetation that competes with commercial tree species. Further conflicts with residences arise because of the noise associated with commercial operations and the safety risks of logging near residential property.

"The steps that would need to be taken to efficiently and effectively manage timber production in the area makes such uses impracticable." Record 28 (emphasis added).

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[6] Forest operations or forest practices specified in OAR 660-006-0025(2)(a) are:

"Forest operations or forest practices including, but not limited to, reforestation of forest land, road construction and maintenance, harvesting of a forest tree species, application of chemicals, and disposal of slash[.]"

The county's findings emphasize the potential conflicts that resource use of the subject property would produce with adjacent and nearby existing residential uses from fire protection requirements, fencing and spraying. First, petitioners argue that commercial viability is not the measure of practicability. Petition for Review 25. Second, in their second assignment of error, petitioners argue that the county's findings are not supported by substantial evidence where the undisputed evidence shows the subject property contains merchantable tree species in its southern portion and contains soil types that are capable of supporting Ponderosa Pines (20-49 cubic feet per year). Record 19; Record 1331. Petitioners argue that given the undisputed evidence that the soil types on the property support Ponderosa Pines, the county's findings are inadequate to explain why the remaining open portion of the subject property could not be planted and uses for forestry purposes.

We agree with petitioners. The correct standard is not whether commercial forestry operations are practicable on the subject property, and the county must consider forest operations that are smaller in scale and generate less revenue than commercial forestry operations. *Friends of Yamhill County v. Yamhill County*, 38 Or LUBA 62, 75 (2000). Further, as the staff report explains, the state and county recognize parcels as small as two acres as eligible for forest tax deferral. Record 1345.

Moreover, the county's findings, quoted above, focus on alleged conflicts with nearby residential uses from conducting commercial forestry on the

property, but do not consider whether forest operations that are smaller in scale would create similar conflicts that render forest use of the property impracticable. We also agree with petitioners that given the soil types on the property, the county's findings do not establish that forest use of the property is impracticable or explain why trees could not be planted on the property. Finally, we agree with petitioners that the county's finding that conflicts with residential uses resulting from spraying are not a basis to find that resource use of the subject property is impracticable. *Prentice*, 71 Or App at 403 (conflicts resulting from odors, noise, spraying and dust are a consequence of rural life and are not sufficient in themselves to justify an irrevocably committed exception).

The first, second and third assignments of error are sustained.

FOURTH ASSIGNMENT OF ERROR

The board of county commissioners approved a physically developed exception and in the alternative, an irrevocably committed exception. In the fourth assignment of error, petitioners challenge the county's conclusion that a physically developed exception was justified.

Under OAR 660-004-0025(1), in order to approve a physically developed exception, the local government must establish that "the land subject to the exception is physically developed *to the extent that it is no longer available for uses allowed by the applicable goal*." OAR 660-004-0025(1) (emphasis added). OAR 660-004-0025(2) provides guidance for local governments in determining

whether land has been physically developed with uses other than those allowed by a goal:

> "Whether land has been physically developed with uses not allowed by an applicable goal, will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception." OAR 660-004-0025(2).

The county relied on the two dwellings, accessory structures, well, and driveways to conclude that the property meets the requirements for adoption of a "physically developed" exception to Goal 4:

> "The development pattern that exists on this property makes forestry uses impractical. These include the current home and outbuildings located halfway up the property on the western side after an approximately 1000 [foot] driveway, the old farmhouse in the center after a 400 [foot] driveway and the old barn another 240 [feet] further south, within 450 [feet] of the rear property line. The latter two more than half bisects the property contributing to the physically developed nature of the subject parcel. The property is also serviced by two wells, and a pump house located in the north central portion of the parcel, approximately 190 feet south of the road. Due to these physical developments, and the impracticality of conducting forestry uses around them, a physically developed exception would apply." Record 20.

In the fourth assignment of error, petitioners argue that the county's findings in support of a physically developed exception to Goal 4 are inadequate and that the county improperly construed OAR 660-004-0025 when it concluded that development of approximately 12 percent of the property means that it is "physically developed to the extent that it is no longer available for uses allowed by the applicable goal." Petition for Review 29. Petitioners also assert that the county's findings are not supported by evidence in the whole record, and that the evidence in the record supports a determination that the property is available for uses allowed by Goal 4, including the growing of Ponderosa Pines. Petitioners point to evidence that all of the development on the property combined totals approximately 12 percent of the property, while more than 87 percent of the property is undeveloped. Petitioners also point out that the soil types on the property are capable of supporting Ponderosa Pine at a volume of 57.2 cubic feet per acre per year. Record 711, 1331. Therefore, petitioners argue, the county erred in concluding that a physically developed exception was justified. Finally, petitioners argue that the county erred in relying on the two driveways existing on the property because "[u]ses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception," and roads are allowed under Goal 4 as accessory to forest uses. OAR 660-004-0025(2).

Intervenor responds that managing the subject property for commercial forestry would require "extensive" fire buffers along the eastern and northern

borders that are adjacent to developed residential areas and around the existing dwelling on the property. Intervenor's Response Brief 27. Intervenor also points out that "two strings" of overhead power lines are located on the property, and that forestry uses would require a buffer from those lines. *Id.* We understand intervenor to argue that such extensive buffers mean that the property is "physically developed to the extent it is no longer available" for forestry uses.

The standard for approving a physically developed exception is demanding. *Sandgren v. Clackamas County*, 29 Or LUBA 454, 457 (1995). We agree with petitioners that the county's findings are inadequate to explain why the property is developed to such an extent that it is no longer available for forestry uses. The findings conclude, with reference to the existing development on the property, that "forestry uses [are] impractical." Record 20. Impracticality is relevant to an irrevocably committed exception. However, impracticality is not the standard for a physically developed exception. Instead, the county is required to determine that the property is "physically developed *to the extent that it is no longer available*" for forestry uses. ORS 197.732(2)(a) (emphasis added).[7] A

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[7] ORS 197.732 provides, in part:

"(2) A local government may adopt an exception to a goal if:

"(a) The land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal;

conclusion that forestry uses are "impractical" due to approximately 12 percent of the property containing structures or other development is not responsive to the standard. Finally, we agree with petitioners that the county's findings are inadequate where they fail to explain why the two driveways on the property should be considered as physically developed, when roads are uses allowed by Goal 4.

Further, we agree with petitioners that the county's decision is not supported by substantial evidence in the record, where the evidence in the record is that the property has available at least 87 percent of its area for forestry. Intervenor does not attempt to quantify the amount of buffer that would be required to conduct forestry uses or quantify the amount by which that buffer would decrease the amount of property available for forestry uses to such an extent that the property "is no longer available for forestry uses." We conclude that the county's findings in support of its approval of a physically developed exception are not supported by substantial evidence in the record.

The fourth assignment of error is sustained.

DISPOSITION

ORS 197.732(6)(b) provides that LUBA:

> "(b) The land subject to the exception is irrevocably committed as described by Land Conservation and Development Commission rule to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable[.]"

> "shall determine whether the local government's findings and reasons demonstrate that the [exception standards of OAR 660-004-0028] have or have not been met."

We conclude that the findings do not demonstrate that the property is physically developed to such an extent that it is no longer available for resource use, and that the county's findings regarding the physically developed exception are not supported by substantial evidence in the record. We also conclude that the findings do not demonstrate that the property is irrevocably committed to non-resource uses. Because we conclude that the findings to support a conclusion that the property is irrevocably committed to non-resource use are inadequate to satisfy the relevant criteria, we do not address petitioners' substantial evidence arguments under those criteria. *DLCD v. Columbia County*, 15 Or LUBA 302, 305 (1987).

Petitioners argue that we should reverse, rather than remand the county's decision. OAR 661-010-0071(1)(c) provides that this Board shall reverse a land use decision when "[t]he decision violates a provision of applicable law and is prohibited as a matter of law." In addition, OAR 661-010-0071(2)(a) provides that this Board shall remand a land use decision for further proceedings when "[t]he findings are insufficient to support the decision[.]"

If the county had approved only a physically developed exception, we would likely agree with petitioners that reversal is the appropriate remedy because the evidence in the record demonstrates that approximately 90 percent of the property is undeveloped and available for forest uses. With regard to the

irrevocably committed exception, petitioners may be correct that, under the circumstances described in the application, and when the correct standards are applied by the county, it is extremely unlikely that intervenor will be able show the property is irrevocably committed to nonresource uses. However, we cannot say at this point that the county's decision is prohibited as a matter of law.

The county's decision is remanded.

ATTACHMENT D – EXHIBIT 8

"Soil Assessment Submittal Form" and "Soil Assessment Release Form"

Oregon
Kate Brown, Governor

Department of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, Oregon 97301-2540
Phone: 503-373-0050
Fax: 503-378-5518
www.oregon.gov/LCD

Soils Assessment Submittal Form

Soils Professional Information

Soils professional*: Gary A. Kitzrow Certification number: 1741

Property Information

Person who requested soils assessment: David Wilson
Mailing address: 7100 7 Mile Hill Rd The Dalles Or 97058
Email address: None Telephone number: 541-490-3730
Property owner (if different):
Property address (if different): 7000 7 Mile Hill Rd The Dalles Or 97058
County: Wasco Township: 2N Range: 12E Section: 22
Tax lot(s): 4400 Parcel Acreage: 40.13 Acres Evaluated: 40.13
Comprehensive Plan designation: — Zone: EFU
Proposed land use action: Plan Amendment Zone change To RR10

The soils professional must submit an electronic copy of the soils assessment together with this form to Timothy Murphy, Farm and Forest Lands Specialist, at the above address. The person requesting the soils assessment or the property owner must submit a check for a non-refundable administrative fee of $625 made out to the Department of Land Conservation and Development, to Timothy Murphy, at the same address.

Soils assessments must be consistent with the Soils Assessment Report Requirements and will be checked for completeness and be subject to audits as described in OAR 660-033-0030(9). Some soils assessments will additionally be subject to review and field checks by a DLCD-contracted soils professional as described in OAR 660-033-0030(9). Property owners and soils professionals will be notified of any negative reviews or field checks. Soils assessments will not be released to local governments without submittal of a signed release form by the property owner and person who requested the soils assessment; however, when released, any negative reviews or field checks will accompany the soils assessments.

The department and the Land Conservation and Development Commission will not be held liable for non-performance or information that is contained in soils assessments, or for negative reviews, field checks or audits of soils assessments. For the protection of the department and commission, we ask that you read and sign the following authorization and disclaimer:

I hereby expressly give my consent, should I be notified by the department that the submitted soils assessment for my property is selected for a review and field check, to authorize timely

access to my property by a DLCD-contracted soils professional to perform a field check to corroborate the information provided in the submitted soils assessment. I understand that failure to authorize access to the property may result in a negative review.

I hereby waive my right to pursue a claim for relief or cause of action alleging injury from the content of soils assessments or from any negative reviews, field checks or audits conducted by the department and any and all soils professionals used by the department under OAR 660-033-0030(5) and (9). I hold these entities harmless and release them from liability for any injury or damage that may occur in conjunction with the submitted soils assessment.

In exchange for the department's review of this submittal under the soils assessment program, I expressly agree to forever waive and give up all claims, suits, actions, proceedings, losses, damages, liabilities, awards and costs of every kind and description, including any and all federal and state claims, reasonable attorney's fees, and expenses at trial (collectively "claims") which I have or may have a right to bring against any agency, department, the state, or their agents, officials or employees arising out of or related to my participation and performance in the soil assessment program, including but not limited to claims for mistake or negligence of the department, the state of Oregon, and their officers, employees and agents. I further agree that the provisions of this Liability Waiver and Release from Federal and State Claims shall be effective and binding upon my heirs, executors, administrators, successors, assigns, beneficiaries, or delegatees and shall inure to the benefit of the department, the State of Oregon, and their officers, employees and agents.

David Wilson David Wilson — 1/15/21

Person who requested soils assessment — Date

Property owner (if different) — Date

In addition to agreeing to the above, I hereby certify that the attached soils assessment that I performed for the property identified on this form is soundly and scientifically based and meets the reporting requirements established by the department.

Soils professional — 1/10/21

Date

* Must be from the posted list of qualified soils professionals at: http://www.oregon.gov/LCD/pages/soilsassessment.aspx

12/22

Oregon
Kate Brown, Governor

Department of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, Oregon 97301-2540
Phone: 503-373-0050
Fax: 503-378-5518
www.oregon.gov/LCD

Soils Assessment Release Form

Soils Professional Information

Soils professional*: Gary A. Kitzrow Certification number: 1741

Date of submittal of soils assessment to department: Jan 23, 2021

Property Information

Person who requested soils assessment: David Wilson
Mailing address: 7100 7 Mile Hill Rd The Dalles Or 97058
Email address: none Telephone number: 541-490-3230
Property owner (if different):
Property address (if different): 7000 7 mile Hill Rd The Dalles Or 97058
County: Wasco Township: 2N Range: 12E Section: 22
Tax lot(s): 4400 Parcel Acreage: 40.13 Acres Evaluated: 40.13
Comprehensive Plan designation: Zone: EFU
Proposed land use action: Plan Amendment Zone change to RR10

If you would like the soils assessment for the subject property to be released to a County planning department for its consideration in a land use proceeding, please sign this form and send it to Timothy Murphy at the above address, or email to: timothy.murphy@state.or.us.

I hereby request that the Department of Land Conservation and Development release the soils assessment submitted to the department on the above date regarding the above-described property to the Wasco County Planning Department, as well as any department notifications of deficiencies. I understand that any and all previous soils assessments applying to this property produced under this rule, as well as any department notifications of deficiencies in such soils assessments, will also be released to the local government.

David Wilson — 1/15/21
Person who requested soils assessment — Date

Property owner (if different) — Date

ATTACHMENT D – EXHIBIT 9

"Soil Assessment Completeness Review"

Oregon
Kate Brown, Governor

Department of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, Oregon 97301-2540
Phone: 503-373-0050
Fax: 503-378-5518
www.oregon.gov/LCD

Soil Assessment Completeness Review

In accordance with OAR 660-033-0045(6)(a), the Department of Land Conservation and Development (DLCD) finds that this soils assessment is complete and consistent with reporting requirements for agricultural soils capability. The county may make its own determination as to the accuracy and acceptability of the soils assessment. DLCD has reviewed the soils assessment for completeness only and has not assessed whether the parcel qualifies as agricultural land as defined in OAR 660-033-0020(1) and 660-033-0030.

Hilary Foote
DLCD Farm Forest Specialist
March 29, 2001

The department will consider soil assessments under OAR 660-033-0030 to be complete if they meet the following standards:

(1) General information, to include:

(a) Title of the report; Wildon – Order 1 Soil Survey
(b) Person making request for soils assessment; David Wilson
(c) Names of soil scientist/classifier conducting the field work and preparer of the report, along with their certification numbers; Gary Kitzrow, CPSC/CPSS #1741
(d) Land use case file number (if available); n/a
(e) County in which the assessment was conducted; Wasco
(f) Location of the project site, including the township, range, section and tax lot numbers; Township 2N Range 12E Section 23 Taxlot 4400, Wasco County, Oregon
(g) Present zoning designation; EFU
(h) Current land use; unknown
(i) Parcel acreage: 40.13 ; evaluated: 40.13 ,and
(j) A description of the purpose of the assessment. Zone Change

(2) Previous Mapping or Background: The soil scientist/classifier shall provide a copy of the applicable and most current National Cooperative Soil Survey map(s) provided by the Natural Resources Conservation Service (NRCS) on the Web Soil Survey, with the area of investigation outlined on the map(s). The scale of the map(s) shall be identified and a list of the map units under investigation shall be listed. The applicable

interpretations and minor components (inclusions) for the map units for which the investigation is being made shall also be provided. NRCS mapped soils include: Wamic loam, 5 to 12 percent north slopes (acpability class 4e), Wamic laom, 12 to 20 percent slopes (capability class 4e) and Wamic-Skyline complex, 2 to 20 percent slopes (capability class 4e (Wamic components) and 7s (skyline componenets)). See pages 8-9.

(3) Methods Used by Soil Scientist/Classifier: The soil scientist/classifier shall describe the methodologies used for the preparation of the report and shall include the following:

(a) The level of order of survey used in the field survey, scale and type of maps used for field investigations, number of sample locations and observation points all confirming or disagreeing with the NRCS mapping units. The survey shall be one or more level of order higher than the NRCS survey as described in the NRCS Soil Survey Manual, 1993. Note that an Order 1 survey is more detailed than an Order 2 or greater survey. Order 1 soil survey was conducted

(b) The date(s) of the field investigation; December 18-19, 2020

(c) The methods used for observations (backhoe, auger, shovel, etc.) and methods used for documentation (for slope, color, pH, etc.); Backhoe, field texturing, munsell chart comparison, soil pH, field assessment, etc as described on page 1.

(d) The number and location of borings either shown on an aerial photograph base map of the parcel or provided in a table with latitude and longitude coordinates. In conducting Order 1 soil surveys, the scale of the base maps used for the survey needs to be large enough to enable the identification of polygons of soil map units as consociation map units. Soil map units identified as a complex, association, or undifferentiated group should be avoided as this defeats the purpose of an Order 1 survey. If, however, the soils are so intermingled that they cannot be mapped at a reasonable scale so as to identify consociation map unit polygons, then there should be sufficient sampling and documentation of the complex to demonstrate this soil component distribution. A percentage of each member of the complex will used in determining area of extent and the reported percentages will be based on this sampling and its documentation, including soil profile descriptions, boring locations and, where useful, photographs. 23 locations. Coordinates listed on page 1 and mapped on page 10

(e) Geomorphic and vegetation correlations supporting the interpretation of land capability classes of soils that differ from those in the official soil survey information; and Described on page 2.

(f) A notation of any limitations encountered during the field investigation, such as soil depth, drainage, slope or inaccessibility. No limitations noted (page 2).

(4) Results, Findings, and Decisions: The soils report shall describe how the level of order of survey used in this investigation differs from that used by NRCS in the original soil survey. The soils report shall also include:

(a) An overview of the geology or geologic setting, describing sources of parent material, bedrock and related factors; Described on page 2

(b) A description of the landforms and topography, confirming the relationship of landforms to soil mapping units; Described on pages 2 and 3

(c) A description of on-site and adjacent hydrology, including surface and subsurface features, intermittent versus perennial, floodplain and floodways and other related information; Described on page 3.

(d) A description of the revised soil mapping units with their range of characteristics, explaining how and why they differ from NRCS soil mapping. The soils report shall include a summary of soil variability incorporating significance of preceding weather (above or below average), where known and crops and natural vegetation present; and Described on page 3

(e) A tabulation of all previous and revised soil mapping units complete with their acreages and land capability classification. Pages 3, 8, 9 and 13

(5) Summary or Conclusion: The soils report shall contain a section reiterating the purpose of the investigation, explaining the significance of the revised soil mapping and describing any other significant issues related to the report's purpose. Page 3

(6) References: This section may list any manuals or publications utilized or referenced by the report. Page 3

(7) Attachments: Other informational materials provided as attachments, such as maps, figures or appendices shall include the following and shall be printed on 8 ½ x 11" wherever possible:

(a) Vicinity map at a scale of 1:48,000 or smaller showing the project location; Map included on page 11

(b) The NRCS soils map generated from Web Soil Survey at a scale of 1:20,000 or larger outlining the project site; Map included on page 7

(c) Site condition map (aerial photo) at a scale of 1:5,000 or larger outlining the project site and showing the location of site investigations (borings) and other relevant features; Map included on page 10

(d) Topography map at a scale of 1:24,000 or larger outlining the project site; Map included on page 11

(e) Assessor's map at a scale of 1:5,000 or larger outlining the project site; Map included on page 12

(f) Revised soils map of the project site at a scale of 1:5,000 or larger; Map included on page 13

ATTACHMENT D – EXHIBIT 10

Gary Kitzrow, M.S., Certified Professional Soil Classifier (CPSC), Certified Professional Soil Scientist (CPSS) (License # 1741), Principal Soil Taxonomist.

Daniel Dougherty <danield@co.wasco.or.us>

"Wilson - Order 1 Soil Survey" Inquiry

3 messages

Daniel Dougherty <danield@co.wasco.or.us> Fri, Nov 19, 2021 at 6:00 AM
To: kitzrowga@gmail.com

Mr. Kitzrow,

My name is Daniel Dougherty, Senior Planner with the Wasco County Planning Department. I've been assigned to review your Order 1 soil survey for Mr. David Wilson regarding a particular land use application he has pending before our Planning Commission. It's been extremely interesting learning about soil classification, order types, soil complexes, and series; however, I've hit a wall regarding analysis of your survey, and I'm hoping you can help me if you have time.

As you provided in your survey, Mr. Wilson's property (Location: 2N 12E 22 4400) contains Skyline, Wamic, Bodell and Infrastructure mapping units. I have to make findings regarding the woodland suitability (tree types & cubic ft. per acre) of each particular soil mapping unit found on his property. To do this, I'm using the USDA-STS Soil Interpretation Records (1983) "Green Sheets". The Green Sheets provide specific data regarding the 1982 USDA “Soil Survey of Wasco County, Oregon, Northern Part”.

The problem I'm running into is that two of the three soil mapping units you discovered aren't explicitly found in the USDA Order 3 survey or Green Sheets. Those soil mapping units being 51D Skyline (monotaxa) and 51C Skyline (monotaxa). The Green Sheets & USDA Survey do provide for a 51D Wamic-Skyline Complex. I'm hoping you can clarify whether or not the 51D Wamic-Skyline Complex is in fact the 51D Skyline (monotaxa) and/or 51C Skyline (monotaxa). I've scoured the internet to try and find information on 51D & 51C units, but everything keeps pointing me back to 51D Wamic-Skyline Complex.

Any help you might provide is greatly appreciated.

Respectfully,

Daniel

--

Daniel Dougherty | ***Senior Planner***
PLANNING DEPARTMENT

danield@co.wasco.or.us | **http://www.co.wasco.or.usdepartments/planning/index.php**

541-506-2560 | Fax 541-506-2561
2705 E Second Street | The Dalles, OR 97058

Pioneering pathways to prosperity.

Office Notice about COVID-19

Welcome back! We have resumed in-person customer service. Office hours are Tuesday and Thursday, 10am to 4pm with a lunchtime closure. Appointments can be accommodated on Fridays. Masks are required in the office unless you bring your vaccination card to demonstrate you are a full two weeks out from your final COVID-19 vaccination.
Email is still the best way to reach me! Please view our website for office hours and COVID-19 accommodations.

This correspondence does not constitute a Land Use Decision per ORS 197.015.
It is informational only and a matter of public record.

Gary Kitzrow <kitzrowga@gmail.com> Fri, Nov 26, 2021 at 12:09 PM
To: danield@co.wasco.or.us

Skyline units on my report are MONOTAXA units meaning one soil per delineation. Wamic soils are NOT found within those mapping units except as an *inclusion.* Order I Soil Surveys (such as the current one) separates out soil "Complexes" into their component parts. Order I Soil Surveys are Site Specific Soil Surveys with a high degree of confidence in the final delineations correlated. I have mapped over 1 million acres of soils in the USA and in 2 foreign countries. I use the same USDA-protocols in all jurisdictions I have published Soil Survey Reports in (8) states. The goal of Order I Soil Surveys is to make every soil mapping unit a monotaxa element.

The green sheets DO NOT tabulate the Forestry site index tables because Skyline is a *Non-Commercial Forest Soil.* As a former USDA-NRCS Soil Scientist here in Oregon and as a degreed forester as well, when employed as a USDA scientist, we left the "Green Pages" blank when there was no commercial timber producing potential OR no trees within the correct age-class or dominance-class to measure and assign a valid site index or mensuration estimate (cu-ft/ac/yr). Skyline has never been cited as a commercial forest soil and predictably, no proper trees are available to measure as well. Since this soil (Skyline) is the dominant soil on this subject parcel, a preponderance of the legal lot of record is not a commercial timber site. This follows suit for agriculture as well which is demonstrated in the Capability Class assignment.

I hope this helps,

Gary A. Kitzrow, Master of Science
Principal Soil Classifier/Soil Scientist
Degreed forester
GSEA
[Quoted text hidden]

Daniel Dougherty <danield@co.wasco.or.us> Fri, Nov 26, 2021 at 9:45 PM
To: Gary Kitzrow <kitzrowga@gmail.com>

Good evening,

Thank you for the additional information and clarification.

I hope you had a great Thanksgiving.

Respectfully,

Daniel
[Quoted text hidden]

ATTACHMENT D – EXHIBIT 11

"Wilson – Order 1 Soil Survey"

Wilson- Order 1 Soil Survey Report
RE: OAR 660-033-0030

1). General Information

a). Order 1 Soil Survey Report—Wilson Property, Oregon
b). David Wilson
c). Gary A. Kitzrow, M.S., CPSC/CPSS # 1741, Master of Science
d). None
e). Wasco
f). RE: T2N R12E Sec. 23C TL# 4400
g). EFU
h). Zone change
i). 40.13 Ac./40.13 acres
j). complete a site-specific soil survey for the above parcel to determine if a preponderance of the property is comprised of generally unsuited soils. The goal is to secure a Plan Amendment Zone Change.

2). Enclosed

a). Scale of enclosed USDA-NRCS Soil maps: 1:3170;--USDA Soil Legend: 49C Wamic 29.8 Acs.; 50D Wamic 10.5 Acs.; 51D Wamic-Skyline Complex 0.5 Acs.

a). We completed a total of 23 descriptions for the 40.13-acre study site.

b). December 18-19, 2020

c). A Backhoe was used to excavate the study area Field texturing was completed; Munsell color chart was used for soil colors; standard soil pH kit was used; field assessment for structure, consistence, pores, drainage class, root distribution, effective/absolute rooting depths and related morphology testing.

d). Enclosed Is a map showing all description locations.

1). 45.63857' N -121.31456' W
2). 45.63825' N -121.31395' W
3). 45.63832' N -121.31380' W
4). 45.63857' N -121.31344' W
5). 45.63876' N -121.31392' W
6). 45.63891' N -121.31370' W
7). 45.64031' N -121.31458' W
8). 45.63857' N -121.31456' W
9). 45.64071' N -121.31207' W
10). 45.64030' N -121.31235' W
11). 45.64063' N -121.31125' W
12). 45.64030' N -121.31113' W
13). 45.64003' N -121.31100' W
14). 45.63979' N -121.31075' W
15). 45.63871' N -121.31071' W
16). 45.63897' N -121.31229' W
17). 45.63804' N -121.31140' W
18). 45.63827' N -121.31133' W
19). 45.63889' N -121.30940' W
20). 45.63926' N -121.30998' W
21). 45.63980' N -121.30980' W
22). 45.64031' N -121.30998' W
23). 45.63926' N -121.30991' W

e). There are excellent correlations of soil mapping units and vegetation for this study area. The dominant Skyline and Bodell soil units are droughty due to shallow bedrock (< 20"), loamy matricies and very high rock content in the case of the Bodell soil mapping unit (10E). Grasses and hardwood are noted on the mapping units and have not been cultivated in perpetuity. The moderately deep Wamic mapping unit is droughty but does have an argillic horizon hence increased water holding capacities and increased clay content in the Control Section. This area is generally tree-free and has been growing grasses for many years. This particular property is very complex with the vegetative and soil communities NOT aspect related.

Regarding the geomorphic surfaces and soil mapping units; the determining factor for mapping No alluvium soils are present.

(f). No limitations were encountered in completing this Soil Survey. It is noteworthy; this portion of the *Wasco County Soil Survey Area* is apparently under-represented regarding USDA Order 3 Reporting Standards and the number and diversity of Soil Mapping Units on the Wasco County USDA Soil Legend. By completing offsite reviews of surrounding properties and detailed Order I Soil Survey for the current subject property, Wamic soils are over-represented mapping units given the confirmed diverse and wide range of landforms and geomorphic surfaces in this specific region. Wamic soils are mapped on virtually every landform in this area. Although a pervasive soil series, there are many other soils in this region and we would not expect only one soil to be mapped in such a large geographic domain. Oregon is an extremely diverse state and unlike states such as Iowa where indeed the same soil may be found over a many square mile area, that is not the case in Oregon. This current subject property is a good example of the natural complexity expected in most Oregon areas where hills, valleys and competing landscapes are confirmed.

(4) Results, Findings and Decisions:

(a) The bedrock geology for this land base is basalt mixed with areas in the southwest portion of the property exhibiting a paralithic contact with and without a duripan which all occur at less than 20". Little direct hard rock is noted in this area transitioning from definable soil. Soil development is generally a function of the presence or absence of ejected ash moving into or out from the subject study area. The basalt itself yields very immature, shallow soils when soils erode *from* the site hence the Class 7 (Bodell and Skyline). Conversely, where soil accumulates via erosion (central area and central northern areas), soils deepen up, Soil Capability Class gets better and Wamic soils become dominant. The Wamic soils are more of a function of accretion NOT soil removal but basalt is a common thread underlying all areas on this parcel. Lithic verses paralithic geologic contacts are important on this subject property. Where paralithic contacts are present (SW ¼ and some SE ¼) of the ownership, soils shallow-up and the bedrock becomes a more dominant portion of the land capability.

(b) The landforms present on this study site include planar to planar concave, non-colluvial lava plains and basins with local microsites. In the bottomland area (mid northern property) some mixed alluvium and terrace remnants may be present but are truncated and ill-defined. The soils we found strongly correlate to these landforms. Rolling convex

areas in the northwest ¼ (north of the developed infrastructure areas) are classified as indistinct uplands showing suited Wamic soils throughout. Contiguous areas due south exhibit ancient infrastructure dating back to the 1980s. The eastern 1/3 of the survey area shows harder bedrock and much rock in the soil profile as a function of the more sharply overt convex slopes some of which face west and northwest. These eastern areas show landforms which are much more dissected and abbreviated as compared with area in the western 1/3. The soils reflect these contrasting landforms. Much of the eastern 1/3 of the ownership exhibits harsh growing conditions.

(c) No natural drainageways are confirmed within the parcel. The nearest drainageway is about 2 miles southeast and 4 miles due east.

(d) Our Order I Soil Survey confirms Skyline, Wamic, Bodell and Infrastructure are the only soil mapping units confirmed on the subject property. Presence or absence of a paralithic geologic contact combined with landscape position principally govern the soil series and mapping units present. The subject property is complex and diverse. Shallow Bodell and Skyline soils are consistently present but are spread out throughout the ownership. Wamic soils are found where ash has eroded from surrounding low hillslopes.

(e) Previous USDA Survey: 49C Wamic 29.8 Acs.; 50D Wamic 10.5 Acs.; 51D Wamic-Skyline Complex 0.5 Acs. GSEA: Final Order I Soil Survey Mapping units: See attached Soil Map.

(5) Summary and Conclusions:

A slim majority, (preponderance) of this proposed lot is made up of the shallow, generally unsuited Class 7 Skyline, Bodell units and Class 8 Infrastructure. (irrigated and non-irrigated). The lithic, entic Bodell soil mapping units are shallow, very rocky with restrictive rooting capabilities and low water holding capacities. Skyline soils, which are very definable and modal, on this parcel similarly has shallowness due to a somewhat indurated paralithic contact beginning at less than 20 inches consistently. Conversely, Wamic soils are somewhat deeper, have thicker and more defined topsoils with more clay build-up (hence water holding capacity

<u>This study area and legal lot of record is comprised of 51.8% (20.79 Ac.) of generally unsuited soils Capability Class 7 and Class 8 by Wasco County and DLCD definitions</u>.

References: Official Soil Series Descriptions USDA NRCS-Wasco County: Bodell, Wamic and Skyline Soil Series
Soil Survey Report, Soil Survey, Wasco County
Soil Survey Manual, USDA

(6) Attachments:

(a) Vicinity Map
(b) NRCS Soil Map for property
(c) Site Condition map
(d) Topography map outlining the subject property
(e) Assessor's map outlining the study parcel
(f) Revised Order I Soil Map
(g) Soil Profile descriptions: Wamic, Skyline and Bodell Soils
(h) Representative Soil profile descriptions

Please call with questions,



Gary A. Kitzrow, Master of Science
Certified Professional Soil Classifier, Certified Professional Soil Scientist #1741
Principal Soil Taxonomist
GROWING SOILS ENVIRONMENTAL ASSOCIATES

Wilson
T2N R12E Sec. 23C TL# 4400
Vicinity Map



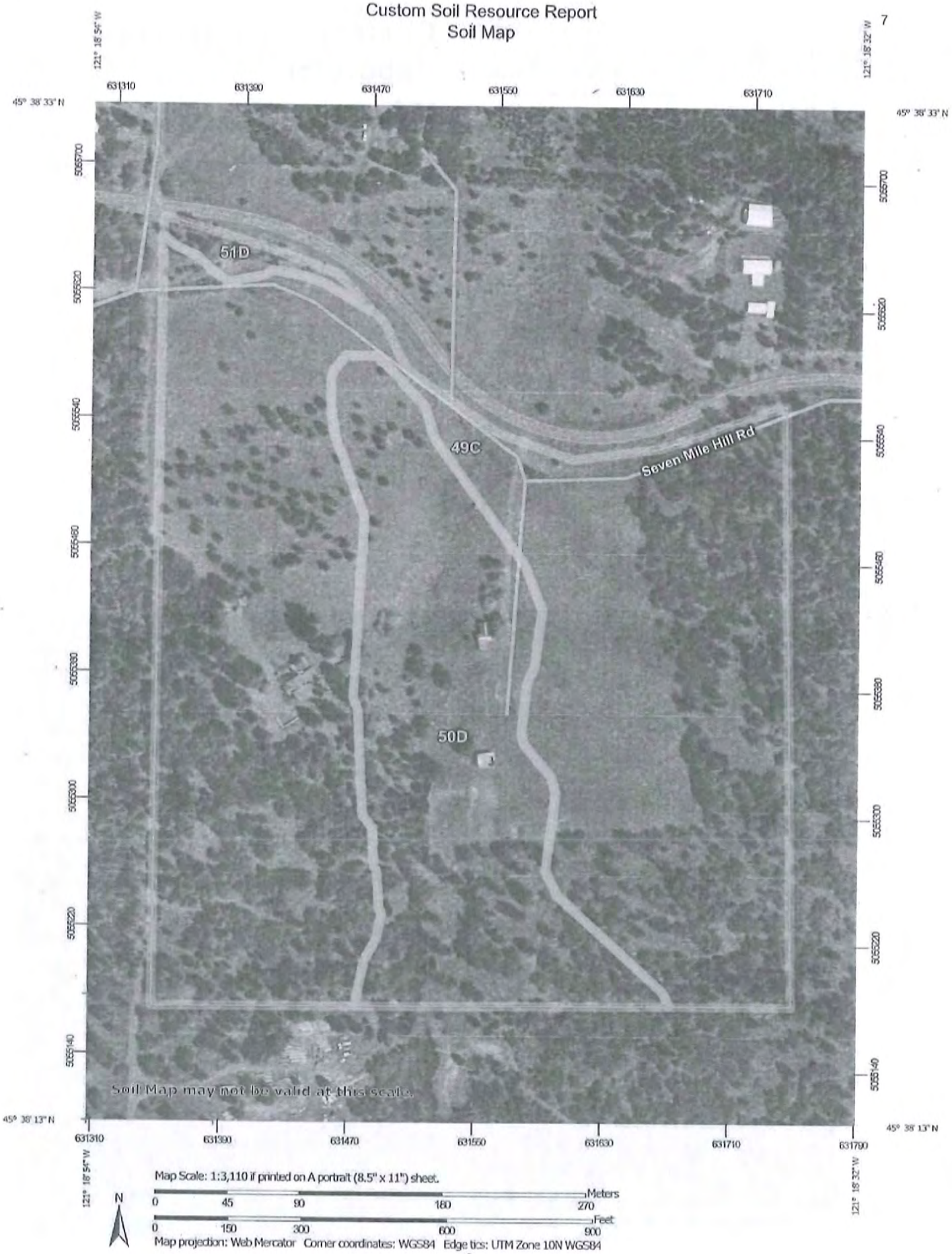
USDA United States Department of Agriculture

NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wasco County, Oregon, Northern Part




7
121° 18' 54" W
121° 18' 32" W
631310
631390
631470
631550
631630
631710
631790
45° 38' 33" N
45° 38' 13" N
5065700
5065620
5065540
5065460
5065380
5065300
5065220
5065140
51D
49C
50D
Seven Mile Hill Rd
Soil Map may not be valid at this scale.
Map Scale: 1:3,110 if printed on A portrait (8.5" x 11") sheet.
N
0 45 90 180 270 Meters
0 150 300 600 900 Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84
9

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
49C	Wamic loam 5 to 12 percent north slopes	28.6	72.0%
50D	Wamic loam, 12 to 20 percent slopes	10.7	26.8%
51D	Wamic-Skyline complex, 2 to 20 percent slopes	0.5	1.3%
Totals for Area of Interest		**39.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

- Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion.

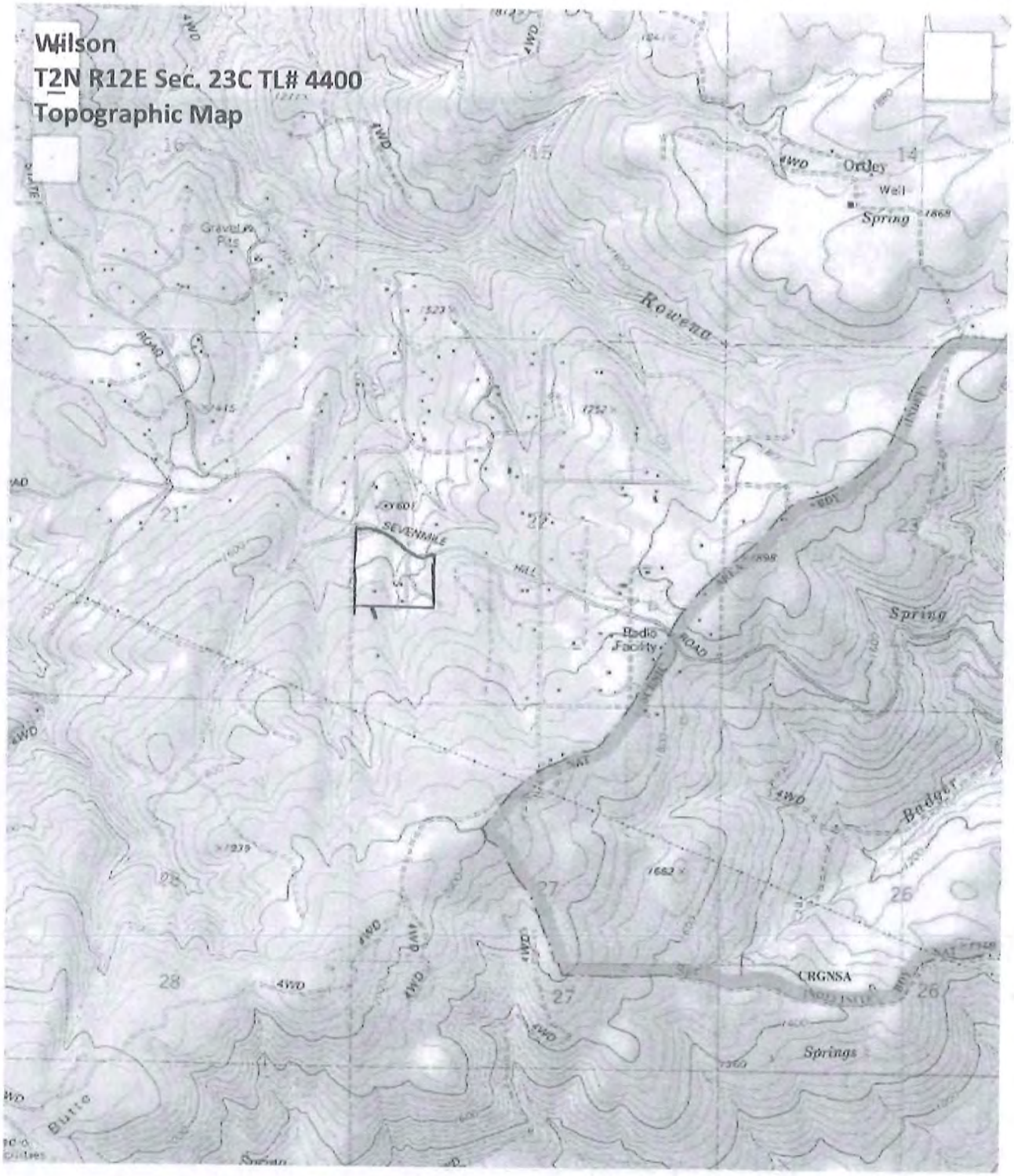
Report—Land Capability Classification

Land Capability Classification–Wasco County, Oregon, Northern Part				
Map unit symbol and name	Pct. of map unit	Component name	Land Capability Subclass	
			Nonirrigated	Irrigated
49C—Wamic loam 5 to 12 percent north slopes				
	90	Wamic, north	4e	—
50D—Wamic loam, 12 to 20 percent slopes				
	90	Wamic	4e	—
51D—Wamic-Skyline complex, 2 to 20 percent slopes				
	60	Wamic	4e	—
	20	Skyline	7s	—

Wilson
T2N R12E Sec. 23C TL# 4400
Site Constraints Map



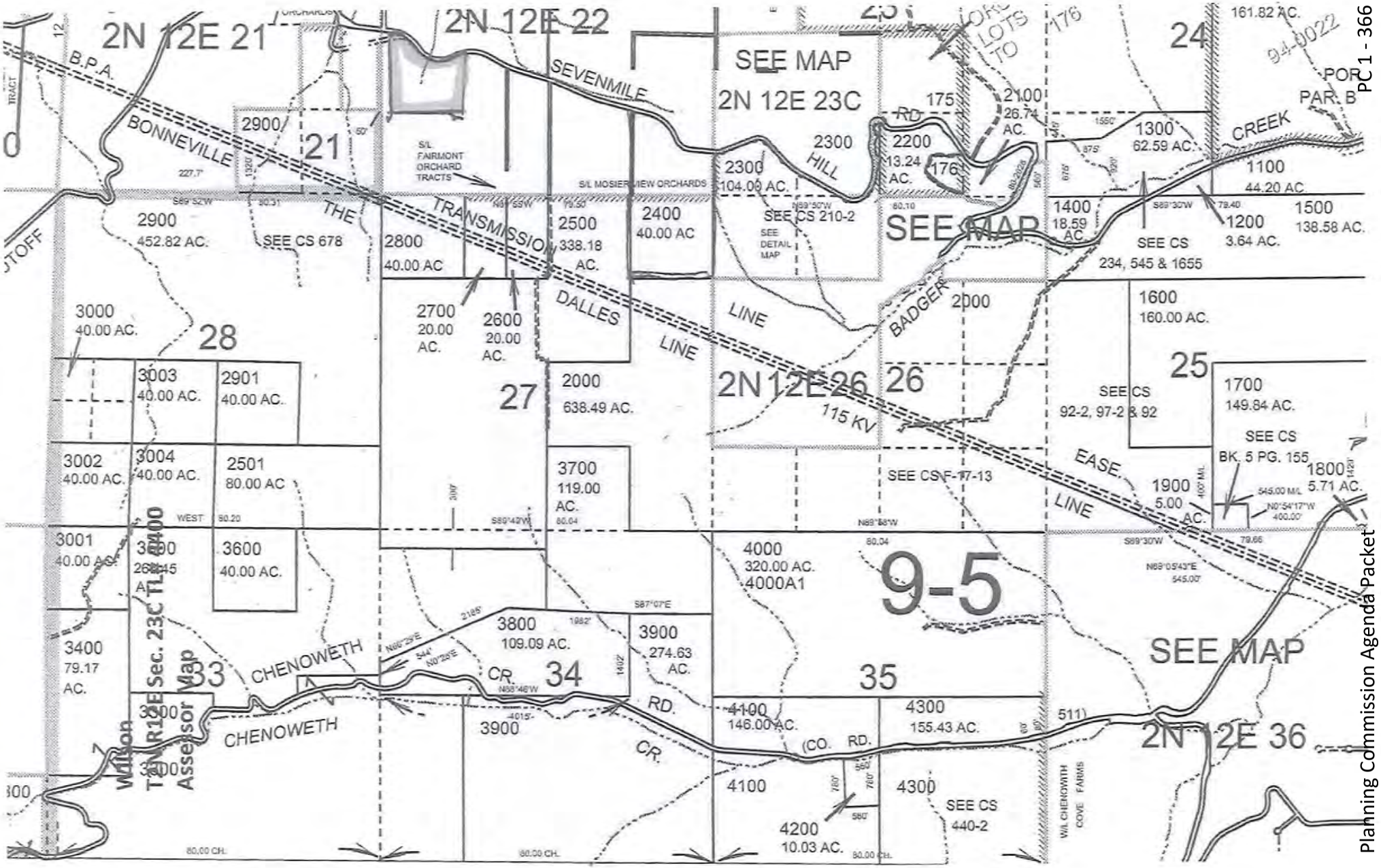
The Dalles Topo Map in Wasco County Oregon



Print this map

Map provided by TopoZone.com

2N12E

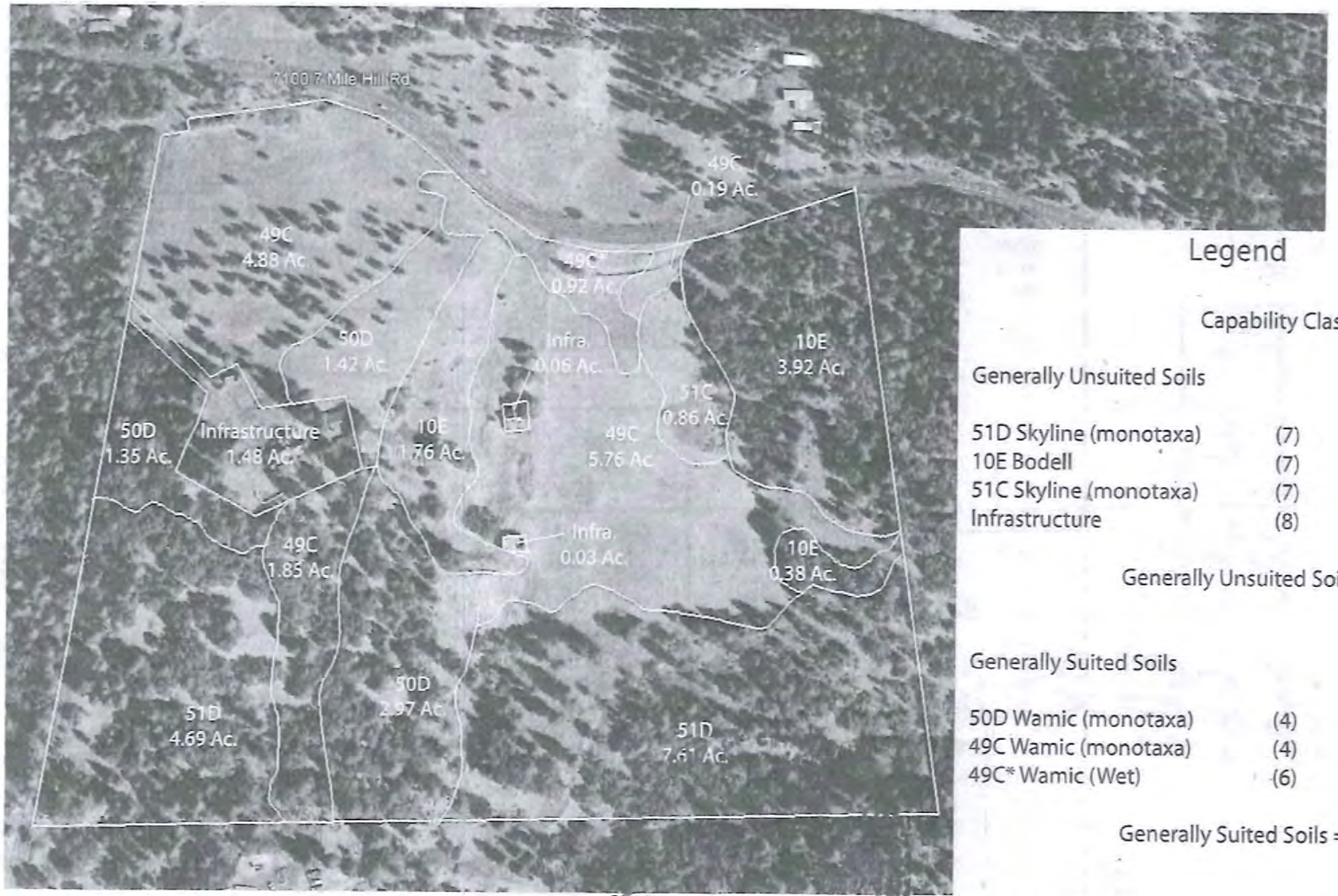


PC 1 - 366
Planning Commission Agenda Packet
December 7, 2021

Wilson Property

Seven Mile Hill Rd
The Dalles, Oregon
T2N R12E Sec. 22 TL#4400

Order 1 Soil Survey



Legend

	Capability Class	Acreage
Generally Unsuited Soils		
51D Skyline (monotaxa)	(7)	= 12.30 Acres
10E Bodell	(7)	= 6.06 Acres
51C Skyline (monotaxa)	(7)	= 0.86 Acres
Infrastructure	(8)	= 1.57 Acres

Generally Unsuited Soils = 20.79 Acres

Generally Suited Soils		
50D Wamic (monotaxa)	(4)	= 5.74 Acres
49C Wamic (monotaxa)	(4)	= 12.68 Acres
49C* Wamic (Wet)	(6)	= 0.92 Acres

Generally Suited Soils = 19.34 Acres

Total Acres: 40.13 Acres
Percentage of Generally Unsuited Soils: 51.8%

N

Growing Soils Environmental Associates

14

impenetrable below ~15" Poor

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # 1 Location SW extreme corner
GPS Coordinates see report
Slope 5 Elevation ° Landform (plains / hills)
Geology/Genesis ash over ~~sediment~~
Vegetation trees ~ HW

BRIEF PROFILE DESCRIPTION

good roots to 15" Then Abrupt Stop

Horiz	Depth	Moist Color	Mott	Text	Struct	Clay%	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR	0	L	1fgr	10		cm 1-15 yes	1/2	fr	0	0 x=	mod
BA	6-12	10YR	0	L	1c SBK	12		cm 6-12 yes	2	fi	0	0 x=	mod
CB	12-15	10YR	0	L	11	7		yes	2	fi	0	0 x=	mod slow
2CR	15" +	Dense clay substratum										1+ x=	0 None
		Consolidated Not cemented										x=	
												x=	
~~Continuously duripan~~													

Remarks V poor soil below 14"
Basalt
Diagnostic hor

Capability Class 7 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification Family Loamy
Soil Drainage Class w Soil Erodibility Index .29+ Series Skyline
Hydrologic Group D/C Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to shallow paralithic contact
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # (2) Location SW extreme corner Area
GPS Coordinates see report
Slope ____ Elevation ____ Landform uplands / hills / Plateau
Geology/Genesis ash over (sediments)
Vegetation HW Trees, Xerophytes

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-5	10YR 3/2	Ø	L		1 fgr	10	cm 1-2 yes	1½	fr	Ø	Ø x=	mod
AB	5-6	10YR 3/3	Ø	L		1 fm SBK	10	cm 1 yes	1"	fi	Ø	Ø x=	mod
BC	6-21	10YR 3/4	Ø	L		1	10	soft yes	1"	fi	Ø	2 x=	mod
2CR	21"+	fractured + saprolitic sediments (Alkent?)										(1+ 2+) x=	Ø
												x=	

V abrupt geologic contact

(+) Cemented
(+) Indurated

Remarks (+) Abbieviated
(-) Andic

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Aboriptic Xerochrept Family Loamy
Soil Drainage Class well D Soil Erodibility Index .277 Series Skyline
A Hydrologic Group ~~D~~ Depth to Mottles Ø Effective Rooting Depth <10"
Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø
Runoff Potential mod due to shallow paralithic contact
Flooding Potential Ø Wetland Conditions Ø

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # 3 Location SW corner
GPS Coordinates see report
Slope 1/6 Elevation ~ Landform uplands / hills
Geology/Genesis ash over sediment
Vegetation

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-4	10YR 3/2	Ø	L	18%		10	cm 1-2 yes	1½	fr	Ø	Ø x=	mod
											Ø	Ø	
AB	4-8	10YR 3/3	Ø	L		1 msbk	12	cm <0.5 yes	1	fi	Ø	Ø x=	mod
											Ø	Ø	
BC	8-25	10YR (4/4)	Ø	L		11	10	yes	1½	fi	Ø	Ø x=	mod slow
											Ø	Ø	
2CR	25+	highly weathered saprolite - Mohs ~ 2-3									—	1+ x= 2+	Ø
												x=	

Remarks
Ⓐ highly erodible
Ⓑ Diagnostic hor.
Ⓒ soft rocks in Control Section

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Loamy
Soil Drainage Class WD Soil Erodibility Index .30+ Series Skyline
Hydrologic Group A Depth to Mottles Ø Effective Rooting Depth <10"
Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø
Runoff Potential mod due to shallow paralithic contact
Flooding Potential Ø Wetland Conditions Ø

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # (4) Location Western mid Limit
GPS Coordinates see report
Slope 7 Elevation ~ Landform uplands / hills
Geology/Genesis ash over sediment
Vegetation Trees - Htw & upland shrubs

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR	0	L	1G sbk	10	cm yes	1½	fr	0	0 x=	1
AB	6-18	10YR	0	L	1m SBK	10	cm yes	2½	fi	0	0 x=	
BW	18-24	10YR	0	L	1m SBK	10	yes	2"	fi	0	0 x=	
2CR	(24)+	X	Paralithic contact							0	1+ x=	0
											2+	
											hardness x=	2.5-3
											x=	

Remarks Borderline Skyline / Wamic

Capability Class 7/6 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification fine loamy, Andic Xeroch-ept Family Loamy
Soil Drainage Class WD Soil Erodibility Index .20 Series Skyline/Wam
Hydrologic Group A/B/C/D Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to shallow paralithic contact
Flooding Potential 0 Wetland Conditions 0

freely drained

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/18/20 Preparer Kitzrow
Stop # 5 Location NW¼, near access Rd
GPS Coordinates see enclosed report
Slope 7 Elevation: Landform upland / Low rolling hill / Basin
Geology/Genesis residuum
Vegetation monocots

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR 3/2	Ø	L	1 fgr	<15	cm/ yes	1"	fr	Ø	Ø x=	mod
										Ø	Ø	
BW,	6-17"	10YR 4/3	Ø	L	[m, f SBK	<10	cm/ yes	1"	fi	Ø	Ø x=	mod
										Ø	Ø	
BW2	17-24"	10YR 4/3	Ø	L	11	10	yes	1"	fi/fr	Ø	Ø x=	mod
										Ø	Ø	
BC	24-29"	10YR 5/4	Ø	L	11	12	yes	1½"	fi	Ø	Ø x=	mod
										Ø	Ø	
R	29"	basalt (fractured)									Ø x=	X
		⊕ Lithic									x=	

Remarks
- AP
- Ø Bt but close
- mixed medial properties
- no low BD

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index Series Wamic
Hydrologic Group A Depth to Mottles Ø Effective Rooting Depth
Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø
Runoff Potential mod due to basalt rock
Flooding Potential Ø Wetland Conditions Ø

East facing, slopes somewhat protected

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/18/20 Preparer Kitzrow
Stop # 6 Location NW 1/4 - Above steeper drop off
GPS Coordinates see enclosed report
Slope 10% Elevation: ~ Landform upland / low rolling hill / Basin
Geology/Genesis residuum / colluvium ??
Vegetation monocots, scattered Trees (open grown) Hardwoods

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-8	10YR 3/2	0	L	1m gr	<15	cm 1 yes	1"	fr	0	0 x=	mod
										0	0	
BW1	8-16	10YR 4/3	0	L	1f,m SBK	10	cm 1 yes	1"	fi	0	0 x=	mod
										0	0	
BW2	16-31	10YR 5/4	0	L	1"	15	yes	2"	fi	0	0 x=	mod
										0	0	
BC	31-37	10YR 5/4	0	HL	1"	10	yes	2"	fi	0	0 x=	mod
										0	0	
R	37"+	basalt -		Mohs ~4	X						0 x=	X
											x=	

Remarks AP @ 37" HL = ~28-30% clay

Capability Class 4 Suitability = (Gen. suited), Gen. unsuited WHC = (>2") <2"

Classification mesic, Xerochrepts Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index Series Wamic
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to basalt rock
Flooding Potential 0 Wetland Conditions 0

1D slope" N. of house (50D)

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # 4 Location West central Edge
GPS Coordinates see report
Slope 7 Elevation — Landform uplands / hills
Geology/Genesis ash over sediment
Vegetation trees - conifers + HW

BRIEF PROFILE DESCRIPTION

DNA

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
AB	0-6	10YR	0	L			10	cm yes	1½	fr	0	0 x=	mod
AB	6-9	10YR	0	L			10	cm yes	1½	fi	0	0 x=	mod
BW	9-30"	10YR	0	L			10	yes	1½	fi	0	0 x=	mod
2CR	30"+			Saprolitic sediments								1+ x=	0
												2+ x=	
												x=	
												x=	

bedrock

Remarks Warm

Capability Class 7/6 Suitability = Gen. suited / Gen. unsuited WHC = >2" / <2"

Classification fine loamy, mixed, mesic Typic xeorthents Family Loamy
Soil Drainage Class WD Soil Erodibility Index .24-.28 Series Skyline/Loamy
Hydrologic Group A/D Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to shallow paralithic contact
Flooding Potential 0 Wetland Conditions 0

SOIL PROFILE DOCUMENTATION SHEET

Steep, dry East. face slope

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow

Stop # 3 Location North central portion

GPS Coordinates see report

14 Slope ~~0-3~~ Elevation ~ Landform Low Hillslopes

Geology/Genesis resistant basalt

Vegetation V few Hardwoods @ Xerophytes - Mostly open @ monocots @ shrubs

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-3	10YR 3/3 D	0	CB L	1mgr	25	cm 1-2 yes	1/1	fr	0 0	0 0 x=	mod
BC	3-11	10YR 4/3 D	0	CB L	1C sbk	30	cm 1-2 yes	1/1	fi	0 0	0 0 x=	mod
BC2	11-18	10YR 5/4 D	0	CB L (MASS)		35	yes	2/1	fi	0 0	0 0 x=	mod slow
R	18"+	Basalt / Geo. contact								—	0 x=	
											x=	
											x=	

Remarks → ** ↑ clay 2° TO Din PM to basalt

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Lo-Sk/lo fd

Soil Drainage Class WD Soil Erodibility Index .27 Series Bodell

Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5'

Depth Current Water Table 0 Est Depth Seasonal High Water Table 0

Runoff Potential mod due to rocky, shallow soils

Flooding Potential 0 Wetland Conditions 0

'E' slope

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/18/20 Preparer Kitzrow
Stop # 9 Location mid property
GPS Coordinates see report
Slope 6 - 8 Elevation ~ Landform Low Hillslopes
Geology/Genesis resistant basalt
Vegetation Hardwoods, Xerophytes

BRIEF PROFILE DESCRIPTION

1% Surface Rock

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Bail Hold	Rib-bon	Con-sist	Andic Smear	Andic Cem	Indur Cem	Sat Intake
A	0-6	10YR 2/2 D		SiL 16%	1 gr	25	cm 1-2 yes	1½"	fr	0	0	x=	mod
BC	6-12	10YR 4/3 D		gr L 15%	1 SBK	30	cm 4 yes		fr	0	0	x=	mod
BC/R	12-18	10YR 5/4 D		CB L	1	35	yes	↓	fr	0	0	x=	mod slow
R	18"	Basalt / Geo. contact									0	x=	
												x=	
												x=	

10YR

Remarks next to old house
steep microsite

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Lo-Sk eletal
Soil Drainage Class WD Soil Erodibility Index Series Bodell
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5 ½
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to rocky, shallow soils
Flooding Potential 0 Wetland Conditions 0

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # 10 Location mid south East Asp
GPS Coordinates see report
Slope 10 Elevation : Landform uplands / hills
Geology/Genesis ash over sediment
Vegetation Trees w/ natl open area w/ forbes

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Bail Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR 3/2	Ø	L	10	1C SBK	10	cm 1 yes	1½	fr	~~1+~~ ~~1+~~	Ø x= Ø	M
BW1	~~A~~ 6-14	10YR 4/4	Ø	L	10	1C SBK	10	cm L yes	1½	fi	~~1+~~ ~~vfi~~	Ø x= Ø	
	BW 14-30	10YR 7/6	Ø	L	10	1	10	yes	1½	fi	Ø Ø	2 x= Ø	
2CR	30+			paralithic contact								1+ x= 2+	Ø
												x=	
R	≈564											x=	

Remarks Andic on steep E slope

Capability Class 7 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"
Classification fine-loamy mixed mestic Andic ~~Ø~~ yes Family Loamy
Soil Drainage Class WD Soil Erodibility Index .24 Series ~~Silt~~ Wam
Hydrologic Group ~~D~~ Depth to Motties Ø Effective Rooting Depth ≥10"
Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø
Runoff Potential mod due to shallow paralithic contact
Flooding Potential Ø Wetland Conditions Ø

A

Growing Soils Environmental Associates

24

Strong CC 7

Clay content $\bar{X}$ = 20-22%.

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # (11) Location SE corner of property
GPS Coordinates see report
Slope 11 Elevation — Landform uplands / hills
Geology/Genesis ash over sediment & Andesite basalt
Vegetation solid trees HW & a few con. fir

284° Aspect

BRIEF PROFILE DESCRIPTION

Poor site

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Bail Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-4	10YR	0	L	1 f gr	<10	cm 1 yes	1½	fr	0	0 x=	mod
AB	4-6	7.5YR	0	L	1 f,m < SBK	10	cm ≤5 yes	1½"	fi	0	0 x=	mod
BC	6+5	7.5YR	0	L	11	5	yes	1"	fi	0	0 x=	mod slow
2CX vs 2CR	15	\	distinct	CR	X	X					1+ x=	0
											2+	
											x=	
											x=	

CR Mobs
2 to 3

Duripan @ 15"
No rooting Ability

Remarks 11

Paddock

Diagnostic

ARD = 15"!

Capability Class 7 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification Entic Abruptic Durochrepts Family Loamy
Soil Drainage Class WD Soil Erodibility Index .24 Series Skyline
Hydrologic Group D/C Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to shallow paralithic contact
Flooding Potential 0 Wetland Conditions 0

BRC 22"

Growing Soils Environmental Associates

25

Small Inclusions slope Area

Compiled into Transition between 49C & 50D

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/18/20 Preparer K. Herod

Stop # ~~X~~ (12) Location South central Area - (100' N of S. Property border)

GPS Coordinates see enclosed report

Slope 16 Elevation: - Landform Upland / Low rolling hill / Basin

Geology/Genesis residuums only

Vegetation trees mixed monocots ~ Isolated hardwoods No V few conch

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR 3/3	0	L		<15	cm yes	1"	fr	0	0 x=	mod
BW1	6-9	10YR 4/3	0	L		5	cm yes	1"	fi	0	0 x=	mod
BW2	9-15	7.5YR 5/4	0	gL		15	yes	1"	fi	0	0 x=	mod
BC	15-20	7.5YR 5/4	0	gL		15	yes	2"	fi	0	0 x=	mod
2R	20"	basalt highly fractured									0 x=	X slow

R begins @ 50" & between 20 & 50" ~ X slow permeable

Remarks ~~Borderline Wamic & Skylone~~

Capability Class 4 Suitability = (Gen. suited) Gen. unsuited WHC = (>2") <2"

Classification _____ Family Fi-loamy

Soil Drainage Class WD Soil Erodibility Index _____ Series Wamic/Skylone

Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth _____

Depth Current Water Table 0 Est Depth Seasonal High Water Table 0

Runoff Potential mod due to basalt rock

Flooding Potential 0 Wetland Conditions 0

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ARD = 27" ** Mod Wamic but a little shallow

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/14/20 Preparer Kitzrow
Stop # 13 Location SE Edge of hay field
GPS Coordinates see enclosed report
Slope 4-6 Elevation: Landform upland / Low rolling hill / Basin
Geology/Genesis residuum - basalt
Vegetation monocots

Near steep "E" slope where there's a major soil change ??

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-5	10YR 3/2	0	L	18	1fm gr	<15	cm 1-2 yes	1"	fr	0 WK	0	0 x= mod
BW1	5-14	10YR 4/3	0	L	18	1f SBK	10	cm yes	1"	fi	0 WK	0	0 x= mod
BW2	14-20	10YR 5/4	0	SL	11		15	yes	1"	fi	0	0	0 x= mod
BC	20-28	10YR 5/4	0	SL	11		15	yes	1"	fi	0	0	0 x= mod
2CR	28"+	basalt - highly weathered - saprolitic										0	0 x=
													x=

** Even distribution from top to bottom 15+"

Remarks Good moderately deep soils
Possibly modified in upper 1+

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Vitrandic Xerochrepts Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index .24 Series Wamic
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to basalt rock
Flooding Potential 0 Wetland Conditions 0

*** (+) paralithic contact

Growing Soils Environmental Associates

27

Modal Bodell

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 14 Location East Knoll near opening
GPS Coordinates see report
Slope 6-8 Elevation ~ Landform Low Hillslopes
Geology/Genesis resistant basalt
Vegetation Hardwoods, xerophytes, dissected landscape = Floral Diversity

ARD = 22"

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Andic Cem	Indur	Sat Intake
A	0-4	10YR 3/2 D		Stony Hfsl		25	cm 1 yes	2+	fr	0	0		mod
BC	4-14	10YR 3/4 D		CB L	1m SBK	30	cm 2 yes	2+		0	0	x=	mod
BC	14-24	10YR 3/4 D		CB L	1f	35	yes	2+		0	0	x=	mod to mod slow
CR/R	24"	Basalt / Geo. contact									0	x=	X
		Fractured Lithic contact				large boulders						x=	
												x=	

Remarks Paralithic

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Lithic Haploxeralf Family Lo-Skeletal
Soil Drainage Class WD Soil Erodibility Index .25-.30 Series Bodell (10E)
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5 ft
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to rocky, shallow soils/dissected landscape
Flooding Potential 0 Wetland Conditions 0

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 15 Location NE 1/4 ~ 80' west of prop limits
GPS Coordinates see report
Slope 15% Elevation ~ Landform Low Hillslopes (west face)
Geology/Genesis resistant basalt
Vegetation Dense Hardwoods, Xerophytes, no manzanita
Balsamroot

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR 3/2 D		VCB L	1MGr	25	cm yes 24"		fr	0 0	0 0 x=	mod
BC	6-14	10YR 4/3 D		CB L	1C CBK	30	cm yes		G	0 0	0 0 x=	mod
BC	14-20	10YR 5/4 D		stony L	(DNA)	35	yes			0 0	0 0 x=	mod slow
R	20"	Basalt / Geo. contact									0 x=	
		NOCR 10									x=	
											x=	

Remarks ARD = 18"
⊖ Diagnostic horizon

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Lo-Sk/Ck Lofl
Soil Drainage Class WD Soil Erodibility Index .25"+ Series Bodell
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to rocky, shallow soils
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

highly skeletal :. CC 7 V Wltc

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 10 Location NE extreme corner
GPS Coordinates see report
Slope 6 - 8 Elevation ~ Landform Low Hillslopes
Geology/Genesis resistant basalt
Vegetation Hardwoods, Xerophytes

BRIEF PROFILE DESCRIPTION

Some weath material/gravels

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-7	10YR	D	VCB L		25	cm yes		fr	~~1+~~ ~~wk~~	~~0~~ x=	mod
BW	7-20	10YR	D	VCB L		40	cm yes		fi	~~1+~~ ~~wk~~	~~0~~ x=	mod
BC	20-25	10YR	D	VCB L		35	yes		fr	~~0~~	~~0~~ x=	mod slow
R	25+	Basalt / Geo. contact									~~0~~ x=	

Remarks Strongly skeletal ARD = 25"
Overtly convex

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Lo-Skelet, Andic Xerochrepts Family Lo-Skeletal
Soil Drainage Class WD Soil Erodibility Index 27 Series Badell
Hydrologic Group A Depth to Mottles ~~A~~ Effective Rooting Depth <45"
Depth Current Water Table ~~0~~ Est Depth Seasonal High Water Table ~~0~~
Runoff Potential mod due to rocky, shallow soils
Flooding Potential ~~0~~ Wetland Conditions ~~0~~

49C

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson Date 12/19/20 Preparer K. Tyson
Stop # 17 Location SE 1/4 open hayfield
GPS Coordinates See Report
Slope 5 Elevation ____ Landform cultivated
Geology/Genesis residuum basalt
Vegetation no trees, dead grasses + weeds

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	7.5YR 3/2		L	1M gr	5	cm yes	1 1/2"	fr	0 WK	0 x=	mod
BW1	6-11	4/3		L	1C SBK	0	cm		fi	1t WK	0 x=	mod
BW2	11-18	5/4		L	1M BLK	5			fi	0 0	0 x=	mod
BC	18-29	↓	↓	L	1C BLK	0		2"	VFi	0 0	0 x=	mod
CR	29+	saprolitic sediment									x=	
											x=	

Remarks geologic contact close by probed 22"

Capability Class 4 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification Andic Xerochrepts Family fi lo
Soil Drainage Class WD Soil Erodibility Index .24 Series Wamic
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth 10+
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential Low due to ↑ Soil depth
Flooding Potential 0 Wetland Conditions 0

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harsh site

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 16 Location NE 1/4
GPS Coordinates see report
Slope 6-8 Elevation ~ Landform Low Hillslopes - microsite
Geology/Genesis resistant basalt
Vegetation Hardwoods, Xerophytes

V Thin topsoil

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	02	10YR	0	stony L			25 cm	yes	2f vfr	0	0 X=	mod
BC	2-11	10YR	0	stony L			30 cm	yes	2f fi	0	0 X=	mod
BC	11-17	10YR	0	stony L			35	yes	2f fi	0	0 X=	mod slow
17+ R	hard Basalt / Geo. contact										0 X=	
	Mohs hardness 7+										X=	
											X=	

Remarks Perched H2O table down to hard rock

Capability Class 7 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification Family Lo-Sk loful
Soil Drainage Class WD Soil Erodibility Index 12 a f Series Badell
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5 ft
Depth Current Water Table 24+ Est Depth Seasonal High Water Table 20 ft
Runoff Potential mod due to rocky, shallow soils
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

32

49 C

Suited

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/18/20 Preparer Kitzrow
Stop # 19 Location Mid Property
GPS Coordinates see enclosed report
Slope 3 Elevation ~1 Landform upland / Low rolling hill / Basin
Geology/Genesis residuum
Vegetation monocots only (slight depression nearby = localized relief

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Color	Moist	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-7	10YR 3/2	Ø	L			1f, m, sbk	<15	cm 1 yes	1"	fr	Ø	Ø x=	mod
BW1	7-14	10YR 3/4	Ø	L			1m SBK	Ø	cm 1 yes	1"	fr	Ø	Ø x=	mod
BW2	14-21	7.5YR 3/4	Ø	L			1 m,c ± SBK	Ø	yes	1"	fr	Ø	Ø x=	mod
BW3	21-29	7.5YR 3/4	Ø	L			massive vs. SBK	10	yes	1"	fr	Ø	Ø x=	mod
CR	29"+ basalt fractured - borderline saprolitic							X					Ø x=	X
R	>45"												x=	

Remarks BRD=25 to 30" Good Modal Wamic
No Argillic but Good cambic

Capability Class 4/6 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index Series Wamic
Hydrologic Group A Depth to Mottles Ø Effective Rooting Depth
Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø
Runoff Potential mod due to basalt rock
Flooding Potential Ø Wetland Conditions Ø

Growing Soils Environmental Associates

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 20 Location North end
GPS Coordinates see report
Slope 6-8 Elevation ↓ Landform Low Hillslopes
Geology/Genesis resistant basalt
Vegetation Hardwoods, Xerophytes

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Bail Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-7	10YR 3/2	D	SiCL		25 cm	yes	2"	fr	0	0 x=	mod 27
										0	0	
BC	7-11	10YR 4/3	D	CL		30 cm	yes		fr	0	0 x=	mod slow
										0	0	
BC	11-20	10YR 5/4	D	CL		35	yes		VFi	0	0 x=	mod slow
CR	20"+	Basalt / Geo. contact										Indurated
		Mohs hard ≈ 2.5-3										
		can chip with file spade										

Remarks FLOOR

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Lo-Skeletal
Soil Drainage Class WD Soil Erodibility Index 24 Series Bodell/SKylg
Hydrologic Group A Depth to Mottles D Effective Rooting Depth <5 ft
Depth Current Water Table D Est Depth Seasonal High Water Table D
Runoff Potential mod due to rocky, shallow soils
Flooding Potential D Wetland Conditions D

Wilson
T2N R12E Sec. 23C TL# 4400
Typifying Pedons

Wamic

A 0- 8" loam; 10YR 3/2; weakly smeary, low bulk density weak fine, medium granular structure; friable; slightly sticky, non-plastic; 10% cobbles; common fine and medium roots; clear wavy boundary
Bw1 8-16" loam; 10YR 4/3; weakly smeary, moderate fine, coarse sub angular structure; firm; slightly sticky, non-plastic; 10% cobbles and stones; few fine roots; gradual, wavy boundary, pH 7.4
Bw2 16-26" loam; 10YR 4/3; moderate fine, coarse sub angular structure; firm; slightly sticky, non-plastic; 5% cobbles and gravel; clear smooth boundary, pH 7.6
BC 26-38" loam; 10YR 5/4; weak fine, coarse sub angular structure parting to blocky; firm; slightly sticky, non plastic;, 5% cobbles; few fine roots; pH. 7.6
38"+ Paralithic contact, indurated but non-cemented basalt; non-calacreous

Bodell

A 0-5" stony loam, 10YR3/3, 20% gravels, 15% cobbles; friable, weak fine granular structure; few fibrous roots, non-sticky, non-plastic, clear wavy boundary pH=7.7
Bw 5-10" very cobbly loam, 10YR5/4, 10% gravels, 25% cobbles; friable consistence, weak fine, medium sub angular-blocky structure; no roots; slightly sticky, non- plastic, pH=7.9
BC 10-16" cobbly loam, 10YR5/4, 5% gravels, 25% cobbles; very firm consistence, weak medium subangular blocky structure; common interstitial and tubular pores; slightly-sticky, non- plastic, pH=7.9
16"+ hard, Massive Basalt; non-saprolitic, lithic

Skyline

A 0- 3" loam; 10YR 3/2; non-smeary, weak fine, medium granular structure; friable; slightly sticky, non-plastic; 10% cobbles; common fine and medium roots; clear wavy boundary
BC1 3-11" loam; 10YR 4/3; weakly smeary, moderate fine, coarse sub angular structure; firm; slightly sticky, non-plastic; 10% cobbles and stones; few fine roots; gradual, wavy boundary, pH 7.4
BC2 11-18" loam; 10YR 4/3; moderate fine, coarse sub angular structure; firm; slightly sticky, non-plastic; 5% cobbles and gravel; clear smooth boundary, pH 7.6
18"+ Paralithic contact, sedimentary origin

49C #

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/19/20 Preparer Kitzrow
Stop # 23 Location North central extent
GPS Coordinates see enclosed report
Slope <4 Elevation : Landform Upland / Low rolling hill / Basin
Geology/Genesis residuum
Vegetation monocots

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-5	10YR 3/2	0	L	1fm sbk	<15	cm 1 yes	1"	fr	0	0 x=	mod
BW1	5-18	10YR 3/4	0	L	1C sbk	5	cm yes	1½"	fr	0	0 x=	mod
BW2	18-30	10YR 5/6	0	L	1C/m sbk	5	yes	1"	fr	0	0 x=	mod
BC	30-35+	10YR 5/3	1F	L	1C blk	5	yes	1"	fr	0	0 x=	mod
CR	35"	basalt - saprolitic									0 x=	Mods = ≤ 3012
											x=	

not SBK

estimated

Remarks Transient Water Table

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index .24 Series Wamic wet *
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to basalt rock
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

49C* = Wet phase [35]

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/14/20 Preparer K. Itzrow
Stop # 22 Location north central extreme limits
GPS Coordinates see enclosed report
Slope <2 Elevation : Landform ~~Upland / Low Depression~~ V Basin
Geology/Genesis residuum
Vegetation monocots (Isolated Fac wet forbs)

* DTM = 35"

BRIEF PROFILE DESCRIPTION (Lowest elevation in parcel & lowest landscape pos.)

Horiz	Depth	Moist Color	Mott	Text	Struct	Frag Clay%	Bail	Rib-bon	Con-sist	Andic Smear	Indur Cem	Set	Intake
A	0-7	10YR 3/2	0	L	1f,m,c gr	<15	cm yes	1"	fr	0	0	x=	mod
BW1	7-14	10YR 3/3	0	L	1m,c SBK	<10	cm yes	2"	fi	0	0	x=	mod
BW2	14-30	10YR 5/4	0	HL	1C SBK	<5	yes	2"	fi	0	0	x=	mod slow
BC	30-35	10YR	0	HL	??	<5	yes	2"	fi	0	0	x=	mod slow
CR	35"	basalt fractured								0		x=	X
		Abrupt geo contact								0		x=	.6-2"/hr

Remarks Browser Than upslope Areas
no rock

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification _____ Family Fi-loamy
Soil Drainage Class MWD Soil Erodibility Index .28+ Series Wamic Wet
Hydrologic Group A/D Depth to Mottles 50" Effective Rooting Depth <10"
Depth Current Water Table 50" Est Depth Seasonal High Water Table 40-50"
Runoff Potential mod due to basalt rock
Flooding Potential 0 Wetland Conditions 0

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hydrology alteration area 2° to 7 mile Hill Rd

Border de pressen Area

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/19/20 Preparer K. Itzrod
Stop # 21 Location North Central extreme
GPS Coordinates see enclosed report
Slope 23 Elevation ~ Landform Upland / Low rolling hill / Basin
Geology/Genesis residuum + some colluvium
Vegetation monocots, isolated Fac monocots

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A		10YR 3/2 θ	L		1fm gr	<15		cm+ yes	1"	fr	θ	θ x=	mod
											θ	θ	
BW1		10YR 3/3 θ	L		1c SBK	10		cm+ yes	2"	fi	θ	θ x=	mod
											θ	θ	
BW2		10YR 4/3 θ	L		1	10		yes	2"	fi	θ	θ x=	mod
											θ	θ	
BC		10YR 3/3 (10)	th L		1	5		yes	1 3/4"	fi	θ	θ x=	mod
											θ	θ	
R	55"+	basalt weathered										θ x=	
												x=	

Highly erodible

Remarks 55+ interpore locations Wet Warm Hot Dry

Capability Class 4/6 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index .27-.35 Series Womic
Hydrologic Group A Depth to Mottles 38+ Effective Rooting Depth
Depth Current Water Table 50" Est Depth Seasonal High Water Table 50" or less
Runoff Potential mod due to basalt rocks
Flooding Potential 0 Wetland Conditions A to I

ATTACHMENT D – EXHIBIT 12

"Soil Survey of Wasco County, Oregon, Northern Part"

This is a scanned version of the text of the original Soil Survey report of Wasco County, Oregon, Northern Part, issued March 1982. Original tables and maps were deleted. There may be references in the text that refer to a table that is not in this document.

Updated tables were generated from the NRCS National Soil Information System (NASIS). The soil map data has been digitized and may include some updated information. These are available from http:/soildatamart.nrcs.usda.gov.

Please contact the State Soil Scientist, Natural Resources Conservation Service (formerly Soil Conservation Service) for additional information.

SOIL SURVEY OF WASCO COUNTY, OREGON, NORTHERN PART

By George L. Green

Fieldwork by George L. Green, Terry A. Dallin, and Dal F. Ames, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Oregon Agricultural Experiment Station

WASCO COUNTY, NORTHERN PART, is east of the Cascade Mountains in the north-central part of Oregon (see facing page). It occupies 559,730 acres.

The survey area is used mainly for farming. Sale of beef, wheat, and fruit is the principal source of farm income. Wheat is the main cash crop.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Wasco County, Northern Part; where they are located; and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The soil phase is the category of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. Chenoweth and Dufur, for example, are the names of two soil series. All the soils in the United States having the same series name have essentially the same characteristics affecting their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Condon silt loam, 1 to 7 percent slopes, is one of several phases within the Condon series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

A mapping unit consists of all those areas shown on a soil map that are identified by the same symbol. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Wasco County, Northern Part: soil complexes and soil associations.

A soil complex consists of areas of two or more soils, so intermingled or so small they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Bakeoven-Condon complex, 2 to 20 percent slopes, is an example.

A soil association is made up of two or more soils that could be delineated individually but that are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. If there are two or more dominant series represented in the soil

association, the name ordinarily consists of the dominant soils joined by a hyphen. Bindle-Bins association, steep, is an example.

In most areas surveyed there are places where the soil is so stony, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called miscellaneous areas and are given descriptive names. Riverwash is a miscellaneous area.

Some of the mapping units in this survey area are broadly defined. These are indicated in the Index to Mapping Units and in the Guide to Mapping Units by an asterisk following the name of the mapping unit. The composition of these units is more variable than that of other units in the survey area, but mapping has been controlled well enough that interpretations can be made for the expected uses of the soil.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, ox covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or to its high water table. They see that streets, road pavements, and foundations for houses are cracked on a particular soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Wasco County, Northern Part. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for selecting the exact location of a road, building, or similar structure because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in Wasco County, Northern Part, are discussed in the following pages.

The soil associations in this survey area have been grouped into five general kinds of landscapes for broad interpretative purposes. Each of the broad groups and their included soil associations are described in the following ages. The terms for texture used in the title for several of the associations apply to the texture of the surface layer. For example, in the title of association 1, the words, silt loam and loam refer to the texture of the surface layer of the major soils named in the association. Terms used to express the dominant slope and depth of soil in the titles of the five major groups and the ten associations are defined in the Glossary. All the major soils in this survey area are well drained.

Deep, Moderately Sloping to Steep Soils on Uplands and Terraces

These soils are on uplands and old terraces in the northern part of the survey area along the Columbia River and its tributaries.

1. Cherryhill-Chenoweth association

Deep, moderately sloping to steep silt loam and loam soils

This association consists of moderately sloping to steep soils on the sides of canyons and dissected terraces along Three Mile, Five Mile, Mill, Chenoweth, and Mosier Creeks. These soils formed in old alluvium and in colluvium weathered from consolidated and semiconsolidated tuffaceous sandstone. In uncultivated areas, the vegetation is bunchgrasses, forbs, shrubs, Oregon white oak, and ponderosa pine. Slopes range from 1 to 50 percent but are dominantly 7 to 35 percent. Elevation ranges from 200 to 1,200 feet. The average annual precipitation ranges from 14 to 20 inches, and the average annual air temperature ranges from 51° to 54° F. The frost-free period is 140 to 210 days at 32° and 170 to 250 days at 28°.

This association makes up about 3 percent of the survey area. It is about 62 percent Cherryhill soils, 26 percent Chenoweth soils, and 12 percent Van Horn, Wind River, Hesslan, Skyline, Tygh, Endersby, and Cumulic Haplaquolls soils and Rock outcrop-Xeropsamments.

Cherryhill soils have a surface layer of very dark

grayish brown silt loam and a subsoil of dark brown and dark yellowish brown silt loam, sandy clay loam, and loam. Effective rooting depth is 40 to 60 inches.

Chenoweth soils have a surface layer of very dark brown and very dark grayish brown loam and a subsoil of dark brown loam. Effective rooting depth is 60 inches or more.

This association is used for irrigated and dryfarmed fruit orchards that are mostly sweet cherries (fig. 1), for wildlife habitat, and for water supply. The wildlife is mainly upland birds and deer.

Runoff is mainly from the steep soils where vegetative cover is in poor condition or has been removed by cultivation. Sediment from runoff is moderate. Maintaining maximum cover in orchards and using conservation practices on dryfarmed cropland minimize the hazard of erosion.

Shallow to Deep, Nearly Level to Steep Soils on Uplands

These soils are in the eastern part of the survey area in the Columbia District, Tygh Ridge, and Juniper Flat area.

They are well drained soils that formed mostly in loess, volcanic ash, and residuum weathered from basalt. Slopes range from 0 to 50 percent. Elevation ranges from 300 to 3,600 feet. The average annual precipitation ranges from 10 to 16 inches, and the average annual air temperature ranges from 45° to 52° F. The frost-free period is 100 to 170 days at 32° and 150 to 210 days at 28°.



Figure 1: Irrigated sweet cherries with permanent cover crop on Chenoweth loam,1 to 7 percent slopes.

The four soil associations in this group make up about 46 percent of the survey area.

2. Walla Walla-Dufur association

Deep, nearly level to steep silt loam soils

This association consists of broad areas of soils that formed in loess on ridgetops and along major drainageways. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. Elevation ranges from 300 to 2,000 feet. The average annual precipitation ranges from 12 to 14 inches, and the average annual air temperature ranges from 48° to 52° F. The frost-free period is 120 to 170 days at 32° and 150 to 210 days at 28°.

This association makes up about 13 percent of the survey area. It is about 58 percent Walla Walla soils, 24 percent Dufur soils, and 18 percent Duart, Anderly, Wato, Endersby, Hermiston, Pedigo, Lickskillet, Nansene, and Wrentham soils and Riverwash.

Walla Walla soils have a surface layer of very dark brown silt loam and a subsoil of dark brown and brown silt loam. Effective rooting depth is 40 to 60 inches or more.

Dufur soils have a surface layer of very dark brown silt loam; a subsoil of dark brown, dark grayish brown, and dark yellowish brown silt loam; and a substratum of yellowish brown, moderately calcareous cobbly fine sandy loam. Effective rooting depth is 40 to 60 inches or more.

This association is used. for dryfarmed grain and pasture, wildlife habitat, and water supply. Farms are large, and water supplies for livestock are limited. The wildlife is mainly deer and upland birds.

Runoff is mainly from the moderately steep and steep soils, particularly in range where the grass is in poor condition and on summer fallow areas where vegetative protection is not provided. Sediment from runoff is moderate to high. Maintaining maximum cover on range and using conservation practices on dryfarmed cropland minimize the hazard of erosion.

3. Condon-Cantala Bakeoven association

Shallow to deep, nearly level to steep silt loam and very cobbly loam soils

The soils in this association formed in loess, volcanic ash, and residuum weathered from basalt. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. Elevation ranges from 1,600 to 3,600 feet. The average annual precipitation ranges from 10 to 13 inches, and the average annual air temperature ranges from 45° to 52° F. The frost-free period is 100 to 150 days at 32° and 150 to 200 days at 28 .

This association makes up about 19 percent of the survey area. It is about 44 percent Condon soils, 24 percent Cantala soils, 23 percent Bakeoven soils, and 9 percent Lickskillet, Wrentham, and Hermiston soils.

Condon soils are moderately deep and nearly level to steep. They have a surface layer of very dark brown silt loam and a subsoil of dark brown and very dark grayish brown silt loam. Effective roofing depth is 20 to 40 inches.

Cantala soils are deep and nearly level to steep. They have a surface layer of very dark brown and very dark grayish brown silt loam, a subsoil of dark brown silt loam, and a substratum of dark brown loam. Effective rooting depth is 40 to 60 inches or more.

Bakeoven soils are shallow and nearly level to moderately steep. They have a surface layer of dark brown very cobbly loam and a subsoil of dark brown very cobbly loam and very cobbly clay loam. Effective rooting depth is 5 to 12 inches.

This association is used for dryfarmed grain, range, and pasture; for wildlife habitat; and for water supply. Condon and Cantala soils are used for dryfarmed small grain. Bakeoven soils are used for grazing, mostly by cattle. Water supplies for livestock are limited. Springs and ponds are the main sources of water. The wildlife is mainly deer and upland birds.

Runoff is mainly from the shallow Bakeoven soils and the steep Condon and Cantala soils. Sediment from runoff is moderate to high. Maintaining maximum cover on range and using soil- and water-conserving practices on dryfarmed cropland minimize the hazard of erosion.

4. Watama-Bakeoven-Wapinitia association

Shallow to deep, nearly level to steep silt loam and very cobbly loam soils

This association consists of broad areas of soils on upland plateaus. These soils formed in loess, volcanic ash, and in residuum weathered from basalt. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. Elevation ranges from 1,800 to 3,400 feet. The average annual precipitation ranges from 13 to 16 inches, and the average annual air temperature ranges from 48° to 50° F. The frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28 .

This association makes up about 7 percent of the survey area. It is about 39 percent Watama soils, 30 percent Bakeoven soils, 24 percent Wapinitia soils, and 7 percent Wamic, Hesslan, Maupin, and Wapinitia variant soils.

Watama soils are moderately deep and nearly level to steep. They have a surface layer of very dark brown and very dark grayish brown silt loam and a subsoil of dark brown loam and brown clay loam. Effective rooting depth is 20 to 40 inches.

Bakeoven soils are shallow and nearly level to moderately steep. They have a surface layer of dark brown very cobbly loam and a subsoil of dark brown very cobbly loam and very cobbly clay loam. Effective rooting depth is 5 to 12 inches

Wapinitia soils are deep and nearly level to steep. They have a surface layer of very dark brown silt loam, a subsoil of very dark brown silt loam and dark brown silty clay loam, and a substratum of dark yellowish brown fine sandy loam and dark brown clay loam. Effective rooting depth is 40 to 60 inches.

This association is used for dryfarmed grain, range, and pasture; for irrigated grain, hay, and pasture; for wildlife habitat; and for water supply. Bakeoven soils are used for grazing, mostly by cattle. The wildlife is mainly deer and upland birds.

Runoff is mainly from the shallow Bakeoven soils. Sediment from runoff is low to moderate. Maintaining maximum cover on range and using soil- and water-conserving practices on cropland minimize the hazard of erosion.

5. Maupin Bakeoven association

Shallow and moderately deep, nearly level to moderately steep loam and very cobbly loam soils

This association consists of broad areas of soils on upland plateaus. These soils formed in loess, volcanic ash, and residuum weathered from basalt. In uncultivated areas, the vegetation is bunchgrasses, forbs, shrubs, and juniper. Elevation ranges from 1,600 to 3,400 feet. The average annual precipitation ranges from 10 to 12 inches, and the average annual air temperature ranges from 45° to 52° F. The frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28 .

This association makes up about 7 percent of the survey area. It is about 65 percent Maupin soils, 29 percent Bakeoven soils, and 6 percent Lickskillet, Hesslan, Sherar, and Maupin variant soils and Rock outcrop-Rubble land complex.

Maupin soils are moderately deep and nearly level or gently sloping. They have a surface layer of very dark grayish brown loam and a subsoil of dark brown loam. Effective rooting depth is 20 to 40 inches.

Bakeoven soils are shallow and nearly level to moderately steep. They have a surface layer of dark brown very cobbly loam and a subsoil of dark brown very cobbly loam and very cobbly clay loam. Effective rooting depth is 5 to 12 inches.

This association is used for dryfarmed grain, range, and pasture; for irrigated grain, hay, and pasture; for wildlife habitat; and for water supply. Bakeoven soils are used for grazing, mostly by cattle. The wildlife is mainly deer and upland birds.

Runoff is mainly from the shallow Bakeoven soils. Sediment from runoff is low to moderate. Maintaining maximum cover on range and using soil- and water-conserving practices on cropland minimize the hazard of soil erosion.

Shallow and Moderately Deep, Moderately Steep to Very Steep Soils on Uplands

These soils are on uplands in the eastern part of the survey area along the Deschutes River, Fifteenmile Creek, and their tributaries.

6. Lickskillet-Wrentham association

Shallow and moderately deep, moderately steep to very steep silt loam, very stony loam, and extremely stony loam soils

This association consists of soils on the sides of canyons along Fifteenmile Creek and the Columbia and Deschutes Rivers and soils on ridgetops (fig. 2). These



Figure 2: Typical area of the Lickskillet-Wrentham association. The south-facing soil is Lickskillet extremely stony loam, 40 to 70 percent slopes (mostly in right background), and the north-facing soil is Wrentham-Rock outcrop complex, 35 to 70 percent slopes (mostly in left background in areas of shadow). Bakeoven-Condon complex, 2 to 20 percent slopes, is on ridgetops.

soils formed in loess and in colluvium weathered from basalt. The vegetation is bunchgrasses, forbs, and shrubs. Slopes range from 15 to 70 percent. The average annual precipitation ranges from 10 to 13 inches, and the average annual air temperature ranges from 45° to 52° F. The frost-free period is 100 to 150 days at 32° and 150 to 210 days at 28°.

This association makes up about 18 percent of the survey area. It is about 59 percent Lickskillet soils, 17 percent Wrentham soils, and 24 percent Bakeoven, Anderly, Condon, Maupin, Watama, Warden, Nansene, Sherar, and Sinamox soils and Rock outcrop-Rubble land complex and Riverwash.

Lickskillet soils have a surface layer of very dark grayish brown extremely stony loam and a subsoil of dark brown very stony heavy loam and dark yellowish brown have gravelly heavy loam. Effective rooting depth is 12 to 20 inches.

Wrentham soils have a surface layer of very dark brown silt loam and a subsoil of dark brown very cobbly silty clay loam and silt loam. Effective rooting depth is 20 to 40 inches.

This association is used for range, wildlife habitat, and water supply. Ranches are large, and water supplies for livestock are limited. Springs and ponds are the main sources of water. The wildlife is mainly deer and upland birds.

Runoff is mainly from the shallow Lickskillet soils, particularly in areas of range where the grass is in poor condition. Sediment from runoff is low to moderate. Maintaining maximum cover on range minimizes the hazard of erosion.

Moderately Deep and Deep, Nearly Level to Very Steep Soils on Uplands of Tygh Valley

This group of soils is in the southeastern part of the survey area. The major soils are on uplands bordering White River and Tygh Creek in the Tygh Valley area.

7. Sherar-Sinamox association

Moderately deep and deep, nearly level to very steep cobbly loam and silt loam soils

This association consists of soils on upland plateaus. These soils formed in loess and gravelly colluvium. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. Elevation ranges from 1,500 to 2,500 feet. The average annual precipitation ranges from 10 to 12 inches, and the average annual air temperature is 48° to 52° F. The frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

This association makes up about 2 percent of the

survey area. It is about 46 percent Sherar soils, 26 percent Sinamox soils, and 28 percent Lickskillet, Bakeoven, Maupin, Pedigo, Quincy, and Tygh soils and Riverwash.

Sherar soils have a surface layer of very dark grayish brown cobbly loam and a subsoil of dark brown clay and gravelly clay. Effective rooting depth is 20 to 40 inches.

Sinamox soils have a surface layer of black and very dark grayish brown silt loam, a subsoil of dark brown silt loam, and a substratum of dark yellowish brown silty clay and brown gravelly clay loam. Effective rooting depth is 40 to 60 inches or more.

This association is used for dryfarmed grain and pasture, irrigated hay and pasture, wildlife habitat, and water supply. The wildlife is mainly deer and upland birds.

Runoff is mainly from the steep and very steep soils, particularly in areas of range where the grass is in poor condition and in areas of summer fallow where vegetation protection is not provided. Sediment from runoff is moderate to high. Maintaining maximum cover on ran e and using soil- and water-conserving practices on armed cropland minimize the hazard of erosion.

Shallow to Deep, Nearly Level to Very Steep Soils on Foot Slopes of the Cascade Mountains

This group of soils is in the western art of the survey area. They are loam, stony loam, gravelly loam, and very cobbly loam soils that formed in loess, volcanic ash, and in colluvium weathered from andesite and sandstone sediment. Slopes range from 1 to 70 percent. Elevation ranges from 500 to 3,600 feet. The average annual precipitation ranges from 14 to 30 inches, and the average annual air temperature ranges from 42° to 50° F. The frost-free period is 50 to 150 days at 32° and 90 to 200 days at 28°.

The three associations in this group make up about 31 percent of the survey area.

8. Hesslan-Skyline-Frailey association

Shallow to deep, nearly level to very steep stony loam, very cobbly loam, and loam soils

This association consists of soils on the sides of canyons along Fivemile, Fifteen Mile, and Mill Creeks and their tributaries and soils on ridgetops, side slopes, and bottom lands along streams. These soils formed in loess, in volcanic ash, and in colluvium weathered from sediment and sandstone. Vegetation is bunchgrasses, forbs, shrubs, Oregon white oak, ponderosa pine, and Douglas-fir. Elevation ranges from 500 to 3,500 feet. The average annual precipitation ranges from 14 to 30 inches, and the average annual air temperature ranges from 45° to 49° F. The frost-free period is 100 to 140 days at 32° and 120 to 160 days at 28°.

This association makes up about 9 percent of the survey area. It is about 45 percent Hesslan soils, 16 percent Skyline soils, 15 percent Frailey soils, and 24 percent Bald, Bodell, Ketchly, Wamic, and Tygh soils and Rock outcrop-Xeropsamments and Riverwash.

Hesslan soils have a surface layer of very dark grayish brown stony loam and a subsoil of dark brown loam and cobbly loam. Effective rooting depth is 20 to 40 inches.

Skyline soils have a surface layer of very dark grayish brown very cobbly loam and cobbly loam and a subsoil of dark brown gravely loam. Effective rooting depth is 12 to 20 inches.

Frailey soils have a surface layer of very dark grayish brown loam, a subsoil of dark brown loam, and a substratum of brown loam. Effective rooting depth is 40 to 60 inches or more.

This association is used for range, pasture, woodland, wildlife habitat, and water supply. The wildlife is mainly deer and upland birds.

Runoff is mainly from the very steep soils, particularly in areas of range where the grass is in poor condition and in logged-over areas where vegetative cover is sparse. Sediment from runoff is moderate or high. Maintaining maximum cover on range and using soil- and water-conserving practices on logged areas minimize the hazard of erosion.

9. Wamic Hesslan association

Moderately deep and deep, nearly level to very steep loam and stony loam soils

This association consists of soils that formed in loess, in volcanic ash, and in colluvium weathered from sandstone. In uncultivated areas, the vegetation is bunchgrass, forbs, shrubs, Oregon white oak, and ponderosa pine. Elevation ranges from 1,000 to 3,600 feet. The average annual precipitation ranges from 14 to 20 inches, and the average annual air temperature ranges from 46° to 50 F. The frost-free period is 100 to 150 days at 32° and 150 to 200 days at 28 .

This association makes up about 18 percent of the survey area. It is about 77 percent Wamic soils, 13 percent Hesslan soils, and 10 percent Bakeoven, Bald, Bodell, Frailey, Ketchly, Tygh, and Watama soils and Riverwash.

Wamic soils have a surface layer of very dark grayish brown loam, a subsoil of dark brown loam, and a substratum of dark brown heavy loam. Effective rooting depth is 40 to 60 inches or more.

Hessian soils have a surface layer of very dark grayish brown stony loam and a subsoil of dark brown loam and cobbly loam. Effective rooting depth is 20 to 40 inches.

This association is used for dryfarmed grain and pasture; irrigated grain, hay, and pasture; wildlife habitat; and water supply. Farms are large, and water supplies for livestock are limited. The wildlife is mainly deer and upland birds.

Runoff is mainly from areas of range where the grass is in poor condition and from areas of summer fallow where vegetation protection is not provided. Sediment from runoff is moderate to high. Maintaining maximum cover on ran e and using soil- and water-conserving practices on armed cropland minimize the hazard of erosion.

10. Ketchly-Bins association

Deep, nearly level to very steep loam and gravelly loam soils

This association consists of soils that formed in loess, in volcanic ash, and in colluvium weathered from andesite. Vegetation is shrubs, Douglas-fir, grand fir, and ponderosa pine. Elevation ranges from 1,100 to 3,600 feet. The average annual precipitation ranges from 25 to 30 inches, and the average annual air temperature ranges from 42° to 45° F. The frost-free period is 50 to 120 days at 32° and 90 to 140 days at 28°.

This association makes up about 4 percent of the survey area. It is about 57 percent Ketchly soils, 23 percent Bins soils, and 20 percent Bindle, Bald, Bodell, Wamic, Frailey, and Hesslan soils and Riverwash.

Ketchly soils have a surface layer of very dark grayish brown or dark brown loam and a subsoil of brown heavy loam. Effective rooting depth is 40 to 60 inches or more.

Bins soils have a surface layer of dark brown gravelly loam and a subsoil of dark brown loam and gravelly loam. Effective rooting depth is 40 to 60 inches or more.

This association is used for woodland, wildlife habitat, and water supply. The wildlife is mainly deer, elk, bear, and upland birds.

Runoff is mainly from the steep and very steep soils, particularly in recently logged areas. Sediment from runoff is low to moderate. Maintaining maximum cover on logging roads and skid trails and using soil- and water-conserving practices on logged areas minimize the hazard of erosion.

Descriptions of the Soils

In this section the soil series and mapping units in Wasco County, Northern Part, are described. Each soil series is described in detail, and then each mapping unit in that series is briefly described. Unless it is noted otherwise, what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for moist soil unless otherwise stated. The profile described in the series is representative of one of the mapping units in that series. If profile of a soil in a given mapping unit is different from the one described as representative of the series, these differences are stated in the description of the mapping unit or they are apparent in the name of the mapping unit, or both.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Cumulic Haplaquolls, for example, do not belong to a soil series; nevertheless, they are listed in alphabetic order along with the soil series.

Preceding the name of each mapping unit is the symbol that identifies the mapping unit on the detailed soil map. Listed at the end of the description of each mapping unit are the capability unit and range site in which the mapping unit has been placed. The pages on which each capability unit, range site, woodland group and windbreak group are described can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (11) .

Anderly Series

The Anderly series consists of well drained soils formed in loess and volcanic ash on uplands. Slopes are 3 to 35 percent. Elevation is 300 to 2,000 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 50° to 52° F, and the frost-free period is 150 to 170 days at 32° and 170 to 210 days at 28°.

In a representative profile the surface layer is very dark grayish brown silt loam about 14 inches thick. The upper 15 inches of the subsoil is dark brown silt loam, and the lower 8 inches is brown silt loam. Basalt bedrock is at a depth of about 37 inches. The profile is neutral.

Permeability is moderate, and the available water capacity is 3 to 8 inches. Water-supplying capacity is 6 to 9 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Anderly silt loam, 12 to 20 percent slopes, 500 feet east of a road in the NW1/4NW1/4NE1/4 section 32, T. 1 N., R. 15 E.:

Ap-0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots many very fine irregular pores; neutral; abrupt clear boundary.

Al-7 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; slightly hard, friable slightly sticky and slightly plastic; many very fins roots; many very fine irregular pores; neutral; clear wavy boundary.

B21-14 to 29 inches; dark brown (10YR 3/3) silt loam brown (10YR 5/3) dry; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear wavy boundary.

B22-29 to 37 inches brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak coarse prismatic struc-

In the original manuscript, there was a table in this space.
All tables have been updated and are available as a separate document.

ture; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; neutral; abrupt wavy boundary.

IIR-37 inches; basalt bedrock.

The A horizon is very dark grayish brown or very dark brown when moist. The B2 horizon is grayish brown, brown, or pale brown when dry and dark brown or brown when moist. There is no lime accumulation in most places. Few basalt fragments, 1/8 to 1/2 inch in diameter, are throughout the profile. Depth to bedrock is 20 to 40 inches.

1C-Anderly silt loam, 7 to 12 percent slopes. A representative mapping unit is in the NW1/4NW1/4NE1/4 section 31, T. 1 N., R. 15 E. This soil is on broad ridgetops. Slopes average about 10 percent.

Included with this soil in mapping were areas of nearly level Anderly and Walla Walla soils that make up as much as 10 percent of the unit. Also included were Bakeoven and Lickskillet soils that make up as much as 5 percent.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-5; Rolling Hills range site.

1D-Anderly silt loam, 12 to 20 percent slopes. A representative mapping unit is in the NWl/4NW1/4NE1/4 section 32, T. 1 N., R. 15 E. This soil is in long, narrow areas and has south-facing slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Walla Walla, Bakeoven, and Lickskillet soils. These soils make up as much as 15 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-7 ; Rolling Hills range site.

1E-Anderly silt loam, 20 to 35 percent slopes. A representative mapping unit is in the NE1/4SW1/4SE1/4 section 29, T. 1 N., R. 15 E. This soil is in long, narrow areas and has south-facing slopes.

Included with this soil in mapping were areas of Walla Walla, Bakeoven, and Lickskillet soils. These soils make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is high. Capability subclass VIe; Droughty South Exposure range site.

Bakeoven Series

The Bakeoven series consists of well drained soils formed on uplands in a thin layer of loess and the underlying residuum weathered from basalt. Slopes are 2 to 20 percent. Elevation is 1,600 to 3,600 feet. The vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 13 inches, the average annual air temperature is 45° to 52° F, and the frost-free period is 110 to 150 days at 32° and 150 to 200 days at 28°.

In a representative profile the surface layer is dark

brown very cobbly loam about 3 inches thick. The subsoil is dark brown very cobbly loam and very cobbly clay loam about 6 inches thick. Basalt bedrock is at a depth of about 9 inches. The profile is neutral.

Permeability is moderately slow, and the available water capacity is .15 to .7 inches. Water-supplying capacity is less than 2.5 inches. Effective rooting dept is 4 to 1 inches.

These soils are used for range, wildlife habitat, and water supply.

Representative profile of Bakeoven very cobbly loam, 2 to 20 percent slopes, 100 feet southeast of a road in the SE1/4SE1/4NE1/4 section 16, T. 3 S., R. 14 E.:

A1-0 to 3 inches; dark brown (7.5YR 3/2) very cobbly loam, brown (10YR 5/3) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; 30 percent pebbles, 25 percent cobbles and 5 percent stones; neutral; abrupt smooth boundary.

B1-3 to 6 inches; dark brown (7.5YR 3/3) very cobbly loam, brown (7.5YR 4/4) dry; weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; 30 percent pebbles, 30 percent cobbles, and 5 percent stones; neutral; abrupt smooth boundary.

B2-6 to 9 inches; dark brown (10YR 3/3) very cobbly clay loam, brown (7.5YR 4/4) dry; moderate fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common very fine tubular pores; 30 percent pebbles, 50 percent cobbles, and 10 percent stones; neutral; abrupt wavy boundary.

IIR-9 inches; basalt bedrock.

The A horizon is brown or grayish brown when dry and dark brown or very dark grayish brown when moist. It is very cobbly loam, very stony loam, or extremely stony loam. The B2 horizon is brown, dark brown, or yellowish brown when dry and dark brown or dark yellowish brown when moist. The B horizon is 50 to 90 percent rock fragments. Depth to bedrock is 4 to 12 inches.

2D-Bakeoven very cobbly loam, 2 to 20 percent slopes. A representative mapping unit is in the SE1/4SE1/4NE1/4 section 16, T. 3 S., R. 14 E. This soil is in long, narrow areas between Condon soils on ridgetops and Lickskillet soils on south-facing canyon slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Condon, Maupin, Wapinitia, Watama, and Lickskillet soils. These soils make up as much as 15 percent of the unit.

Runoff is slow to rapid, and the hazard of erosion is moderate. Capability subclass VIIs; Scabland range site.

3D-Bakeoven-Condon complex, 2 to 20 percent slopes. A representative mapping unit is in the NE1/4NE1/4NW1/4 section 15, T. 3 S:, R. 14 E. This complex is about 50 to 85 percent Bakeoven very cobbly loam; 2 to 20 percent slopes, and 10 to 35 percent a Condor silt loam that has 2 to 20 percent slopes. The Bakeoven soil has the profile described as representative of the series. It is on ridgetops or side slopes in areas of scabland between and around areas of the Condon soil The Condon soil is generally on ridgetops or side slope, in circular or elongated mounds.

Included with this complex in mapping were areas of a Lickskillet very stony loam and shallow stony soils. These soils make up as much as 15 percent of the unit.

Runoff is slow to rapid, and the hazard of erosion is slight to moderate. Capability subclass VIIs; Bakeoven soil in Scabland range site; Condon soil in Rolling Hills range site.

4C-Bakeoven-Maupin complex, 0 to 12 percent slopes. A representative mapping unit is in the NW1/4SW1/4NW1/4 section 2, T. 5 S., R. 13 E. This complex is about 50 to 85 percent a Bakeoven very stony loam and 10 to 35 percent a Maupin loam (fig. 3). It is on upland plateaus. The Bakeoven soil is in areas of scabland between and around areas of the Maupin soil. The Maupin soil commonly is on circular or elongated mounds. The Bakeoven soil has a profile similar to the one described as representative of the Bakeoven series, but it is very stony.

Included with this complex in mapping were areas of Lickskillet soils that make up as much as 15 percent of the unit.

Runoff is slow to rapid, and the hazard of erosion is slight to moderate. Capability subclass VIIs; Bakeoven soil in Scabland range site; Maupin soil in Shrubby Rolling Hills range site.

5C-Bakeoven-Watama complex, 0 to 12 percent slopes. This complex is about 50 to 85 percent a Bakeoven very stony loam that has 2 to 12 percent slopes, and 10 to 35 percent a Watama silt loam that has 0 to 12 percent slopes. The Bakeoven soil is in areas of scabland between and around the Watama soil. The Watama soil is in circular mounds that have a convex surface. The soil near the center of the mound is deeper to bedrock than near the edges. Where the slope is more than 10 percent, the Watama soil commonly occurs as elongated mounds and the long axis is downslope. The mounds are 15 to 40 feet in diameter and about 25 feet apart. The Bakeoven soil has a profile similar to the one described as representative of the series, but it is very stony.

Included with this complex in mapping were areas of Lickskillet soils, shallow stony soils, and Rock outcrop. These soils make up as much as 15 percent of the unit.

Runoff is slow to medium, and the hazard of erosion is slight to moderate. Capability subclass VIIs; Bakeoven soil in Scabland range site; Watama soil in Shrubby Rolling Hills range site.

Bald Series

The Bald series consists of well drained soils formed in loess and volcanic ash and the underlying colluvium weathered from basalt on uplands. Slopes are 5 to 75 percent. Elevation is 200 to 3,000 feet. The vegetation is oak, pine, fir, bunchgrasses, forbs, and shrubs. The average annual precipitation is 20 to 30 inches, the average annual air temperature is 48° to 51° F, and the frost-free period is 100 to 140 days at 32° and 140 to 180 days at 28°.



Figure 3: Bakeoven very stony loam, 0 to 12 percent slopes, is in the foreground. Maupin loam, 0 to 12 percent slopes, is on the round mounds In the background.

In a representative profile the surface layer is dark brown cobbly loam and dark reddish brown gravelly loam about 12 inches thick. The subsoil is dark reddish brown and reddish brown very gravelly loam about 25 inches thick. Basalt bedrock is at a depth of about 37 inches. The surface layer is neutral, and the subsoil is slightly acid.

Permeability is moderate, and the available water capacity is 2 to 5 inches. Water-supplying capacity is 12 to 25 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for range, timber production, wildlife habitat, and water supply.

Representative profile of Bald cobbly loam, 5 to 45 percent slopes, in the SE1/4SE1/4NE1/4 section 36, T. 2 N., .11 E.:

O1-1/2 inch to 0; oak leaves, pine twigs, and needles.

A1-0 to 5 inches; dark brown (7.5YR 3/2) cobbly loam, reddish brown (5YR 4/3) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine irregular pores; 20 percent pebbles, 20 percent cobbles; neutral; clear smooth boundary.

A12-5 to 12 inches; dark reddish brown (5YR 3/3) gravelly loam, reddish brown (5YR 4/4) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 30 percent pebbles, 15 percent cobbles; neutral; gradual wavy boundary.

B21-12 to 21 inches; dark reddish brown (5YR 3/4) very gravelly heavy loam, reddish brown (5YR 5/4) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 35 percent pebbles, 25 percent cobbles; slightly acid; gradual wavy boundary.

B22-21 to 37 inches; reddish brown (5YR 4/4) very gravelly heavy loam, yellowish red (5YR 5/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 40 percent pebbles, 30 percent cobbles; slightly acid; abrupt wavy boundary.

IIR-37 inches; basalt bedrock, partly fractured.

The A horizon has fine or medium granular structure and is 15 to 45 percent rock fragments. The B2 horizon is loam, heavy loam, or light clay loam and is more than 35 percent cobbles and pebbles. It has weak to moderate, fine to medium, subangular blocky structure. Depth to bedrock is 20 to 40 inches.

6E-Bald cobbly loam, 5 to 45 percent slopes. A representative mapping unit is in the SE1/4SE1/4NE1/4 section 36, T. 2 N., R. 11 E. This soil is in irregularly shaped areas and has south-facing slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Bodell and Wamic soils. These soils make up about 15 percent of the unit.

Runoff is slow to rapid, and the hazard of erosion is slight to severe. Capability subclass VIs; Pine-Douglas Fir-Sedge range site; woodland group 4f.

7F-Bald very cobbly loam, 45 to 75 percent slopes. A representative mapping unit is in the NW1/4NW1/4NW1/4 section 18, T. 2 N., R. 13 E. This soil is in long, narrow areas and has south-facing slopes. It has a profile similar to the one described as representative of the series, but the surface layer is more than 50 percent rock fragments.

Included with this soil in mapping were areas of Bodell and Wamic soils. These soils make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIs; Oak-Pine Steep South range site; woodland group 4f.

Bald Variant

The Bald variant consists of well drained soils formed in loess and volcanic ash and the underlying colluvium weathered from basalt on uplands. Slopes are 45 to 75 percent. Elevation is 200 to 2,500 feet. The vegetation is Douglas-fir, bigleaf maple, forbs, and shrubs. The average annual precipitation is 22 to 30 inches, the average annual air temperature is 48° to 51° F, and the frost-free period is 100 to 140 days at 32°.

In a representative profile the surface layer is very dark grayish brown cobbly loam about 5 inches thick. The subsoil is dark brown cobbly loam, gravelly loam, and very gravelly loam about 35 inches thick. The substratum is brown very gravelly loam about 22 inches thick. The surface layer is slightly acid, and the subsoil and substratum are neutral.

Permeability is moderate, and the available water capacity is 4 to 8 inches. Water-supplying capacity is 16 to 20 inches. Effective rooting depth is 40 to 60 inches.

These soils are used for woodland, wildlife habitat, and water supply.

Representative profile of Bald variant cobbly loam, 45 to 75 percent slopes, in the NE1/4SE1/4SE1/4 section 34, T. 3 N., R. 8 E.

O1-2 inches to 0; pine needles, twigs, and leaves.

A1-0 to 5 inches; very dark grayish brown (10YR 3/2) cobbly loam; grayish brown (10YR 5/2) dry; moderate fine granular structure; slightly hard, friable, slight (y sticky and slightly plastic; many very fine roots; many very fine irregular ores; 10 percent pebbles, 15 percent cobbles; slightly acid; gradual wavy boundary.

B1-5 to 12 inches; dark brown (10YR 3/3) cobbly loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many very fine tubular pores; 15 percent pebbles, 15 percent cobbles; neutral; gradual wavy boundary.

B21-12 to 23 inches; dark brown (7.5YR 3/3) gravelly loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium fine and very fine roots; many very fine tubular pores; 30 percent pebbles, 10 percent cobbles; neutral; gradual wavy boundary.

B22-23 to 40 inches; dark brown (7.5YR 4/3) very gravelly loam, brown (10YR 6/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots many very fine tubular pores; 45 percent pebbles, 20 percent cobbles; neutral; gradual wavy boundary.

C1-40 to 62 inches; brown (7.5YR 4/4) very gravelly loam, light brown (10YR 6/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine tubular pores; 50 percent pebbles, 35 percent cobbles; neutral.

The A horizon is very dark grayish brown or dark reddish brown and is 25 to 50 percent rock fragments. The B horizon is dark brown or brown and is 50 to 80 percent rock fragments. It has weak or moderate structure. Depth to bedrock is 40 to 60 inches or more.

8F-Bald variant cobbly loam, 45 to 75 percent slopes. A representative mapping unit is in the NE1/4SE1/4SE1/4, section 34, T. 3 N., R. 8 E. This soil is in long areas and has north-facing slopes.

Included with this soil in mapping were areas of Bald, Bodell, and Bindle soils. These soils make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIs; woodland group 2f.

Bindle Series

The Bindle series consists of well drained soils formed in loess, volcanic ash, and the underlying stony colluvium weathered from andesite on uplands. Slopes are 1 to 70 percent. Elevation is 2,500 to 3,500 feet. The vegetation is Douglas-fir, grand fir, bunchgrasses, forbs, and shrubs. The average annual precipitation is 25 to 30 inches, the average annual air temperature is 42° to 45° F, and the frost-free period is 50 to 100 days at 32° and 90 to 130 days at 28°.

In a representative profile the surface layer is dark brown gravelly loam about 6 inches thick. The upper 9 inches of the subsoil is dark brown gravelly loam, and the lower 7 inches is dark brown very gravelly heavy loam. Depth to highly fractured bedrock is 20 to 40 inches. The surface layer is neutral, and the subsoil and substratum are slightly acid to medium acid.

Permeability is moderate, and the available water capacity is 4 to 7 inches. Water-supplying capacity is 13 to 20 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for timber, wildlife habitat, and water supply.

Representative profile of Bindle gravelly loam in an area of Bindle-Bins association, steep, south of road in the NE1/4SW1/4 section 23, T. 1 N., R. 10 E.:

O1-1 1/2 inches to 0; fir twigs and needles.

A1-0 to 6 inches; dark brown (7.5YR 3/2) gravelly loam, brown (7.5YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very tine and few medium roots; many very fine irregular pores; 25 percent pebbles; slightly acid; clear smooth boundary.

B21-6 to 15 inches; dark brown (7.5YR 3/3) gravelly loam, brown (7.5YR 5/3) dry; moderate fine granular structure and moderate very fine subangular blocky

structure slightly hard, friable, slightly sticky and slightly plastic; many very fine and few medium roots; many very fine tubular pores; 25 percent pebbles, 10 percent cobbles; slightly acid; gradual wavy boundary.

B22-15 to 22 inches; dark brown (7.5YR 4/2) very gravelly heavy loam, brown (7.5YR 5/2) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and medium roots; many very fine tubular pores; 35 percent pebbles, 15 percent cobbles; medium acid; gradual wavy boundary.

IIC-22 to 60 inches; highly fractured bedrock with horizontal s acing between cracks less than 4 inches; fines are too few to fill some of the interstices larger than 1 millimeter; fines are dark brown (7.5YR 4/4) loam, brown (7.5YR 5/4) dry; slightly hard, friable, slightly sticky and slightly plastic; many fine roots in fractures; many very fine irregular pores; 30 percent stones; 40 percent cobbles, and 15 percent pebbles; medium acid.

The A horizon is reddish brown or brown when dry and dark brown or dark reddish brown when moist. It is 20 to 40 percent pebbles and as much as 10 percent stones. The B horizon is reddish brown or brown when dry and dark reddish brown or dark brown when moist. It is 20 to 40 percent pebbles, 5 to 20 percent cobbles, and as much as 10 percent stones. Depth to highly fractured bedrock is 20 to 40 inches.

9E-Bindle-Bins association, steep. A representative mapping unit is in the NWl/4NW1/4 section 22, T. 1 N., R. 11 E. This association is about 55 percent a Bindle gravelly loam that has 1 to 30 percent slopes and 30 percent a Bins gravelly loam that has l to 30 percent slopes. The Bindle soil is on narrow ridges and the upper part of slopes capped with rock. The Bins soil is in irregularly shaped areas on broad ridgetops not capped by rock. Both soils have the profile described as representative of their respective series.

Included with this association in mapping were areas of very stony shallow soil, ashy soils, an Rock outcrop that make up as much as 15 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Bindle soil in capability subclass VIs; woodland group 3f. Bins soil in capability subclass VIe; woodland group 2o.

9F-Bindle-Bins association, very steep. A representative mapping unit is in the NE1/4SW1/4 section 23, T. 1 N., R. 10 E. This association is about 45 percent a Bindle gravelly loam that has 30 to 70 percent slopes and 40 percent a Bins gravelly loam that has 30 to 70 percent slopes. The Bindle soil is on the top and convex part of slopes in areas capped by rock. The Bins soil is on the middle and lower parts of slopes not capped by rock. The Bins soil has a profile similar to the one described as representative of the Bins series, but it contains more rock fragments.

Included with this association in mapping were areas of shallow very stony soils, Bold variant soils, and Rock outcrop that make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Bindle soil in capability subclass VIIs; woodland group 3f; Bins soil in capability subclass VIIe; woodland group 2r.

Bins Series

The Bins series consists of well drained soils formed in loess, volcanic ash, and the underlying stony, moderately fine textured colluvium weathered from andesite on uplands. Slopes are 1 to 70 percent. Elevation is 1,100 to 3,600 feet. The vegetation is Douglas-fir, grand fir, forbs, and shrubs. The average annual precipitation is 25 to 30 inches, the average annual air temperature is 42° to 45° F, and the frost-free period is 50 to 100 days at 32° and 90 to 130 days at 28°.

In a representative profile the surface layer is dark brown gravelly loam about 8 inches thick. The subsoil is dark brown loam and gravelly loam about 28 inches thick. The substratum is dark brown cobbly clay loam about 24 inches thick. Basalt bedrock is at a depth of about 40 to more than 60 inches.

Permeability is moderately slow, and the available water capacity is 7 to 12 inches. Water-supply capacity is 17 to 20 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for timber, wildlife habitat, and water supply.

Representative profile of a Bins gravelly loam in an area of Bindle-Bins association, steep, in the SEl/4SW1/4SE1/4 section 15, T. 1 N., R. 11 E.:

O1-1 inch to 0; fir twigs and needles.

A1-0 to 8 inches; dark brown (7.5YR 3/2) gravelly loam, brown (7.5YR 5/2) dry; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine and medium roots; many very fine irregular pores; 25 percent fine pebbles; slightly acid; clear smooth boundary.

B1-8 to 12 inches; dark brown (7.5YR 3/2) loam, brown (7.5YR 5/3) dry; weak medium granular structure; slight l hard, friable, slightly sticky and slightly plastic; many very tine roots; many very fine tubular pores; 10 percent pebbles; slightly acid; gradual smooth boundary.

B21-12 to 25 inches; dark brown (7.5YR 4/3) gravelly loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; 15 percent pebbles, 10 percent cobbles; many very fine tubular pores; slightly acid; gradual wavy boundary.

B22-25 to 36 inches; dark brown (7.5YR 4/4) gravelly heavy loam, reddish brown (5YR 5/4) dry; weak medium subangular blocky structure; slightly hard, fable, slightly sticky and slightly plastic, common very fine roots; many very fine tubular pores; few thin clay films in pores; 20 percent pebbles, 5 percent cobbles; slightly acid; clear wavy boundary.

C-36 to 60 inches; dark brown (7.5YR 4/4) cobbly clay loam, reddish brown (5YR 5/4) dry; massive; slightly hard, friable, sticky and plastic; common very fine roots; common very fine and fine irregular pores; slightly acid.

The A horizon is dart' reddish gray or brown when dry. It is 15 to 25 percent fine pebbles 1/8 to 1/2 inch in diameter and 0 to 15 percent cobbles and stones. The B horizon and C horizon are loam, heavy loam, or clay loam. They are 0 to 15 percent pebbles and 0 to 20 percent cobbles. Depth to bedrock is 40 to 60 inches or more. Bin soils are mapped only in association with Bindle soils in two mapping units. Refer to the Bindle series for a description of these mapping units.

Bodell Series

The Bodell series consists of well drained soils formed in loess and volcanic ash and the underlying colluvium weathered from basalt on uplands. Slopes are 5 to 75 percent. Elevation is 200 to 2,500 feet. The

vegetation in bunchgrasses, forbs, shrubs, and scattered oak trees. The average annual precipitation is 20 to 30 inches, the average annual air temperature is 48° to 51° F, and the frost-free period is 100 to 140 days at 32° and 140 to 180 days at 28 .

In a representative profile the surface layer is dark brown cobbly loam about 5 inches thick. The upper 8 inches of the subsoil is dark brown very cobbly loam, and the lower 5 inches is dark brown very cobbly clay loam. Basalt bedrock is at a depth of about 18 inches. The soil material throughout the profile is neutral.

Permeability is moderate, and the available water capacity is 1 inch to l inches. Water-supplying capacity is 4 to 7 inches. Effective rooting depth is 12 to 20 inches.

These soils are used for range, wildlife habitat, and water supply.

Representative profile of Bodell cobbly loam, 5 to 45 percent slopes, 100 feet north of road in the NW1/4SW1/4SW1/4 section 33, T. 2 N., R. 12 E.:

A1-0 to 5 inches; dark brown (7.5YR 3/2) cobbly loam, brown (7.5YR 4/3) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; 15 percent pebbles, 20 percent cobbles; neutral; abrupt smooth boundary.

B21-5 to 13 inches; dark brown (7.5YR 3/3) very cobbly loam, brown (7.5YR 4/3) dry; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular and irregular pores; 20 percent pebbles, 40 percent cobbles; neutral; clear smooth boundary.

B22-13 to 18 inches; dark brown (7.5YR 3/3) very cobbly clay loam, brown (7.5YR 3/3) dry; weak fine subangular blocky structure; hard, firm, sticky and plastic; plentiful very fine roots; many very fine irregular and tubular pores; 60 percent cobbles, 10 percent stones; neutral; abrupt smooth boundary.

IIR-18 inches; basalt bedrock.

The A horizon is brown, grayish brown, or dark grayish brown when dry and dark brown or very dark grayish brown when moist. It is 20 to 40 percent pebbles and 0 to 10 percent cobbles. The B2 horizon is brown or dark yellowish brown when dry and dark brown or dark yellowish brown when moist. It is very cobbly loam to very cobbly clay loam and is 18 to 30 percent clay. It is 50 to 70 percent rock fragments, mainly cobbles. Depth to bedrock is 12 to 20 inches.

10E-Bodell cobbly loam, 5 to 45 percent slopes. A representative mapping unit is in the NW1/4SW1/4SW1/4 section 33, T. 2 N., R. 12 E. This soil is in irregularly shaped areas and has south-facing slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Bald, Ketchly, and Wamic soils. These soils make up as much as 15 percent of the unit.

Runoff is slow to rapid, and the hazard of erosion is slight to severe. Capability subclass VIIs; South Exposure range site.

11F-Bodell very cobbly loam, 45 to 75 percent slopes. A representative mapping unit is in the NE1/4NW1/4 section 14, T. 1 N., R. 12 E. This soil is in long, narrow areas and has south-facing slopes. This soil has a profile similar to the one described as representative of the series, but the surface layer is more than 50 percent rock fragments.

Included with this soil in mapping were areas of Bald, Ketchly, and Wamic soils. These soils make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIs; Steep South range site.

Cantala Series

The Cantala series consists of well drained soils formed in loess that has an appreciable content of volcanic ash overlying stratified alluvium on uplands. Slopes are 1 to 35 percent. Elevation is 1,600 to 3,600 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 13 inches, the average annual air temperature is 45° to 52° F, and the frost-free period is 100 to 150 days at 32° and 150 to 200 days at 28°.

In a representative profile the surface layer is very dark brown and very dark grayish brown silt loam about 18 inches thick. The subsoil is dark brown silt loam about 36 inches thick. The substratum is dark brown loam about 8 inches thick. The surface layer and subsoil are neutral, and the substratum is mildly alkaline.

Permeability is moderate, and the available water capacity is 6 to 12 inches. Water-supplying capacity is 9 to 12 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Cantala silt loam, 1 to 7 percent slopes, 65 feet west of the county road in SE1/4SEl/4SE1/4 section 5, T. 2 S., R. 15 E.:

Ap-0 to 8 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

A12-8 to 13 inches; very dark brown (10YR 2/2) silt loam grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

A13-13 to 18 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

B21-18 to 35 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; slightly hard, fable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

B22-35 to 54 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear wavy boundary.

IIC-54 to 62 inches; dark brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; hard, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine tubular pores; many noncalcareous nodules 1/4

to 1 inch in diameter; few mycelia lime below a depth of 60 inches; mildly alkaline.

IIIR-62 inches; basalt bedrock.

The B2 horizon is silt loam and is 18 to 24 percent clay. It is less than 15 percent rock fragments coarser textured than very fine sand. It has weak or moderate structure. The C horizon is stratified sand or silt in some places.

12B-Cantala silt loam, 1 to 7 percent slopes. A representative mapping unit is in the SE1/4SEI/4SE1/4 section 5, T. 2 S., R. 15 E. This soil is on broad ridgetops in long, broad areas. Slopes average about 5 percent. The soil has the profile describes representative of the series.

Included with this soil in mapping were areas of Bakeoven, Condon, Lickskillet, and Wrentham soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-3; Rolling Hills range site.

12C-Cantala silt loam, 7 to 12 percent slopes.

A representative mapping unit is in the SW1/4SW1/4SW1/4 section 34, T. 1 S., R. 14 E. This soil is on broad ridgetops in long, broad areas.

Included with this soil in mapping were areas of Bakeoven, Condon, Lickskillet, and Wrentham soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-1; Rolling Hills range site.

12D-Cantala silt loam, 12 to 20 percent slopes.

A representative mapping unit is in the NE1/4NE1/4NE1/4 section 10, T. 2 S., R. 15 E. This soil is in long, broad areas and has north-facing slopes.

Included with this soil in mapping were areas of Bakeoven, Condon, Lickskillet, and Wrentham soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Droughty North Exposure range site.

12E-Cantala silt loam, 20 to 35 percent slopes.

A representative mapping unit is in the SE1/4NE1/4NW1/4 section 1, T. 2 S., R. 14 E. This soil is in long, irregularly shaped areas and has north-facing slopes.

Included with this soil in mapping were areas of Bakeoven, Condon, Lickskillet, and Wrentham soils. These soils make up about 10 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability unit IVe-3 ; North Exposure range site.

Chenoweth Series

The Chenoweth series consists of well drained soils formed in old alluvium on uplands. Slopes are 1 to 35 percent. Elevation is 200 to 950 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, shrubs, and ponderosa pine. The average annual precipitation is 14 to 20 inches, the average annual air temperature is 51° to 54° F, and the frost-free period is 150 to 210 days at 32° and 185 to 250 days at 28 .

In a representative profile the surface layer is very dark brown and very dark grayish brown loam about 22 inches thick. The subsoil is dark brown loam about 24 inches thick. The upper 9 inches of the substratum is brown loam, and the lower part is brown very fine sandy loam to a depth of 60 inches or more. The soil material throughout the profile is neutral.

Permeability is moderate, and the available water capacity is 7.5 to 9.0 inches. Water-supplying capacity is 10 to 12 inches. Effective rooting depth is 60 inches or more.

These soils are used mostly for fruit orchards and some range.

Representative profile of Chenoweth loam, 1 to 7 percent slopes, 1/2 mile south of The Dalles city limits on Glen Cooper farm in the NE1/4SE1/4SW1/4 section 10, T. 1 N., R. 13 E.:

Ap1-0 to 5 inches; very dark brown (10YR 2/2) loam, grayish brown (10YR 5/2) dry; weak medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine ad fine irregular pores; neutral; abrupt smooth boundary.

Ap2-5 to 11 inches; very dark brown (10YR 2/2) loam, grayish brown (10YR 5/2) dry; weak thick platy and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine tubular pores; neutral; clear smooth boundary.

A3-11 to 22 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine tubular pores; few noncalcareous nodules as much as 1 inch in diameter; neutral; gradual smooth boundary.

B21-22 to 34 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine tubular pores; many noncalcareous very dark grayish brown (10YR 3/2) nodules as much as 1 inch in diameter; neutral; gradual smooth boundary.

B22-34 to 46 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine tubular pores; few noncalcareous nodules as much as 1 inch in diameter; neutral; gradual smooth boundary.

CI-46 to 55 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; massive; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine an few medium tubular pores; neutral; gradual smooth boundary

C2-55 to 88 inches; brown (10YR 4/3) very fine sandy loam, pale brown (10YR 6/3) dry; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many medium tubular pores; neutral.

The A horizon is loam or very fine sandy loam. The B2 horizon is silt loam, loam, or very fine sandy loam. It is as much as 18 percent clay and more than 15 percent particles coarser textured than very fine sand. The C horizon is loam or very fine sandy loam. It has iron staining and lime accumulations in places.

13B-Chenoweth loam, 1 to 7 percent slopes. A representative mapping unit is in the NW1/4SE1/4SW1/4 section 10, T. 1 N., R. 13 E. This soil is on ridgetops in broad areas. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Cherryhill, Wind River, Van Horn, Frailey, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-1; Pine-Oak-Fescue range site.

13C-Chenoweth loam, 7 to 12 percent slopes. A representative mapping unit is in the NE1/4NE1/4NE1/4 section 22, T. 1 N., R. 13 E. This soil is on ridgetops in long, broad areas.

Included with this soil in mapping were areas of Cherryhill, Wind River, Van Horn, Frailey, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-2; Pine-Oak-Fescue range site.

13D-Chenoweth loam, 12 to 20 percent slopes.
A representative mapping unit is in the NE1/4NW1/4NW1/4 section 14, T. 1 N., R. 13 E. This soil is in long, irregularly shaped areas.

Included with this soil in mapping were areas of Cherryhill, Wind River, Van Horn, Frailey, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-2; Pine-Oak-Fescue range site.

13E-Chenoweth loam, 20 to 35 percent slopes.
A representative mapping unit is in the NE1/4NE1/4SW1/4 section 14, T. I N., R. 13 E. This soil is in long, irregularly shaped areas.

Included with this soil in mapping were areas of Cherryhill, Wind River, Van Horn, Frailey, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability unit IVe-1; Pine-Oak-Fescue range site.

Cherryhill Series

The Cherryhill series consists of well drained soils formed in old alluvium and the underlying colluvium weathered from consolidated and semiconsolidated tuffaceous sandstone on uplands. Slopes are 1 to 50 percent. Elevation is 500 to 1,200 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, shrubs, and ponderosa pine. The average annual precipitation is 14 to 20 inches, the average annual air temperature is 51° to 53° F, and the frost-free period is 140 to 180 days at 32° and 170 to 220 days at 28°.

In a representative profile the surface layer is very dark grayish brown silt loam about 11 inches thick. The upper 10 inches of the subsoil is dark brown silt loam and loam, and the lower 20 inches is dark yellowish brown heavy loam and sandy clay loam. Soft sandstone bedrock is at a depth of about 41 inches. The surface layer is slightly acid to neutral, and the subsoil is neutral to medium acid.

Permeability is moderately slow, and the available water capacity is 6.5 to 11 inches. Water-supplying capacity is 8 to 10 inches. Effective rooting depth is 40 to 60 inches.

These soils are used mostly for fruit orchards and some range and wildlife habitat.

Representative profile of Cherryhill silt loam, 1 to 7 percent slopes, 2 1/2 miles south of The Dalles city limits, 1,000 feet from Skyline road, 100 feet northeast of dirt road in the center of the line between sections 16 and 17, T. 1 N., R. 13 E.

Ap-0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry: weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine irregular pores; slightly acid; abrupt smooth boundary.

A12-6 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 3/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots many fine tubular pores; neutral; clear smooth boundary.

B11-11 to 17 inches dark brown (10YR 3/3) silt loam, brown (10YR 5/3) moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; few thin clay films in pores; few noncalcareous nodules 1/4 to 1 inch in diameter; neutral; clear smooth boundary.

B12-17 to 21 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine tubular pores; few thin clay films in pores; few coarse fragments; slightly acid; abrupt smooth boundary.

B21t-21 to 28 inches; dark yellowish brown (10YR 3/4) heavy loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few roots; many fine tubular pores; common thick clay films on peels and in pores; medium acid; clear smooth boundary.

B22t-28 to 41 inches; dark yellowish brown (10YR 3/4) sandy clay loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few roots; many fine tubular pores; many thick clay films on peds; medium acid; abrupt smooth boundary.

IIC-41 inches; weathered tuffaceous sandstone, cobbles, and rock fragments; few clay films on fractured surfaces.

The A horizon is grayish brown or brown dry and very dark grayish brown or dark brown when moist. It is silt loam or loam. The B horizon is brown, yellowish brown, or pale brown when dry. It is loam, sandy clay loam, or clay loam. Depth to rippable bedrock is 40 to 60 inches.

14B-Cherryhill silt loam, 1 to 7 percent slopes.
A representative mapping unit is in the center of the line between sections 16 and 17, T. 1 N., R. 13 E. This soil is on ridgetops in long, broad areas. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Chenoweth, Hesslan, Van Horn, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-1; Pine-Oak-Fescue range site.

14C-Cherryhill silt loam, 7 to 12 percent slopes.
A representative mapping unit is in the NE1/4SW1/4NW1/4 section 16, T. 1 N., R. 13 E. This soil is on ridgetops in long, broad areas.

Included with this soil in mapping were areas of Chenoweth, Hesslan, Van Horn, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is medium, and the hazard of erosion is mod-

erate. Capability unit IIIe-2; Pine-Oak-Fescue range site.

14D-Cherryhill silt loam, 12 to 20 percent slopes. A representative mapping unit is in the SE1/4SW1/4SW1/4 section 16, T. 1 N., R. 13 E. This soil is in irregularly shaped areas.

Included with this soil in mapping were areas of Chenoweth, Hesslan, Van Horn, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IVe-1; Pine-Oak-Fescue range site.

14E-Cherryhill silt loam, 20 to 35 percent slopes. A representative mapping unit is in the SW1/4SE1/4NW1/4 section 21, T. 1 N., R. 13 E. This soil is in long, irregularly shaped areas.

Included with this soil in mapping were areas of Chenoweth, Hesslan, Van Horn, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability unit IVe-1; Pine-Oak-Fescue range site.

14F-Cherryhill silt loam, 35 to 50 percent north slopes. A representative mapping unit is in the SW1/4NW1/4NE1/4 section 7, T. I N., R. 13 E. This soil is in long, irregularly shaped areas and has north-facing slopes. It has a profile similar to the one described as representative of the series, but it contains more rock fragments.

Included with this soil in mapping were areas of Chenoweth, Hesslan, Van Horn, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. This soil is used for range and wildlife habitat. Capability subclass IVe; Pine-Douglas Fir-Sedge range site.

15F-Cherryhill silt loam, 35 to 50 percent south slopes. A representative mapping unit is in the NE1/4NWl/4NE1/4 section 7, T. 1 N., R. 13 E. This soil is in long, irregularly shaped areas and has south-facing slopes. It has a profile similar to the one described as representative of the series, but it has a thinner, lighter colored surface layer and has more and larger rock fragments.

Included with this soil in mapping were areas of Chenoweth, Hesslan, Van Horn, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. This soil is used for range and wildlife habitat. Capability subclass VIe; Oak South Exposure range site.

16D-Cherryhill-Rock outcrop complex, 3 to 25 percent slopes. A representative mapping unit is in the NW1/4NE1/4SE1/4 section 9, T. 1 N., R. 13 E. This complex is about 50 to 85 percent a Cherryhill silt loam that has 3 to 25 percent slopes and 10 to 35 percent Rock outcrop. The Cherryhill soil has convex and concave slopes and is in upland between and around Rock outcrop. It has a profile similar to the one described as representative of the series, but it contains more rock fragments. Rock outcrop has convex and concave slopes and is in irregularly shaped areas of the uplands.

Included with this complex in mapping were areas of a soil similar to this Cherryhill soil, but it is 20 to 40 inches deep to bedrock and it makes up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. This complex is used for hay, pasture, and fruit orchards. Capability subclass VIe; Cherryhill soil in Pine-Oak-Fescue range site. Rock outcrop not in a range site.

Condon Series

The Condon series consists of well drained soils formed in loess and small amounts of volcanic ash over basalt bedrock on uplands. Slopes are I to 25 percent. Elevation is 1,600 to 3,600 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 13 inches, the average annual air temperature is 45° to 52° F, and the frost-free period is 100 to 150 days at 32° and 150 to 200 days at 28°.

In a representative profile the surface layer is very dark brown silt loam about 13 inches thick. The upper 4 inches of the subsoil is very dark grayish brown silt loam, and the lower 10 inches is dark brown silt loam. Basalt bedrock is at a depth of about 27 inches. The soil material throughout the profile is neutral.

Permeability is moderate, and the available water capacity is 3 to 8 inches. Water-supplying capacity is 7 to 9 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Condon silt loam, 1 to 7 percent slopes, 180 feet south of road in the NE1/4NWI/4NW1/4 section 28, T. 1 S., R. 15 E.:

Ap-0 to 9 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

A12-9 to 13 inches; very dark brown (10YR 2/2) silt loam; grayish brown (10YR 5/2) dry; weak medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; clear smooth boundary.

B21-13 to 17 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

B22-17 to 22 inches; dark brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine boon; many very fine tubular pores; neutral; clear wavy

B3-22 to 27 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 2 percent 2- to 5-millimeter and 1 percent 5-millimeter to 3-inch pebbles; neutral; abrupt wavy boundary.

IIR-27 inches; basalt bedrock.

The A horizon is grayish brown or dark grayish brown when dry and very dark brown or very dark grayish brown when moist. The B horizon is very dark grayish brown, dark grayish brown, or dark brown when moist. It is

silt loam and is 18 to 24 percent clay and is less than 15 percent coarser textured than very fine sand. Depth to bedrock is 20 to 40 inches.

17B-Condon silt loam, 1 to 7 percent slopes. A representative mapping unit is in the NE1/4NW1/4NW1/4, section 28, T. 1 S., R. 15 E. This soil is on ridgetops in long, broad areas. Slopes average about 5 percent. The soil has the profile described as representative of the series.

Included with this soil in mapping were areas of Bakeoven, Cantala, Lickskillet, and Wrentham soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIIe-5; Rolling Hills range site.

17C-Condon silt loam, 7 to 12 percent slopes. A representative mapping unit is in the NE1/4SW1/4NW1/4 section 28, T. 1 S., R. 15 E. This soil is on ridgetops in long, broad areas.

Included with this soil in mapping were areas of Bakeoven, Cantala, Lickskillet, and Wrentham soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-5; Rolling Hills range site.

17D-Condon silt loam, 12 to 25 percent slopes. A representative mapping unit is in the NWl/4SE1/4SW1/4 section 28, T. 1 S., R. 15 E. This soil is in long, broad areas.

Included with this soil in mapping were areas of Bakeoven, Cantala, Lickskillet, and Wrentham soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability subclass VIe; Rolling Hills range site.

18D-Condon-Bakeoven complex, 2 to 20 percent slopes. A representative mapping unit is in the SW1/4SWl/4SE1/4 section 25, T. I S., R. 15 E. This complex is about 50 to 85 percent a Condon silt loam and 10 to 35 percent a Bakeoven very cobbly loam. The London soil is on ridgetops or side slopes in circular or elongated mounds. The Bakeoven soil is on ridgetops or side slopes in areas of scabland between and around areas of the Condon soil.

Included with this complex in mapping were areas of Lickskillet very stony loam and other shallow stony soils. These soils make up as much as 15 percent of the unit.

Runoff is rapid, and the erosion hazard is moderate. This complex is used for range, hay, pasture, and wildlife habitat. Capability subclass VIe; London soil in Rolling Hills range site; Bakeoven soil in Scabland range site.

Cumulic Haplaquolls

19A-Cumulic Haplaquolls, nearly level. These soils are somewhat poorly drained or poorly drained silt loam, loam, sandy loam, clay loam, or clay. They formed in mixed alluvium along streams and on concave alluvial fans. The soils are in small, narrow, irregularly shaped areas along stream channels and in concave areas. Slopes are 0 to percent. Elevation is 100 to 1,000 feet. In uncultivated areas, the vegetation is sedges, bunchgrasses, shrubs, and forbs. The average annual precipitation is 15 to 30 inches, the average annual air temperature is 45° to 52° F, and the frost-free period is 100 to 180 days at 32° and 180 to 210 days at 28°.

The surface layer, subsoil, and substratum are generally dark colored. Mottling is at a depth of 10 to 40 inches. Water-rounded pebbles or cobbles commonly form a thin stone line or layer in the lower part of the subsoil. The surface layer, subsoil, and substratum range from slightly acid to medium acid.

Permeability is moderate to slow, and the available water capacity and water-supplying capacity are variable. Effective rooting depth is 20 to 60 inches or more.

These soils are used for hay, pasture, and wildlife habitat.

Runoff is slow, and the hazard of erosion is slight. The soils are subject to overflow and in places are ponded during high precipitation. Capability unit IVw-1.

Duart Series

The Duart series consists of well drained soils formed in a loess mantle that has an appreciable content of volcanic ash on uplands. Slopes are 1 to 55 percent. Elevation is 800 to 1,800 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 48° to 50° F, and the frost-free period is 120 to 150 days at 32° and 150 to 200 days at 28°.

In a representative profile the surface layer is very dark grayish brown silt loam about 16 inches thick. The subsoil is brown silt loam about 17 inches thick. Semiconsolidated sandstone is at a depth of about 33 inches. The soil material throughout the profile is neutral.

Permeability is moderate, and the available water capacity is 3 to 8 inches. Water-supplying capacity is 7 to 9 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Duart silt loam, 7 to 12 percent slopes, 190 feet north of road in the NW1/4NW1/4SWl/4 section 31, T. 1 N., R. 14 E.:

Ap-0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; 3 percent rock fragments 2 millimeters to 1 inch in diameter; neutral; abrupt smooth boundary.

A12-8 to 16 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; percent rock fragments 2 millimeters to 1 inch in diameter; neutral; clear smooth boundary.

B21-16 to 26 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; about 2 percent rock fragments 2 millimeters to 1 inch in diameter; 5 percent non-

calcareous nodules 1/2 to 1 inch in diameter; neutral; clear smooth boundary.

B22-26 to 33 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak medium to fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; about 2 percent rock fragments 2 millimeters to 1 inch in diameter; 5 percent noncalcareous nodules 1/2 to 1 inch in diameter; neutral; clear wavy boundary.

IIC-33 to 39 inches; dark brown (10YR 3/3) semiconsolidated sandstone, pale brown (10YR 6/3) moist; extremely hard, extremely firm; no roots; few lime mycelia.

The A horizon is as much as 3 percent rock fragments 2 millimeters to 1 inch in size. The B horizon is dark brown or dark yellowish brown when moist. It is silt loam or loam. It is 16 to 18 percent clay, more than 15 percent particles coarser textured than very fine sand, and as much as 5 percent noncalcareous nodules 1/2 to 1 inch in diameter. Depth to rippable semiconsolidated sandstone is 20 to 40 inches.

20B-Duart silt loam, 1 to 7 percent slopes. A representative mapping unit is in the SE1/4SE1/4NE1/4 section 23, T. 1 N., R. 13 E. This soil is on ridgetops in long, broad areas. Slopes average about 5 percent.

Included with this soil in mapping were areas of Walla Walla, Dufur, and Skyline soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIIe-5; Rolling Hills range site.

20C-Duart silt loam, 7 to 12 percent slopes. A representative mapping unit is in the NW1/4NW1/4SW1/4 section 31, T. 1 N., R. 14 E. This soil is on ridgetops in long, irregularly shaped areas and has south-facing slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Walla Walla, Dufur, and Skyline soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-5; Rolling Hills range site.

20D-Duart silt loam, 12 to 25 percent slopes. A representative mapping unit is in the SW1/4SE1/4NE1/4 section 36, T. 1 N., R. 13 E. This soil is in long, irregularly shaped areas and has south-facing slopes.

Included with this soil in mapping were areas of Walla Walla, Dufur, and Skyline soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability subclass VIe; Rolling Hills range site.

20E-Duart silt loam, 25 to 40 percent slopes. A representative mapping unit is in the SW1/4SE1/4NE1/4 section 24, T. 1 N., R. 13 E. This soil is in long, irregularly shaped areas and has south-facing slopes.

Included with this soil in mapping were areas of Walla Walla, Dufur, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIe; Droughty South Exposure range site.

21E-Duart complex, 20 to 55 percent slopes. A representative mapping unit is in the NW1/4NW1/4SE1/4 section 13, T. 1 S., R. 13 E. This complex is about 50 to 75 percent Duart silt loam, 25 to 40 percent slopes, and 20 to 35 percent shallow, very cobbly loam soils that have slopes of 20 to 55 percent. The Duart soil is on upland slopes between the very cobbly loam soils. The very cobbly loam soils are on upland slopes in long, irregularly shaped areas extending up and down the slope between the Duart soils.

Included with this complex in mapping were areas of moderately deep cobbly loam soils that make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. This complex is used mainly for range, pasture, and wildlife habitat. Capability subclass VIe; Droughty South Exposure range site.

Dufur Series

The Dufur series consists of well drained soils formed in a loess mantle that has an appreciable content of volcanic ash over mixed alluvium and colluvium and sedimentary bedrock on uplands. Slopes are 1 to 40 percent. Elevation is 800 to 1,800 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 48° to 50° F, and the frost-free period is 120 to 150 days at 32° and 150 to 200 days at 28°.

In a representative profile the surface layer is very dark brown silt loam about 8 inches thick. The subsoil is very dark grayish brown, dark brown, and dark yellowish brown silt loam about 34 inches thick. The substratum is yellowish brown cobbly fine sandy loam about 19 inches thick. Semiconsolidated sedimentary bedrock is at a depth of about 61 inches. The surface layer is slightly acid, the subsoil is neutral to mildly alkaline and the substratum is moderately alkaline.

Permeability is moderate, and the available water capacity is 6 to 12 inches. Water-supplying capacity is 9 to 12 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Dufur silt loam, 1 to 7 percent slopes, 2 miles north of Dufur, 250 feet northeast of road on a broad ridgetop in the NWl/4SW1/4NW1/4 section 13, T. 1 S., R. 13 E.:

Apl-0 to 6 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very tine irregular pores; slightly acid; abrupt smooth boundary.

Ap2-6 to 8 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium platy structure; hard, firm, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; slightly acid; clear smooth boundary.

B1-8 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, able, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; about 3 percent rock fragments 2 millimeters to 1 inch in diameter; 5 percent noncalcareous nodules 1/4 to 3/4 inch in diameter; neutral; clear wavy boundary.

B21-12 to 18 inches; dark brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 3 percent rock fragments 2 millimeters to 1 inch in diameter; 5 percent noncalcareous nodules 1/4 to 3/4 inch in diameter; neutral; gradual smooth boundary.

B22-18 to 32 inches; dark brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak coarse prismatic structure; slightly hard, friable, slightly stick and slightly plastic; many very fine roots; many very fine tubular pores; about 5 percent rock fragments 2 millimeters to 1 inch in diameter 5 to 10 percent noncalcareous nodules 1/4 to 3/4 inch in diameter; mildly alkaline; gradual smooth boundary.

B3-32 to 42 inches; dark yellowish brown (10YR 4/4) silt loam, yellowish brown (10YR 5/4) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic many fine roots; common very fine tubular pores; 2 percent rock fragments 2 millimeters to 1 inch in diameter; 5 percent noncalcareous nodules 1/4 to 3/4 inch in diameter; mildly alkaline; clear smooth boundary.

IICIca-42 to 61 inches; yellowish brown (10YR 4/4) cobbly fine sandy loam light yellowish brown (10YR 6/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic;common very fine roots; common very fine tubular pores; moderately calcareous; moderately alkaline; clear wavy boundary.

IIIC2-61 inches; semiconsolidated sedimentary bedrock.

The A horizon is very dark brown or very dark grayish brown when moist. It is silt loam or loam and is 0 to 5 percent rock fragments as much as 1 inch in diameter. The B horizon is silt loam or loam. It is 12 to 18 percent clay, 18 to 22 inches percent particles coarser textured than very fine sand, and 0 to 5 percent rock fragments as much as 1 inch in diameter. Secondary lime is at a depth of 30 to 43 inches. Depth to bedrock is 40 to more than 60 inches.

22B-Dufur silt loam, 1 to 7 percent slopes. A representative mapping unit is in the SW1/4NE1/4NE1/4 section 24, T. 1 S., R. 13 E. This soil is on ridgetops in long, broad areas. Slopes average about 5 percent. The soil has the profile described as representative of the series.

Included with this soil in mapping were areas of Walla Walla, Duart, Nansene, and Skyline soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-3; Rolling Hills range site.

22C-Dufur silt loam, 7 to 12 percent slopes. A representative mapping unit is in the NW1/4SW1/4NW1/4 section 13, T. 1 S., R. 13 E. This soil is on ridgetops in long, broad areas.

Included with this soil in mapping were areas of Walla Walla, Duart, Nansene, and Skyline soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-1; Rolling Hills range site.

22D-Dufur silt loam, 12 to 25 percent slopes. A representative mapping unit is in the NW1/4NE1/4NE1/4 section 24, T. 1 S., R. 13 E. This soil is in long, broad, irregularly shaped areas.

Included with this soil in mapping were areas of Walla Walla, Duart, Nansene, and Skyline soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Droughty North Exposure range site.

22E-Dufur silt loam, 25 to 40 percent slopes. A representative mapping unit is in the NEl/4NW1/4SW1/4 section 14, T. 1 S., R. 13 E. This soil is in long, irregularly shaped areas.

Included with this soil in mapping were areas of Walla Walla, Duart, Nansene, and Skyline soils. These soils make up about 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. This soil is used mainly for range, hay, pasture, and wildlife habitat. Capability unit IVe-2; North Exposure range site.

Dune Land

23-Dune land. A representative mapping unit is in the SWl/4SW1/4NE1/4 section 22, T. 2 N., R. 14 E. Dune land consists of small areas where the wind has drifted sand into dunes. Slopes range from 5 to 25 percent. This miscellaneous area is in the extreme northern part of the survey area. Dunes advance in the direction of the prevailing westerly wind and bury adjacent soils.

Dune land is nearly devoid of vegetation and is not suitable for grazing. Improved perennial grasses or nursery-grown plants or clones of Volga wildrye, planted 20 inches apart in rows spaced 20 inches apart, stabilize the dunes. Capability subclass VIIIe; not placed in a range site.

Endersby Series

The Endersby series consists of somewhat excessively drained soils formed in mixed alluvium, volcanic ash, and loess on bottom lands. Slopes are 0 to 3 percent. Elevation is 200 to 1,500 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 49° to 53° F, and the frost-free period is 140 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is very dark grayish brown loam about 10 inches thick. The next layer is dark brown loam about 28 inches thick. Beneath this is dark brown fine sandy loam about 15 inches thick. Very gravelly sand is at a depth of about 53 inches. The material in the upper 24 inches is neutral, and is moderately alkaline in the lower 29 inches.

Permeability is moderately rapid, and the available water capacity is 6.5 to 11 inches. Water-supplying capacity is 9 to 12 inches. Effective rooting depth is 40 to 60 inches.

These soils are used for small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Endersby loam, 150 feet south of Fifteen Mile Road in the SWl/4NE1/4SW1/4 section 25, T. 2 N., R. 14 E.:

Ap1-0 to 2 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/ 2) dry; weak thin

platy structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

Ap2-2 to 10 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; neutral; abrupt wavy boundary.

AC-10 to 24 inches; dark brown (10YR 3/3) loam, brown (10YR 4/3) dry; massive; slightly hard, friable, slightly sticky and slightly plastic, few very fine roots; many very fine tubular pores; neutral; clear wavy bounds

C1-24 to 38 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; moderately alkaline; clear wavy boundary.

C2-38 to 53 inches dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; moderately alkaline; clear wavy boundary.

IIC3-53 to 60 inches; multicolored very gravelly sand; single grained; loose, nonsticky and nonplastic.

The A horizon is gray, grayish brown, dark gray, or dark grayish brown when dry and very dark gray, very dark grayish brown, or dark brown when moist. It is loam or fine sandy loam. It has weak fine angular or platy structure or is structureless. The AC horizon and Cl horizon are stratified in places with thin lenses ranging from silt to loamy sand. The content of pebbles in the upper 40 inches ranges from 0 to 15 percent. The content of rock fragments below a depth of 40 inches ranges from 50 to 80 percent.

24-Endersby loam. A representative mapping unit is in the SW1/4NE1/4SW1/4 section 25, T. 2 N., R. 14 E. This soil has slopes of 0 to 3 percent and is on alluvial bottoms in long, narrow areas.

Included with this soil in mapping were areas of Hermiston, Pedigo, and Tygh soils. These soils make up about 15 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-3, nonirrigated and I-1, irrigated; Semi-Moist Bottom range site.

Frailey Series

The Frailey series consists of well drained soils formed in volcanic ash, loess, and colluvium weathered from semiconsolidated sedimentary materials on uplands. Slopes are 3 to 70 percent. Elevation is 1,000 to 3,500 feet. The vegetation is oak, ponderosa pine, Douglas-fir, bunchgrasses, forbs, and shrubs. The average annual precipitation is 16 to 30 inches, the average annual air temperature is 45° to 49° F, and the frost-free period is 100 to 140 days at 32° and 120 to 160 days at 28°.

In a representative profile the surface layer is very dark grayish brown loam about 4 inches thick. The subsoil is dark brown loam about 46 inches thick. The substratum is brown loam about 15 inches thick. The soil material throughout the profile is slightly acid.

Permeability is moderate, and the available water capacity is 5 to 10 inches. Water-supplying capacity is 10 to 15 inches. Effective rooting depth is 40 to 6 inches or more.

These soils are used for timber, range, wildlife habitat, and water supply.

Representative profile of Frailey loam, 30 to 70 percent slopes, about 50 feet north of road in the NE1/4NE1/4SW1/4, section 22, T. 2 N., R. 11 E.:

O1-2 inches to 0; fir needles, twigs, and partly decomposed material.

A1-0 to 4 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; may very fine irregular pores; 15 percent fine pebbles; slightly acid; clear smooth boundary.

B21-4 to 10 inches; dark brown (10YR 3/3) loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky and weak fine granular structure; slightly hard, friable, slightly stick and slightly plastic; many very fine roots many very fine tubular pores 1 percent fine pebbles; slightly acid; clear smooth boundary.

B22-10 to 33 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular pores; 10 percent fine pebbles
5 percent cobbles; slightly acid; clear smooth boundary.

B23-33 to 50 inches; dark brown (10YR 3/3) loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine tubular pores; 10 percent cobbles, 5 percent pebbles; few thin clay films in pores; slightly acid; clear smooth boundary.

C-50 to 65 inches; brown (10YR 4/3) loam, light brownish gray (10YR 6/2) dry; massive; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine tubular pores; 10 percent cobbles, 5 percent pebbles; few thin clay films in pores; slightly acid. The A horizon is grayish brown or light brownish gray whendry and very dark grayish brown or dark brown when moist. The B horizon is loam. It is 5 to 20 percent rock fragments 2 millimeters to 3 inches in size and 0 to 15 percent cobbles. Depth to rippable bedrock is 40 to 60 inches or more.

25E-Frailey loam, 3 to 30 percent slopes. A representative mapping unit is in the NE1/4NE1/4NE1/4 section 7, T. 2 S., R. 12 E. This soil is in broad, irregularly shaped areas.

Included with this soil in mapping were areas of Hesslan, Ketchly, Skyline, and Wamic soils. These soils make up as much as 20 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability subclass VIe; Pine-Douglas-Fir Sedge range site; woodland group 3o.

25F-Frailey loam, 30 to 70 percent slopes. A representative mapping unit is in the NE1/4NE1/4SW1/4 section 22, T. 2 N., R. 11 E. This soil is in long, narrow areas and has north-facing slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Hesslan, Ketchly, Skyline, and Wamic soils. These soils make up as much as 20 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIe ; woodland group 3r.

Hermiston Series

The Hermiston series consists of well drained soils formed in alluvium derived from loess and volcanic ash on bottom lands. Slopes are 0 to 3 percent. Elevation is 800 to 2,600 feet. In uncultivated areas, the

vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 13 inches, the average annual air temperature is 49° to 54° F, and the frost-free period is 130 to 180 days at 32° and 180 to 200 days at 28°.

In a representative profile the surface layer is very dark grayish brown silt loam about 16 inches thick. The underlying material is very dark grayish brown and dark brown silt loam that extends to a depth of 60 inches or more. Depth to gravel and sand is 40 to 60 inches or more. The soil material throughout the profile is neutral to moderately alkaline.

Permeability is moderate, and the available water capacity is 7.5 to 12.5 inches. Water-supplying capacity is 8 to 13 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for hay, pasture, small grain, range, and wildlife habitat.

Representative profile of a Hermiston silt loam in the SW1/4SE1/4NW1/4, section 32, T. 2 N., R. 15 E.:

Ap-0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; gradual wavy boundary.

A12-8 to 16 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; gradual wavy boundary.

AC-16 to 37 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak coarse prismatic structure; slightly hard, firm, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; moderately calcareous; moderately alkaline; gradual wavy boundary.

C1ca-37 to 48 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; moderately calcareous with mycelial lime; mildly alkaline; gradual wavy boundary.

C2-48 to 60 inches; dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; neutral; abrupt smooth boundary.

The A horizon is dark grayish brown or grayish brown when dry and very dark brown or very dark grayish brown when moist. It is silt loam or loam. The C horizon is grayish brown or brown when dry and very dark grayish brown or dark brown when moist. It is silt loam or loam and has stratified layers of sand and gravel.

26-Hermiston silt loam. A representative mapping unit is in the SW1/4SE1/4NW1/4 section 32, T. 2 N., R. 15 E. This soil has slopes of 0 to 3 percent. It is, adjacent to streams in long, narrow strips that average about 100 yards wide.

Included with this soil in mapping were areas of Tygh, Endersby, Pedigo, and noncalcareous silt loam soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-3, nonirrigated and I-l, irrigated-, Semi-Moist Bottom range site.

Hesslan Series

The Hesslan series consists of well drained soils formed in loess, volcanic ash, and colluvium weathered from sandstone on uplands. Slopes are 5 to 70 percent. Elevation is 500 to 3,500 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, shrubs, oak, and ponderosa pine. The average annual precipitation is 14 to 20 inches, the average annual air temperature is 45° to 49° F, and the frost-free period is 110 to 140 days at 32° and 140 to 160 days at 28°.

In a representative profile the surface layer is very dark grayish brown stony loam about 9 inches thick. The upper 9 inches of the subsoil is dark brown loam, and the lower 5 inches is dark brown cobbly loam. Semiconsolidated sandstone is at a depth of about 23 inches. The soil material throughout the profile is neutral.

Permeability is moderate, and the available water capacity is 3 to 8 inches. Water-supplying capacity is 5 to 7 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for range, timber, wildlife habitat, and water supply.

Representative profile of a Hesslan stony loam in an area of Skyline-Hesslan complex, 40 to 65 percent slopes, 500 feet north of the county road in the NWl/4SW1/4SE1/4 section 1, T. 1 S., R. 12 E.:

A11-0 to 3 inches; very dark grayish brown (10YR 3/2) stony loam, grayish brown (10YR 5/2) dry; weak medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 5 percent pebbles, 5 percent cobbles, and 5 percent stones; neutral; abrupt smooth boundary.

A12-3 to inches; very dark grayish brown (10YR 3/2) stony loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 5 percent pebbles, 5 percent cobbles, and 5 percent stones; neutral; abrupt smooth boundary.

B1-9 to 18 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium sub angular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very tine tubular pores; 5 percent pebbles and 5 percent cobbles; neutral; clear smooth boundary.

B2-18 to 23 inches; dark brown (10YR 4/3) cobbly loam, pale brown (10YR 6/3) dry weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 10 percent pebbles and 10 percent cobbles; neutral; abrupt wavy boundary.

IIC-23 to 30 inches; semiconsolidated sandstone; extremely hard.

The A horizon is grayish brown, dark grayish brown, or brown when dry and very dark grayish brown, very dark brown, or dark brown when moist. It is stony loam or cobbly loam. The content of rock fragments 2 millimeters to 10 inches in size ranges from 5 to 20 percent. The content of surface stones is 5 to 20 percent. The B horizon is grayish brown, brown, or pale brown when dry and very dark grayish brown or dark brown when moist. It is 5 to 30 percent rock fragments 2 millimeters to 10 inches in size. It has weak or moderate medium and fine subangular blocky structure. Depth to rippable bedrock is 20 to 40 inches.

27F-Hesslan complex, 30 to 70 percent slopes.

A representative mapping unit is in the SW1/4NW1/4NW1/4 section 17, T. 1 S., R. 13 E. This complex is about 60 percent a Hesslan stony loam and 20 percent loam or cobbly loam soils that are 40 to 60 inches deep to bedrock. The Hesslan soil is on ridgetops and north-facing side slopes.

Included with this complex in mapping were areas of Wamic loam and Skyline very cobbly loam. These soils make up about 20 percent of the unit. Also included were outcroppings of sandstone.

Runoff is rapid, and the hazard of erosion is severe. This complex is used for timber, range, wildlife habitat, and water supp1y. Capability subclass VIIs; Oak Steep North range site.

28E-Hesslan-Skyline complex, 5 to 40 percent slopes. A representative mapping unit is in the SW1/4SW1/4NW1/4 section 5, T. 1 S., R. 12 E. This complex is about 30 to 60 percent a Hesslan stony loam and 20 to 50 percent a Skyline very cobbly loam. The Hesslan soil has north-facing slopes, and the Skyline soil has south-facing slopes.

Included with this complex in mapping were areas of Frailey loam and Wamic loam. These soils make up about 20 percent of the unit.

Runoff is medium to rapid, and the hazard of erosion is moderate. This complex is used for range, wildlife habitat, and water supply. Capability subclass VIIs; Oak Steep South range site.

Ketchly Series

The Ketchly series consists of well drained soils formed in loess, volcanic ash, and colluvium weathered from andesite on uplands. Slopes are 3 to 65 percent. Elevation is 2,000 to 3,600 feet. The vegetation includes Douglas-fir, ponderosa pine, Oregon white oak, bunchgrasses, forbs, and shrubs. The average annual precipitation is 25 to 30 inches, the average annual air temperature is 42° to 45° F, and the frost-free period is 70 to 120 days at 32° and 100 to 140 days at 28°.

In a representative profile the surface layer is very dark grayish brown or dark brown loam about 11 inches thick. The subsoil is brown heavy loam about 31 inches thick. The substratum is very cobbly clay loam about 3 inches thick. Andesite bedrock is at a depth of 45 inches.

Permeability is moderately slow, and the available water capacity is 6 to 11 inches. Water-supplying capacity is 10 to 15 inches. Effective rooting depth is 40 to 60 inches.

These soils are used for timber, water supply, and wildlife habitat.

Representative profile of Ketchly loam, 3 to 30 percent slopes, 175 feet south of road in the NE1/4NE1/4NW1/4 section 2, T. 1 N., R. 11 E.:

O1-1 inch to 0; fir needles and twigs, grass, and deciduous leaves.

All-0 to 6 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard friable, slightly sticky and slightly plastic; many very tine and fine roots; many very fine irregular pores; 15 percent pebbles 1/8 to 1/2 inch in diameter; neutral; gradual smooth boundary.

A12-6 to 11 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry, weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine and medium roots; many very fine tubular pores; 15 percent pebbles 1/4 to 1/2 inch in diameter; neutral; clear smooth boundary.

Bl-11 to 18 inches; brown (7.5YR 4/4) heavy loam, pale brown (10YR 6/ 3) dry weak medium subangular blocky structure; hard, liable, slightly sticky and slightly plastic; many fine and medium roots; many very fine tubular pores; 15 percent pebbles; neutral; gradual smooth boundary.

B21t-18 to 24 inches; brown (7.5YR 4/4) heavy loam, pale brown (10YR 6/3) dry; weak coarse subangular blocky structure very hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine tubular pores; common thin clay films in pores; neutral; gradual smooth boundary

B22t-24 to 42 inches; brown (7.5YR 4/4) heavy loam, light yellowish brown (10YR 6/4) dry; weak coarse subangular blocky structure; extremely hard, firm, sticky and plastic; few to common fine and medium roots; many very fine tubular pores; common thin clay films on peds and in pores; slightly acid; gradual wavy boundary.

IIC-42 to 45 inches; very cobbly clay loam; massive; extremely hard, very firm, sticky and plastic; common very fine pores.

IIIR-45 inches; andesite bedrock.

The B2t horizon is loam, heavy loam, or light clay loam and is 5 to 30 percent rock fragments. Depth to bedrock is 40 to 60 inches or more.

29E-Ketchly loam, 3 to 30 percent slopes. A representative mapping unit is in the NE1/4NE1/4NW1/4 section 2, T. 1 N., R. 14 E. This soil is on broad ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Bins, Bindle, Frailey, Bald, and shallow stony loam soils. These soils make up as much as 15 percent of the unit.

Runoff is slow, and the hazard of erosion is moderate. Capability subclass VIe; woodland group 2o.

29F-Ketchly loam, 30 to 65 percent slopes. A representative mapping unit is in the NW1/4NE1/4 section 10, T. 1 N., R. 11 E. This soil has long and narrow slopes.

Included with this soil in mapping were areas of Bins, Bindle, and Bald soils. These soils make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIe; woodland group 2r.

Licksillet Series

The Lickskillet series consists of well drained soils formed in shallow, stony colluvium consisting of a mixture of loess, rock fragments, and residuum weathered from the underlying basalt on uplands. Slopes are 15 to 70 percent. Elevation is 200 to 3,600 feet. The vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 13 inches, the average annual air temperature is 45° to 52° F, and the frost-free period is 100 to 150 days at 32° and 150 to 210 days at 28 .

In a representative profile (fig. 4) the surface layer is very dark grayish brown extremely stony loam about



Figure 4: Profile of Lickskillet very stony loam, 15 to 40 percent slopes, which Is underlain by bedrock at a depth of 12 inches.

4 inches thick. The upper 6 inches of the subsoil is dark brown very stony heavy loam, and the lower 6 inches is dark yellowish brown very gravelly heavy loam. Basalt bedrock is at a depth of about 16 inches. The surface layer is slightly acid, and the subsoil is neutral.

Permeability is moderate, and the available water capacity is 1 to 3 inches. Water-supplying capacity is 2 to 5 inches. Effective rooting depth is 12 to 20 inches.

These soils are used for range, wildlife habitat, and water supply.

Representative profile of Lickskillet extremely stony loam, 40 to 70 percent slopes, in the SE1/4NE1/4SW1/4, section 27, T. 2 S., R. 15 E.

A1--0 to 4 inches; very dark grayish brown (10YR 3/2) extremely stony loam, grayish brown (10YR 5/2) dry; weak thin platy structure parting to weak fine granular; slightly hard, friable, slight sticky and slightly plastic; many very fine roots; many very me irregular pores; 2 percent basalt pebbles; 10 percent cobbles and 25 percent stones; slightly acid; abrupt smooth boundary.

B1-4 to 10 inches; dark brown (10YR 3/3) very stony heavy loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many very fine roots; many very fine tubular pores; 30 percent basalt pebbles, 10 percent cobbles, and 20 percent stones; neutral; abrupt smooth boundary.

B2-10 to 16 inches; dark yellowish brown (10YR 3/4) very gravelly heavy loam, yellowish brown (10YR 5/4) dry; we medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common very fine roots; common very fine tubular pores; 40 percent basalt pebbles and 25 percent cobbles and stones; neutral; abrupt wavy boundary.

IIR-16 inches; basalt bedrock.

The A horizon is very dark brown, very dark grayish brown or dark brown when moist. It is loam, silt loam, or very fine sandy loam. In some places it is gravelly, very gravelly, cobbly, or very cobbly, and in others it is stony, very stony, or extremely stony. The B horizon is heavy silt loam, heavy loam, sandy clay loam, silty clay loam, or clay loam. In places clay films are in pores and some basalt fragments and extend into fractures in the bedrock. Depth to basalt bedrock is 12 to 20 inches.

30E-Lickskillet very stony loam, 15 to 40 percent slopes. A representative ma ping unit is in the SE1/4NE1/4NE1/4 section 28, T. 2 S., R. 15 E. This soil is in broad, irregularly shaped areas and has south-facing slopes. It has a profile similar to the one described as representative of the series, but the surface layer contains fewer stones.

Included with this soil in mapping were areas of Bakeoven, Condon, Walla Walla, and Wrentham soils. These soils make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIs; Droughty South Exposure range site.

31F-Lickskillet extremely stony loam, 40 to 70 percent slopes. A representative mapping unit is in the SE1/4NE1/4SW1/4 section 27, T. 2 S., R. 15 E. This soil is in long, broad, irregularly shaped areas and has south-facing slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Bakeoven, Condon, Walla Walla, and Wrentham soils. These soils make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIs; Droughty Steep South range site.

Maupin Series

The Maupin series consists of well drained soils formed in loess and volcanic ash on uplands. Slopes are 0 to 12 percent. Elevation is 1,600 to 3,400 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 45° to 52° F, and the frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is very dark grayish brown loam about 10 inches thick. The subsoil is dark brown loam about 15 inches thick. The upper 6 inches of the substratum is dark brown loam. An indurated hardpan is at a depth of about 31 inches.

The surface layer is neutral and the subsoil is neutral to mildly alkaline.

Permeability is moderate, and the available water capacity is 3 to 7 inches. Water-supplying capacity is 7.5 to 8.5 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for dryfarmed small grain, hay, pasture, irrigated crops, range, and wildlife habitat.

Representative profile of Maupin loam, 0 to 5 percent slopes, 35 feet south of State Highway 216 in the NW1/4SW1/4SW1/4 section 2, T. 5 S., R. 13 E.:

Ap1-0 to 6 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

Ap2-6 to 10 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

B2-10 to 20 inches dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; few nodules; neutral; abrupt wavy boundary.

B3ca-20 to 25 inches; dark brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; man very fine tubular pores; few nodules; lime in mycelium farm; weakly calcareous; mildly alkaline; clear wavy boundary.

C1ca-25 to 31 inches; dark brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; massive; hard, friable, slightly plastic; many very fine tubular pores; common nodules; 5 percent fragments 2 millimeters to 3 inches in size; lime in mycelium form; moderately calcareous; moderately alkaline; abrupt wavy boundary.

Csicam-31 to 37 inches; dark brown (10YR 4/3) and pale brown (10YR 6/3) dry duripan; platy; very firm; indurated silica laminar capping nearly continuous; strongly calcareous.

IIR-37 inches; fractured bedrock.

The A horizon is very dark grayish brown or dark brown when moist. The B horizon is brown or pale brown when dry. The C1 horizon is brown or pale brown when dry. The control section is 18 to 22 percent clay, is more than 15 percent material coarser textured than very fine sand, and is 2 to 5 percent fragments 2 millimeters to 3 inches in diameter. Depth to the hardpan is 20 to 40 inches, and depth to bedrock is 22 to 45 inches.

32A-Maupin loam, 0 to 5 percent slopes. A representative mapping unit is in the NW1/4SW1/4SW1/4 section 2, T. 5 S., R. 13 E. This soil is on ridgetops in long, broad, narrow areas. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Bakeoven soils and Maupin variant soils that have 0 to 3 percent slopes. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-3, nonirrigated and IIe-2, irrigated; Shrubby Rolling Hills range site.

32B-Maupin loam, 5 to 12 percent slopes. A representative mapping unit is in the NW1/4SE1/4NEl/4 section 18, T. 4 S., R. 14 E. This soil is on ridgetops in long, broad, narrow areas.

Included with this soil in mapping were areas of soils covered with 15 to 50 percent stones and boulders. These soils make up less than 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-5; Shrubby Rolling Hills range site.

Maupin Variant

The Maupin variant consists of well drained soils formed in loess and volcanic ash on uplands. Slopes are 0 to 3 percent. Elevation is 1,600 to 3,400 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 45° to 52° F, and the frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is very dark grayish brown loam about 10 inches thick. The subsoil is dark brown and brown loam about 25 inches thick. The substratum is dark brown loam about 16 inches thick. Basalt bedrock is at a depth of about 51 inches. The surface layer is neutral and the subsoil is neutral to moderately alkaline.

Permeability is moderate, and the available water capacity is 6 to 12 inches. Water-supplying capacity is 7.5 to 10 inches. Effective rooting depth is 40 to 60 inches or more.

This soil is used for dryfarmed small grain, hay, pasture, irrigated crops, range, and wildlife habitat.

Representative profile of Maupin variant loam, 50 feet north of State Highway 216 in the NW1/4NE1/4SW1/4 section 9, T. 4 S., R. 13 E.

Ap1-0 to 4 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

Ap2-4 to 10 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

B2-10 to 20 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 10 percent round nodules; neutral; abrupt wavy boundary.

B3ca-20 to 35 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak medium subangular block structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 10 percent nodules; moderately calcareous; moderately alkaline; clear wavy

Clca-35 to 43 inches; dark brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 10 percent nodules; moderately calcareous; moderately alkaline; abrupt wavy boundary.

C2sica-43 to 51 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; massive; weakly cemented; very hard, firm, slightly sticky and slightly

plastic; few very fine roots; many very fine tubular pores; 10 percent nodules; strongly calcareous; moderately alkaline; abrupt wavy boundary.

IIR-51 inches; basalt bedrock with a thin indurated capping.

The A horizon is loam or silt loam. The B horizon is loam or heavy loam. Depth to bedrock is 40 to 60 inches or more.

33-Maupin variant loam. A representative mapping unit is in the NW1/4NE1/4SW1/4 section 9, T. 4 S., R. 13 E. This soil is on uplands. Slopes average about 2 percent.

Included with this soil in mapping were areas of Maupin and Bakeoven soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-3, nonirrigated and IIe-2, irrigated; Shrubby Rolling Hills range site.

Nansene Series

The Nansene series consists of well drained soils formed in loess on uplands. Slopes are 35 to 70 percent. Elevation is 300 to 1,500 feet. The vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 48° to 52° F, and the frost-free period is 140 to 170 days at 32° and 170 to 200 days at 28 .

In a representative profile the surface layer is very dark brown silt loam about 22 inches thick. The subsoil is dark brown silt loam about 10 inches thick. The upper 20 inches of the substratum is dark brown silt loam, and the lower 10 inches is grayish brown silt loam. Basalt bedrock is at a depth of about 62 inches. The surface layer and subsoil are neutral, and the substratum is neutral to moderately alkaline.

Permeability is moderate, and the available water capacity is 6 to 11 inches. Water-supplying capacity is 8 to 12 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for range and wildlife habitat.

Representative profile of Nansene silt loam, 35 to 70 percent slopes, in NW1/4NW1/4NE1/4 section 29, T. 1 N., R. 15 E.

A11-0 to 4 inches; very dark brown (10YR 2/2) coarse silt loam, dark grayish brown (10YR 4/2) dry; weak thin platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly, plastic; many very fine roots; many very fine irregular pores; neutral; clear smooth boundary.

A12-4 to 14 inches; very dark brown (10YR 2/2) coarse silt loam, dark grayish brown (10YR 4/2) dry; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; neutral; clear smooth boundary.

A13-14 to 22 inches; very dark brown (10YR 2/2) coarse silt loam, dark grayish brown (10YR 4/2) dry; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common fine to medium tubular pores; neutral; gradual smooth boundary.

B2-22 to 82 inches; dark brown (10YR 3/3) coarse silt loam, dark brown (10YR 4/8) dry; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; neutral ; gradual smooth boundary.

C1-32 to 52 inches; dark brown. (10YR 3/8) coarse silt loam, brown (10YR 5/3) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine tubular pores; neutral; gradual smooth boundary.

C2ca-52 to 62 inches; grayish brown (10YR 5/2) silt loam, light brownish gray (106/2) moist; massive; slightly hard to hard, friable, slightly sticky and slightly plastic; few very fine roots; 5 percent fragments 1/16 inch in diameter; calcareous nodules; moderately calcareous; disseminated and segregated lime; moderately alkaline.

IIR-62 inches; basalt bedrock.

The A horizon is dark grayish brown or dark brown when dry. The B horizon is dark brown or dark grayish brown when dry and moist. The C horizon is dark brown to grayish brown when moist. Clay content of the soil is 10 to 18 percent. The soil is less than 5 percent fragments 1 inch or less in diameter. Rock is exposed on as much as 10 percent of the surface layer in places. Depth to basalt bedrock is 40 to 60 inches or more.

34F-Nansene silt loam, 35 to 70 percent slopes

A representative mapping unit is in the NW1/4NW1/4NE1/4, section 29, T. 1 N., R. 15 E. This soil is in long, narrow areas and has north-facing slopes.

Included with this soil in mapping are areas of Walla Walla, Lickskillet, and Wrentham soils and Rock outcrop that make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIe; Steep North range site.

Pedigo Series

The Pedigo series consists of somewhat poorly drained soils formed in alluvium derived from loess and volcanic ash on bottom lands. Slopes are 0 to 3 percent. Elevation is 200 to 2,700 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 13 inches, the average annual air temperature is 50° to 53° F, and the frost-free period is 130 to 180 days at 32° and 180 to 200 days at 28°.

In a representative profile the surface and subsurface layers are black silt loam to a depth of 40 inches. The upper 9 inches of the underlying material is very dark gray silt loam, and below this is dark grayish brown loam to a depth of 60 inches or more. The soil material in the profile is moderately alkaline to neutral.

Permeability is moderate, and the available water capacity is 10 to 11 inches. Water-supplying capacity is 9 to 13 inches. Effective rooting depth is more than 60 inches.

These soils are used for hay, pasture, dryfarmed small grain, range, and wildlife habitat.

Representative profile of Pedigo silt loam in the SE1/4NW1/4 section 21, T. 1 S., R. 13 E.:

Ap-0 to 8 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; moderately calcareous; moderately alkaline; abrupt smooth boundary.

A12-8 to 21 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak coarse structure; slightly hard, friable, slightly sticky and slightly plastic; many very tine roots; many fine tubular pores; weakly calcareous; moderately alkaline; abrupt smooth boundary.

AC-21 to 40 inches; black (10YR 2/1) silt loam, yellowish brown (l0YR 5/2) dry; massive; hard, friable, slight sticky and slightly plastic; many very fine roots; many fine tubular pores; neutral; clear smooth boundary.

C1-40 to 49 inches; very dark gray (10YR 3/1) silt loam, light brownish gray (10YR 6/2) y; massive; hard, friable, slightly sticky and slightly plastic' few roots; many fine and few medium tubular pores; neutral; clear smooth boundary.

C2-49 to 60 inches; dark grayish brown (10YR 4/2) loam; massive; hard, friable, slightly sticky and slightly plastic; few roots; many fine and few medium tubular pores; neutral.

The A horizon is dark grayish brown or dark brown when dry and very dark brown, dark grayish brown, black, or very dark grayish brown when moist. It is silt loam, coarse silt loam, or loam and is moderately calcareous to strongly calcareous. The AC horizon is light gray, light brownish gray, or grayish brown when dry and very dark gray, very dark grayish brown, or black when moist. It is coarse silt loam, silt loam, or silty clay loam.

35-Pedigo silt loam. A representative mapping unit is in the SE1/4NW1/4 section 21, T. 1 S., R. 13 E. This soil is in long, narrow areas on alluvial bottom lands adjacent to streams. Slopes are 0 to 3 percent.

Included with this soil in mapping are areas of Hermiston, Endersby, and Tygh soils.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIw-1; Alkaline Bottom range site.

Quincy Series

The Quincy series consists of soils formed in sandy alluvium from mixed material on bottom lands. Slopes are 0 to 3 percent. Elevation is 1,400 to 1,500 feet. In uncultivated areas, the vegetation is cottonwoods, forbs, and shrubs. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 48° to 52° F, and the frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is very dark gray loamy fine sand about 6 inches thick. The underlying material to a depth of 35 inches is very dark grayish brown sand, the next 9 inches is dark gray fine sand, and below this to a depth of 60 inches or more is dark gray very fine sand. The surface layer is medium acid, and the underlying material is slightly acid to neutral.

Permeability is rapid, and the available water capacity is 3 to 6 inches. Water-supplying water-supplying capacity is variable and depends upon the depth to the water table. Effective rooting depth is 40 to 60 inches.

This soil is used for irrigated hay and pasture, crops, range, and wildlife habitat.

Representative profile of Quincy loamy fine sand, wet, in the NW1/4SW1/4NW1/4, section 12, T. 4 S., R. 13 E.

Ap-0 to 6 inches; very dark gray (10YR 3/1) loamy fine sand, gray (10YR 5/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine irregular pores; medium acid; clear smooth boundary.

C1-6 to 41 inches; very dark grayish brown (10YR 3/2) sand, grayish brown (10YR 5/2) dry; single grained; loose; many very fine roots; 10 percent very fine pebbles; slightly acid; clear wavy boundary.

C2-41 to 50 inches; dark gray (10YR 4/1) fine sand, gray (10YR 5/1) dry; single grained; loose; common fine roots; common dark brown (7.5YR 4/4) moist, mottles; slightly acid; clear wavy boundary.

C3-50 to 60 inches; dark gray (10YR 4/1) very fine sand, gray (10YR 6/1) dry; single grained; loose; very few roots; neutral.

The A horizon is gray or grayish brown when dry and very dark gray or very dark grayish brown when moist. It is loamy fine sand or loamy sand and is as much as 20 percent coarse fragments 2 to 10 millimeters in size. The C1 horizon is gray to grayish brown when dry. It is loamy sand or sand and is 10 to 20 percent pebbles. The C2 horizon is gray or light gray when dry and has common to many dark brown mottles. It is sand or very fine sand.

Quincy soils are excessively drained or somewhat excessively drained. However, this Quincy soil is on bottom land and remains wetter throughout the year than is normal for the Quincy series because of a water table at a depth of 40 to 60 inches.

36-Quincy loamy fine sand, wet. A representative mapping unit is in the NW1/4SW1/4NWI/4 section 12, T. 4 S., R. 13 E. This soil is on bottom lands along major streams. Slopes are 0 to 3 percent.

included with this soil in mapping were areas of Endersby, Tygh, and Pedigo soils. These soils make up as much as 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Depth to a water table is 40 to 60 inches in spring and early in summer. Some areas are subject to overflow. Capability unit IIIw-1; Semi-Moist Bottom range site.

Riverwash

37--Riverwash. A representative mapping unit is in the NE1/4SW1/4NW1/4 section 11, T. 4 S., R. 13 E. Riverwash is in narrow, irregularly shaped strips in the bends of stream channels along the Columbia and Deschutes Rivers and along drainageways in the survey area. It is 2 to 10 feet above the normal waterline. The strips are 40 to 200 yards wide. Riverwash consists of well-rounded sand, gravel, stones and boulders, chiefly basalt. The surface layer generally is uneven. This area has little or no vegetation.

Riverwash is subject to overflow when the water is high and is extremely droughty when the water is low. During each overflow, new deposits are received and some material is removed. Adjacent river sandbars are included in the unit.

Riverwash is used for wildlife habitat and as a source of sand and gravel. Capability subclass VIIIw; not placed in a range site.

Rock Outcrop

38-Rock outcrop-Rubble land complex. A representative mapping unit is in the NWl/4NE1/4, section 17, T. 3 S., R. 15 E. This complex is about 65 to 75 percent Rock outcrop and 20 to 30 percent Rubble land. It is on uplands in basalt outcrop and rubble (fig. 5) . Elevation is 200 to 3,600 feet. Rock outcrop-Rubble land complex has little or no vegetation except on included soils. The average annual precipitation is 10 to 22 inches, the average annual air temperature is 45° to 52° F, and the frost-free period is 70 to 210 days.

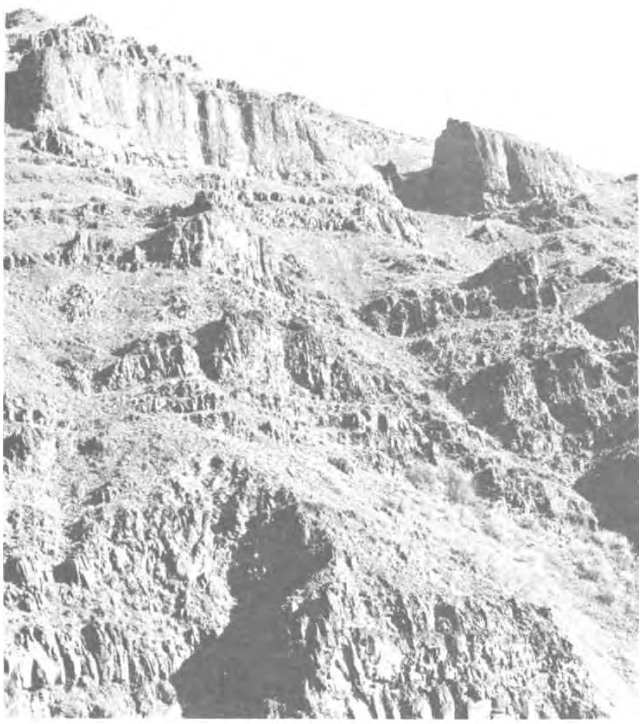


Figure 5: Area of Rock outcrop-Rubble land complex. Slopes are 30 to 100 percent.

This complex is severely eroded. The almost perpendicular basalt cliffs are as much as 500 feet high and have stony or bouldery foot slopes. Slopes are 30 to 100 percent.

Included with this complex in mapping were areas of Wrentham, Nansene, Lickskillet, and Wyeth soils. These soils make up as much as 15 percent of the unit.

This complex is used mainly for wildlife habitat and water supply. Capability subclass VIIIs; not placed in a range site.

39-Rock outcrop-Xeropsamments complex. A representative mapping unit is in the NW1/4NW1/4SW1/4 section 2, T. 2 N., R. 11 E. This complex is along the Columbia River. These areas were previously part of the Columbia River channel but are now terraces above the river. Stream action has scoured holes in the basalt lava beds and deposited sand and water-worn gravel. Numerous large and small outcrops of bedrock protrude from a few inches to as much as 15 feet above the soil and make up 50 to 75 percent of the complex. The soil consists mostly of sandy water-laid and windlaid material 5 to more than 60 inches deep. It is light colored and contains little organic matter. The root zone is shallow, and the water-supplying capacity and natural fertility are low. The principal concerns are wind erosion and fire. The complex is not subject to overflow. Slopes are 0 to 30 percent.

This complex is poorly suited to grazing. Large areas are idle because they are not readily accessible to livestock. In the northwestern part of the survey area, some drought-resistant woody species occur. Capability subclass VIIIs; not placed in a range site.

Sherar Series

The Sherar series consists of well drained soils formed in loess and gravelly colluvium on uplands. Slopes are 5 to 70 percent. Elevation is 1,500 to 2,500 feet. The vegetation is bunchgrasses forbs, and shrubs. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 48 to 52° F, and the frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is very dark grayish brown cobbly loam and clay loam about 9 inches thick. The upper 9 inches of the subsoil is dark brown clay, and the lower 11 inches is dark brown gravelly clay. The upper 6 inches of the substratum is dark brown very gravelly clay. Rippable bedrock is at a depth of about 35 inches. The soil material throughout the profile is neutral.

Permeability is slow, and the available water capacity is 2 to 6 inches. Water-supplying capacity is 2 to 5 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for range and wildlife habitat.

Representative profile of Sherar cobbly loam, 5 to 45 percent slopes, 35 feet upslope from road in the NW1/4NE1/4SW1/4 section 29, T. 3 S., R. 14 E.:

A11-0 to 3 inches; very dark grayish brown (10YR 3/2) cobbly loam; grayish brown (10YR 5/2) dry; moderate thin platy and weak very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; 20 percent cobbles and 5 percent pebbles; neutral; abrupt smooth boundary.

A12-3 to 9 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; 10 percent cobbles and 5 percent pebbles; neutral; abrupt smooth boundary.

IIB2t-9 to 18 inches dark brown (7.5YR 3/3) clay, dark brown (7.5YR 4/4) dry; weak medium prismatic structure parting to strong medium subangular blocky; extremely hard, very firm, very sticky and very plastic; few roots; many very fine tubular pores; common thin clay films; 10 percent cobbles and 5 percent pebbles neutral; clear wavy boundary.

IIB3t-18 to 29 inches; dark brown (7.5YR 4/3) gravelly clay, dark brown (7.5YR 4/4) dry; weak medium subangular blocky structure; extremely hard, firm, sticky and plastic; few roots; common very fine tubular pores; common thin clay films; 30 percent pebbles and 5 percent cobbles neutral; clear wavy

IIC1-29 to 35 inches; dark brown (7.5YR 4/3) very gravelly clay, dark brown (7.5YR 4/4) moist; massive; extremely hard, v firm, very sticky and very plastic 45 percent pebbles and percent cobbles; neutral; clear wavy boundary.

IIIC2-35 to 50 inches; dark brown (10YR 4/3) moist; very cobbly semi-consolidated extremely hard breccia.

The A horizon is very dark grayish brown or dark brown when moist. It is cobbly loam, cobbly clay loam, or clay loam and is 5 to 10 percent pebbles and 10 to 25 percent cobbles. The B horizon is dark brown or yellowish brown when dry and dark brown or brown when moist. It is clay or gravelly clay. It is 40 to 50 percent clay, 5

to 30 percent pebbles, and 10 to 20 percent cobbles. Depth to rippable bedrock is 20 to 40 inches.

40E-Sherar cobbly loam, 5 to 45 percent slopes. A representative mapping unit is in the NW1/4NE1/4SE1/4 section 29, T. 3 S., R. 14 E. This soil is in broad, irregularly shaped areas and has south-facing slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Sinamox soils that make up as much as 1 percent of the unit.

Runoff is medium to rapid, and the hazard of erosion is moderate to severe. Capability subclass VIe; Shrubby South Exposure range site.

41F-Sherar very cobbly loam, 45 to 70 percent slopes. A representative mapping unit is in the SE1/4NE1/4SW1/4 section 1, T. 4 S., R. 14 E. This soil is in long, broad, irregularly shaped areas and has south-facing slopes. It has a profile similar to the one described as representative of the series, but the surface layer is very cobbly.

Included with this soil in mapping were areas of Sinamox soils that make up as much as 2 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIe; Droughty Steep South range site.

Sinamox Series

The Sinamox series consists of well drained soils formed in loess and gravelly colluvium on uplands. Slopes are 1 to 70 percent. Elevation is 1,600 to 2,600 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 48° to 52° F, and the frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is black and very dark grayish brown silt loam about 24 inches thick. The subsoil is dark brown silt loam about 9 inches thick. The upper 16 inches of the substratum is brown gravelly clay loam, and the lower 14 inches is dark yellowish brown silty clay. Rippable bedrock is at a depth of about 63 inches. The soil material in the profile is neutral to a depth of 49 inches and moderately alkaline below that depth.

Permeability is moderately slow, and the available water capacity is 5 to 11 inches. Water-supplying capacity is 6 to 9 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Sinamox silt loam, 45 to 70 percent slopes, in SW1/4SW1/4SW1/4, section 12, T. 4 S., R. 13 E.:

A11-0 to 3 inches; black (10YR 2/1) silt loam, grayish brown (10YR 5/2) dry; weak medium platy and weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

A12-3 to 9 inches; black (10YR 2/1) silt loam, grayish brown (10YR 5/2) dry; weak fine granular and weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear wavy boundary.

A3-9 to 24 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 4/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear wavy boundary.

B2-24 to 33 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear wavy boundary.

IIC1-33 to 49 inches; brown (10YR 4/3) gravelly clay loam pale brown (10YR 6/3) dry; massive; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; 25 percent pebbles; neutral; clear wavy boundary.

IIIC2ca-49 to 63 inches; dark yellowish brown (10YR 4/4) silty clay, light yellowish brown (10YR 6/4) moist; massive; extremely hard, very firm, sticky and very plastic; 10 percent pebbles; moderately alkaline; weakly calcareous; abrupt wavy boundary.

IVC3-63 to 70 inches; dark brown (10YR 4/3) moist; semiconsolidated very cobbly breccia.

The A horizon is very dark grayish brown or grayish brown when dry and very dark grayish brown, very dark brown or black when moist. The B horizon is dark brown or brown when dry and very dark grayish brown or dark brown when moist. It is silt loam and is 13 to 22 percent clay. Depth to rippable bedrock is 40 to 60 inches or more.

42B-Sinamox silt loam, 1 to 7 percent slopes. A representative mapping unit is in the SWl/4SW1/4SE1/4 section 28, T. 3 S., R. 14 E. This soil is on ridgetops in long, broad, irregularly shaped areas.

Included with this soil in mapping were areas of Sherar soils that make up about 5 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIIe-3; Shrubby Rolling Hills range site.

42C-Sinamox silt loam, 7 to 12 percent slopes. A representative mapping unit is in the NE1/4SW1/4SE1/4, section 6, T. 4 S., R. 14 E. This soil is on ridgetops in long, broad, irregularly shaped areas.

Included with this soil in mapping were areas of Sherar soils that make up about 6 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-5; Shrubby Rolling Hills range site.

42D-Sinamox silt loam, 12 to 20 percent slopes, A representative mapping unit is in the NE1/4NE1/4NE1/4 section 32, T. 3 S., R. 14 E. This soil is in long, narrow areas and has north-facing slopes.

Included with this soil in mapping were areas of Sherar soils that make up about 6 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-7 ; Shrubby Rolling Hills range site.

42E-Sinamox silt loam, 20 to 45 percent slopes. A representative mapping unit is in the NE1/4SW1/4SW1/4 section 36, T. 8 S., R. 13 E. This soil is in long, narrow areas and has north-facing slopes.

Included with this soil in mapping were areas of

Sherar soils that make up as much as 10 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIe; Droughty North Exposure range site.

42F-Sinamox silt loam, 45 to 70 percent slopes. A representative mapping unit is in the SW1/4SW1/4SW1/4 section 12, T. 4: ., R. 13 E. This soil is in long, narrow areas and has north-facing slopes. It has a profile described as representative of the series.

Included with this soil in mapping were areas of Sherar soils that make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIe; Steep North range site.

Skyline Series

The Skyline series consists of well drained soils formed in loess, volcanic ash, and colluvium over bedrock on uplands. Slopes are 5 to 70 percent. Elevation is 500 to 3,500 feet. The vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 14 to 20 inches, the average annual air temperature is 47° to 49° F, and the frost-free period is 110 to 140 days at 32° and 140 to 160 days at 28°.

In a representative profile the surface layer is very dark grayish brown very cobbly loam and cobbly loam about 9 inches thick. The subsoil is dark brown gravelly loam about 5 inches thick. Sandstone bedrock is at a depth of about 16 inches. The soil material in the profile is neutral.

Permeability is moderate, and the available water capacity is 1 to 3 inches. Water-supplying capacity is 6 to 9 inches. Effective rooting depth is 12 to 20 inches.

These soils are used for range and wildlife habitat.

Representative profile of a Skyline very cobbly loam in an area of Skyline-Hesslan complex, 40 to 65 percent slopes, 1,000 feet north of the county road in the NE1/4NE1/4NW1/4 section 26, T. 1 S., R. 12 E.:

A1-0 to 2 inches; very dark grayish brown (10YR 3/2) very cobbly loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; 20 percent fine and medium pebbles; 20 percent cobbles, and 10 percent stones; neutral; abrupt smooth boundary.

A3-2 to 9 inches; very dark grayish brown (10YR 3/2) cobbly loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 10 percent fine pebbles and 16 percent cobbles; neutral; clear smooth boundary.

B2-9 to 14 inches; dark brown (10YR 3/3) gravelly loam, brown (10YR 4/3) dry weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 15 percent pebbles and 10 percent cobbles; neutral; abrupt wavy boundary.

IIC-14 to 16 inches; semiconsolidated sandstone bedrock,

The A horizon is grayish brown, brown, or dark grayish brown when dry and very dark grayish brown or dark brown when moist. It is cobbly loam or very cobbly loam and is 20 to 40 percent rock fragments 2 millimeters to 10 inches in size. The content of surface stones is 5 to 20 percent. The B horizon is grayish brown or brown when dry and very dark grayish brown or dark brown when moist. It is cobbly loam to cobbly heavy loam and is 10 to 30 percent rock fragments 2 millimeters to 10 inches in size. It has weak to moderate, medium, subangular blocky structure. The soil is 12 to 20 inches deep to semiconsolidated sandstone bedrock.

43F-Skyline-Hesslan complex, 40 to 65 percent slopes. A representative mapping unit is in the NE1/4NE1/4NW1/4 section 26, T. 1 S., R. 12 E. This complex is about 50 to 70 percent a Skyline very cobbly loam and 10 to 30 percent a Hesslan stony loam. The Skyline soil has south-facing slopes, and the Hesslan soil has north-facing side slopes. The soils have the profiles described as representative of their respective series.

Included with this complex in mapping were areas of Frailey loam and Wamic loam. These soils make up about 20 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. This complex is used for range and wildlife habitat. Capability subclass VIIs ; Oak Steep South range site.

Tygh Series

The Tygh series consists of somewhat poorly drained soils on bottom lands. They formed in alluvium derived from volcanic ash, loess, and weathered sedimentary rocks. Slopes are 0 to 3 percent. Elevation is 200 to 1,800 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 14 to 20 inches, the average annual air temperature is 48° to 52° F, and the frost-free period is 130 to 150 days at 32° and 150 to 180 days at 28 .

In a representative profile the surface layer is very dark brown fine sandy loam about 10 inches thick. The upper 20 inches of the underlying material is dark grayish brown fine sandy loam, the next 11 inches is dark gray sandy loam, the next 5 inches is gray and dark gray loamy sand, and below this is gray to dark gray very gravelly sand to a depth of 60 inches or more. The soil material throughout the profile is neutral.

Permeability is moderately rapid, and the available water capacity is 4 to 8 inches. These soils are subject to seasonal flooding. Effective rooting depth is 40 to 60 inches.

These soils are used for dryfarmed and irrigated small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Tygh fine sandy loam, 200 feet north of Fifteen Mile Creek in the NE1/4NW1/4SW1/4, section 33, T. 1 S., R. 13 E.:

Ap-0 to 10 inches; very dark brown (10YR 2/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine irregular pores; 2 percent gravel; neutral; abrupt smooth boundary.

C1-10 to 17 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish y (10YR 4/2) dry; common prominent fine reddish brown 5YR 4/4) mottles; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; 2 percent gravel; neutral; clear wavy boundary.

C2-17 to 30 inches; dark grayish brown (10YR 4/2) fine sandy loam, gray (10YR 6/1) dry; many prominent reddish brown (5YR 4/4) mottles; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; 2 percent gravel; neutral; clear wavy boundary.

C3-30 to 41 inches; dark gray (10YR 4/1) sandy loam, gray (10YR 6/1) dry; common medium prominent reddish brown (5YR 4/4) mottles; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; 2 percent gravel; few black (10YR 2/1) manganese stains; neutral; clear wavy boundary.

C4-41 to 46 inches; gray and dark gray (10YR 5/1-4/1) loamy sand, light gray (10YR 7/1) dry; common large prominent reddish brown (5YR 4/4) mottles; single grained; loose, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; 5 percent gravel; neutral; clear wavy boundary.

IIC5-46 to 60 inches; gray to dark gray (10YR 5/1-4/1) very gravelly sand, light gray (10YR 7/I) dry; common large prominent reddish brown (5YR 4/4) mottles; single grained; loose, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; 75 percent pebbles and 5 percent cobbles; neutral.

The A horizon is fine sandy loam or very fine sandy loam. It has weak fine granular structure or is single grained. The C horizon is fine sandy loam, silt loam, or loam and has thin lenses that range from silt to medium gravel. Common to many, fine to medium, dark brown or reddish brown when moist mottles are below a depth of about 10 inches. They increase in size and number with depth.

44-Tygh fine sandy loam. A representative mapping unit is in the NE1/4NW1/4SW1/4 section 33, T. I S., R. 13 E. This soil is adjacent to streams in long strips that are about 100 to 150 feet wide. Slopes are 0 to 3 percent.

Included with this soil in mapping were areas of Endersby, Hermiston, and Pedigo soils and cobbly soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. The hazard of streambank erosion is severe (fig. 6). Capability unit IIIw-1; Semi-Moist Bottom range site.

Van Horn Series

The Van Horn series consists of well drained soils formed in stratified old alluvial deposits on uplands. Slopes are 0 to 35 percent. Elevation is 100 to 850 feet. In uncultivated areas, the vegetation is Douglas-fir, ponderosa pine, forbs, and shrubs. The average annual precipitation is 20 to 25 inches, the average annual air temperature is 49 to 52 F, and the frost-free period is 150 to 180 days at 32° and 180 to 210 days at 28 .

In a representative profile the surface layer is very dark grayish brown and dark brown loam about 11 inches thick. The subsoil is dark brown loam and clay loam about 38 inches thick. The substratum is dark brown loam 11 inches or more thick. The soil material in the profile is slightly acid or neutral.

Permeability is moderate, and the available water capacity is 8 to 9 inches. Water-supplying capacity is 12 to 15 inches. Effective rooting depth is more than 60 inches.

These soils are used mostly for fruit orchards, hay, pasture, and wildlife habitat and for some range.

Representative profile of Van Horn loam, 8 to 12 percent slopes, in the NE1/4SW1/4NW1/4 section 18, T. 2N., R. 11 E.:

A1p-0 to 5 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; weak medium granular structure; slightly hard, very friable, slightly sticky

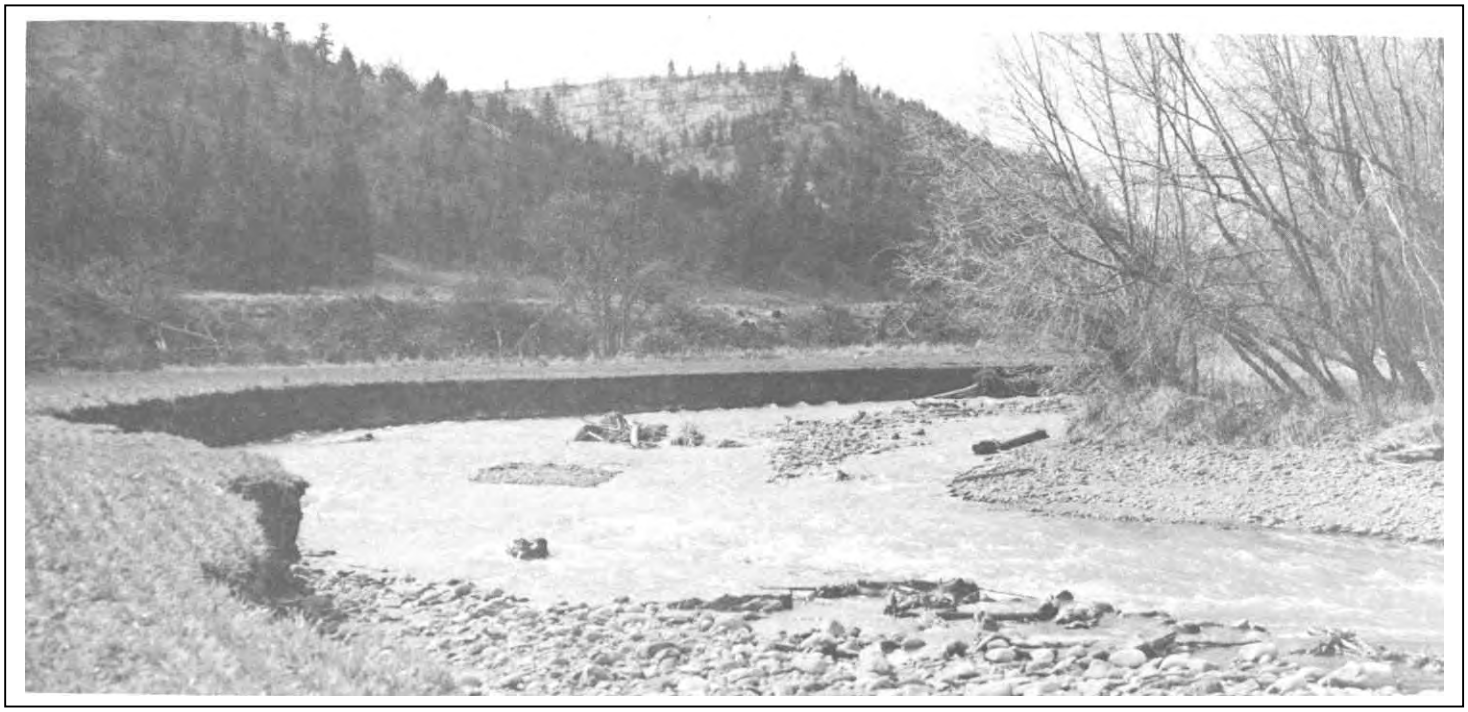


Figure 6.-Streambank erosion on Tygh fine sandy loam.

and slightly plastic; many very fine roots; many very fine irregular pores; slightly acid; abrupt smooth boundary.

A12-5 to 11 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky an slightly plastic; many very fine roots; common very fine tubular pores; slightly acid; clear smooth boundary.

B1-11 to 21 inches; dark brown (10YR 3/3) loam, grayish brown (10YR 5/3) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; slightly acid; clear smooth boundary.

B21t-21 to 33 inches; dark brown (10YR 3/3) heavy loam, brown (10YR 6/3) dry; moderate medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; few thin clay films on ped faces and common moderately thick clay films in pores; many gray (10YR 7/2) sand coatings on peds; slightly acid; gradual smooth bounds .

B22t-33 to 49 inches; dark brown (10YR 3/3) clay loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; very hard, firm, sticky and slightly plastic; few very fine roots; many very fine tubular pores; few thin clay films on ped faces and common thin clay films in pores; many gray (10YR 7/2) sand coatings on peds; neutral; gradual smooth boundary.

C-49 to 60 inches; dark brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral.

The A horizon is grayish brown or brown when dry and very dark grayish brown or dark brown when moist. It is very fine sandy loam, fine sandy loam, or loam. The B2 horizon is light brownish gray, pale brown, brown, or yellowish brown when dry and dark brown, dark yellowish brown, or dark grayish brown when moist. It is clay loam, sandy clay loam, or heavy loam and is 22 to 35 percent clay.

45B-Van Horn loam, 0 to 8 percent slopes. A representative mapping unit is in the NW1/4SE1/4NW1/4 section 7, T. 2 N., R. 12 E. This soil is in broad, irregularly shaped areas.

Included with this soil in mapping were areas of Chenoweth, Cherryhill, and Wind River soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit Ile-1; Pine-Oak-Fescue range site.

45C-Van Horn loam, 8 to 12 percent slopes. A representative mapping unit is in the NE1/4SW1/4NW1/4 section 18, T. 2 N., 11 E. This soil is in broad, irregularly shaped areas. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Chenoweth, Cherryhill, and Wind River soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-2; Pine-Oak-Fescue range site.

45D-Van Horn loam, 12 to 20 percent slopes. A representative mapping unit is in the NW1/4NW1/4NW1/4 section 7, T. 2 N., R. 12 E. This soil is in long, narrow, irregularly shaped areas.

Included with this soil in mapping were areas of Chenoweth, Cherryhill, and Wind River soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-2; Pine-Oak-Fescue range site.

45E-Van Horn loam, 20 to 35 percent slopes. A representative mapping unit is in the SE1/4SE1/4SW1/4, section 6, T. 2 N., R. 12 E. This soil is in narrow, irregularly shaped areas.

Included with this soil in mapping were areas of Chenoweth, Cherryhill, and Wind River soils. These soils make up about 10 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability unit IVe-1; Pine-Oak-Fescue range site.

Walla Walla Series

The Walla Walla series consists of well drained soils formed in loess on uplands. Slopes are 3 to 60 percent. Elevation is 300 to 2,000 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 49° to 62° F, and the frost-free period is 160 to 170 days at 32° and 170 to 210 days at 28°.

In a representative profile the surface layer is very dark brown silt loam about 13 inches thick. The subsoil is dark brown and brown silt loam about 18 inches thick. The substratum is dark yellowish brown silt loam to a depth of 82 inches or more. The surface layer is slightly acid and neutral, the subsoil is neutral, and the substratum is neutral and mildly alkaline.

Permeability is moderate, and the available water capacity is 7 to 12 inches. Water-supplying capacity is 8 to 12 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Walla Walla silt loam, 12 to 20 percent north slopes, about 600 feet north of the line between sections 12 and 13 in the SE1/4SW1/4SW1/4, section 12, T. 1 N., R. 14 E.:

Ap-0 to 7 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak thin platy structure parting to weak fine granular; soft to slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; slightly acid; abrupt smooth boundary.

A12-7 to 13 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak medium platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

B1-13 to 20 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak coarse prismatic structure parting to very weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine pores; neutral ; clear smooth boundary.

B2-20 to 31 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak coarse prismatic structure parting to very weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; gradual smooth boundary.

C11-31 to 44 inches; dark yellowish brown (10YR 3/4) silt loam, pale brown (10YR 6/3) dry; massive;

slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; neutral; gradual smooth boundary.

C12-44 to 82 inches; dark yellowish brown (10YR 3/4) silt loam, pale brown (10YR 6/3) dry; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; mildly alkaline.

The A horizon is dark grayish brown, grayish brown, or brown when dry and very dark brown, very dark grayish brown, or dark brown when moist. It is silt loam or coarse silt loam. The B horizon is silt loam or coarse silt loam. The C horizon is light brownish gray or pale brown when dry and dark yellowish brown or brown when moist. It is silt loam or coarse silt loam. Lime in mycelium form is below a depth of 55 inches in some places. Depth to bedrock is 40 to more than 60 inches.

46B-Walla Walla silt loam, 3 to 7 percent slopes. A representative mapping unit is in the SW1/4SW1/4SW1/4 section 2, T. 1 N., R. 15 E. This soil is on ridgetops in broad, smooth, convex areas.

Included with this soil in mapping were areas of Anderly and Nansene soils. These soils make up about 5 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-3; Rolling Hills range site.

46C-Walla Walla silt loam, 7 to 12 percent slopes. A representative mapping unit is in the SW1/4SW1/4SW1/4 section 3, T. 1 N., R. 15 S. This soil is on ridgetops in broad, smooth, convex areas.

Included with this soil in mapping were areas of Anderly and Nansene soils. These soils make up about 5 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-1; Rolling Hills range site.

46D-Walla Walla silt loam, 12 to 20 percent north slopes. A representative mapping unit is in the SE1/4SWl/4SW1/4 section 12, T. 1 N., R. 14 E. This soil is in long, broad, convex areas. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Anderly and Nansene soils. These soils make up about 5 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Droughty North Exposure range site.

47D-Walla Walla silt loam, 12 to 20 percent south slopes. A representative mapping unit is in the SW1/4SW1/4SWI/4 section 6, T. 1 N., R. 15 E. This soil is in long, broad, convex areas.

Included with this soil in mapping were areas of Anderly and Nansene soils that makeup about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Rolling Hills range site.

47E-Walla Walla silt loam, 20 to 35 percent north slopes. A representative mapping unit is in the NE1/4SW1/4SW1/4 section 9, T. 1 N., R. 14 E. This soil is in long, broad, irregularly shaped areas.

Included with this soil in mapping were areas of Anderly and Nansene soils that make up about 10 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability unit IVe-3 ; North Exposure range site.

48E-Walla Walla silt loam, 20 to 35 percent south slopes. A representative mapping unit is in the NW1/4NW1/4NW1/4 section 10, T. 1 N., R. 14 E. This soil is in long, broad, irregularly shaped areas.

Included with this soil in mapping were areas of Anderly and Nansene soils that make up about 10 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability unit IVe-2; Droughty South Exposure range site.

48F-Walla Walla silt loam, 35 to 50 percent south slopes. A representative mapping unit is in the W1/4SE1/4NE1/4 section 7, T. 1 **N.,** R. 14 E. This soil is in long, narrow, irregularly shaped areas.

Included with this soil in mapping were areas of Anderly and Nansene soils that make up about 10 percent of this mapping unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIe; Droughty South Exposure range site.

Wamic Series

The Wamic series consists of well drained soils formed in volcanic ash, and loess overlying alluvium or colluvium weathered from basalt or andesite on uplands. Slopes are 1 to 70 percent. Elevation is 1,000 to 3,600 feet. In uncultivated areas, the vegetation is ponderosa pine, Douglas-fir, oak forbs, and shrubs. The average annual precipitation is 14 to 20 inches, the average annual air temperature is 46° to 50° F, and the frost-free period is 100 to 150 days at 32° and 150 to 200 days at 28°.

In a representative profile the surface layer is very dark grayish brown loam about 7 inches thick. The subsoil is dark brown loam about 21 inches thick. The substratum is dark brown heavy loam 16 or more inches thick. The soil material throughout the profile is neutral.

Permeability is moderately slow, and the available water capacity is 6.5 to 11 inches. Water-supplying capacity is 8 to 12.5 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for dryfarmed small grain, hay, pasture, range, timber, and wildlife habitat.

Representative profile of Wamic loam, 5 to 12 percent south slopes, 100 feet south of road in the NE1/4NW1/4NW1/4 section 26, T. 2 S., R. 12 E.:

Ap-0 to 7 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; weak tune granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

B1-7 to 18 inches; dark brown (10YR 3/3) loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear wavy boundary.

B2-18 to 28 inches; dark brown (10YR 4/3) loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; many

very fine and common fine tubular pores; about 2 percent very fine pebbles; light gray (10YR 7/2) when dry coatings of very fine sand on peds; neutral; abrupt wavy boundary.

IIC-28 to 44 inches; dark brown (10YR 4/3) heavy loam, pale brown (10YR 4/3) dry; massive; very hard, firm, sticky and plastic; few fine roots; many very fine and common fine tubular pores; about 2 percent very fine pebbles; brown (7.5YR 4/4) when dry
thick clay films in nearly all pores and on faces of fractures; neutral.

IIIR-44 inches; basalt bedrock.

The A horizon is light brownish gray or pale brown when dry and very dark grayish brown or dark brown when moist. It is loam, very fine sandy loam, or silt loam. It has weak granular or subangular blocky structure. The B horizon is light brownish gray, pale brown, or light yellowish brown when dry and dark brown, brown, or dark yellowish brown when moist. It is loam or silt loam, is 18 to 22 percent clay, and is more than 15 percent particles coarser textured than very fine sand. The substratum is pale brown or light yellowish brown when dry and brown or dark yellowish brown when moist. It is heavy loam, foam, or sandy clay loam and is 20 to 80 percent clay.

The amount of ash in the soil ranges from 20 to 60 percent. Depth to bedrock is 40 to 60 inches or more.

49B-Wamic loam, 1 to 5 **percent slopes.** A representative mapping unit is in the SW1/4SE1/4SW1/4 section 26, T. 1 N., R. 12 E. This soil is on ridgetops in broad, smooth, convex areas.

Included with this soil in mapping were areas of Bald, Bodell, Hesslan, Skyline, and Frailey soils. These soils make up about 6 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIIe-1; Pine-Oak-Fescue range site; woodland group 60.

49C-Wamic loam, 5 to 12 percent north slopes. A representative mapping unit is in the SE1/4NW1/4NW1/4 section 36, T. 2 S., R. 12 E. This soil is on ridgetops in broad, smooth areas.

Included with this soil in mapping were areas of Bald, Bodell, Hesslan, Skyline, and Frailey soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Pine-Oak-Fescue range site; woodland group 60.

50C-Wamic loam,. 5 to 12 percent south slopes. A representative mapping unit is in the NE1/4NW1/4NW1/4 section 26, T. 2 S., R. 12 E. This soil is in long, irregularly shaped areas and has south-facing slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Bald, Bodell, Hesslan, Skyline, and Frailey soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-5; Oak South Exposure range site.

50D-Wamic loam, 12 to 20 percent slopes. A rep representative mapping unit is in the SE1/4SE1/4SE1/4 section 14, T. 2 S., R. 14 E. This soil is in irregularly shaped areas.

Included with this soil in mapping were areas of Bald, Bodell, Hesslan, Skyline, and Frailey soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Pine-Oak-Fescue range site; woodland group 60.

50E-Wamic loam, 20 to 40 percent slopes. A representative mapping unit is in the NE1/4NE1/4NE1/4 section 31, T. 2 S., R. 13 E. This soil is in long, broad areas and narrow, irregularly shaped areas.

Included with this soil in mapping were areas of Bald, Hesslan, Skyline, and Frailey soils. These soils make up about 10 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIe; Pine-Douglas Fir-Sedge range site; woodland group 6r.

50F-Wamic loam, 40 to 70 percent slopes. A representative mapping unit is in the NE1/4SW1/4SW1/4 section 10, T. 2 N., R. 12 E. This soil is in long, narrow, irregularly shaped areas. It has a profile similar to the one described as representative of the series, but the surface layer is darker colored.

Included with this soil in mapping were areas of Bald, Hesslan, Frailey, and Skyline soils. These soils make up as much as 20 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIe; Pine-Douglas Fir-Sedge range site; woodland group 6r.

51D-Wamic-Skyline complex, 2 to 20 percent slopes. A representative mapping unit is in the NW1/4NW1/NE1/4 section 86, T. 2 S., R. 12 E. This 4complex is about 46 to 70 percent a Wamic loam and about 16 to 40 percent a Skyline very cobbly loam. The Wamic soil is on ridgetops or side slopes in circular or elongated mounds. The Skyline soil is in areas where the ridgetops break off into canyons.

Included with this complex in mapping were areas of very shallow, very stony, and deep stony soils. These soils make up about 20 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. This complex is used for range and wildlife habitat. Capability subclass VIe; Wamic soil in Oak South Exposure range site; Skyline soil in Oak Steep South range site.

Wapinitia Series

The Wapinitia series consists of well drained soils, formed in loess and volcanic ash on uplands. Slopes are 0 to 36 percent. Elevation is 1,800 to 3,400 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 13 to 16 inches, the average annual air temperature is 48° to 60° F, and the frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is very dark brown silt loam about 6 inches thick. The upper 13 inches of the subsoil is very dark brown silt loam, and the lower 10 inches is dark brown silty clay loam. The upper 7 inches of the substratum is dark yellowish brown fine sandy loam, and the lower 14 inches is dark brown clay loam. Basalt bedrock is at a depth of about 60 inches. The surface layer and upper part of the subsoil are slightly acid, and the lower part of the subsoil and the substratum is neutral.

Permeability is moderately slow, and the available water capacity is 7 to 12 inches. Water-supplying capacity is 10 to 14 inches. Effective rooting depth is 40 to 60 inches.

These soils are used for small grain, dryfarmed hay, pasture, range, irrigated crops, and wildlife habitat.

Representative profile of Wapinitia silt loam in an area of Watama-Wapinitia silt loams, 0 to 5 percent slopes, 50 feet east of graveled county road and 450 feet south of main irrigation canal in the NW1/4NE1/4SE1/4 section 17, T. 5 S., R. 12 E.:

Ap-0 to 6 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; slightly acid; abrupt smooth boundary.

B1-6 to 19 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine and fine tubular pores; few thin clay films on peds; common noncalcareous nodules 1/4 to 3/4 inch in diameter; slightly acid; clear smooth boundary.

B2t-19 to 29 inches; dark brown (10YR 3/3) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many very fine roots; many to common very fine and fine tubular pores; many thin clay films on peds; common noncalcareous nodules 1/4 to 3/4 inch in diameter; neutral; clear smooth boundary.

IICI-29 to 36 inches; dark yellowish brown (10YR 3/4) fine sandy loam, yellowish brown (10YR 5/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common fine tubular pores; common clay bridges; neutral; clear smooth boundary.

IIC2-36 to 50 inches; dark brown (10YR 4/3) clay loam, pale brown (10YR 6/3) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; neutral; abrupt smooth boundary.

IIIR-50 inches; basalt bedrock.

The A horizon is dark grayish brown or grayish brown when dry and very dark brown or very dark grayish brown when moist. It is silt loam or loam. The B horizon is grayish brown or brown when dry. It is clay loam or silty clay loam and is 27 to 35 percent clay. It contains 2 to 5 percent noncalcareous nodules 1/4 to 3/4 inch in diameter and more than 16 percent particles coarser textured than very fine sand. The horizon is fine sandy loam, loam, or clay loam. Depth to basalt bedrock is 40 to 60 inches.

The Wapinitia series is mapped only in complexes with Watama sods. Refer to the Watama series for a description of these mapping units.

Wapinitia Variant

The Wapinitia variant consists of well drained soils formed in loess and volcanic ash on uplands. Slopes are 1 to 7 percent. Elevation is 1,800 to 3,400 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 13 to 16 inches, the average annual air temperature is 48° to 50° F, and the frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is very dark brown silt loam about 12 inches thick. The upper 10 inches of the subsoil is very dark grayish brown silty clay loam, and the lower 31 inches is dark brown and brown clay. Basalt is at a depth of 53 inches. The surface layer and subsoil are neutral.

Permeability is slow, and the available water capacity is 7 to 11.5 inches. Water-supplying capacity is 10 to 13 inches. Effective rooting depth is 40 to 60 inches.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Wapinitia variant silt loam, 1 to 7 percent slopes, 100 feet north of road in the SWl/4SE1/4SW1/4 section 28, T. 5 S., R. 12 E.:

Ap1-0 to 5 inches; very dark brown (10YR 2/2) silt loam, dark brown (10YR 4dry; weak very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

Ap2-5 to 12 inches; very dark brown (10YR 2/2) loam, dark brown (10YR 4/3) dry; moderate fine granular and weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

B1-12 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; hard, firm, sticky and very plastic; many very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

IIB21t-22 to 32 inches; dark brown (10YR 3/3) clay, brown (10YR 6/3) dry; weak medium prismatic and strong medium blocky structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; common thin clay films on peds; 5 percent pebbles 2 millimeters to 3 inches in size; neutral; clear wavy boundary.

IIB22t-32 to 63 inches; brown (10YR 4/3) clay, brown (10YR 5/3) dry; weak medium prismatic and strong medium blocky structure; extremely hard, very firm, sticky and very plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films on peds; 5 percent pebbles 2 millimeters to 3 inches in size; neutral; abrupt smooth boundary.

IIIR-53 to 60 inches; basalt.

The A horizon is silt loam or loam. Depth to bedrock is 40 to 60 inches or more.

52B-Wapinitia variant silt loam, 1 to 7 percent slopes. A representative mapping unit is in SW1/4SE1/4SW1/4 section 28, T. 5 S., R. 12 E. This soil is in narrow, irregularly shaped areas. Slopes average about 4 percent.

Included with this soil in mapping were areas of Wapinitia, Watama, and Bakeoven soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is moderate. Capability unit IIIe-5; Shrubby Rolling Hills range site.

Warden Series

The Warden series consists of well drained soils formed in a loess mantle over calcareous, silty lacustrine sediment on terraces. Slopes are 5 to 40 percent. Elevation is 600 to 1,000 feet. The vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is about 9 inches, the average annual air temperature is 51° to 53° F, and the frost-free period is 130 to 180 days at 32° and 180 to 200 days at 28°.

In a representative profile the surface layer is very dark grayish brown and dark brown silt loam about 8 inches thick. The subsoil is dark brown silt loam about 13 inches thick. The substratum is dark grayish brown silt loam about 39 inches thick. The substratum is dark grayish brown silt loam about 39 inches thick. The soil material in the profile is neutral to strongly alkaline. Lime accumulation is at a depth of 20 to 30 inches.

Permeability is moderate, and the available water capacity is 10 to 12 inches. Water-supplying capacity is 6 to 9 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for hay, pasture, range, and wildlife habitat.

Representative profile of Warden silt loam, 5 to 40 percent slopes, in abandoned field 30 feet northeast of Sinamox Road in the SE1/4SW1/4NE1/4 section 27, T. 2 S., R. 15 E.

A1-0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

A12-3 to 8 inches; dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; weak medium prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; common fine tubular pores; neutral; abrupt wavy boundary.

B2-8 to 21 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak coarse prismatic structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; mildly alkaline; abrupt wavy boundary.

IIC1ca-21 to 34 inches; dark grayish brown (2.5Y 4/3) silt loam, pale brown (10YR 613) dry; massive; hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; many fine to medium (1/4 to 1 inch) calcareous concretions; moderately alkaline; strongly calcareous; clear wavy boundary.

IIC2ca-34 to 45 inches; dark grayish brown (2.5Y 4/2) silt loam, light brownish gray (10YR 6/2) dry; massive; slightly hard, friable and firm, slightly sticky an slightly plastic; common very fine roots; many fine tubular pores; strongly alkaline; strongly calcareous; clear wavy boundary.

IIC3ca-45 to 60 inches; dark grayish brown (2.5Y 4/2) silt loam, light brownish gray (2.5Y 6/2) dry; massive; hard, friable, slightly sticky and slightly plastic; few roots; many very fine irregular pores; strongly alkaline; strongly calcareous.

The A horizon is grayish brown or light brownish gray when dry. The B horizon is brown or pale brown when dry and dark brown or dark yellowish brown when moist. The C horizon is light brownish gray, brown, or pale brown when dry and grayish brown or dark grayish brown when moist. It is as much as 5 percent calcareous concretions v4 to I inch in diameter. It is moderately calcareous to strongly calcareous.

53E-Warden silt loam, 5 to 40 percent slopes. A representative mapping unit is in the SE1/4SW1/4NE1/4 section 27, T. 2 S., R. 15 E. This soil is in narrow and broad, irregularly shaped, dissected terraces.

Included with this soil in mapping were areas of Lickskillet and Wrentham soils. These soils make up as much as 10 percent of the unit.

Runoff is medium or slow, and the hazard of erosion is slight to severe. Capability subclass VIe; Silty Terrace range site.

Watama Series

The Watama series consists of well drained soils formed in loess and volcanic ash on uplands. Slopes are 0 to 35 percent. Elevation is 1,800 to 3,400 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 13 to 16 inches, the average annual air temperature is 48° to 50° F, and the frost-free period is 120 to 170 days at 32° and 170 to 200 days at 28°.

In a representative profile the surface layer is very dark brown and very dark grayish brown silt loam about 10 inches thick. The upper 14 inches of the subsoil is dark brown loam, and the lower 10 inches is brown clay loam. Basalt bedrock is at a depth of about 34 inches. The soil material in the profile is neutral throughout.

Permeability is moderately slow; and the available water capacity is 3.5 to 8 inches. water-supplying capacity is 6 to 10 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for dryfarmed small grain, hay, pasture, range, irrigated crops, and wildlife habitat.

Representative profile of a Watama silt loam in an area of Watama-Wapinitia silt loams, 0 to 5 percent slopes, 75 feet south of gravel roast in the NE1/4NWl/4NE1/4 section 16, T. 5 S., R. 12 E.:

A11-0 to 4 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 6/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

A12-4 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

B1-10 to 17 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak to moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

B21-17 to 24 inches; dark brown (10YR 3/3) heavy loam, brown (10YR 6/3) dry; weak coarse prismatic and moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; common very dark grayish brown (10YR 3/2) coatings on peds; 2 percent cobbles; neutral; clear smooth boundary.

B22-24 to 34 inches; brown (10YR 4/3) light clay loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; very hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; common dark brown (10YR 3/3) coatings on peds; 2 percent cobbles; neutral; clear smooth boundary.

IIR-34 inches; basalt bedrock.

Depth to basalt bedrock is 20 to 40 inches.

54B-Watama-Wapinitia silt loams, 0 to 5 percent slopes. A representative mapping unit is in the NE1/4NW1/4NEl/4 section 16, T. 5 S., R. 12 E. This complex is about 55 to 65 percent a Watama silt loam and 25 to 30 percent a Wapinitia silt loam. These soils are in narrow, irregularly shaped areas. Slopes average about 3 percent. Both soils have the profile described as representative of their respective series.

Included with this complex in mapping are areas of

Bakeoven, Maupin, and Wamic soils. These soils make up as much as 15 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-3 nonirrigated, and IIe-2 irrigated; Shrubby Rolling Hills range site.

54C-Watama-Wapinitia silt loams, 5 to 12 percent slopes. A representative mapping unit is in the NW1/4SW1/4SE1/4 section 3, T. 5 S., R. 12 E. This complex is about 65 to 65 percent a Watama silt loam and 25 to 30 percent a Wapinitia silt loam. These soils are on ridgetops in long, broad or narrow areas.

Included with this complex in mapping were areas of Bakeoven, Maupin, and Wamic soils. These soils make up as much as 15 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Shrubby Rolling Hills range site.

54D-Watama-Wapinitia silt loams, 12 to 20 percent slopes. A representative ma in unit is in the SE1/4SE1/4SW1/4 section 3, T. 5 S., 12 E. This complex is about 55 to 65 percent a Watama silt loam and 25 to 35 percent a Wapinitia silt loam. These soils are in long, narrow, irregularly shaped areas.

Included with this complex in mapping were areas of Bakeoven, Maupin, and Wamic soils. These soils make up as much as 15 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Shrubby Rolling Hills Range site.

54E-Watama-Wapinitia silt loams, 20 to 35 percent slopes. A representative mapping unit is in the NW1/4NE1/4NW1/4 section 3, T. 5 S., R. 12 E. This complex is about 55 to 65 percent a Watama silt loam and 25 to 35 percent a Wapinitia silt loam. These soils are in long, narrow, irregularly shaped areas.

Included with this complex in mapping were areas of Bakeoven, Maupin, and Wamic soils. These soils make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability unit IVe-2; North Exposure range site.

Wato Series

The Wato series consists of well drained soils formed in loess on uplands. Slopes are 3 to 35 percent. Elevation is 300 to 1,500 feet. In uncultivated areas, the vegetation is bunchgrasses, forbs, and shrubs. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 51° to 54° F, and the frost-free period is 150 to 170 days at 32° and 170 to 210 days at 28°.

In a representative profile the surface layer is very dark grayish brown very fine sandy loam about 15 inches thick. The subsoil is dark brown loam about 27 inches thick. The substratum is dark brown fine sandy loam about 24 inches thick. The soil material throughout the profile is neutral.

Permeability is moderately rapid, and the available water capacity is 6 to 10 inches. Water-supplying capacity is 7 to 10 inches. Effective rooting depth is 40 to 60 inches or more.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

Representative profile of Wato very fine sandy loam, 3 to 7 percent slopes, 150 feet west of road in the NW1/4NE1/4NW1/4 section 32, T. 2 N., R. 14 E.:

A11-0 to 3 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; neutral; clear smooth boundary.

A12-3 to 15 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, dark grayish brown (10YR 4/2) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; 2 percent fragments 1 to 2 millimeters in size; neutral; clear smooth boundary.

B1-15 to 21 inches; dark brown (10YR 3/3) loam, brown (10YR 4/3) dry; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular an tubular pores; 2 percent fragments 1 to 2 millimeters in size; neutral; clear wavy boundary.

B2-21 to 42 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium prismatic and weak medium subangular bloc structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 3 percent fragments I to 2 millimeters in size; neutral; clear smooth boundary.

C1-42 to 52 inches; dark brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; many to common very fine roots; many very fine tubular pores; 6 percent weathered fragments 1 to 2 millimeters in size; neutral; clear wavy boundary.

C2-52 to 66 inches; dark brown (10YR 4/3) fine sandy loam, ale brown (10YR 6/3) dry; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; 10 percent weathered fragments I to 2 millimeters in size; neutral; abrupt wavy boundary.

The B horizon is dark brown to brown when dry. It is very fine sandy loam to loam.

55B-Wato very fine sandy loam, 3 to 7 percent slopes. A representative mapping unit is in the NW1/4NE1/4NW1/4 section 32, T. 2 N., R. 14 E. This soil is on ridgetops in broad, irregularly shaped areas. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Lickskillet, Walla Walla, Anderly, and Nansene soils. These soils make up about 5 percent of the unit.

Runoff is slow. The hazard of water erosion is slight or moderate, and the hazard of soil blowing is moderate. Some areas are moderately eroded and have lower crop yields than noneroded areas. Capability unit IIIe-6; Rolling Hills range site.

55C-Wato very fine sandy loam, 7 to 12 percent slopes. A representative mapping unit is in the SW1/4NE1/4NE1/4 section 3, T. 2 N., R. 14 E. This soil is on ridgetops in broad, smooth, convex areas.

Included with this soil in mapping were areas of Lickskillet, Walls Walla, Anderly, and Nansene soils. These soils make up about 10 percent of the unit.

Runoff is medium. The hazard of water erosion is moderate. Capability unit IIIe-6; Rolling Hills range site.

55D-Wato very fine sandy loam, 12 to 20 percent north slopes. A representative mapping unit is

in the NE1/4NE1/4NW1/4, section 32, T. 2 N., R. 14 E. This soil is in long, broad, convex areas.

Included with this soil in mapping were areas of Lickskillet, Walla Walla, Anderly, and Nansene soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-4; Droughty North Exposure range site.

55E-Wato very fine sandy loam, 20 to 35 percent north slopes. A representative mapping unit is in the NE1/4SE1/4NW1/4, section 31, T. 2 N., R. 14 E. This soil is in long, narrow, broad, irregularly shaped areas.

Included with this soil in mapping were areas of Lickskillet, Walla Walla, Anderly, and Nansene soils. These soils make up as much as 16 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability unit IVe-3 ; North Exposure range site.

Wind River Series

The Wind River series consists of well drained soils formed in old alluvium on uplands. Slopes are 0 to 30 percent. Elevation is 200 to 800 feet. In uncultivated areas, the vegetation is Douglas-fir, ponderosa pine, Oregon white oak, forbs, and shrubs. The average annual precipitation is 20 to 30 inches, the average annual air temperature is 49° to 52° F, and the frost-free period is 150 to 180 days at 32° and 180 to 210 days at 28°.

In a representative profile the surface layer is very dark grayish brown fine sandy loam about 10 inches thick. The subsoil is dark brown fine sandy loam about 34 inches thick. The substratum is dark yellowish brown sandy loam to a depth of 60 inches or more. Depth to bedrock is more than 60 inches. The soil material in the profile ranges from medium acid to neutral.

Permeability is moderately rapid, and the available water capacity is 7 to 8 inches. Water-supplying capacity is 10 to 14 inches. Effective rooting depth is more than 60 inches.

These soils are used for fruit orchards, pasture, range, and wildlife habitat.

Representative profile of Wind River fine sandy loam, 0 to 8 percent slopes, 400 feet north of Old Columbia River Highway in the NW1/4SE1/4NW1/4 section 6, T. 2 N., R. 12 E..

Ap1-0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam, brown (10YR 5/3) dry; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine irregular pores; medium acid; abrupt smooth boundary.

Ap2-6 to 10 inches, very dark grayish brown (10YR 3/2) fine sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine irregular and tubular pores; slightly acid; gradual smooth boundary.

B2-10 to 17 inches; dark brown (7.5YR 3/3) fine sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; few fine tubular pores; neutral; gradual smooth boundary.

B3-17 to 44 inches; dark brown (7.5YR 3/4) fine sandy loam, brown (10YR 5/4) dry; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; few 1 to 6 centimeter nodules; neutral; gradual smooth boundary.

C1-44 to 61 inches; dark yellowish brown (10YR 4/4) sandy loam, brown (10YR 5/4) dry; massive, slightly hard, friable, nonsticky and nonplastic; common very fine roots; neutral; clear wavy boundary.

The A horizon is brown, grayish brown, or dark grayish brown when dry and very dark grayish brown, very dark brown, or dark brown moist. It is fine sandy loam or sandy loam. The B horizon is brown, grayish brown, or dark grayish brown when dry and very dark grayish brown, very dark brown, or dark brown moist. It is fine sandy loam, loam, or sandy loam. It has weak coarse prismatic or weak coarse or medium subangular blocky structure. The C horizon is yellowish brown, brown, or light yellowish brown when dry and dark yellowish brown or brown moist. It is fine sandy loam, sandy loam, loamy fine sand, or sand and is 0 to 20 percent rock fragments 2 to 5 millimeters in diameter.

56B-Wind River fine sandy loam, 0 to 8 percent slopes. A representative mapping unit is m the NW1/4SE1/4NW1/4 section 6, T. 2 N., R. 12 E. This soil is on ridgetops in broad, irregularly shaped areas. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Chenoweth and Van Horn soils. These soils make up about 10 percent of the unit.

Runoff is slow, and the hazard of erosion is slight. Capability unit IIe-l; Pine-Oak-Fescue range site.

56C-Wind River fine sandy loam, 8 to 12 percent slopes. A representative map ping unit is in the NE1/4NE1/4NW1/4 section 6, T. 2 N., R. 12 E. This soil is on ridgetops in broad, irregularly shaped areas.

Included with this soil in mapping were areas of Chenoweth and Van Horn soils. These soils make up about 10 percent of the unit.

Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe-2; Pine-Oak-Fescue range site.

56D-Wind River fine sandy loam, 12 to 30 percent slopes. A representative mapping unit is in the SE1/4SE1/4SE1/4 section 1, T. 2 N., R. 11 E. This soil is in long, narrow, irregularly shaped areas.

Included with this soil in mapping were areas of Chenoweth and Van Horn soils. These soils make up about 10 percent of the unit.

Runoff is medium to rapid, and the hazard of erosion is moderate to severe. Capability unit IVe-1; Pine-Oak Fescue range site.

Wrentham Series

The Wrentham series consists of well drained soils formed in loess and basalt colluvium on uplands. Slopes are 35 to 70 percent. Elevation is 1,500 to 3,600 feet. The vegetation is bunchgrasses forbs, and shrubs. The average annual precipitation is 10 to 13 inches, the average annual air temperature is 45° to 62° F, and the frost-free period is 60 to 100 days at 32° and 100 to 150 days at 28°.

In a representative profile the surface layer is very dark brown silt loam about 18 inches thick. The upper

3 inches of the subsoil is dark brown heavy silt loam, and the lower 17 inches is dark brown very cobbly silty clay loam. Basalt bedrock is at a depth of about 38 inches. The soil material in the profile is mainly neutral, but the lower part of the subsoil is mildly alkaline.

Permeability is moderately slow, and the available water capacity is 2.5 to 7 inches. Water-supplying capacity is 6 to 8 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for range, wildlife habitat, and water supply.

representative profile of Wrentham silt loam in an area of Wrentham-Rock outcrop complex, 35 to 70 percent slopes, 20 feet north of Sinamox Road in the SE1/4SE1/4 section 28, T. 2 S., R. 15 E.:

A11-0 to 5 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak very thin platy and weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; few fine and very fine irregular pores; 5 percent pebbles and 5 percent cobbles; neutral; clear smooth boundary.

A12-6 to 10 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; 6 percent pebbles and 5 percent cobbles; neutral; clear smooth boundary.

A13-10 to 18 inches; very dark brown (10YR 2/2 silt loam, dark brown (10YR 4/3) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slight sticky and slightly plastic; many very fine roots; many very Pine tubular pores; 10 percent pebbles and 6 percent cobbles; neutral; gradual smooth boundary.

B1-I8 to 21 inches; dark brown (7.5YR 3/3) heavy silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 10 percent pebbles and 6 percent cobbles; neutral; gradual smooth boundary

B21-21 to 32 inches; dark brown (7.5YR 3/3) very cobbly light silty clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; thin clay films on ped surfaces; 26 percent pebbles and 26 percent cobbles; neutral; gradual smooth boundary.

B22-32 to 38 inches; dark brown (7.5YR 3/4) very cobbly silty clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, sticky, plastic; few very fine roots; many very fine tubular pores; 25 percent pebbles and 40 percent cobbles; 50 to 86 percent basalt fragments 1 to 12 inches in diameter; mildly alkaline; abrupt wavy boundary.

IIR-38 inches; basalt bedrock.

The A horizon is very dark brown or very dark grayish brown when moist. It is 0 to 25 percent coarse fragments, by volume. The B horizon is *very* dark brown or dark brown when moist. It is heavy silt loam, light silty clay loam, or silty clay loam. It is 18 to 30 percent clay and 50 to 86 percent rock fragments. Depth to basalt bedrock is 20 to 40 inches.

57F-Wrentham-Rock outcrop complex, 35 to 70 percent slopes. A representative ma ping unit is in the SE1/4SE1/4NE1/4 section 28, T. 2 S., r. 15 E. This complex is about 50 to 85 percent Wrentham silt loam and 10 to 35 percent Rock outcrop. It is in long, narrow areas and has north-facing slopes (fig. 7). The Wrentham soil has the profile described as representative of the series.

Included with this complex in mapping were areas of Cantala, Condom Bakeoven, and Lick Lickskillet soils. These soils make up as much as 15 percent of the unit.

Runoff is rapid, and the hazard of erosion is severe. Capability subclass VIIs ; Wrentham soil in Steep North range site. Rock outcrop not in a range site.

Use and Management o f the Soils

In this section some principles for the management of cropland are described, the soils are grouped into capability units according to the capability classification used by the Soil Conservation Service, yields of principal crops are estimated, and the management of soils when used for range, woodland and windbreaks, wildlife, recreational development, and engineering is discussed.

Crops and Pasture

Under the grain-fallow system of farming used in the survey area, the major management needs are controlling erosion, conserving moisture, preserving soil structure and tilth, maintaining the organic-matter content and the supply of plant nutrients, using proper silage, managing crop residues, using a suitable cropping system, controlling annual and perennial weeds, and using commercial fertilizer and amendments as needed. Soils that have slopes of more than 7 percent require intensive conservation practices to keep annual soil losses less than about 4 or 5 tone per acre. Each field needs to be evaluated for the best combination of alternative treatments to control erosion and maintain crop yields. Irrigated cropland needs proper irrigation management and soil protection against erosion. Onsite technical assistance is available from the Soil Conservation Service.

Management needs

Different soils require different treatments, and the same soil may require different treatment from year to year or from crop to crop. The basic management needs for grain summer fallow are described in the following paragraphs.

Conserving moisture.-Many cultivated soils in Wasco County, Oregon. Northern Part, are limited in productivity because of inadequate moisture. It is important, therefore, to conserve and use efficiently all available moisture. During the fallow season, evaporation losses can be kept to a minimum by maintaining a cloddy surface mulch and tilling only enough to control weeds.

Controlling erosion. -This is a most urgent need. Many of the soils are shallow or only moderately deep. Further erosion reduces the ability of the soils to store moisture and supply nutrients, and continued erosion so reduces their productivity that in time they are suitable only for low-producing range or pasture. Erosion

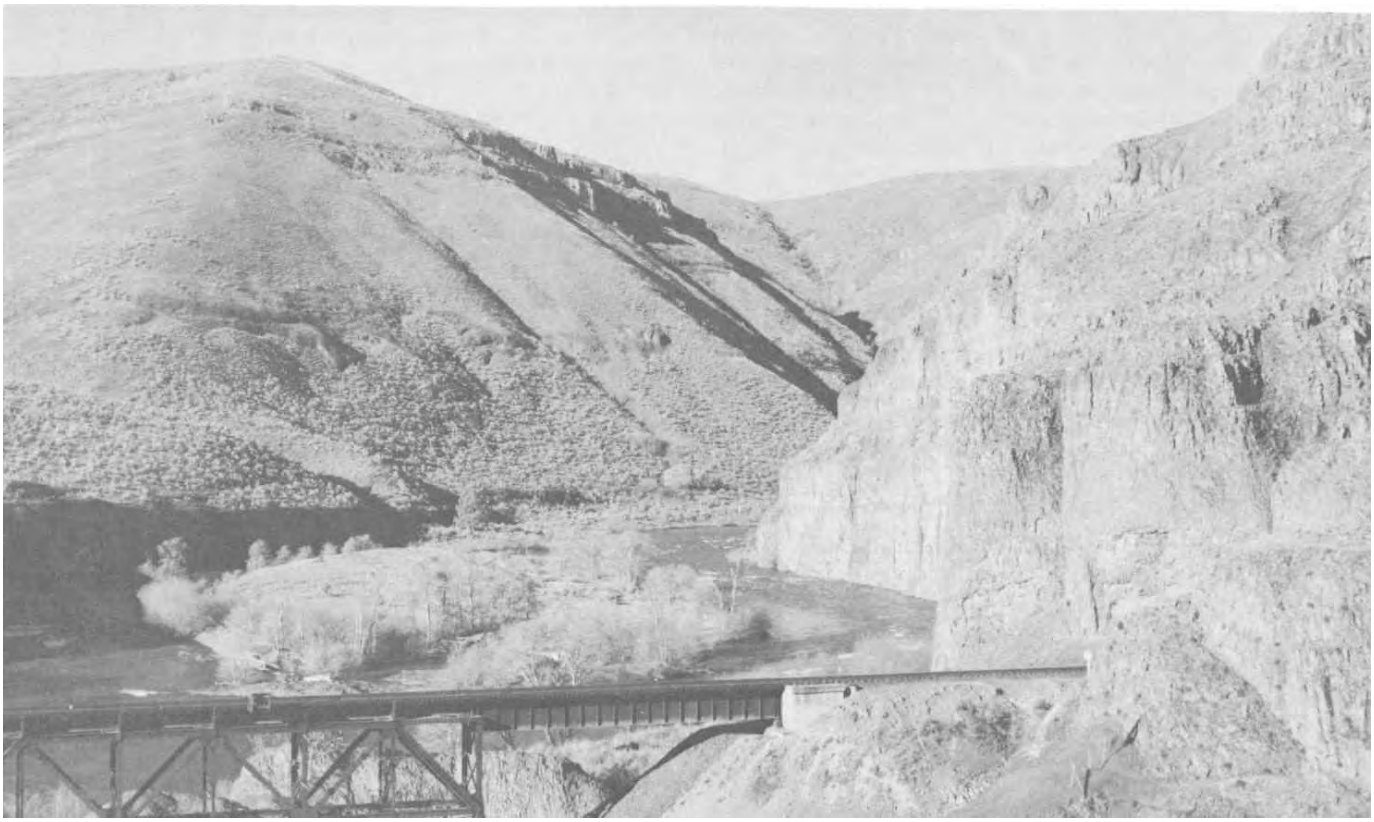


Figure 7: The north-facing soil is Wrentham-Rock outcrop complex, 35 to 70 percent slopes (mostly on right side of hill in center of background), the land on the right is Rock outcrop-Rubble land complex, and the south-facing soil is Lickskillet extremely stony loam, 40 to 70 percent slopes (mostly on left side of hill in center of background). The

reduces yields and results in sedimentation downstream. Minimum or cloddy tillage, maintenance of organic-matter content, preservation of soil structure, and installation of such practices as diversions and grassed waterways help to control erosion.

Preserving soil structure.-Proper tillage and maintenance of the organic-matter content are the two principal factors in preserving soil structure. Excessive tillage while the soil is fallow tends to destroy organic matter and soil aggregates. This reduces the free movement of water, air, and roots through the soil.

Maintaining organic-matter content: Organic matter is the partly decomposed remains of plants and soil organisms. The organic-matter content of the surface layer of the soils of the survey area ranges from a high of 3 or 4 percent under native plant cover to a low of 1 or 2 percent after a long period of cultivation.

Organic matter binds soil particles together in aggregate and thus helps to preserve soil structure. It is the source of most of the available nitrogen in the soil and also supplies other plant nutrients, such as phosphorus and sulfur. The decomposition of organic matter releases nutrients in a form available to plants.

The organic matter in the soil is constantly decomposing. Therefore, the supply must be renewed regularly and often. An adequate supply can be maintained by:

1. Returning all crop residues to the soil. Crop residues are the main source of organic matter. The organic matter is lost if residues are burned or otherwise destroyed or removed.
2. Using commercial fertilizers to balance plant and soil organism requirements in relation to available moisture.
3. Growing grass and legumes in a rotation.

Supplying plant nutrients.-Nitrogen fertilizer is used on all but the driest and shallowest cultivated soils in the survey area. Sulfur is used on about one-third of the dryfarmed areas and on all irrigated crops, particularly alfalfa. Phosphate fertilizers are used on most irrigated soils but only in a minor amount on dry-

farmed soils. Boron is commonly needed for good alfalfa production. Most other plant nutrients are adequate. Soil tests and Oregon State University fertilizer guides are available and useful for specific crops.

Weed control.-Mechanical and chemical control of annual and perennial weeds are widely used. A persistent weed control program is needed. Control of cheatgrass, grain, rye, and morning glory is especially important.

Providing proper irrigation water management. Better water management by sprinkler irrigation can be accomplished by rough leveling to eliminate pockets, sharp breaks, and other irregularities. Properly designed and operated sprinkler systems are essential to good water management. Such soil properties as intake rate, available water capacity, and permeability are important for properly designed systems. Leveling is needed on all soils before surface irrigation. If soils are properly leveled, water moves quickly and evenly over a field and wets the root zone to a uniform depth. Properly designed ditches and structures are essential to uniform water distribution. After the first leveling, floating is needed periodically to eliminate high spots and fill low spots, so that crops can be irrigated uniformly without wasting water. Ordinarily, several years of floating are required before a field is properly leveled and distribution of water is fast and efficient.

Cropping systems

A cropping system can be a regular rotation of different crops, in which the crops follow each other in a definite order, or it can consist of only one crop grown year after year. The number and variety of cropping systems in the survey area are limited by the low precipitation and the shortage of irrigation water. The principal cropping system is grain and fallow. Another dryfarmed cropping system is grass or grass and alfalfa rotated with grain or grain and fallow.

Fallow cropping system.-Most of the cropland in the survey area is used for summer-fallow grain farming. In summer-fallow dryfarming, the soil is kept free of vegetation during one crop season in order to store additional moisture for the growth and yield of a crop the following season. This practice also helps to control weeds and conserves plant nutrients.

The most common method of fallowing is to leave crop stubble standing during the winter. The soil is tilled in February, March, or April, before the weeds have removed much of the moisture and before the surface layer becomes too dry. Tillage is also performed during the summer to keep the soil free of weeds and to prepare a seedbed for fall planting.

Only about a third of the precipitation that occurs during a 2-year period is utilized by crops. Water losses through evaporation from fallow soils are high, and in certain years runoff is rapid because of slow infiltration on finely tilled seedbeds or frozen ground.

Grass-Legume rotation.-A small acreage in the survey area is utilized for a rotation of grass and legume. with grain and fallow. This rotation is used to improve fertility, increase the rate of water infiltration, ant reduce soil erosion.

Grasses and legumes can be used for rotation hay or pasture. Grasses and legumes seeded on summer-fallow or in spring of the stubble year generally can be used for forage the second year.

Plowing up the grass-legume sod and rotating to other fields needs to be done at about the time of maximum root growth. Experiments at the Sherman Branch Experiment Station show maximum root growth of suited species is reached in about 4 years. Soils used for grass-legume rotations are plowed in 4 or 5 years and then reseeded to grain.

A successful grass-legume seeding depends on a firm seedbed, a suitable seed mixture, and proper seeding. The success of the rotation depends on fitting the rotation in with other rotations on the rest of the farm. Recommendations for grass-legume varieties and seeding rates are available from the County Extension Agent and the Soil Conservation Service.

Irrigated cropping systems.-Chenoweth, Cherryhill, Van Horn, Walls Walla, and Wind River soils adjacent to the Columbia River are suited to apples, peaches, apricots, and sweet cherries. Irrigation water is provided by wells and from the Columbia River.

Cover crops are grown in orchards to control erosion. Suitable cover crops are barley or wheat, alone or grown with a legume, such as hairy vetch, common vetch, or peas. The cover crop is disked or mowed in the spring to conserve moisture, and enough residue is left on the surface to control erosion.

The acreage in irrigated hay and pasture has increased during the past 10 years. Irrigated forage is grown along the bottom lands adjacent to streams or in areas where wells or irrigation dams have been constructed.

Alfalfa is the principal legume grown for hay. It is grown alone or in combination with suitable grasses. Yields are good throughout a wide range of conditions. Seed mixtures for hay or pasture are provided by the Extension Service and the Soil Conservation Service.

Good stands, adequate irrigation and fertilization, and controlled grazing are essential for high yields of pasture crops and hay. Sulfur is needed annually on alfalfa. Soil tests can be made to determine the need for phosphorus and boron. Irrigated grass pastures need nitrogen fertilizer each year. Irrigated grass-legume pastures may need sulfur and phosphorus.

Management of grazing is essential for high yields. Good management increases yields, reduces selective grazing, cuts forage wastes, and controls the quality of the forage. Pastures can be divided, and grazing rotated every 2 to 4 days in several pastures to allow 3 to 4 weeks of regrowth.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field trope. The soils are grouped according to their limitations when used for field crops, the rink of damage when they are so used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change elope, depth, or other characteristics of the soils; does not

take into consideration possible but unlikely major reclamation projects; and does not apply to some crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, the kinds of soils are grouped at three levels: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of ants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat. (None in survey area.)

Class VI soils have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture, range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to pasture, range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, *or c*, to the class numeral, for example, IIw. The letter *e* indicates that the main limitation is risk of erosion; *w* that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by w, s, and c, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by. adding an Arabic numeral to the subclass symbol, for example, IIw-1 or IIIe-2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass. In this survey, only the cultivated soils are grouped at three levels. The noncultivated soils are grouped at two levels, in capability subclasses.

In the following pages the capability unite in the survey area are described. The names of soil series represented in a capability unit are given in the description of the capability unit, but this does not mean that all the soils of a given aeries appear in the unit. To find the capability unit or subclass in which a soil has been placed, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I-1

This capability unit consists of soils in the Endersby and Hermiston series. These soils are somewhat excessively drained or well drained loams and silt loams. Slopes are 0 to 3 percent. The annual precipitation is 10 to 14 inches. The frost-free period is 130 to 180 days at 32° F and 180 to 200 days at 28 .

Permeability is moderate or moderately rapid, and the available water capacity is 6.6 to 12.6 inches. Water-supplying capacity is 8 to 13 inches. Typically, roots penetrate to a depth of 40 to more than 60 inches. Runoff is slow, and the hazard of erosion is alight.

These soils are used for irrigated crops and wildlife habitat.

Irrigated alfalfa or alfalfa and grass is grown for hay, which is used for sale or winter feed. Some haylands are used for aftermath grazing in the fall. However, grazing is generally avoided to maintain the vigor of alfalfa. Hay is generally grown 6 to 8 years, and grain is grown the next year. Alfalfa generally needs annual application of sulfur or gypsum and, on some fields, phosphorus and boron. Soil teats can determine amounts needed. The first cutting of alfalfa should be at the full bud stage, the second cutting at the 1/10 to 1/2 bloom stage, and the third cutting 4 to 6 weeks before the last killing frost.

Irrigation water is available from streamflow until late in June but in several areas dams impound water for use throughout the summer. Irrigation methods include sprinkler, border, contour furrow, and wild flooding.

CAPABILITY UNIT IIe-1

This capability unit consists of soils in the Chenoweth, Cherryhill, Van Horn, and Wind River aeries. These soils are well drained fine sandy loams, silt

loams, and loams. Slopes are 0 to 8 percent. The annual precipitation is 14 to 30 inches. The frost-free period is 140 to 210 days at 32° F and 170 to 250 days at 28°.

Permeability is moderately rapid to moderately slow, and the available water capacity is 6.5 to 11 inches. Water-supplying capacity is 8 to 15 inches. Typically, roots penetrate to a depth of 40 to 60 inches or more. Runoff is slow, and the hazard of erosion is slight.

These soils are used for fruit orchards, hay, pasture, and wildlife habitat.

Cover crops are used in orchards as a source of organic matter. An annual grain or mixed grain and legume cover crop is common, but some perennials are used where irrigation water is adequate. Spring mowing or disking reduces the cover crop and conserves soil moisture. The cover crop is fertilized as follows.

For mature bearing trees, 100 pounds per acre of nitrogen is applied late in winter or early in spring in one application, 6 to 8 pounds of zinc in a spray, and 2 to 3 pounds of boron in a spray.

For trees less than 10 years old, 1/4 pound of nitrogen per tree is applied in a split application late in winter or early in spring and a second application in June.

Irrigated cherries commonly are planted in a diamond pattern. The trees are spaced 30 feet by 30 feet, and 56 trees can be planted per acre. Only 48 trees per acre can be planted in a square pattern at the same spacing.

Systematic pruning is practiced. Harvesting is mostly done by hand. Rigorous and timely spraying for cherry fruit fly and other insects and diseases is necessary.

CAPABILITY UNIT II-2

This capability unit consists of soils in the Maupin, Maupin variant, Watama, and Wapinitia series. These soils are well drained silt loams and loams. Slopes are 0 to 5 percent. The annual precipitation is 10 to 16 inches. The frost-free period is 120 to 170 days at 32° F and 170 to 200 days at 28 .

Permeability is moderate or moderately slow, and the available water capacity is 3 to 12 inches. Water-supplying capacity is 6 to 14 inches. Typically, roots penetrate to a depth of 20 to 60 inches. Runoff is slow, and the hazard of erosion is slight.

These soils are used for irrigated hay, pasture, grain, and wildlife habitat.

Irrigated alfalfa or alfalfa and grass is grown for hay, which is used for sale or winter feed. Some haylands are used for aftermath grazing in the fall. However, grazing is generally avoided to maintain the vigor of alfalfa. Hay is generally grown 5 to 8 years, and then grain is grown the next year. Alfalfa generally needs annual application of sulfur or gypsum and, on some fields, phosphorus and boron. Soil tests can determine amounts needed. The first cutting of alfalfa should be done at the full bud stage, the second cutting at the 1/10 to 1/2 bloom stage, and the third cutting 4 to 6 weeks before the last killing frost.

Irrigation water is available from streamflow until late in June, but in several areas dams impound water for use throughout the summer. Good irrigation water management is important. Irrigation methods include sprinkler, border, contour furrow, and wild flooding. Some fields adjoining streams need streambank protection.

CAPABILITY UNIT IIe-3

This capability unit consists of soils in the Cantala, Dufur, Endersby, Hermiston, Maupin, Maupin variant, Walla Walla, Watama, and Wapinitia series. These soils are somewhat excessively drained and well drained silt loams and loams. Slopes are 0 to 7 percent. The annual precipitation is 10 to 14 inches. The frost-free period is 100 to 170 days at 32° F and 150 to 210 days at 28°.

Permeability is moderate, and the available water capacity is 7 to 15 inches. Water-supplying capacity is 5 to 13 inches. Typically, roots penetrate to a depth of 40 to 60 inches or more. Runoff is slow, and the hazard of erosion is slight.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in the spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce water erosion during the winter. At higher elevations early fall seeding is needed to ensure a stand. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Straw scattering at harvest is helpful in erosion control. Cloddy fallow and minimum tillage increases water intake and reduces soil erosion.

CAPABILITY UNIT II-1

The only soil in this capability unit is Pedigo silt loam. It is a somewhat poorly drained soil. Slopes are 0 to 3 percent. The annual precipitation is 10 to 13 inches. The frost-free period is 130 to 180 days at 32° F and 180 to 200 days at 28°.

Permeability is moderate, and the available water capacity is 10 to 11 inches. Water-supplying capacity is 9 to 13 inches. Typically, roots penetrate to a depth of more than 60 inches. Runoff is, slow, and the hazard of erosion is slight.

This soil is used for irrigated hay, pasture, dryfarmed grain, and wildlife habitat.

Irrigated alfalfa or alfalfa and grass is grown for hay, which is used for sale or winter feed. Some haylands are used for aftermath grazing in the fall. However, grazing is generally avoided to maintain the vigor of alfalfa. Hay is generally grown for 5 to 8 years and

then grain is grown the next year. Alfalfa generally needs annual application of sulfur or gypsum and, on some fields, phosphorus and boron. Soil tests can determine amounts needed. The first cutting of alfalfa should be done at the full bud stage, the second cutting at 1/10 to 1/2 bloom stage, and the third cutting 4 to 6 weeks before the last killing frost.

Irrigation water is available from streamflow until late in June, but in several areas dams impound water for use throughout the summer. Good irrigation water management is important. Irrigation methods include sprinkler, border, contour furrow, and wild flooding. Some fields adjoining streams need streambank protection.

A grain-fallow system of dryfarming is commonly used. In the flow year a seedbed is prepared in the spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed in some soils.

Several winter wheat varieties are suitable. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

CAPABILITY UNIT IIIe-1

This capability unit consists of soils in the Cantala, Dufur, Walla Walla, and Wamic series. These soils are well drained silt roams and loams. Slopes are 1 to 12 percent. The annual precipitation is 10 to 14 inches. The frost-free period is 100 to 170 days at 32° F and 160 to 210 days at 28°.

Permeability is moderate or moderately slow, and the available water capacity is 6 to 12 inches. Water-supplying capacity is 8 to 12 inches. Typically, roots penetrate to a depth of 40 to 60 inches or more. Runoff is slow or medium, and the hazard of erosion is slight or moderate.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the flow year a seedbed is prepared in the spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce water erosion during the winter. At higher elevations early fall seeding is needed to ensure a stand. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Straw scattering at harvest, cloddy fallow and minimum tillage, and contour farming are needed to keep soil erosion losses to less than about 4 to 6 tons per acre per year.

CAPABILITY UNIT IIIe-2

This capability unit consists of soils in the Chenoweth, Cherryhill, Van Horn, and Wind River series. These soils are well drained silt roams, fine sandy roams, and loams. Slopes are 7 to 20 percent. The annual precipitation is 14 to 30 inches. The frost-free period is 140 to 210 days at 32° F and 170 to 260 days at 28°.

Permeability is moderately rapid to moderately slow, and the available water capacity is 7 to 11 inches. Water-supplying capacity is 8 to 15 inches. Typically, roots penetrate to a depth of 40 to 60 inches or more. Runoff is medium, and the hazard of erosion is moderate.

These soils are used for fruit orchards, hay, pasture, and wildlife habitat.

Cover crops are used in orchards for erosion control and as a source of organic matter. An annual grain or mixed grain and legume cover crop is common, but some perennials are used where irrigation water is adequate. Spring mowing or disking reduces the cover crop and conserves soil moisture. The cover crop is fertilized as follows.

For mature bearing trees, 100 pounds per acre of nitrogen is applied late in winter and early in s ring in one application, 6 to 8 pounds of zinc in a spray, and 2 to 3 pounds of boron in a spray.

For trees less than 10 years old, 1/4 pound of nitrogen per tree is applied in a split application late in winter or early in spring and a second application in June.

Irrigated cherries are commonly planted in a diamond pattern. The trees are spaced 30 feet by 30 feet, and 66 trees can be planted per acre. Only 48 trees per acre can be planted in a square pattern at the same spacing.

Systematic pruning is practiced. Harvesting is mostly done by hand. Rigorous and timely spraying for cherry fruit fly and other insects and diseases is necessary.

CAPABILITY UNIT IIIe-3

The only soil in this capability unit is Sinamox silt loam, 1 to 7 percent slopes. It is a well drained soil. The annual precipitation is 10 to 12 inches. The frost-free period is 120 to 170 days at 32° F and 170 to 200 days at 28°.

Permeability is moderately slow, and the available water capacity is 5 to 11 inches. Water-supplying capacity is 6 to 9 inches. Typically, roots penetrate to a depth of 40 to more than 60 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce

water erosion during the winter. At higher elevations early fall seeding is needed to ensure a stand. Annual broadleaf weeds are generally controlled in fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Straw scattering at harvest, clod fallow and minimum tillage, and contour farming are needed to keep soil erosion losses to less than about 4 or 5 tons per acre per year.

CAPABIUTY UNIT IIIe-4

This capability unit consists of soils in the Cantala, Dufur, Walla Walla, Wamic, Watama, Wapinitia, and Wato series. These soils are well drained silt loams, loams, and very fine sandy loams. The frost-free period is 100 to 170 days at 32° F.

Permeability is moderately rapid to moderately slow, and the available water capacity is 6 to 12 inches. Water-supplying capacity is 6 to 14 inches. Typically, roots penetrate to a depth of 20 to more than 60 inches. Runoff is medium, and the hazard of erosion is moderate.

These soils are used for dryfarmed small grain, hay, pasture, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in the spring by plowing or by using dikes, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce water erosion during the winter. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Combinations of straw scattering at harvest, cloddy fallow and minimum tillage, diversion terraces where slopes are as much as 18 percent, contour farming, and as much as 1,700 pounds of crop residue per acre on the soil surface during winter are needed to keep soil erosion losses to less than about 4 or 5 tons per acre per year.

CAPABILITY UNIT IIIe-5

This capability unit consists of soils in the Anderly, Condom Duart, Maupin, Sinamox, Wamic, and Wapinitia variant series. These soils are well drained loams and silt loams. Slopes are 1 to 20 percent. The annual precipitation is 10 to 20 inches. The frost-free period is 100 to 170 days at 32° F.

Permeability is slow to moderate, and the available water capacity is 3 to 11 inches. Water-supplying capacity is 6 to 13 inches. Typically, roots penetrate to a depth of 20 to more than 60 inches. Runoff is slow or medium, and the hazard of erosion is slight or moderate.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in the spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce water erosion during the winter. At higher elevations early fall seeding is needed to ensure a stand. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Combinations of straw scattering at harvest, clod fallow and minimum tillage, diversion terraces, contour farming, and as much as 1,000 pounds of crop residue per acre on the soil surface during winter are needed to keep soil erosion losses to less than about 4 or 5 tons per acre per year.

CAPABILITY UNIT IIIe-6

This capability unit consists of soils in the Wato series. These soils are well drained very fine sandy loam. Slopes are 3 to 12 percent. The annual precipitation is 12 to 14 inches. The frost-free period is 150 to 170 days at 32° F and 170 to 210 days at 28 .

Permeability is moderately rapid, and the available water capacity is 6 to 10 inches. Water-supplying capacity is 7 to 10 inches. Typically, roots penetrate to a depth of 40 to more than 60 inches. Runoff is slow or medium. The hazard of water erosion is slight or moderate, and the hazard of soil blowing is moderate. Some areas are moderately eroded.

These soils are used for dryfarmed small grain, hay, pasture, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in the spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce water erosion during the winter. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Combinations of straw scattering at harvest, cloddy fallow and minimum tillage, diversion terraces, contour farming, and about 1,000 pounds of crop residue per acre on an established crop are needed on the soil surface at all times to keep water erosion and soil blowing losses to less than about 4 or 5 tons per acre per year.

CAPABILITY UNIT IIIe-7

This capability unit consists of soils in the Anderly and Sinamox series. These soils are well drained silt loams. Slopes are 12 to 20 percent. The annual precipitation is 10 to 14 inches. The frost-free period is 120 to 170 days at 32° F and 170 to 210 days at 28 .

Permeability is moderate or moderately slow, and the available water capacity is from 3 to 11 inches. Water-supplying capacity is 6 to 9 inches. Typically, roots penetrate to a depth of 20 to more than 60 inches. Runoff is medium, and the hazard of erosion is moderate.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in the spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce water erosion during the winter. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Combinations of straw scattering at harvest, cloddy fallow and minimum tillage, diversion terraces, contour farming, as much as 2,100 pounds of crop residue per acre on the soil surface over winter, or conversion to permanent pasture or hay are needed to keep soil erosion losses to less than about 4 or 5 tons per acre per year.

CAPABILITY UNIT IIIw-1

This capability unit consists of soils in the Quincy and Tygh series. These soils are loamy fine sands and fine sandy loams. They are subject to seasonal flooding or have a water table at a depth of 40 to 60 inches. Slopes are 0 to 3 percent. The annual precipitation is 10 to 20 inches. The frost-free period is 120 to 170 days at 32° F and 150 to 200 days at 28°.

Permeability is rapid or moderately rapid, and the available water capacity is 3 to 8 inches. Water-supplying capacity is variable and depends upon depth to the water table. Typically, roots penetrate to a depth of 40 to more than 60 inches. Runoff is slow, and the hazard of erosion is slight.

These soils are used for irrigated grain, hay, pasture, dryfarmed grain, and wildlife habitat.

Irrigated alfalfa or alfalfa and grass is grown for hay, which is used for sale or winter feed. Some haylands are used for aftermath grazing in the fall. However, grazing is generally avoided to maintain the vigor of alfalfa. Hay is generally grown for 5 to 8 years, and then grain is grown the next year. Alfalfa needs annual application of sulfur or gypsum and, on some fields, phosphorus and boron. Soil tests can determine amounts needed. The first cutting of alfalfa should be at the full bud stage, the second cutting at the 1/10 to 1/2 bloom stage, and the third cutting 4 to 6 weeks before the last killing frost.

Irrigation water is available from streamflow until late in June, but in several areas dams impound water for use throughout the summer. Good irrigation water management is important. Irrigation methods include sprinkler, border, contour furrow, and wild flooding. Some fields adjoining streams need. streambank protection, and some fields need protection against flooding. A water table confines roots to a depth of less than 40 to 60 inches unless additional drainage is provided.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in the spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

CAPABILITY UNIT IVe-1

This capability unit consists of soils in the Chenoweth, Cherryhill, Van Horn, and Wind River series. These soils are well drained loams, silt loams, and fine sandy loams. Slopes are 12 to 35 percent. The annual precipitation is 14 to 30 inches. The frost-free period is 140 to 210 days at 32° F.

Permeability is moderately slow to moderately rapid, and the available water capacity is 7 to 9 inches. Water-supplying capacity is 8 to 15 inches. Typically, roots penetrate to a depth of more than 60 inches. Runoff is medium or rapid, and the hazard of erosion is moderate or severe.

These soils are used for fruit orchards, pasture, range, and wildlife habitat.

Cover crops are essential in orchards for erosion control, and they also provide a source of organic matter. An annual grain or mixed grain and legume cover crop is common, but perennials are better suited for erosion control. If adequate irrigation water is available, mowing alone is sufficient to reduce the cover crop. Conservation of soil moisture is necessary in nonirrigated orchards. The cover crop is fertilized as follows.

For mature bearing trees, 100 pounds per acre of nitrogen is applied late in winter or early in spring in one application, 6 to 8 pounds of zinc in a spray, 2 to 3 pounds of boron in a spray.

For young trees less than 10 years old, 1/- pound of nitrogen per tree is applied in a split application late in winter or early in spring and a second application in June.

Irrigated cherries are commonly planted in a diamond pattern. The trees are spaced 30 feet by 30 feet, and 56 trees can be planted per acre. Only 48 trees per acre can be planted in a square pattern at the same spacing.

Systematic pruning is practiced. Harvesting is most-

ly done by hand. Rigorous and timely spraying for cherry fruit fly and other insects and diseases is necessary.

CAPABILITY UNIT IVe-2

This capability unit consists of soils in the Dufur, Walla Walla, Watama, and Wapinitia series. These soils are well drained silt loams. Slopes are 20 to 40 percent. The annual precipitation is 12 to 16 inches. The frost-free period is 120 to 170 days at 32° F and 170 to 200 days at 28°.

Permeability is moderate or moderately slow, and the available water capacity is 4 to 12 inches. Water-supplying capacity is 6 to 14 inches. Typically, roots penetrate to a depth of 20 to 60 inches. Runoff is rapid, and the hazard of erosion is severe.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in the ring by lowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce water erosion during the winter. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Combinations of straw scattering at harvest, cloddy fallow and minimum tillage, diversion terraces where slopes are as much as 18 percent, contour farming, and as much as 2,500 pounds of crop residue per acre on the soil surface during winter or conversion to permanent pasture or hay are needed to keep soil erosion losses to less than about 4 or 5 tons per acre per year.

CAPABILITY UNIT IVe-3

This capability unit consists of soils in the Cantata, Walla Walla, and Wato series. These soils are well drained silt loams and very fine sandy loams. Slopes are 20 to 35 percent. The annual precipitation is 10 to 14 inches. The frost-free period is 100 to 170 days at 32° F and 150 to 210 days at 28°.

Permeability is moderate or moderately rapid, and the available water capacity is 6 to 12 inches. Water-supplying capacity is 8 to 12 inches. Typically, roots penetrate to a depth of 40 to more than 60 inches. Runoff is rapid, and the hazard of erosion is severe.

These soils are used for dryfarmed small grain, hay, pasture, range, and wildlife habitat.

A grain-fallow system of dryfarming is commonly used. In the fallow year a seedbed is prepared in the spring by plowing or by using disks, sweeps, or chisels. Weeds are controlled and soil moisture is retained through the use of rod weeders. Nitrogen fertilizer is applied in the fallow year. Sulfur is needed on some soils.

Several winter wheat varieties are suitable. Early fall seeding provides extra cover and helps reduce water erosion during the winter. Annual broadleaf weeds are generally controlled in the fall or spring depending on weather, crops, and weed size. Perennial weeds are controlled by use of chemicals and mechanical practices. Grain is harvested in bulk, and the straw is scattered or dumped.

Combinations of straw scattering at harvest, cloddy fallow and minimum tillage, diversion terraces where slopes are as much as 18 percent, contour farming, and as much as 2,800 pounds of crop residue per acre on the soil surface over winter or conversion to permanent pasture or hay are needed to keep soil erosion losses to less than about 4 or 5 tons per acre per year.

CAPABILITY UNIT IVw-1

This capability unit consists of Cumulic Haplaquolls. These soils are nearly level, somewhat poorly drained, or poorly drained silt loams, loams, sandy loams, clay loams, and clays. The annual precipitation is 15 to 30 inches. The frost-free period is 100 to 180 days at 32° F and 180 to 210 days at 28 .

Permeability is moderate to slow, and the available water capacity and water-supplying capacity are variable depending upon texture and depth to water table. Typically, roots penetrate to a depth of 20 to more than 60 inches. These soils are occasionally flooded and are subject to channeling and washing. Runoff is slow, and the hazard of erosion is slight. These soils are subject to overflow and in places are ponded during months of high precipitation.

These soils are used for hay, pasture, range, and wildlife habitat.

Alfalfa and grass are grown for hay, which is used for sale or winter feed. Some haylands are used for aftermath grating in the fall. However, grazing is generally avoided to maintain the vigor of alfalfa. Hay is generally grown 5 to 8 years, and grain is grown the next year. Alfalfa generally needs an annual application of sulfur or gypsum and, on some fields, phosphorus and boron. Soil tests can determine amounts needed. The first cutting of alfalfa should be done at the full bud stage, the second cutting at the 1/10 to 1/2 bloom stage, and the third cutting 4 to 6 weeks before the last killing frost.

Irrigation water is available from streamflow until late in June, but in several areas dams impound water for use throughout the summer. Good irrigation water management is important. Irrigation methods include sprinkler, border, contour furrow, and wild flooding. Fields adjoining streams need streambank protection, and most fields need protection against flooding. A water table confines roots to a depth of less than 20 to 60 inches unless additional drainage is provided.

CAPABILITY SUBCLASS VIe

This capability subclass consists of soils in the Anderly, Bakeoven, Bins, Cherryhill, London, Duart, Frailey, Ketchly, Sherar, Sinamox, Skyline, Walla Walla, Wamic, and Warden series. These soils are well drained, and they formed in loess and volcanic ash and

in colluvium or residuum weathered from sandstone, conglomerate, and basalt. Slopes are 2 to 55 percent. The annual precipitation is 9 to 30 inches. The frost-free period is 50 to 180 days at 32° F and 90 to 200 days at 28°.

Permeability is slow to moderate, and the available water capacity is about 1 inch to 12 inches. Water-supplying capacity is 3 to 20 inches. Typically, roots penetrate to a depth of about 4 to more than 60 inches. Runoff is slow to rapid, and the hazard of erosion is slight to severe.

These soils are used for range, pasture, timber, wildlife habitat, and water supply. For use and management suggestions see the sections, "Range," "Wildlife," and "Woodland and Windbreaks."

CAPABILITY SUBCLASS VIs

This capability subclass consists of soils in the Bald and Bindle series. These soils are well drained, and they formed in volcanic ash and colluvium derived from basalt. Slopes are 1 to 45 percent. The annual precipitation is 20 to 30 inches. The frost-free period is 50 to 140 days at 32° F and 90 to 180 days at 28°.

Permeability is moderate, and the available water capacity is 2 to 7 inches. Water-supplying capacity is 12 to 20 inches. Typically, roots penetrate to a depth of 20 to 40 inches. Runoff is slow to rapid, and the hazard of erosion is slight to severe.

These soils are used for range, timber, wildlife habitat, and water supply. For use and management suggestions see the sections "Range," "Wildlife," and 'Woodland and Windbreaks."

CAPABILITY SUBCLASS VIIe

This capability subclass consists of soils in the Bins, Frailey, Ketchly, Nansene, Sherar, Sinamox, and Wamic series. These soils are well drained, and they formed in loess and volcanic ash and in colluvium or residuum weathered from sandstone, conglomerate, and basalt. Slopes are 30 to 70 percent. The annual precipitation is 10 to 30 inches. The frost-free period is 50 to 180 days at 32° F and 90 to 220 days at 28°.

Permeability is slow to moderate, and the available water capacity is 2 to 12 inches. Water-supplying capacity is 2 to 20 inches. Typically, roots penetrate to a depth of 20 to more than 60 inches. Runoff is rapid, and the hazard of erosion is severe.

These soils are used for range, timber, wildlife habitat, and water supply. For use and management suggestions see the sections "Range," "Wildlife," and "Woodland and Windbreaks."

CAPABILITY SUBCLASS VIIs

This capability subclass consists of soils in the Bakeoven, Bald, Bald variant, Bindle, Bodell, Condom Hesslan, Lickskillet, Maupin, Skyline, Watama, and Wrentham series and Rock outcrop. The soils are well drained, and they formed on uplands in loess and volcanic ash and in colluvium and residuum weathered from sandstone, and conglomerate, and basalt. Slopes range from 2 to 70 percent. The annual precipitation ranges from 10 to 30 inches. The frost-free period is 50 to 170 days at 32° F and 90 to 210 days at 28°.

Permeability is moderate or moderately slow, and the available water capacity is about 1 inch to 11 inches. Water-supplying capacity is about 3 to 20 inches. Typically, roots penetrate to a depth of about 4 to 40 inches. Runoff is slow to rapid, and the hazard of erosion is slight to severe.

These soils are used for range, timber, wildlife habitat, and water supply. For use and management suggestions see the sections "Range," "Wildlife," and "Woodland and Windbreaks."

CAPABILITY SUBCLASS VIIIe

This capability subclass consists only of Dune land. This land type consists of areas where westerly winds have drifted sand into small dunes. It is barren, and has little or no value for farming or grazing. Dune land is used for wildlife habitat.

CAPABILITY SUBCLASS VIIIs

This capability subclass consists of Rock outcrop. Rubble land complex and Rock outcrop-Xeropsamments complex. Rock outcrop-Rubble land complex consists of severely eroded areas and basalt cliffs that have stony or bouldery foot slopes. Slopes are mainly 30 to 100 percent. Rock outcrop-Xeropsamments complex is old scoured terraces along the Columbia River and consists of outcroppings of rock, sand, and gravel. Slopes are 0 to 30 percent. Most of the area is not accessible to livestock.

These complexes are used for wildlife habitat, for water supply, and as a source of material for roads and other construction.

CAPABILITY SUBSCLASS VIIIw

This capability subclass consists of Riverwash. Riverwash is subject to overflow and shifting during normal high water and has little or no value for farming.

Riverwash is used for wildlife habitat and as a source of material for roads and other construction.

Estimated yields

Table 2 shows estimated average yields per acre of selected crops for most soils in the survey area. Estimates are used on the most common combination of management practices used by most farmers and ranchers in Wasco County, Oregon, Northern Part. The estimated yields for dryfarmed wheat is for the year of harvest or every 2 years. It is based on data from Agricultural Stabilization and Conservation Service records for the determination of the 10-year cereal grain base. Most dryfarmed mapping units in the survey area are included in these records.

Estimated yields of cherries and apples are based on the records of farmers. The yield data for grass-legume hay are based on leaving a 50 percent stubble. These data are estimated from actual use records, clipping information, and observations.

In the original manuscript, there was a table in this space.
All tables have been updated and are available as a separate document.

Range

About 75 percent of the survey area is in two types of range, based on the sensitivity of the vegetation to climate. The western third of the survey area is dominated by Oregon white oak and coniferous trees. Oaks follow the flow of warm, moist air from the Columbia Gorge and south from The Dalles along the base of the Cascade Mountains for about 35 miles. The eastern part of the survey area is beyond this temperate influence, and bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass make up nearly 100 percent of the original plant community. South of Tygh Ridge, a more complex type of vegetation occurs. It consists of native bunchgrass, western juniper, big sagebrush, and bitterbrush. This area lies adjacent to the White River Game Management Area administered by the Oregon Wildlife Commission, and deer and elk use the area for winter range.

A significant ecological change in recent years is the increase of Oregon white oak. Because Oregon white oak sprouts following fire, it has replaced ponderosa pine in the more favorable soil areas. As a result, the original pine-oak savannahs have been replaced by young stands of "scrub" oak that now dominate much of the landscape from The Dalles south along the western portion of the survey area.

S. F. GREENFIELD, JR., range conservationist, Soil Conservation Service, helped prepare this section.

Range sites and condition classes

Soils that have the capacity to produce the same kinds, amounts, and proportions of range plants are grouped into range sites. A range site is the product of all environmental factors responsible for its development.

A plant community existing within a range site that has not undergone abnormal disturbance is the potential, or climax, plant community, for that site. Climax plant communities are not precise or fixed in their composition but vary, within reasonable limits, from year to year and from place to place.

Abnormal disturbance, such as overuse by livestock, excessive burning, erosion, or plowing, results in changes in the climax plant community or even its complete destruction if disturbance is drastic enough. When the range site has not deteriorated significantly under such disturbance, secondary plant succession

progresses in the direction of the natural potential or climax plant community for the site.

Four range condition classes are used to indicate the degree of departure from the potential, or climax, vegetation brought about by grazing or other uses. The classes show the present condition of the native vegetation on a range site in relation to the native vegetation that could grow there.

A range is in excellent condition if 76 to 100 percent of the vegetation is of the same kind as that in the climax stand. It is in good condition if the percentage is 51 to 75 ; in fair condition if the percentage is 26 to 50 ; and in poor condition if the percentage is less than 25.

When changes occur in the climax plant community due to use by livestock or disturbance, some plant species increase, others decrease. The species that increase or decrease depends upon the grazing animal, season of use, and the degree of utilization. By comparing the composition of the present plant community to the potential plant community, it is possible to see how individual species have increased while others decreased. Plants not present in the climax community which show up in the present plant community are invaders for the site.

The composition of climax and present plant communities together with other range site information provides the basis for selecting range management systems.

Management programs on range generally try to increase desirable plants and restore range to as near climax condition as possible. Some programs are designed to create or maintain plant communities somewhat removed from the climax to fit specific needs in the grazing program, to provide for wildlife habitat, or for other benefits. Any management objective should be compatible with conservation objectives.

Grazing of understory plants on forest land is compatible with timber management if it is controlled in a manner that maintains or enhances both timber and forage resources. However, there are several factors that affect forage production and grazing use. Tree spacing and canopy cover strongly influence both the composition and productivity of the understory. As the shade cast by tree canopies increases, productivity decreases and species that are not shade tolerant decrease in number or die. When forest cover is cut or burned, maximum forage production can occur for a number of years under proper treatment and management.

Environmental variations on forest land also influence plant composition and forage production. In this survey area, south-facing slopes and other less favorable tree-producing sites have good stands of forage bunchgrasses because of the more nearly open tree canopy. In the upper mountain areas, especially on north-facing slopes, the value for grazing is low because of the normally dense canopy cover and the heavy accumulation of fallen needles under the trees. Such a condition leaves only a sparse understory of shade-tolerant grasses and forbs.

Table 3 shows, for each soil, the range site; the total annual production in favorable, normal, and unfavorable years; and the names of major plant species and the percentage of each in the composition of the potential plant community.

A range site supports a distinctive potential plant community, or combination of plants, that can grow on a site that has not undergone major disturbance. Soils that produce the same kind, amount, and proportion of range plants are grouped into range sites. Range sites can be interpreted directly from the soil map where the relationships between soils and vegetation have been correlated. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on range plants and their productivity. Soil reaction, salt content, and a seasonal high water table are also important.

Potential production refers to the amount of vegetation that can be expected from a well-managed range that is supporting the potential plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. A favorable year is one in which the amount and distribution of precipitation and the temperature result in growing conditions substantial)y better than average; a normal year is one in which these conditions are about average for the area; an unfavorable year is one in which growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential plant community. All vegetation, both that which is highly palatable and that which is unpalatable to livestock, is included. Some vegetation also may be grazed extensively by wildlife and some of it may not. Plant species that have special value for livestock forage are mentioned in the description of each soil mapping unit.

Common names are listed for the grasses, orbs, and shrubs that make up most of the potential plant community on each soil. Under the heading "Composition" in table 3, the proportion of each species is presented as the percentage, in dry-weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the season when the forage is grazed. All of the vegetation produced is normally not used.

ROLLING HILLS RANGE SITE

This range site is on Anderly, Bakeoven, Cantala, Condom Duart, Dufur, Walla Walla, and Wato soils. It is in the eastern part of the survey area. These soils are well drained silt looms and very fine sandy looms that formed mostly in loess and volcanic ash on broad ridgetops and rolling uplands. They are nearly level to steep.

Elevation ranges from 300 to 3,600 feet. The average annual precipitation is 10 to 14 inches. Runoff is slow or medium, and the hazard of erosion is slight or moderate. Permeability is moderate or moderately rapid, and the water-supplying capacity is 6 to 12

inches. Roots penetrate to a depth of 20 to 60 inches or more. Major forage grasses begin to grow about March 20.

Where this site is in poor condition, big sagebrush and an understory of Sandberg bluegrass commonly increase in the stand. Bluebunch wheatgrass and Idaho fescue have been nearly eliminated. If deterioration is severe, cheatgrass, squirreltail, and annual weeds invade and dominate.

Special improvement measures are suited to most areas of this site. If the range is in fair and poor condition, spraying to control brush or cheatgrass and seeding grasses are practical. Where a reasonably good stand of perennial grasses is under the brush, spraying alone is practical.

SCABLAND RANGE SITE

This range site is on Bakeoven soils. It is mainly in the eastern and southern parts of the survey area. These soils are well drained. They have a surface layer of very cobbly loam or very stony loam, and a subsoil of very cobbly loam or very cobbly clay loam. They formed in loess and in residuum weathered from basalt on uplands. They are nearly level to moderately steep.

Elevation ranges from 1,600 to 3,600 feet. The average annual precipitation is 10 to 13 inches. Runoff is slow to rapid, and the hazard of erosion is slight or moderate. Permeability is moderately slow, and the water-supplying capacity is less than 2.5 inches. Roots penetrate to a depth of 4 to 12 inches. The major forage grass, Sandberg bluegrass, begins to grow about April 1. Some areas commonly have a distinctive pattern of circular mounds, or biscuits, surrounded by scabland (fig. 8).

Where this site is in poor condition, the already sparse stand of bunchgrasses has been nearly eliminated. Sandberg bluegrass is depleted, and stiff sagebrush and forbs have increased. If deterioration is severe, only bare ground, stones, and hedged sagebrush occupy the site.

Special improvement measures generally are not suited to this site. Stiff sagebrush is a natural part of the plant community and provides valuable forage late in fall, in winter, and early in spring. Brush spraying should be avoided to protect the stiff sagebrush.

In areas of this range site in the southern part of the survey area south of Tygh Valley, western juniper has a canopy cover of 5 to 10 percent. These areas are in a 12- to 16-inch precipitation zone. The vegetation consists of Sandberg bluegrass, 45 percent; bluebunch wheatgrass, 2 percent; Thurber needlegrass, 2 percent; Oregon bluegrass, 5 percent; squirreltail, 2 percent; lomatium, 2 percent; snow eriogonum, 5 percent; western juniper, 35 percent; and other shrubs, 2 percent.

DROUGHTY SOUTH EXPOSURE RANGE SITE

This range site is on Anderly, Duart, Lickskillet, and Walla Walla soils. It is in the eastern part of the survey area. These soils are well drained silt loams and very stony loams that formed in loess, volcanic ash, and mixed colluvium. They are steep and very steep and have south-facing slopes. They are on uplands. Elevation ranges from 200 to 2,800 feet. The average annual precipitation is 10 to 14 inches. Runoff is rapid, and the hazard of erosion is severe. Permeability is moderate, and the water-supplying capacity is 2 to 12 inches. Roots penetrate to a depth of 12 to 60 inches or more. Major forage grasses begin to grow about March 1.

Where this site is in poor condition, the perennial bunchgrasses have been nearly eliminated. Squirreltail and a small amount of bluebunch wheatgrass are in some protected places, such as under the brush or in rocky areas. If deterioration is severe, big sagebrush,



Figure 8: Scabland range site is in foreground (biscuit part is Condon soil). The cultivated field in the center is Condon silt loam, 2 to 20 percent slopes. Scabland range site is in near background, and Rolling Hills range site is in far background.

snakeweed, and rabbitbrush become dominant and annual grasses and weeds invade the site.

Special improvement measures generally are suited to this site. If the range is in poor condition, spraying to control brush and seeding grasses are practical. However, drill seeding on the very stony Lickskillet soil is hard on equipment and is not considered practical. Where brush control is a concern and a reasonably good stand of grass is under the brush, spraying alone can be the most practical way of returning this site to optimum production.

DROUGHTY STEEP SOUTH RANGE SITE

This range site is on Lickskillet and Sherar soils. It is mainly on the breaks of the Deschutes River along the eastern boundary of the survey area. These soils are well drained extremely stony loams and very cobbly loams that formed in loess and colluvium. They are very steep and have south-facing slopes. They are on uplands (fig. 9). Elevation ranges from 200 to 300 feet. The average annual precipitation is 10 to 13 inches. Runoff is rapid, and the hazard of erosion is severe. Permeability is slow to moderate, and the water-supplying capacity is 2 to 5 inches. Roots penetrate to a depth of 12 to 40 inches. Major forage grasses begin to grow about February 20.

Where this site is in poor condition, broom snakeweed, rabbitbrush, and big sagebrush have nearly replaced the stand of forage bunchgrasses. Cheatgrass and low-value forbs are dominant. If deterioration is severe, much of the ground is bare and rocky.

Special improvement measures generally are not suited to this site because the soils are steep, extremely stony or very cobbly, and very droughty.

SOUTH EXPOSURE RANGE SITE

This range site is only on Bodell cobbly loam, 5 to 45 percent slopes. It is mainly in the northwestern part of the survey area. This soil is well drained. It formed in loess, volcanic ash, and basalt colluvium. It is nearly level to steep and has south-facing slopes. It is on uplands. Elevation commonly ranges from 500 to 2,500 feet. The average annual precipitation is 20 to 30 inches. Runoff is slow to rapid, and the hazard of erosion is slight to severe. Permeability is moderate, and the water-supplying capacity is 4 to 7 inches. Roots penetrate to a depth of 12 to 20 inches. Major forage grasses begin to grow about March 1.

Where this site is in poor condition, cheatgrass and a variety of forbs have nearly replaced the stand of perennial bunchgrasses. If deterioration is severe, annual forbs and low-value grasses dominate, and the site takes on a weedy appearance.

Special improvement measures generally are not suited to this site because the soil is stony and shallow.



Figure 9: Lickskillet extremely stony loam, 40 to 70 percent slopes, in Droughty Steep South range site.

STEEP SOUTH RANGE SITE

This range site is only on Bodell very cobbly loam, 45 to 75 percent slopes. It is mainly in the northwestern part of the survey area. This soil is well drained, and it formed in loess, volcanic ash and in basalt colluvium. It is very steep and has south-facing slopes. It is on uplands. Elevation commonly ranges from 500 to 2,500 feet. The average annual precipitation is 20 to 30 inches. Runoff is rapid, and the hazard of erosion is high. Permeability is moderate and the water-supplying capacity is 4 to 7 inches. Roots penetrate to a depth of 12 to 20 inches. Major forage grasses begin to grow about March 1.

Where this soil is in poor condition, cheatgrass and a variety of forbs have nearly replaced the stand of perennial bunchgrasses. If deterioration is severe, annual forbs and low-value grasses dominate and the site takes on a weedy appearance.

Special improvement measures are not suited to this site because it is steep, stony, and shallow.

DROUGHTY NORTH EXPOSURE RANGE SITE

This range site is on Cantala, Dufur, Sinamox, Walla Walla, and Wato soils. It is in the eastern part of the survey area. These soils are well drained silt loams and very fine sandy loams that formed in loess, volcanic ash, and alluvium. They have north-facing slopes and are on uplands.

Elevation ranges from 800 to 3,000 feet. The average annual precipitation is 10 to 14 inches. Runoff is medium or rapid, and the hazard of erosion is moderate or high. Permeability is moderate or moderately slow, and the water-supplying capacity is 6 to 12 inches. Roots penetrate to a depth of 40 to more than 60 inches. Major forage grasses begin to grow about March 1.

Where this site is in poor condition, the forage bunchgrasses are low in vigor and widely spaced. The mulch layer of lichens and mosses that protected the surface layer has been destroyed and bare ground is exposed. During deterioration, bluebunch wheatgrass, temporarily increases and dominates in places because selective summer grazing by cattle and heavy use by sheep or deer deplete the stand of Idaho fescue. If deterioration is severe, snakeweed, annual grasses, and brush are prominent.

Special improvement measures are suited to this site. If the range is in poor condition, spraying to control brush and seeding grasses are practical. Were a reasonably good stand of grass is under the brush spraying alone can be the most practical way of re turning the site to optimum production.

NORTH EXPOSURE RANGE SITE

This range site is on Cantala, Dufur, Walla Walla Watama, Wapinitia, and Wato soils. It is in the eastern part of the survey area. These soils are well drained silt loams and very fine sandy loams that former mainly in loess and volcanic ash. They are steep and have north-facing slopes. They are on uplands.

Elevation ranges from 1,000 to 3,600 feet. The average annual precipitation is 10 to 16 inches. Runoff is rapid, and the hazard of erosion is severe. Permeability is moderate or moderately slow, and the water-supplying capacity is 6 to 14 inches. Roots penetrate to a depth of 20 to 60 inches. Major forage grasses begin to grow about March 15.

Where this site is in poor condition, the forage bunchgrasses are low in vigor and widely spaced. The mulch layer of lichens and mosses that protected the surface layer is destroyed and bare ground is exposed. Sandberg bluegrass and perennial forbs are prominent in the stand. During deterioration, bluebunch wheatgrass temporarily increases and dominates in places because selective summer grazing by cattle and heavy use by sheep or deer deplete the stand of Idaho fescue. If deterioration is severe, the site becomes weedy and brushy.

Special improvement measures generally are suited to this site. If the range is in poor condition and a reasonable stand of grass is under the brush, spraying to control brush can be the most practical way of returning the site to optimum production.

STEEP NORTH RANGE SITE

This range site is on Nansene, Sinamox, and Wrentham soils. It is in the eastern part of the survey area. These soils are well drained silt loams that formed in loess and mixed colluvium. They are steep or very steep and have north-facing slopes. They are on uplands.

Elevation ranges from 300 to 3,600 feet. The average annual precipitation is 10 to 13 inches. Runoff is rapid, and the hazard of erosion is severe. Permeability is moderate, and the water-supplying capacity is 6 to 12 inches. Roots penetrate to a depth of 20 inches to more than 60 inches. Major forage grasses begin to grow about April 1.

Where this site is in poor condition, the forage bunchgrasses are low in vigor and widely spaced. The mulch layer of lichens and mosses that protected the surface layer has been destroyed and bareground is exposed. Sandberg bluegrass and perennial forbs are prominent. During deterioration, bluebunch wheatgrass temporarily increases and dominates the site in places because selective summer grazing by cattle and heavy use by sheep and deer deplete the stand of Idaho fescue. If deterioration is severe, sagebrush and cheatgrass invade strongly and the site becomes weedy and brushy.

Special improvement measures generally are not suited to this site because the soils are steep. However, if the range is in poor condition and a reasonable stand of grass is under the brush, spraying to control brush on the more gently sloping soils is practical.

SHRUBBY ROLLING HILLS RANGE SITE

This range site is on Maupin, Maupin variant, Sinamox, Watama, Wapinitia, and Wapinitia variant soils. It is in the southern part of the survey area south of Tygh Ridge. These soils are well drained loams and silt loams that formed in volcanic ash and in colluvium They are nearly level to moderately steep and are on uplands.

Elevation ranges from 1,500 to 3,400 feet. The aver-

age annual precipitation is 10 to 16 inches. Runoff is slow or medium, and the hazard of erosion is slight or moderate. Permeability is moderate or moderately slow, and the water-supplying capacity is 6 to 14 inches. Roots penetrate to a depth of 20 to 60 inches. Major forage grasses begin to grow about March 15.

Where this site is in poor condition, bluebunch wheatgrass and Idaho fescue have been nearly eliminated from the stand. Bitterbrush is commonly hedged, and dead plants occur. Low-value shrubs increase, and juniper from adjacent areas invade the site in places. If deterioration is severe, annual weeds invade the areas of shallow and eroded soils.

Special improvement measures are suited to this site. If the range is in poor condition, clearing the juniper or spraying to control brush and seeding grasses are practical. Where brush is the concern and a reasonably good stand of grass is under the brush, spraying alone can be the most practical way of returning this site to optimum production. Plans for manipulating brush should consider the amount and value of existing bitterbrush and other forage shrubs.

In the area south of Tygh Valley in the southern part of the survey area, Maupin and Watama soils in this range site are mapped in complexes with Bakeoven soils (see Scabland range site description). For the percentages of Maupin and Watama soils in these mapping units, see descriptions of the mapping units.

SHRUBBY SOUTH EXPOSURE RANGE SITE

This range site is on Sherar cobbly loam, 5 to 45 percent slopes. It is in the southern part of the survey area, south of Tygh Ridge. These soils are well drained cobbly loams that formed in loess and colluvium. They have south-facing slopes and are on uplands.

Elevation ranges from 1,500 to 2,500 feet. The average annual precipitation is 10 to 12 inches. Runoff is medium or rapid, and the hazard of erosion is moderate or severe. Permeability is slow, and the water-supplying capacity is 2 to 5 inches. Depth to very gravelly semiconsolidated tuff is 20 to 40 inches. Major forage grasses begin to grow about March 1.

Where this site is in poor condition, the forage bunchgrasses are low in vigor and widely spaced and matchweed, big sagebrush, and rabbitbrush are prominent. If deterioration is severe, the site becomes brushy and weedy. Bitterbrush and other forage shrubs are hedged, and dead plants occur.

Special improvement measures are suited to this site. If the range is in poor condition, reducing the brush and seeding grasses are practical. Where a reasonable stand of grass is under the brush, spraying for selective reduction of sagebrush and rabbitbrush can be the most practical way of returning the site to optimum production. Plans for manipulating brush should consider the amount and value of existing forage shrubs.

SILTY TERRACE RANGE SITE

This range site is on Warden silt loam, 5 to 40 percent slopes. It is commonly on terraces along the Deschutes River another places in the eastern part of the survey area. This well drained soil formed in loess and lacustrine silt. It is gently sloping on bench terraces and terrace fronts.

Elevation ranges from 600 to 1,000 feet. The average annual precipitation is 9 to 10 inches. Runoff is slow or medium, and the hazard of erosion is slight to severe. Permeability is moderate, and the water-supp1ying capacity is 6 to 9 inches. Roots penetrate to a depth of 40 to more than 60 inches. Major forage grasses begin to grow about March 1.

Where this site is in poor range condition, big sagebrush and gray rabbitbrush have nearly replaced the stand of bluebunch wheatgrass. If deterioration is severe, cheatgrass and annual weeds replace the perennial forbs and grasses.

Special improvement measures are well suited to this site. Where the range is in fair and poor condition, reducing brush and seeding drought-resistant grasses is practical. Where a reasonably good stand of perennial grasses remains under the brush, spraying alone may be the most practical way of returning this site to optimum condition.

SEMI-MOIST BOTTOM RANGE SITE

This range site is on Endersby, Hermiston, Quincy, and Tygh soils. These soils are well drained to somewhat poorly drained loams, silt loams, loamy fine sands, and fine sandy loams that formed mostly in alluvium. They are nearly level and are on bottom lands.

Elevation ranges from 200 to 2,500 feet. The average annual precipitation is 10 to 20 inches. Runoff is slow, and the hazard of erosion is slight. Some of the soils are subject to flooding and have a high water table, and the hazard of streambank erosion is high. Permeability is moderate or moderately rapid, and the water-supplying capacity is about 9 to 13 inches. Roots penetrate to a depth of 40 to more than 60 inches. Major forage grasses begin to grow about March 15.

Where this site is in poor condition, big sagebrush and rabbitbrush have nearly replaced the stand of giant wildrye. If deterioration is severe, the site becomes very brushy or very weedy and much ground is left bare.

Many areas of this site are in irrigated hay or pasture, but special improvement measures are suited to this site if it is not used for crops. Streamside vegetation, especially shrubs and giant wildrye, is important to streambank stabilization and wildlife cover, and it should be taken into account when planning management.

ALKALINE BOTTOM RANGE SITE

This range site is only on Pedigo silt loam. It is along drainageways in the eastern part of the survey area. This soil is somewhat poorly drained. It formed in alluvium from loess and some volcanic ash washed from uplands. It is nearly level and is on bottom lands.

Elevation ranges from 200 to 2,700 feet. The average annual precipitation is 10 to 13 inches. Runoff is slow, and the hazard of erosion is slight. However, during periods of high streamflow, the hazard of streambank erosion is severe in several places. Permeability is

moderate, and the water-supplying capacity is 9 to 13 inches. Roots penetrate to a depth of more than 60 inches. Major forage grasses begin to grow about April 1.

any areas of this site are in irrigated hay or pasture, but special improvement measures are well suited to this site if it is not used for crops. Streamside vegetation, especially giant wildrye and riparian shrubs, is important to streambank stabilization and wildlife cover, and it should be taken into account when planning management.

OAK SOUTH EXPOSURE RANGE SITE

This range site is on Cherryhill and Wamic soils. It is in the northwestern part of the survey area. These soils are well drained loams and silt loams that formed in loess, volcanic ash, colluvium, and alluvium. They are nearly level to very steep and have south-facing slopes. They are on uplands.

Elevation commonly ranges from 500 to 2,000 feet. The average annual precipitation is 14 to 20 inches. Runoff is medium or rapid, and the hazard of erosion is moderate to severe. Permeability is moderately slow, and the water-supplying capacity is 8 to 12 inches. Roots penetrate to a depth of 40 to more than 60 inches. Major forage grasses begin to grow about March 15.

Where this site is in poor condition, oaks and such perennial forbs as arrowleaf balsamroot and lupine have severely reduced the stand of forage bunchgrasses. If deterioration is severe, cheatgrass and other low-value plants dominate the understory.

Most areas of Cherryhill soils are in fruit orchards or other crops, but special improvement measures generally are suited to this site if it is not cultivated. Where the range has been burned, oak becomes more dense and reproduction is more profuse. After a fire, it is practical to broadcast seed of suitable plants before fall rains settle the seedbed. A major objective of seeding is to stabilize the soil and prevent excessive oak reproduction. The site provides important aesthetic values. Habitat for wildlife should be taken into account when planning management.

OAK STEEP SOUTH RANGE SITE

This ran e site is on Skyline and Hesslan soils. It is mainly in the no western part of the survey area. These soils are well drained stony loams and very cobbly loams that formed in loess, volcanic ash, and colluvium. They are nearly level to very steep and have south-facing slopes. They are on uplands.

Elevation commonly ranges from 1,000 to 3,500 feet. The average annual precipitation is 14 to 20 inches. Runoff is moderate or rapid, and the hazard of erosion is moderate or severe. Permeability is moderate. In the Skyline soils, roots penetrate to a depth of 12 to 20 inches and the water-supplying capacity is 6 to 9 inches. In the Hesslan soils, roots penetrate to a depth of 20 to 40 inches and the water-supplying capacity is 5 to 7 inches. Major forage grasses begin to grow about March 15.

Where this site is in poor condition, cheatgrass, annual weeds, and other shallow-rooted plants have replaced the stand of tall bunchgrasses. If deterioration is severe, much ground is left bare.

Special improvement measures are not suited to this site because the soils are steep and stony or cobbly.

OAK STEEP NORTH RANGE SITE

This range site is on Hesslan soils of the Skyline-Hesslan complex, 30 to 70 percent slopes. It is mainly in the northwestern part of the survey area. These are well drained stony loams that formed in loess, volcanic ash, and colluvium. They are steep or very steep and have north-facing slopes. They are on uplands.

Elevation commonly ranges from 1,000 to 3,000 feet. The average annual precipitation is 14 to 20 inches. Runoff is rapid, and the hazard of erosion is high. Permeability is moderate, and the water-supplying capacity is 6 to 7 inches. Roots penetrate to a depth of 20 to 40 inches or more. Major forage grasses begin to grow about April 1.

Where this site is in poor condition, oaks and such perennial forbs as lupine and arrowleaf balsamroot have severely reduced the stand of forage bunchgrasses. If deterioration is severe, cheatgrass and other plants of low-forage value dominate the understory.

Special improvement measures are not suited to this site because the soils are steep and stony. Where the range has burned, dense stands of oak occur. After fire it is practical to broadcast seed suitable plants before fall rains settle the seedbed. A major objective of seeding is to stabilize the soil and prevent excessive oak regeneration. This site also provides important forage and cover for deer and other wildlife, which needs to be taken into account when planning management.

OAK-PINE STEEP SOUTH RANGE SITE

This range site is on Bald very cobbly loam, 45 to 75 percent slopes. It is in the northwestern part of the survey area. This soil is well drained, and it formed in loess, volcanic ash, and basalt colluvium. It is very steep and has south-facing slopes. It is on uplands.

Elevation commonly ranges from 200 to 3,000 feet. The average annual precipitation is 25 to 30 inches. Runoff is rapid, and the hazard of erosion is high. Permeability is moderate, and the water-supplying capacity is 12 to 15 inches. Roots penetrate to a depth of 20 to 40 inches. Major forage grasses begin to grow about March 1.

Where this site is in poor condition, cheatgrass and other shallow-rooted plants occupy the openings. Also, perennial forbs, shrubs, and white oak reproduction have reduced, the stand of forage bunchgrasses. If deterioration is severe, much ground is left bare.

Special improvement measures are not suited to this site because this soil is very steep and very cobbly.

PINE•OAK•FESCUE RANGE SITE

This range site is on Chenoweth, Cherryhill, Van Horn, Wamic, and Wind River soils. Wamic soils are along the western part of the survey area, and they sometimes occur as small hummocks interspersed with areas of shallow and very stony scabland. The other

soils are in the northwestern part of the survey area. These soils are well drained loams, silt loams, and fine sandy loams that formed in loess, volcanic ash, and alluvium. They are on ridgetops and on uplands. They are nearly level to steep.

Elevation commonly ranges from 100 to 2,500 feet. The average annual precipitation is 14 to 30 inches. Runoff is slow to rapid, and the hazard of erosion is slight to severe. Permeability is moderately slow to moderately rapid, and the water-supplying capacity is 8 to 14 inches. Roots penetrate to a depth of 40 to more than 60 inches. Major forage grasses begin to grow about March 15.

Where this site is in poor condition, the competition from dense shrub and oak reproduction severely reduces the stand of understory plants, especially grasses. If deterioration is severe, cheatgrass and other low-value plants dominate and much soil is bare.

Many areas of the site are used for fruit orchards or other crops, but in uncultivated areas, special management is suited to this site to improve plant resources. Where the range has been cut over or burned, oak reproduction and shrub growth occur in a dense stand. After a fire, it is practical to broadcast seed suitable plants before fall rains settle the seedbed. A major objective of seeding is to stabilize the soil and prevent excessive oak and shrub reproduction. This site provides important aesthetic values, habitat for wildlife, and is a component of the deer and elk winter range in this area. These considerations need to be taken into account when planning management alternatives.

Shallow and very cobbly Skyline soils interspersed with the deeper Wamic soils are also in this site. They are in a complex pattern, and it was not practical to separate them. Only the Wamic soils should be considered when evaluating forage production for the site. For the percentage of each soil refer to the mapping unit description for Wamic-Skyline complex, 2 to 20 percent slopes.

PINE-DOUGLAS FIR-SEDGE RANGE SITE

This range site is on Bald, Cherryhill, Frailey, and Wamic soils. Bald and Cherryhill soils are in the northwestern part of the survey area. Frailey and Wamic soils are along the western part of the survey area. These soils are well drained silt loams, loams, and cobbly loams that formed in loess, volcanic ash, colluvium, and alluvium. Slopes are 5 to 70 percent. The soils are on uplands.

Elevation ranges from 500 to 3,000 feet. The average annual precipitation is 14 to 30 inches. Runoff is slow to rapid, and the hazard of erosion is slight to severe. Permeability is moderately slow or moderate, and the water-supplying capacity is 8 to 15 inches. Roots penetrate to a depth of 20 to 60 inches. Major forage grasses begin to grow about March 15 in most areas.

In the absence of fire and where ponderosa pine has been logged from the stand, the more shade-tolerant Douglas-fir has increased in abundance and dominates many of the present stands. As the understory deteriorates, elk sedge and other forage bunchgrasses lose vigor and decrease in the stand. If deterioration is severe, the more densely shaded areas have only a few spindly shrubs, scattered forbs, and an occasional spear of grass.

Where this site has been severely cut over or burned, shrubs of many kinds increase in vigor and abundance, and the range can produce a considerable amount of forage for a number of years. After fire or logging, it is practical to broadcast seed suitable plants in disturbed areas before fall rains settle the seedbed. A major objective of seeding is to stabilize the soil and prevent excessive shrub reproduction. This site provides important forage and cover for deer and elk, which need to be taken into account when planning management.

Woodland and Windbreaks

In this section, the relationship between soils and trees is described. Interpretations useful to landowners and operators in developing and carrying out plans for establishment and management of tree crops (fig. 10) and windbreaks are given.

Forests cover about 65,000 acres, or 12 percent of the survey area. About 35 percent is owned by farmers, 37 percent is privately owned, 23 percent is owned by the forest industry, and 5 percent is owned by Federal and local governments.

The principal forest cover types (9) include inland Douglas-fir, ponderosa pine, and western juniper.

Woodland management and productivity

Table 4 contains information useful to woodland owners or forest managers planning the use of soils for wood crops. Those soils suitable for wood crops are listed, and the woodland group for each soil is given. All soils in the same woodland group require the same general kinds of management and have about the same potential productivity.

The first part of the woodland group, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *f* indicates high content of coarse fragments in the soil profile, and *r*, steep slopes.. The letter *o* indicates no significant limitations or restrictions.

In table 4 the soils are also rated for a number of factors to be considered in management. The ratings slight, moderate, and severe are used to indicate the degree of major soil limitations.

The hazard of erosion indicates the risk of loss of soil in well-managed woodland. The risk is *slight* if the expected soil loss is small; *moderate* if some measures are needed to control erosion during logging and road construction; and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

JAMES T. BEENE, forester, Soil Conservation Service, helped prepare this section.



Figure 10: Thinning mixed pine and fir stand on Wamic loam, 12 to 20 percent slopes.

Equipment limitation ratings reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor. The ratings are for seedlings from good planting stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than *25* percent; *moderate*, *25* to *50* percent; and *severe*, more than *50* percent.

Plant competition ratings indicate the degree to which undesirable pants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The *potential productivity* of merchantable trees on a soil is expressed as *a site index.* This index is the average height, in feet, of the dominant and codominant Douglas-fir trees at the age of *50* years (4) and ponderosa pine at 100 years. The site index applies to fully stocked, even-aged, unmanaged stands. Conversion of site index into yield may be made by referring to table *5* and 6.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Windbreaks

Windbreaks are established to protect livestock, buildings, and yards from winds and snow (13). Windbreaks also help protect fruit trees and gardens,

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All tables have been updated and are available as a separate document..

and they furnish habitat for wildlife. Several rows of both broadleaved and coniferous species provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field, the interval depending on erodibility of the soil. They protect cropland and crops from wind and hold snow on the fields, and they also provide food and cover for wildlife.

Some plants help to beautify and screen homes and other buildings and to abate noise around them. The plants, mostly evergreen shrubs and trees, are closely spaced. Healthy planting stock of suitable species planted properly on a well prepared site and maintained in good condition can ensure a high degree of plant survival.

Windbreak groups

Most soils of the survey area have been placed in one of two windbreak groups. Timbered soils, steep soils, and shallow soils are excluded.

WINDBREAK GROUP 1

This group consists of well drained to poorly drained silt loams, loams, fine sandy loams, and loamy fine sands. These soils are on uplands, fans, and alluvial bottoms. Slopes are mainly 0 to 30 percent. The native vegetation is grasses, forbs, shrubs, and some oaks and ponderosa pine. The average annual precipitation is about 10 to 30 inches. Runoff is slow to rapid, and the hazard of erosion is slight to severe.

Successful dryland plantings require careful site preparation and clean cultivation. Irrigated windbreaks need to be cultivated in early years of establishment to the degree that competing vegetation does not seriously impede survival or growth of windbreak species.

The suited deciduous trees are black locust and Russian-olive. The suited shrubs are common lilac, caragana, Amur honeysuckle, and Tatarian honeysuckle. The suited evergreens are Rocky Mountain juniper, Austrian pine, Scotch pine, and ponderosa pine. Junipers are hosts to the cedar-apple rust disease and, consequently, should not be planted in areas of apple orchards.

Lombardy poplar, hybrid poplar, Douglas-fir, black willow, mountain ash, and Nanking cherry are suited where precipitation is more than about 15 inches or where the soils are irrigated.

WINDBREAK GROUP 2

This group consists of well drained silt loams, loams, and very fine sandy loams on uplands. Slopes are mainly 0 to 40 percent. The native vegetation is grasses and forbs. The average annual precipitation is about 9 to 16 inches. Runoff is slow or medium, and the hazard of erosion is slight or moderate. Most roots penetrate to a depth of 20 to 60 inches or more.

The soils in this group receive less precipitation than soils in group 1 and, consequently, windbreaks generally are more difficult to establish. Height, grow, and general development is slower. Planting sites need summer fallowing the year prior to planting, careful site preparation before planting, and clean cultivation throughout the life of the windbreak unless irrigated.

The suited deciduous trees are black locust and Russian-olive. The suited shrubs are common lilac and caragana. The suited evergreens are ponderosa pine and Rocky Mountain juniper.

Lombardy poplar, hybrid poplar, Douglas-fir, black willow, mountain ash, and Nanking cherry are also suited if irrigated.

Wildlife

All of the soils in the survey area are suited to and support habitat for one or more species of wildlife. This survey area embraces an area which includes the transition from arid grasslands to heavily timbered slopes on the side of Mt. Hood (fig. 11). Elevations range from 100 to 3,600 feet. The average annual

ROBERT A. CORTHELL, biologist, Soil Conservation Service, helped prepare this section.



Figure 11: Mule deer grazing in an open, grassy area. The soils are mostly Bakeoven, Condon, Lickskillet, and Wrentham soils.

precipitation ranges from 9 inches to more than 30 inches.

The transition from arid grassland to woodland has produced rich and varied plant communities which provide habitat for many kinds of wildlife. For example, oak and pine trees are common, and they are among the most valuable trees for wildlife. The distribution of wildlife has also been influenced by the proximity of the Columbia River Gorge which has allowed western Oregon species such as the black-tailed deer and the band-tailed pigeon to become established in the survey area on the east slope of the Cascade Mountain range. Species of wildlife that are not native to the area, such as ring-necked pheasant, chukar partridge, wild turkey, California quail, and Hungarian partridge, have been introduced and have found suitable habitat within the survey area.

Perennial streams which drain the survey area provide habitat for rainbow trout and steelhead trout. Fishpond construction has generally been limited by unfavorable soil characteristics, and fish production is only fair when ponds are constructed.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the development of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, inadequate, or inaccessible, wildlife either is scarce or does not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by properly managing the existing pant cover, and by fostering the natural establishment of desirable plants.

In table 7 the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in

1. Planning the use of parks, wildlife refuses, nature study areas, and other developments for wildlife.
2. Selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat.
3. Determining the intensity of management needed for each element of the habitat.
4. Determining areas that are suitable for acquisition to manage for wildlife.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderate intensity of management and fairly frequent attention are required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils that have such a rating.

The elements of wildlife are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. Examples are wheat, oats, and barley. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes used by wildlife for food and cover. Examples are fescue, bluegrass, bromegrass, timothy, orchardgrass, clover, alfalfa, and vetch. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and moisture are also considerations.

Wild herbaceous plants are native or naturally established herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are balsamroot, goldenrod, beggarweed, big bluegrass, Sandberg bluegrass, wheatgrass, fescue, and milkvetch. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the sur-

face layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and moisture are also considerations.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Examples of native plants are Oregon white oak, cherry, apple, dogwood, sumac, blackberry, Oregon-grape, blueberry, and briers. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated good are Russian-olive and multiflora rose. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are pine, spruce, hemlock, fir, and juniper. Major soil properties that affect the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Shrubs are bushy woody plants that produce fruits, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Examples are mountainmahogany, bitterbrush, snowberry, and big sagebrush. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, and moisture.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are wild millet, rushes, sedges, reeds, cordgrass, and cattail. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness.

Shallow water areas are bodies of surface water that have an average depth of less than 5 feet and are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadow, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include dove, quail, pheasant, meadowlark, field sparrow, killdeer, cottontail rabbit, and partridge.

Woodland habitat consists of hardwoods or conifers or a mixture of both, with associated grasses, legumes, and wild herbaceous plants. Examples of wildlife attracted to this habitat are wild turkey, ruffed grouse, blue grouse, mountain quail, band-tailed pigeon, tree squirrels, raccoon, deer, elk (fig. 12), and black bear. Tygh and Endersby soils are in the bottom land and Hesslan, Skyline, and Frailey soils occupy the steep slopes.

Wetland habitat consists of water-tolerant plants in open, marshy, or swampy shallow water areas. Examples of wildlife attracted to this habitat are ducks, geese, herons, kingfishers, muskrat, and beaver.

Rangeland habitat consists of wild herbaceous plants and shrubs on range. Examples of wildlife attracted to this habitat are deer, chukar, California and mountain quail, meadowlark, Hungarian partridge, and dove.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for camp areas, picnic areas, playgrounds, and paths and trails. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreational use by the duration of flooding and the season when it occurs. Onsite assessment of height, duration, and frequency of flooding is essential in planning recreational facilities.

In table 8 the limitations of soils are rated as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by additional information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 10.

Camp areas require such site preparation as shaping and leveling tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet nor subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

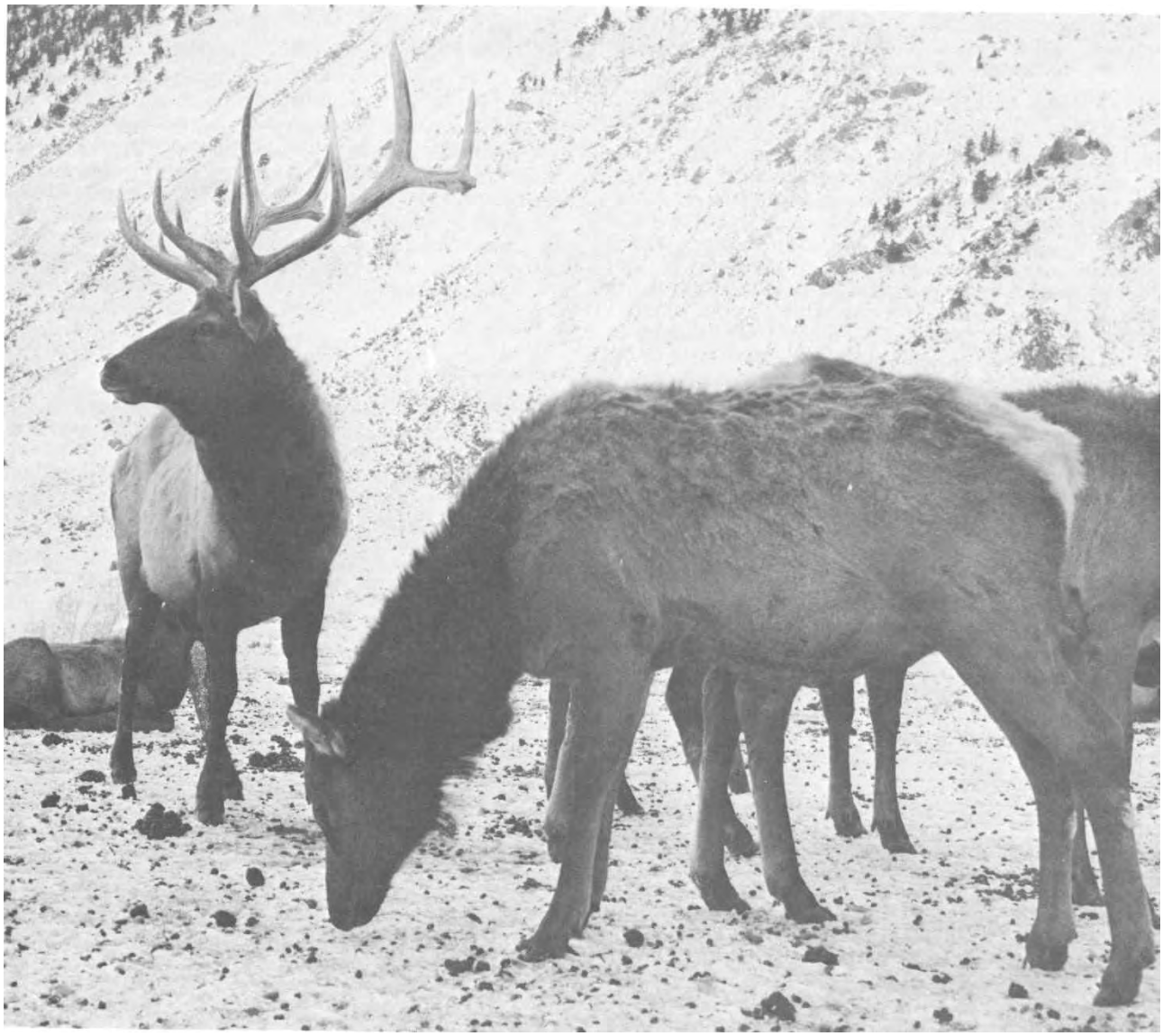


Figure 12: Elk wintering in woodland area.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and not wet nor subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rain, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over rock should be sufficient to allow necessary grading.

The design and layout of *paths and trails* for walking, horseback riding, and bicycling should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rain, are not dusty when dry, and are not subject to flooding more than once during the period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction materials, and water management. Among those who can benefit from this section are engineers, landowners, community decision makers and planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in tables in this section are based on test data and estimated data in the "Soil Properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by the soil survey and used in determining the ratings in this section are grain-size distribution, liquid limit, plasticity index, soil reaction, depth to and hardness of bedrock within 5 or 6 feet of the surface, soil wetness characteristics, depth to a seasonal water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cation were also considered.

Based on the information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to: select potential residential, commercial, industrial, and recreational areas; make preliminary estimates pertinent to construction in a particular area; evaluate alternate routes for roads, streets, highways, pipelines, and underground cables; evaluate alternate sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; plan detailed onsite investigations of soils and geology; find sources of gravel, sand, clay, and to soil; plan farm drainage systems, irrigation systems, pons, terraces, and other structures for soil and water conservation; relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations and testing.

The information is presented mainly in tables. Table 9 shows, for each kind of soil, ratings of the degree and kind of limitations for sanitary facilities; table 10 for building site development; and table 11, for water management. Table 12 shows the suitability of each kind of soil as a source of construction material.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have different meanings in soil science and in engineering; many of these terms are defined in the Glossary.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; *if moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe, soil* properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance are required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect the absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, any susceptibility to flooding. Stones, boulders, and a shallow depth to bedrock interfere with installation. Excessive slope

ELWIN A. Ross, engineer, Soil Conservation Service, helped prepare this section.

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All tables have been updated and are available as a separate document.

may cause lateral seepage and surfacing of the effluent in downslope areas. Also, soil erosion and soil slippage are hazards where absorption fields are installed in sloping soils.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be per-

formed during the season when the water table is highest and the soil is at minimum absorptive capacity.

On many of the soils that have moderate or severe limitations for septic tank absorption fields, a system to lower the seasonal water table or the size of the absorption field could be increased so that performance is satisfactory.

Sewage lagoons are sallow ponds constructed to hold sewage while bacteria decompose the solid and liquid wastes. Lagoons have a nearly level flow area surrounded by cut slopes or embankments of compacted, nearly impervious soil material. They generally are designed to hold sewage within a depth of 2 to 5 feet. Impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of local ground water. Soils that are very high in organic-matter content and those that have cobbles, stones, and boulders are undesirable. Unless the soil has very slow permeability, contamination of local ground water is a hazard in areas where the seasonally high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce its capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste, either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with thin layers or soil. Landfill areas are subject to heavy vehicular traffic. Ease of excavation, risk of polluting ground water, and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate or slow permeability, are deep to bedrock and a seasonal water table, are free of large stones and boulders, and are not subject to flooding. In areas where the seasonal water table is high, water seeps into the trenches and causes problems in excavating and filling the trenches. Seepage into the refuse increases the risk of pollution of ground water. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability that might allow noxious liquids to contaminate local ground water.

Unless otherwise stated, the ratings in table 9 apply only to soil properties and features within a depth of about 6 feet. If the trench is deeper, ratings of slight or moderate may not be valid. Site investigation is needed before a site is selected.

In the area type of sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture, depth to bedrock, and stone content do not apply to this type of landfill. Soil wetness, however, can be a limitation because of difficulty in operating equipment.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill during both wet and dry weather. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all horizons, the A horizon in most soils has the best workability, a higher content of organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluate are those that affect reclamation of the borrow areas, such as slope, erodibility, and potential for plant growth.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 10. A *slight* limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures are not feasible.

Shallow excavations are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness or seasonal high water table, the texture and consistence of soils, the tendency of soils to cave in or slough, and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, generally difficult to excavate, is indicated.

Dwellings and small commercial buildings referred to in table 10 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gar-

dens. Depth to bedrock, slope, and the large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious limitation.

Local roads and streets referred to in table 10 have an all-weather surface that can carry light to medium traffic all year. They consist of subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load-supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic-supporting capacity used in making ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones, all of which affect stability and ease of excavation, were also considered.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for this use have low seepage potential, which is determined by the permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and that has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability, texture, structure, depth to bedrock, hardpan, or other layers that influence rate of water movement, depth to the water table, slope, stability of ditchbanks, susceptibility to flooding, salinity and alkalinity, and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, Texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments, or a combination of channels and ridges, constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock; hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at nonerosive velocities. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Construction materials

The suitability of each soil as a source of road fill, sand, gravel, and topsoil is indicated in table 12 by ratings of good, fair, or poor. The texture thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluate to the depth observed and described as the survey is made, generally about 6 feet.

Roadfill is soil material used in embankments for roads. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil profile between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 13 provide more specific information about the nature of each horizon. This information can help determine its suitability for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as high shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 12 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of

the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plant life. Also considered is the damage that can result to the area from which the topsoil is taken.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent pant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated fair are loose sandy or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated poor are very sandy soils, very firm clayey soils, soils that have suitable layers less than 8 inches thick; soils that have large amounts of gravel, stones or soluble salts; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter. Consequently, careful preservation and use of material from these horizons is desirable.

Soil Properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness of the soil and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many of the soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classification, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area. These estimates are presented as ranges in values most likely to exist in areas where the soil is mapped.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Information is presented for each of these contrasting horizons. Depth to the upper and lower boundaries of each horizon in a typical profile of each soil is indicated. More information about the range in depth and about other properties of each horizon is given for each soil series in the section "Descriptions of the Soils."

Texture is described in table 13 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (2) and the American Association of State Highway and Transportation Officials Soil Classification System (AASHTO) (1). In table 13 soils in the survey area are classified according to both systems.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes - eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified as one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils.

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Highly organic soils are classified as A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best sub grade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 16. The estimated classification, without group index numbers, is given in table 13. Also in table 18 the percentage, by weight, of cobbles or the rock fragments more than 3 inches in diameter are estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

A comparison of these and other systems of size limits for soil separates can be found in the PCA soil primer (7).

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U. S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

All estimates in table 13 have been rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification of the marginal zone has been omitted.

Physical and chemical properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the representative profile of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships between the soil characteristics observed in the field-particularly soil structure, porosity, and gradation or texture-that influence the downward movement of water in the soil. The estimates are for water movement in a vertical direction when the soil is saturated. Not considered in the estimates are lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in the planning and designing of drainage systems, in evaluating the poten-

tial of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted pants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25° C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the value given in table 14. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A *high* shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion, as used in table 14, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Installations of steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the amounts of erosion that will result from specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in terms of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very *highly erodible*, but crops can be grown if intensive measures to control soil blowing are used.
3. Sandy loamy, coarse sandy loamy, fine sandy loamy, and very fine sandy loamy. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loamy, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing are used.
5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible, but crops can be grown if measures to control soil blowing are used.
6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible, and crops can easily be grown.
7. Silty clay loamy that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible, and crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and water features

Table 15 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to deep, moderately well drained to well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes is not considered flooding. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific food frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick in soils for a continuous period of more than 2 weeks during most years. The depth to a high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated are the depth to the high water table; the kind of water table, that is perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing wins to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at depths of 5 to 6 feet or less. For many soils, the limited depth to bedrock is apart of the definition of the soil series. The depths shown are based on measurements made in many soil borings and other observations during the soil mapping. The kind of bedrock and its relative hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth attachment on a 200 horsepower tractor, but hard bedrock generally requires blasting.

Cemented pans are hard subsurface layers that are strongly compacted indurated). Such pans cause difficulty in excavation. e hardness of pans is similar to that of bedrock.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing zone, which causes the formation of ice lenses. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not . artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Engineering test data

Samples from soils of the Dufur series representative of Wasco County, Northern Part, were tested by standard AASHTO procedures to help evaluate the soils for engineering purposes. Only selected layers of each soil were sampled. The results of these tests and the classification of each soil sample according to both the AASHTO and Unified systems are shown in table 16. The samples tested do not represent the entire range of soil characteristics in the survey area or even within the series sampled. The results of the tests, however, can be used as a general guide in estimating the physical properties of the soils. Tests made were for moisture-density relationships, grain-size distribution, liquid limit, and plasticity index.

In the moisture density, or compaction test, a sample of the soil material is compacted several times with a constant compactive effort, each time at a successively higher moisture content. The moisture content increases until the optimum moisture content is reached. After that the density decreases as moisture content increases. The highest density obtained in the compaction test is the maximum density. Moisture

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density data are important in construction because optimum stability is generally obtained if the soil is compacted to approximately the maximum dry density when it is at approximately the optimum moisture content.

The results of the mechanical analysis, obtained by combined sieve and hydrometer methods, can be used to determine the relative proportions of the different size particles that make up the soil sample. The percentage of fine-grained material determined by the hydrometer method should not be used in determining textural classes of soils.

Liquid limit and plasticity index are discussed in the section relating "Engineering Properties."

The specific gravity of a soil is the ratio of the weight in air of a given volume of soil particles at a stated temperature to the weight in air of an equal volume of distilled water at stated temperature. Most soils have specific gravities in the range of 2.65 or 2.85.

Formation, Morphology, and Classification

In this section, the factors that have affected the formation and composition of the soils in the survey area are described, and some important morphological features are discussed. The last part of the section deals with the classification of the soils of the survey area.

Formation

Most soils are formed by weathering and other processes that act on parent material. The characteristics of the soil at any given point depend on the parent material, climate, plants and animas, relief, and time.

The active forces that gradually form a soil from parent material are climate and plant and animal life. Relief strongly influences natural drainage, aeration, runoff, erosion, and exposure to sun and wind, and, as a result, it influences the effectiveness of the active soil forming processes. Generally, soil forming factors are complex. Each force interacts with others and, slowly but constantly, changes are brought about. A soil passes slowly through stages that can be considered as youth, maturity, and old age. Therefore, the character and thickness of a soil depend upon the intensity of the soil forming processes, the length of time during which the various processes have acted, and the resistance of the parent material to change.

At any stage in formation, a soil can be affected by mechanical agencies and by man. The surface layer can be wholly or partly removed by erosion and the material beneath it can become exposed. The soil-forming forces then begin acting on the exposed material to form a new surface layer. Accelerated erosion caused by improper use can severely limit the use of the soil for many years. Grading, shaping, and leveling by man rearrange the soil horizons and interrupt the effects of soil forming factors. Irrigating a soil when it normally is dry has the effect of placing the soil in a different climate environment. Draining by ditch or tile drains counteracts the effects of relief and climate, thereby changing the relationship among the soil forming factors. Applying amendments and chemicals affects the chemical composition of the soil and the plant and animal life.

The soil forming factors are discussed in the paragraphs that follow.

Climate

The climate of the survey area is mainly semi-arid and most of the annual precipitation falls in winter. Climate affects the kind and amount of native vegetation. In parts of this survey area temperature in winter is so low that the soils are frozen for long periods. During these periods many soil-forming processes stop. The average annual air temperature is normally 45° to 52° F at low elevations and decreases to less than 45° at higher elevations within the survey area. The upper few inches of the soil is frozen for some period during winter, and daily freezing and thawing are common on south-facing slopes. Summer temperatures are cool.

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The total precipitation and season of distribution are such that most soils become thoroughly dry in some part of the solum for at least 60 days in most years. The average annual precipitation is 10 to 14 inches in the eastern part of the survey area and about 14 to 30 inches in the forested areas at higher elevations. Precipitation is mainly in the period between October and June. Summer precipitation is spotty and is mostly lost by evaporation. Rainfall is sufficient to only slightly leach or moderately leach the soils.

Living organisms

In well drained areas where the precipitation is 10 to 16 inches a year, the natural vegetation is mainly bluebunch wheatgrass, Sandberg bluegrass, Idaho fescue, big sagebrush, and bitterbrush. In these areas, the A horizon is about 10 inches thick and is more than 1 percent organic matter. As precipitation increases to more than 16 inches and elevation increases to more than 3,600 feet, conifer forests replace the grass and shrub vegetation.

Areas that are not well drained have native plants that differ from the types common in well drained areas. On the flood plains of streams, grasses, sedges, and rushes grow in various combinations. This vegetation supplies an abundance of organic matter, and soils in these areas commonly have an A horizon that is thicker than 10 inches.

Animals and insects that burrow in the soil influence soil formation but probably not as much as plants. Badger activity is common on sandy or loamy soils that are relatively free of stones.

Parent material

The soils of the survey area formed in residuum from the weathering of bedrock and in colluvium on sloping uplands and plateaus; material transported by water and deposited as unconsolidated deposits of clay, silt, and gravel; pumice and ash from volcanic activity; and loess that has been transported by wind from other areas. Soils formed in residuum and colluvium contain minerals and weathered products that have similar composition to the original rock. Alluvial and aeolian material has been mixed so that its original mineralogy is no longer distinct.

The size of particles, mineralogy, and thickness of the parent material have greatly influenced the nature of the soils. Some soil characteristics are inherited directly from the parent material. For example, the soils on uplands are generally shallow over bedrock and are stony. Soils that formed in material on alluvial fans and terraces generally are somewhat gravelly or cobbly and in places are high in content of pumice. Soils formed in loess are high in silt and are shallow to deep over bedrock.

Some of the oldest exposed geologic formations in the survey area are those of the Tertiary Period. (3). They are only minor in extent, and most of them have been covered by succeeding formations of the Quaternary Period consisting mostly of tuff and breccia beds. The material weathers readily resulting in soils that are high in content of clay. Sherar and Sinamox soils formed partly in residuum and colluvium weathered from breccia.

The Columbia River Basalt flow has preserved the major ridges adjacent to the Deschutes and Columbia Rivers. Tygh Ridge in the central part of the survey area is representative of the Columbia River Basalt. Bald, Bodell, Bindle, Bakeoven, and Lickskillet soils formed partly in residuum and colluvium weathered from this basalt. The basalt is commonly more than 1,000 feet thick.

The Dalles Formation has been deposited over older formations in the western part of the survey area (5). It was built up slowly, as is evidenced by buried soils in the regolith. Cherryhill, Duart, Frailey, Hesslan, Maupin, Skyline, Tygh, Wapinitia, and Watama soils formed partly in residuum and colluvium weathered from materials in this geologic formation.

During recent geologic times a mantle of loess was laid down over the entire survey area, but now it is thickest on north-facing slopes, mostly as a result of preferential erosion. It is a nonstratified and unconsolidated deposit by the wind. It is composed dominantly of silt-sized particles of feldspar, quartz, calcite, and

mica, ordinarily with accessory clay and sand. Typically, loess is very smooth and floury.

The loess probably originated from glacial outwash left in the channel of the Columbia River during the Ice Age, or Pleistocene Epoch. The loess probably accumulated chiefly in warm periods when the glaciers melted, the sedimentation of outwash was at a maximum, and the ground surface was neither frozen nor blanketed with snow. Winds from the northeast that blew across the bare outwash evidently started sand grains moving in a jumping motion. The jumping grains bombarded the surface and kicked silt particles into the air stream. The silt and very fine sand particles were carried toward the southwest and gradually settled throughout a wide area. In this area, there is a relationship between the texture and thickness of the loess. Closer to the source, the deposits are coarser textured and thicker. In a southerly direction farther from the source, the deposits are finer textured and thinner.

Along road cuts in the survey area, the loess stands in vertical banks as much as 10 feet thick. This phenomenon, peculiar to loess and common wherever loess occurs, results when the individual plate-shaped particles are laid down flat, much like the pages of a book. On slopes, however, because of the uniform size of the particles, loess is susceptible to water erosion if not protected by vegetation.

Loess contains a wide variety of easily weatherable minerals and together with other favorable qualities generally results in naturally fertile soils. Anderly, Cantala, Condon, Dufur, Hermiston, Nansene, Pedigo, Walla Walla, Warden, Wato, and Wrentham soils formed mostly in loess.

At one or more times during the deposition of the loess, volcanic ash also was deposited in the survey area. Most likely it came from the now extinct volcanoes of the Cascade Mountains. All of the soils in the survey area probably contain some volcanic ash, which consists of sharp edged, sand to silt sized particles of silica, feldspar, glass, and other materials. The Bins, Bindle, Ketchly, and Wamic soils formed in material high in volcanic ash.

Relief

Aspect, or the direction a slope faces, is one of the most important features of relief that has affected soil formation in this survey area. Soils that have south-facing slopes are warmer and drier than those that have north-facing slopes, have less natural vegetation and a lower content of organic matter, and have retained a thinner mantle of loess and volcanic ash against erosion.

Another important feature is slope gradient. Steep soils commonly have thinner and less distinct soil horizons than gently sloping soils, have a greater erosion hazard, and retain less water.

Most soils in the survey area are well drained. Wet soils are only on flood plains or in depressions on the upland plateaus.

Time

The length of time that soil parent material has been subjected to weathering in combination with other factors plays a significant role in soil formation. If other factors are equal, younger soils have less horizon differentiation than older soils. For example, Endersby and Hermiston soils formed in recent alluvium, and although leaching has been strong, no B horizon has formed. Lickskillet and Sherar soils formed under less precipitation but over a longer period of time and have a distinct B horizon.

Morphology

A soil is not easily studied in its natural position because only the surface is exposed. To see and study a soil, it is necessary to expose a vertical section, or profile. A profile generally consists of several layers, or horizons.

In the survey area, the differentiation of horizons is the result of one or more of the following: accumulation of organic matter in the A horizon, accumulation of silicate clay in the B horizon, retention of calcium, potassium, and magnesium to give high base saturation, accumulation or retention of calcium carbonate in lower horizons, and cementation by alkali soluble materials into a hardpan in well drained soils. Walla Walla soils, for example, reflect the accumulation of organic matters and retention of bases.

Organic matter has accumulated in the surface layer of all of the soils in the survey area to form an A horizon. The content of organic matter is lowest in Warden and Bakeoven soils and highest in Nansene and Wrentham soils. The removal of native vegetation from many soils and the subsequent reduction in organic matter under a summer-fallow system of farming have markedly changed the structure and water absorbing ability of the A horizon. Surface crusting, vesicular porosity, and massive or platy structure are common in the A horizon of soils that are cultivated.

Laboratory data on the content of clay confirms that the Cherryhill soils (table 17) have an argillic horizon. Ketchly, Sherar, Van Horn, and Wapinitia soils also have an argillic horizon, but no data are available on these soils. An argillic horizon results mainly from the translocation of silicate clay minerals and a greater formation of clay from primary minerals within the B horizon than within other horizons.

All of the soils in the survey area have moderate to high base saturation. Although data is not available for all soils, Warden soils probably have the highest base saturation and Bindle and Bins soils the lowest.

There is visible evidence of leaching of carbonates and salts in some soils in the survey area. Warden soils, which have been leached the least, have an accumulation of calcium carbonate below a depth of 21 inches. Bins and Bindle soils have been leached the most and generally contain no free carbonates.

Pedigo soils and wet spots in Hermiston soils have high sodium saturation. This probably has been caused by the sodium in the groundwater replacing other exchangeable cations.

Classification

Soils are classified so that we can more easily remember their significant characteristics. Classification

enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to management. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (16).

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the differentiae used as a basis for classification are soil properties that can be observed in the field or that can be inferred either from other properties that are observable in the field, or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or factors that affect soil genesis. In table 17 soils of Wasco County, Northern Part, are placed in a family or higher taxonomic class of the current system. Categories of the current system are defined briefly in the following paragraphs.

ORDER. Ten soil orders are recognized. The differentiae for the orders are based on the kind and degree of the dominant soil forming processes that have gone on.

SUBORDER. Each order is subdivided into suborders that are based primarily on properties that influence soil genesis and that are important to plant growth, or that were selected to reflect what seemed to be the most important variables within the orders. The names of suborders have two syllables.

GREAT GROUP. Soil suborders are separated into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons, soil moisture and temperature regimes, and in base status.

SUBGROUPS. Great groups are subdivided into three kinds of subgroups: the central (typic) concept of the great groups (not necessarily the most extensive subgroup) ; the intergrades, or transitional forms to other orders, suborders, or great groups; and extragrade subgroups that have some properties that are representative of the great groups but that do not indicate transitions to any other known kind of soil.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks.

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SERIES. The series consists of a group of soils that are formed from a particular kind of parent material and have horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Laboratory Data

Physical and chemical characteristics of some representative soils in Wasco County, Northern Part, are given in table 18. The procedures used in making the analyses are described in Soil Survey Investigations Report No. 1. (15).

In preparation for laboratory analyses, soil samples were collected from pits. After air drying, the samples

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were crushed and passed through a 2-millimeter, round hole screen. The fraction greater than 2 millimeters in diameter is reported as weighted percentage of the total sample. Analyses were made on soil material less than 2 millimeters in diameter. Results are reported on an ovendry basis.

The particle size distribution was determined by the pipette method. The amount of water and the bulk density at 1/3 bar tension were determined on plastic-coated clods in a porous-plate pressure cooker. Water held at 15-bar tension was measure on disturbed samples in a pressure membrane apparatus. Reaction is by glass electrode using soil-water ratios indicated. Organic carbon is by the Walkley-Black method. Total nitrogen is by the Kjeldahl method. Electrical conductivity is by method 3a, given in the U.S. Department of Agriculture Handbook "Diagnosis and Improvement of Saline and Alkali Soils" (12). The calcium carbonate equivalent was measured from the amount of carbon dioxide evolved on acidification of the sample. Extractable cations were leached with 1 N NH4OAc. Extractable sodium and potassium were determined by flame photometry; calcium by permanganate titration; and magnesium gravimetrically as pyrophosphate. Extractable acidity, or exchangeable hydrogen, was determined by the triethanolaminebarium chloride method. Cation-exchange capacity (CEC) is the sum of extractable cations and extractable acidity; base saturation is the sum of extractable calcium, magnesium, sodium, and potassium as percentage of the cation-exchange capacity.

The profile description for Chenoweth loam follows. The description for Cherryhill silt loam is on page 16, and for Walla Walla silt loam on page 32.

Chenoweth loam (S67-Ore-33-1 to 10) Wasco County, center of section 10, T. 1 N., R. 13 E.:

Ap1-0 to 6 inches; very dark brown (10YR 2/2) very fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many roots and pores; abrupt smooth boundary.

Ap2-6 to 10 inches; very dark brown (10YR 2/2) very fine sandy loam, grayish brown (10YR 5/2) dry; weak medium platy structure parting to weak fine granular; slight(hard, friable, slightly sticky, slightly plastic; many roots and tine pores; clear smooth boundary.

A3-10 to 17 inches; grayish brown (10YR 5/2) loam;

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weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many roots and fine pores; few noncalcareous nodules as much as 1 inch in diameter, but mainly 1/2 inch in diameter; many earthworm casts; thin patchy clay films on peds and on pores; gradual smooth boundary.

B21-17 to 25 inches; dark brown (10YR 3/3) loam or light very fine sandy clay loam, brown (10YR 5/3) dry; weak coarse prismatic structure parting to weak medium subangular blocky; very friable or friable, sticky, plastic; many roots and fine pores; very few thin clay films on peds and in pores; few earthworm casts; few noncalcareous nodules as much as I inch in diameter, but mainly about 1/2 inch in diameter; clay films nearly continuous on nodules; gradual wavy boundary.

B22-25 to 42 inches; dark brown (10YR 3/3) loam or light very fine sandy clay loam, brown (10YR 5/3) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, sticky, plastic; many roots and fine pores; few thin clay films on peds and in pores; many noncalcareous very dark grayish brown nodules mainly about era inch in diameter; clear smooth boundary.

B3-42 to 50 inches; dark yellowish brown (10YR 3/4 and 4 / 4) loam or very fine sandy loam, brown (10YR 5/3) dry; massive and weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few nodules; many roots and fine pores; abrupt smooth boundary.

C1-50 to 70 inches; dark yellowish brown (10YR 3/4) very fine sandy loam, light yellowish brown (10YR 6/4) dry; massive; soft, friable, very slightly sticky, very slightly plastic; some fine roots and fine pores; gradual wavy boundary.

C2-70 to 82 inches; dark yellowish brown (10YR 3/4) very fine sandy loam, pale brown (10YR 6/3) dry; massive; soft, friable, slightly sticky, slightly plastic; few fine roots and fine pores; abrupt wavy boundary.

General Nature o f the Area

This section provides general information about the physiography, climate, history, transportation, and water supply of Wasco County, Northern Part. Census figures were not used from the U.S. Census of Agriculture for this area because the survey area covers only a part of the county.

Physiography

The survey area is partly on the Columbia Plateau physiographic province and partly on the Eastern Cas-

cade Mountain provinces. The Columbia Plateau is a lava-floored plain that has been uplifted since molten basalt flooded the area. That part of the Eastern Cascade province in the survey area is a high upland terrace of coarse alluvial and pyroclastic materials. This terrace is eroded, and wide nearly level ridgetops are between deep V-shaped canyons. Elevation ranges from 1,000 feet along the northern boundary to about 3,500 feet in the southwestern and western parts of the survey area. The Columbia River, which marks the northern boundary, has an average elevation of 97 feet. Escarpments and very steep slopes border the Columbia River and rise abruptly to the upland terraces.

Tygh Ridge, which is at an elevation of 3,150 feet, is 22 miles south of the Columbia River. North of this ridge, drainage is to the Columbia River. South of the ridge, drainage is to White River and then to the Deschutes River, which forms the eastern boundary of the survey area.

The Columbia River Watershed within the survey area, excluding drainage of the Deschutes River, covers about 338,629 acres. In some places narrow sandy terraces parallel the river; in others, vertical basalt escarpments rise from 800 to 1,000 feet. Except for a few acres of Riverwash, there are no large recent alluvial areas. Tributary streams, flowing directly to the river, have rather steep gradients and flow through deep, V-shaped canyons. Rock Creek, Mosier, Rowena, Mill, Three Mile, Five Mile, and Fifteen Mile Creeks terminate at the Columbia River.

The Juniper Flat and Wamic area, which is at an elevation of 1,600 to 3,400 feet, is south of Tygh Ridge. This upland plateau, which forms the southern boundary of the survey area, drains to the Deschutes River.

The Deschutes River and its main stem and tributaries have a watershed of 221,101 acres within the survey area. White River, south of Tygh Ridge, is one of its main perennial tributaries. Wapinitia and Nena Creeks terminate at the Deschutes River.

The elevation of the towns are The Dalles, 98 feet; Dufur, 1,319 feet; Friend, 2,450 feet; Mosier, 100 feet; and Maupin, 902 feet.

Patterned Ground, or "Biscuit Scabland" (14)

Patterned ground is the general term applied to biscuits or mounds, stone nets, and stone stripes that form distinct patterns on the ground surface (fig. 13). Patterned ground, locally called biscuit scabland, makes up about 35,000 acres. Theories of the origin of such landforms are numerous, and only one simplified explanation is given here.

A common kind of pattern that occurs under glacial influence, mainly in perennially frozen areas, indicates that frozen ground cracks at low temperatures and forms rectangular or polygonal patterns. Ice that forms in these nearly vertical cracks can develop into ice wedges. Commonly, these polygonal structures are the result of the contraction of a layer of homogeneous material, either soil or rock, that is perpendicular to the cooling surface. This is illustrated in the columnar



Figure 13: Area of biscuit scabland. The mounds, or biscuits, are Condon soils; surrounding the mounds is the very shallow Bakeoven soil.

jointing of basalt and in the formation of mud cracks.

The chief climatic significance of the soil patterns as landforms in the survey area is that frozen ground apparently existed in front of the continental glacier during glacial invasion. A regular pattern of polygonal fractures could form in ground frozen to a uniform dept as a result of contraction during periods of subfreezing temperature. Ice wedges could form in these if the temperature fluctuated but generally remained below freezing (6) . Then as the climate became warmer and the front of the continental glacier retreated northward, the ice wedges began to melt. The runoff waters could have caused the erosion and modification of the polygons or mounds.

The biscuits are round or elongated, erosion-modified, polygonal mounds that are underlain by basalt at a depth of 2 to 3 feet. The soil in these mounds has a more weakly defined profile than adjacent soils, but otherwise it is similar to Condon soils. Frost heaving probably was the cause of mixing of various sized fragments of basalt in the soil and of mixing of genetically formed horizons. The soil in the mounds is lighter colored than the adjacent soils and is somewhat more rapidly drained. The removal of large amounts of mineral soil in the formation of the mounds is obvious from the scabland that surrounds the mounds.

The soils in the scabland formed mainly in remnants of material not removed during the thawing of the ice wedges and in material more recently washed from the mounds.

A less striking feature than the mounds are the stone nets, which in places encircle the mounds, and the stone polygons on the scabland. These stone nets and polygons consist of various sized fragments of basalt as much as 2 feet in diameter. Studies of similar features elsewhere suggest that these may have resulted from frost heaving along the original ice-wedged cracks (8).

Where slope is steep, the stone nets and polygons form sorted stripes, or rows, of rock that vary in length and width. The mounds occupy the gentle upper slopes of many of the minor ridges; the sorted stone polygons, the moderately steep intermediate slopes; and the sorted stripes, the steepest slopes on the lower part of the ridges. In places there are sorted stripes that are not associated with nets, polygons, or mounds (6).

History

Wasco County, once the largest county in the United States, has been reduced to a fraction of its original size. At inception Wasco County encompassed about 130,000 square miles. It extended from the Cascade Mountains and from the Washington, Idaho, and Montana borders to the California, Nevada, and Utah borders. It now is in north-central Oregon between Hood River, Jefferson, and Sherman Counties, and the Columbia River. The county seat is The Dalles.

Wasco County was formed January 11, 1854, and maintained its original size until February 14, 1859,

By JOHN LUNDELL.

when Oregon gained statehood. Wasco County's eastern border was the Oregon-Idaho state line. Seventeen counties have been formed in Eastern Oregon out of old Wasco County. Baker County was the first in 1862, and Deschutes County petitioned away in 1916.

Indians living along the Columbia River were the first known inhabitants of the survey area, and fishing was their main livelihood. Indians from other tribes in the Pacific Northwest traveled annually to Winquatt (the Indian name for the geographical area now known as Petersburg, Thompsons Addition, the Dalles, and Chenoweth) to trade and barter for fish. The United States Government established the Warm Springs Indian Reservation in 1855, located partly in the southern part of Wasco County.

The Lewis and Clark Expedition came into the survey area on October 25, 1805. Their group camped at what they termed "Fort Rock," which is located near where Mill Creek enters the Columbia River. For about the next 25 years, the travelers in the area were interested in or associated with the fur trading industry. In 1820 the Hudson Bay Company established a temporary trading post at The Dalles. The region was explored by Peter Skene Ogden, Nathaniel Wyeth, and John C. Fremont.

From 1843 to 1848, wagon trains began arriving from the East over the Old Oregon Trail. At The Dalles they had two methods of reaching the Willamette Valley. One was to raft, boat, or float down the Columbia River. The other was to travel overland around Mt. Hood. A toll road was built around the south side of Mt. Hood in 1846. It began near Wamic in the central part of Wasco County. To get to the toll road some immigrant trains chose to leave the Columbia River just west of where the Deschutes River terminates and travel over the rolling hills to Fairbanks on Fifteen Mile Creek. They would then follow the creek up to Fifteen Mile Crossing (Dufur), over Tygh Ridge and down into Tygh Valley, and then up onto Wapinitia Flat to Wamic.

The Whitman Massacre occurred in 1847, and Oregon Territorial Governor Abernathy promptly dispatched a company of troops to The Dalles on December 8, 1847. Thus began what has to be considered the permanent establishment of a community in Wasco County. Dalles City was incorporated June 22, 1857. The military used the remains of the Methodist Mission buildings as quarters. The military maintained their post at Fort Dalles until the end of the Yakima Indian War in 1858 and then finally abandoned it in 1867.

Settlers started to locate in the rural areas of Wasco County along the numerous streams that flowed north and east from the Mt. Hood drainage system.

Discovery of gold in the early 1860's in the eastern and central parts of Oregon further hastened the settlement of Wasco County. Laborers were imported to help with the tedious digging task. Wagon stops were located out of The Dalles at half-day travel intervals. The main travel route went south across Three, Five, Eight, and Fifteen Mile Creeks, up over Tygh Ridge, and down into the Deschutes Canyon at Sherars Bridge. Crossing at the Deschutes River was a pleasant respite

from the hot, dry, dusty trail. On the trail out of the canyon were Bakeoven, Shaniko, and Antelope. So much gold was coming out of the John Day-Canyon City Country that the U.S. Government started construction of a mint at The Dalles. However, the precious metal source dwindled before coins could be minted.

Major transportation along the Columbia River in the Pioneer Period was confined to steamboats. The sternwheelers paddled up and down the river in front of The Dalles from the 1850's to about 1915. Scows were used to transport lumber from sawmills down the Columbia River, such as the one at Mosier, up to The Dalles. Completion of The Dalles-Celilo Canal in 1915 greatly increased water traffic to the Inland Empire Region.

The Dalles-Celilo Portage Railroad started in 1863. In 1882 The Dalles was connected to Portland by rail and to Wallula in 1883. The first branch railroad to the southern part of Wasco County was started in 1898, and it extended from Biggs in Sherman County to Shaniko. In 1905 John Heimrich built the Great Southern Railroad to Dufur and extended it into Friend in 1913. The Great Southern Railroad opened up the small communities and whistlestops of Petersburg, Fairbanks, Fulton, Brookhouse, Freebridge, Neabeck, Emerson, Wrentham, Rice, Boyd, Dufur, and Friend to regular rail travel. In 1909 the Union Pacific Railroad and the Spokane, Portland & Seattle fought their way to Central Oregon up the Deschutes River. Maupin became an important part of Wasco County's economy because most goods on the Wapinitia Flat are funneled through Maupin to the Oregon Trunk Railroad.

Automobiles and modern highways have aided residents in getting to and from the market places. The routes used are virtually the same. Only the mode and speed has changed.

Farming became big business in Wasco County in the 1860's. Sheep and cattle raised in the central and southern parts of the county contributed to the stability of the economy. Shaniko was once one of the world's largest wool shipping points. Wool buyers from all over the world came to The Dalles and used the famed Umatilla House as their headquarters. Wheat and other grains gradually gained acreage in the eastern and northern parts of the county. Irrigation made possible several cuttings of alfalfa each year, which are either used by the grower or sold to users in the Pacific Northwest. The fruit industry of cherries, peaches, apricots, and apples find world markets. Large apple orchards at Dufur and Ortley failed miserably.

Attempts to diversify the economy of Wasco County have been initiated primarily by the construction of The Dalles Dam. Until the 1950's the economy was virtually stagnant. A major aluminum plant using electrical power was the first attempt at change. The economy is farm oriented, and goods and services concentrate on that segment of the economy.

Climate

The survey area has very light annual total precipitation and somewhat extreme temperatures in both summer and winter. Records used in evaluating the temperature and precipitation were from Friend and Dufur for the Columbia Plateau area and from The Dalles located at the eastern end of the Columbia Gorge on the Columbia River flood plain.

By GILBERT L. STERNES, climatologist for Oregon, National Weather Service, U.S. Department of Commerce.

Temperature

Marine air moving up through the Columbia Gorge and spreading into the inland Columbia Basin has a significant moderating effect on the more extreme temperatures of both summer and winter. The occasional low winter temperatures are the result of strong invasions of very cold continental air from the northeast. Excessively warm temperatures are similarly the result of occasional high pressure during the summer stagnating either over the inland Columbia or Great Basins.

Temperatures have ranged from -30° to 115° F above, both recorded at The Dalles. In most years temperature is not more than 107° or lower than -3° (table 19).

The dates of low temperatures in spring or before which they will occur in fall are given in table 20. These temperatures are significant to various crops. The number of days between the average spring and fall dates of 32° temperature is often referred to as the growing season (table 21).

Precipitation

The average annual precipitation ranges from nearly 10 inches on the eastern edge of the survey area to about 30 inches on the higher slopes of the western part. Between 70 and 80 percent of the annual precipitation occurs in November to March. Only 5 to 10 percent occurs in June to August. The rest is fairly evenly divided between April and May and September and October. While most of the precipitation is in the form of rain, there is substantial snowfall almost every winter, particularly in the higher reaches of the western part of the survey area. The greatest 3-day total ever recorded in Oregon, other than in high mountain areas, was 54 inches at The Dalles. Measurable precipitation can be expected on about 75 days a year.

In table 22 is a summary of certain monthly and annual precipitation data.

Sunshine and cloudiness

There are about 100 to 120 clear, 80 to 90 partly cloudy, and 165 to 185 cloudy days a year. Actual sunshine records have never been made in the survey area, but in a study in which records of cloudiness in the area and of sunshine at surrounding points were analyzed, it is estimated that the sun shines about 20 to 30 percent of the time in December and January; 55 to 65 percent in April, May, and June; 75 to 85 percent in July, Au t, and early in September. Then it gradually decreases to t e winter average.

Relative humidity

In the early morning hours when the air temperature is the lowest, relative humidity of 90 to 100 percent occurs in the summer and is quite frequent almost

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any time of the day late in fall and in winter. In contrast, during the warmest part of the day in summer, it is not unusual to have a relative humidity of 10 to 20 percent. Occasionally it is even lower, although the average is 35 percent.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity. The capacity of soils to hold water available for use by most pants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. In this survey, the range in inches of water is given for each series. This amount is based on the minimum and maximum depths of profiles (to a maximum of 60 inches) and takes into account the different amounts of water held in the ranges of texture given for the profile.

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxides are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are-

Loose.-Noncoherent when dry or moist; does not hold together in a mass.

Friable.-When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.-When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.-When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.-When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.-When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.-When dry, breaks into powder or individual grains under very slight pressure.

Cemented.-Hard; little affected by moistening.

Crop year. The year in which a crop is harvested. It contrasts with the fallow year, the year in which no crop is grown and the soil accumulates moisture from the crop year.

Cross-slope farming. Plowing, cultivating, planting, and harvesting across the general slope, but not on the contour.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diagnostic horizon. A combination of specific soil characteristics that indicate certain classes of soils. Those at the surface are called epipedons; those below the surface, diagnostic subsurface horizons.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.-Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.-Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.-Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.-Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are effected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained: Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided, Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.-Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.-Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Dryfarming. Producing crops that require some tillage in a subhumid or semiarid region, without irrigation. Dryfarming usually involves using periods of fallow during which enough moisture accumulates in the soil to allow production of a cultivated crop.

Duripan. A subsurface silica-cemented horizon.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated throw wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Favorable. Favorable soil features for the specified use.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

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Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gravel. Rounded or angular fragments of rocks up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Horizon,. soil. A layer of soil, approximately parallel to the Surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows

0 horizon.-An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.- The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.-A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.-The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination op these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.-The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon: The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.-Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. Inadequate strength for supporting loads.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance-few, common, and many; size-fine, medium, and coarse; and contrast-faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables-hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.2 inch), moderately slow (0.2 to 0.6 inch, moderate (0.6 to 2.0) inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Piping. Moving water forms subsurface tunnels or pipelike cavities in the soil.

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Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in H values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as

	pH		*pH*
Extremely acid _	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline-	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Rooting depth. Shallow root zone. The soil is shallow over 4 layer that greatly restricts roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff ; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeter in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay, and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope, soil. Amount of deviation of a surface from the horizontal, usually expressed in percent. A 5-foot fall or rise per 100 feet of horizontal distance is a slope of 5 percent. The slope classes used in this survey are: 0 to 7 percent, nearly level or gently sloping; 7 to 12 percent, moderately sloping; 12 to 20 percent, moderately steep; 20 to 45 percent, steep; and 45 to 70 percent, very steep

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil depth. The depth to which ant roots penetrate; the depth to the underlying bedrock, hardpan, or other restrictive layer. The depth classes used in this survey area are: 4 to 20 inches, shallow; 20 to 40 inches, moderately deep; more than 40 inches deep.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are-platy (laminated), prismatic (vertical axis of aggregates longer than horizonal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water-supplying capacity. Water stored in the soil at the beginning of plant growth in the spring, plus rainfall not in excess of evapotranspiration during the growing season, less runoff.

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Water-supplying capacity. Water stored in the soil at the beginning of plant growth in the spring, plus rainfall not in excess of evapotranspiration during the growing season, less runoff.

ATTACHMENT D – EXHIBIT 13

"Guide for Using Soil Survey Single Phase Interpretation Sheets in Oregon"

GUIDE FOR USING SOIL SURVEY
SINGLE PHASE INTERPRETATION SHEETS



PREPARED BY

SOIL CONSERVATION SERVICE

PORTLAND, OREGON

JUNE 1982

GUIDE FOR USING SOIL SURVEY
SINGLE PHASE INTERPRETATION SHEETS IN OREGON

This guide contains a detailed explanation of the Single Phase Interpretation Sheets (SPI), the kinds of rating terms used, and the information presented on the sheets.

Single Phase Interpretation Sheets have been prepared for each kind of soil that has been mapped in the county. Each sheet has a brief description of each kind of soil, its properties, and predictions of its behavior for various uses.

This guide has the following sections:

I. Narrative Soil Description
II. Estimated Soil Properties
III. Explanation of Rating Terms
IV. Sanitary Facilities
V. Building Site Development
VI. Construction Material
VII. Water Management
VIII. Recreational Development
IX. Capability and Predicted Yield - Crops and Pasture
X. Woodland Suitability
XI. Windbreaks
XII. Wildlife Habitat Suitability
XIII. Potential Native Plant Community
XIV. Terms and Definitions of Restrictive Features Used on "SPI" Sheets
XV. Glossary

I. NARRATIVE SOIL DESCRIPTION

At the top of each SPI sheet is the map symbol, county in which applicable, and the name of the soil for each area on the soil map which has that symbol in it. Below this is a brief paragraph which describes the nature and properties of the soil and tells where the soil is on the landscape.

II. ESTIMATED SOIL PROPERTIES

The table, "Estimated Soil Properties," at the top of the sheet, gives estimates of properties, characteristics, and conditions which influence the behavior of the soil when used for different purposes.

COMMENTS THAT FOLLOW HELP EXPLAIN EACH COLUMN ON THE TABLE.

Depth from Surface. The layers shown here take into consideration those properties that influence plant growth and the engineering behavior of the soil.

Classification. Three systems of soil classification are shown in this table. The USDA texture is determined by the percent of sand (.05 to 2.0 millimeters), silt (.05 to .002 millimeter), and clay (below .002 millimeter) after the particles larger than 2 millimeters have been removed. Major soil textural classes are given such as sands, sandy loams, silt loam, clay loam, and clay. Presence of significant amounts of rock fragments is indicated by modifiers such as gravelly, shaly, cobbly, or stony. Muck, peat, mucky peat, and peaty muck are used for organic soils in place of the textural class names for mineral soils.

In the block indicating USDA texture, standard abbreviations are used to indicate texture. Up to three textures can be entered on each line. If more than one texture is used, they are separated by commas. If modifiers are used, they are attached to the texture by a hyphen, e.g., GR-SL. If a layer is stratified, SR is used as a modifier, and the end members of the textural range are connected by hyphens, e.g., SR-S-L or SR-S-GR-C. The following list of modifiers and textures may appear on the Single Phase Interpretation Sheets:

Modifier:

BY	Bouldery	GR	Gravelly
BYV	Very bouldery	GRC	Coarse gravelly
BYX	Extremely bouldery	GRF	Fine gravelly
CB	Cobbly	GRV	Very gravelly
CBA	Angular cobbly	GRX	Extremely gravelly
CBV	Very cobbly	MK	Mucky
CBX	Extremely cobbly	PT	Peaty
CN	Channery	SH	Shaly
CNV	Very channery	SHV	Very shaly
CNX	Extremely channery	SHX	Extremely shaly
CR	Cherty	SR	Stratified
CRC	Coarse cherty	ST	Stony
CRV	Very cherty	STV	Very stony
CRX	Extremely cherty	STX	Extremely stony
FL	Flaggy	SY	Slaty
FLV	Very flaggy	SYV	Very slaty
FLX	Extremely flaggy	SYX	Extremely slaty

Texture or terms used in lieu of texture:

COS	Coarse sand	CE	Coprogenous earth
S	Sand	CEM	Cemented
FS	Fine sand	DE	Diatomaceous earth
VFS	Very fine sand	FB	Fibric material
LCOS	Loamy coarse sand	FRAG	Fragmental material
LS	Loamy sand	G	Gravel
LFS	Loamy fine sand	GYP	Gypsiferous material
LVFS	Loamy very fine sand	HM	Hemic material
COSL	Coarse sandy loam	ICE	Ice or frozen soil
SL	Sandy loam	IND	Indurated
FSL	Fine sandy loam	MARL	Marl
VFSL	Very fine sandy loam	MPT	Mucky-peat
L	Loam	MUCK	Muck
SIL	Silt loam	PEAT	Peat
SI	Silt	SG	Sand and gravel
SCL	Sandy clay loam	SP	Sapric material
CL	Clay loam	UWB	Unweathered bedrock
SICL	Silty clay loam	VAR	Variable
SC	Sandy clay	WB	Weathered bedrock
SIC	Silty clay	CIND	Cinders
C	Clay		

The Unified system is based on the identification of soils according to particle size, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW - well-graded gravel, GP - poorly graded gravel, GM - silty gravel, GC - clayey gravel, SW - well-graded sands, SP - poorly graded sands, SM - silty sands, and SC - clayey sands. There are six classes of fine-grained soils, identified as ML - inorganic silts, CL - inorganic clays (lean clays), OL - organic silts of low plasticity, MH - inorganic silts with high liquid limits, CH - inorganic clays of high plasticity (fat clays), and OH - organic clays of medium to high plasticity. There is one class of highly organic soils, identified as PT - peat and other highly organic soils.

The American Association State Highway Transportation Officials (AASHTO) system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a mineral soil is placed in one of the seven basic groups ranging from A-1 to A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils of high-bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A-7, are clay soils that have low strength when wet and that are poorest soils for subgrade. Highly organic soils (peat and muck) are classfied in an A-8 group. These organic soils are unsuitable for use in embankments and subgrades. They are highly compressible and have low strength.

Coarse fragments over 3 inches refers to percent by weight of rock fragments. In the Unified and AASHTO systems, these fragments are not considered in the classification. However, it is necessary to know how much of the fragments are present in evaluating the class.

Percent of Material Passing various sieve sizes is determined on a weight basis. The number 4 sieve is 4.7 mm in diameter, the number 10 is 2.0 mm, the number 40 is 0.42 mm, and the number 200 is 0.074 mm. In the Unified system, the fines (silt and clay) are the material passing the number 200 sieve. Gravel is that material retained on the number 4 sieve. The amount retained on the number 200 sieve minus the gravel is the percent sand. In the AASHTO system, the material passing the number 200 sieve is clay and silt. Gravel is the material retained on the number 10 sieve. The amount retained on the number 200 sieve minus the gravel is the percent sand.

The figures shown under each sieve size are obtained either by laboratory test data or by estimates based on USDA textural classes.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from a semisolid to a plastic state; and the liquid limit from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Liquid limit and plasticity index are obtained either by engineering tests or by estimates of USDA texture and consistence. Assuming 15-bar water is known, liquid limit can be estimated as follows: 2 times 15-bar water percentage plus 10 equals liquid limit.

Clay is shown as a range of total clay as a percent of the less than 2 mm material for each horizon. Where clay is not applicable, such as in organic layers, no figures are shown.

Moist bulk density of the soil is the mass per unit volume of the <2 mm material at a moisture content near field capacity (1/3-bar in most soils). It excludes the mass of the liquid phase, and the volume over which the weight is determined includes interparticle space. It is expressed as grams per cubic centimeter or pounds per cubic foot.

Permeability is that quality of a soil that enables it to transmit water or air. Accepted as a measure of this quality is the rate at which soil transmits water while saturated. Permeability is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

The following classes and rates are used:

Permeability class	Numerical range (inches per hour)
Very slow	Less than 0.06
Slow	0.06 - 0.2
Moderately slow	0.2 - 0.6
Moderate	0.6 - 2.0
Moderately rapid	2.0 - 6.0
Rapid	6.0 - 20.0
Very rapid	More than 20

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants. The values are reported as inches of water per inch of soil.

Class	Inches/inch
Very high	More than .20
High	.15 - .20
Medium	.10 - .15
Low	.05 - .10
Very low	Less than .05

Soil reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH values and terms used to describe soil reaction are as follows:

Reaction description	pH range
Extremely acid	Below 4.5
Very strongly acid	4.5 - 5.0
Strongly acid	5.1 - 5.5
Medium acid	5.6 - 6.0
Slightly acid	6.1 - 6.5
Neutral	6.6 - 7.3
Mildly alkaline	7.4 - 7.8
Moderately alkaline	7.9 - 8.4
Strongly alkaline	8.5 - 9.0
Very strongly alkaline	Above 9.0

Salinity of soils is based on the electrical conductivity of the saturation extract as expressed in millimhos per centimeter at 25°C. Electrical conductivity is related to the amount of salts more soluble than gypsum in the soil. High amounts of soluble salts in the soil affect plant growth and the corrosion of uncoated steel. A value of 2.0 or less would indicate a very slight limitation for crop production whereas a value of more than 16.0 would indicate a severe salinity problem for crop production. A dash is shown if salinity is no problem for growing plants.

Class	Salinity (MMHOS/CM)
1. Very slightly saline	0-4
2. Slightly saline	4-8
3. Moderately saline	8-16
4. Strongly saline	> 16

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content, that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

The soil erodibility factor (K) used in the universal soil loss equation is a measure of the susceptibility of soil particles to detachment and transport by rainfall and runoff. Soil properties affecting soil erodibility are: soil texture (especially the percent of silt plus very fine sand), percent of sand greater than 0.10 mm, organic matter content, soil structure (type, grade), soil permeability, clay mineralogy, and rock fragments.

K values and classes used are as follows:

Low	.00, .02, .05, .10, .15, .17, .20
Moderate	.24, .28, .32, .37
High	.43, .49, .55, .64

Soil loss tolerance (T), sometimes called permissible soil loss, is the maximum rate of soil erosion that will permit a high level of crop productivity to be sustained economically and indefinitely. T values of 1 through 5 are used. The numbers represent the permissible tons of soil loss per acre per year where food, feed, and fiber plants are grown. T values are not applicable to construction sites or to other nonfarm uses of the erosion equation.

A wind erodibility group consists of soils having the same potential for soil blowing. The properties that affect soil blowing are those that affect the stability of the aggregates against breakdown by tillage and abrasion from wind. These properties are texture, organic matter, calcium carbonate content, mineralogy and perhaps others such as freezing and thawing, or wetting and drying. Texture of the surface inch of soil has the greatest single influence on soil erodibility and is used as a guide for estimating wind erodibility groups. There are seven groups with group 1 being the most susceptible to soil blowing and group 7 being the least susceptible.

In parts of the state where wind erosion is not considered to be a problem, a dash is entered for the surface layer.

Organic matter percentage is shown in the surface layer. Whole numbers are used from 1 and above, tenths from 1 to .5, and <.5 below .5, e.g., <.5-1, 2-5.

Corrosivity pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Rate of corrosion of uncoated steel is related to soil properties such as drainage, texture, total acidity, electrical resistivity, and electrical conductivity of the soil material. Corrosivity for concrete is influenced mainly by the content of sodium or magnesium sulfate but also by soil texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. Corrosivity is rated for the whole soil rather than for each horizon. A corrosivity rating of low means that there is a low probability of soil-induced corrosion damage. A rating of high means that there is a high probability of damage, so that protective measures for steel and more resistant concrete should be used to avoid or minimize damage.

Flooding is given in terms of frequency, duration, and months. Duration and months that floods are likely to occur are given only for soils that flood more frequently than rare. Following is a brief explanation.

Frequency:	None	(No reasonable possibility of flooding)
	Rare	(Flooding unlikely but possible under abnormal conditions)
	Common	(Flooding likely under normal conditions)
	Occasional	(Less often than once in 2 years)
	Frequent	(More often than once in 2 years)
Duration:	Very brief	(Less than 2 days)
	Brief	(2 days to 7 days)
	Long	(7 days to 1 month)
	Very long	(More than 1 month)
Months:	These are the months of probable flooding.	

Water table is given in terms of depth, kind, and months. The depth range of a seasonally high water table is given to the nearest half foot. If the water table is below 6 feet or if the water table exists for less than 1 month, the value greater than 6 (6.0) is used. Kinds of water table listed are: apparent, perched, or artesian. The months shown are those within which the water table is likely to be within the ranges given in the depth column.

A cemented pan prevents or restricts root and water penetration. These include duripan, petrocalcic, orstein and other cemented layers. "Thin" indicates the layer is thin enough that excavation can be made with common construction equipment for pipelines and other excavations. "Thick" indicates that special equipment or blasting can be expected to be necessary. A dash indicates a pan does not occur above a 60-inch depth.

Bedrock prevents or restricts root and water penetration. "Soft" rock can be excavated using trenching machines, backhoes, and other equipment common to making excavations. "Hard" rock requires blasting or use of special equipment above what is considered normal. The normal depth of observation is about 60 inches.

Subsidence is induced when organic soils or other wet soils are drained and is expressed in inches.

Hydrologic soil groups are used to estimate runoff from rainfall. Soil properties are considered that influence the minimum rate of infiltration obtained for a bare soil after prolonged wetting. These properties are: depth of seasonally high water table, intake rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The influence of ground cover is treated independently--not in hydrologic soil groups.

The soils are classified into four groups, A, B, C, and D with Group A having the lowest runoff potential and Group D having the highest runoff potential.

Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravel. These soils have a high rate of water transmission.

Group B soils have moderately low runoff potential and moderate infiltration rates when thoroughly wetted. They consist chiefly of moderately deep to deep, moderately to well drained soils with moderately fine to moderately coarse textures and moderately slow to moderately rapid permeability. These soils have a moderate rate of water transmission.

Group C soils have moderately high runoff potential and slow infiltration rates when thoroughly wetted. They consist chiefly of soils with a layer that impedes downward movement of water, soils with moderately fine to fine texture, soils with slow infiltration due to salts or alkali, or soils with moderate seasonal water tables.

These soils may be somewhat poorly drained. They include well and moderately well drained soils with slowly and very slowly permeable layers such as fragipans, hardpans, hard bedrock and the like at depths of 20 to 40 inches. These soils have a slow rate of water transmission.

Group D soils have high runoff potential and very slow infiltration rates when thoroughly wetted. They consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, soils with very slow infiltration due to salts or alkali, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

Potential frost action is the likelihood of upward or lateral expansion of soil (frost heave) because of the formation of segregated ice lenses and the subsequent loss of strength and collapse on thawing. Daily freezing and thawing that tends to lift the crowns of plants out of the group is not included because it does not contribute to the large movement produced by formation of ice lenses.

In areas where potential frost action is not common, such as west of the Cascade Mountains, no interpretations for potential frost action are made.

Where frost action is a potential problem, three classes are used as follows:

Low	Soils rarely subject to the formation of ice lenses.
Moderate	Soils susceptible to the formation of ice lenses, resulting in frost heave and subsequent loss of strength.
High	Soils highly susceptible to the formation of ice lenses, resulting in frost heave and subsequent loss of strength.

III. EXPLANATION OF RATING TERMS

The soil is also rated for selected uses expected to be important or potentially important to the user. Ratings are given in terms of limitations and suitability. Up to three of the most restrictive features are listed. There may be other features that need to be treated to overcome soil limitations for a specific purpose.

For some uses, degrees of soil limitations are used. The rating terms used are SLIGHT, MODERATE, and SEVERE. For other uses, degrees of soil suitability are used. The rating terms used are GOOD, FAIR, and POOR. Up to three restrictive features are listed if the degree of limitation is more than SLIGHT or if the degree of suitability is less than GOOD.

Limitation Ratings:

Slight soil limitation is the rating given soils that have properties favorable for the rated use. This degree of limitation is minor and can be overcome easily. Good performance and low maintenance can be expected.

Moderate soil limitation is the rating given soils that have properties moderately favorable for the rated use. This degree of limitation can be overcome or modified by special planning, design, or maintenance. During some part of the year, the performance of the structure or other planned use is somewhat less desirable than for soils rated slight. Some soils rated moderate require treatment such as artificial drainage, runoff control to reduce erosion, extended sewage absorption fields, extra excavation, or some modification of certain features through manipulation of the soil. For these soils, modification is needed for those construction plans generally used for soils of slight limitation. Modification may include special foundations, extra reinforcements, sump pumps, and the like.

Severe soil limitation is the rating given soils that have one or more properties unfavorable for the rate used, such as steep slopes, bedrock near the surface, flooding hazard, high shrink-swell potential, a seasonal high water table, or low bearing strength. This degree of limitation generally requires major soil reclamation, special design, or intensive maintenance. Some of these soils, however, can be improved by reducing or removing the soil feature that limits use; but, in many situations, it is difficult and costly to alter the soil or to design a structure to compensate for a severe degree of limitation.

Suitability Ratings:

A rating of good means the soils have properties favorable for the use. Good performance and low maintenance can be expected.

A rating of fair means the soil is generally favorable for the use. One or more soil properties make these soils less desirable than those rated good.

A rating of poor means the soil has one or more properties unfavorable for the use. Overcoming the unfavorable property requires special design, extra maintenance, or costly alteration.

IV. INTERPRETATIONS FOR SANITARY FACILITIES

Septic tank absorption fields. A septic tank absorption field is a soil absorption system for sewage disposal. It is a subsurface tile or perforated pipe system laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into the natural soil.

Criteria used for rating soils (slight, moderate, and severe) for use as absorption fields are based on the limitations of the soil to absorb effluent. Important features affecting this use are permeability, depth to a seasonal water table, flooding, slope, depth to bedrock or hardpan, stoniness, and rockiness.

Sewage lagoons. A sewage lagoon (aerobic) is a shallow lake used to hold sewage for the time required for bacterial decomposition. The requirements for this embankment are the same as for other embankments designed to impound water. (See embankments, dikes, and levees.)

Soil requirements for basin floors of lagoons are slow rate of seepage, even surface of low gradient and low relief, and little or no organic matter.

Sanitary landfill. Because trenches as deep as 15 feet or more are used for many landfills, geologic investigation is needed to determine the potential for pollution of ground water by leachates as well as to ascertain the design needed. Soil survey borings commonly are limited to depths of 5 or 6 feet; however, for some soils, properties can be predicted with reasonable confidence below such depths. Predictions relative to probable depth to a seasonal high water table or to bedrock can be useful in planning for detailed investigation.

Sanitary landfill (trench-type). This type of landfill is a dug trench in which refuse is buried daily and the refuse is covered with a layer of soil material at least 6 inches thick. The material used for covering is the soil excavated in digging the trench. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. Important features affecting trench-type sanitary landfills are depth to a seasonal high water table, flooding, permeability, slope, texture, depth to bedrock or hardpan, stoniness and rockiness.

Sanitary landfill (area-type). In this type of landfill, refuse is placed on the surface of the soil in successive layers. The soil used for daily and final cover generally must be hauled in from elsewhere. A final cover of soil material at least 2 feet thick is placed over the fill when it is completed. Important features affecting this type of landfill are depth to a seasonal high water table, flooding, permeability, and slope.

Daily cover for area-type landfill generally must be obtained from a source away from the site. Suitability of a soil for use as daily cover is based on properties that reflect workability such as slope, wetness, ease of digging, moving, and spreading the soil during both wet and dry periods. Thickness of suitable soil material will determine the supply. Some damage to borrow area is expected, but if revegetation and erosion control could become serious problems in that area, the soil is rated as poor for use as cover material for fills.

V. BUILDING SITE DEVELOPMENT

Shallow excavations are those that require digging or trenching to a depth of less than 6 feet. Important features affecting excavations are a seasonally high water table, flooding, slope, soil texture, depth to bedrock or other cemented layer, stoniness, and rockiness.

Dwellings with and without basements, as considered here, are for structures not more than 3 stories high that are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load, and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Small commercial buildings, as considered here, have the same requirements and features as described for dwellings. The main difference for commercial buildings is a reduction of slope limits for each limitation class. Canneries, foundries, and the like are not considered here because foundation requirements generally would exceed those of ordinary 3-story dwellings.

Local roads and streets, as rated here, have an allweather surface expected to carry automobile traffic all year. They have a subgrade of underlying material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load-supporting capacity and stability of the subgrade, and the workability and quantity of cut and fill material available. The AASHTO and Unified classifications of the soil material, and also the shrink-swell potential, indicate traffic-supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock or cemented layers, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Lawns, Landscaping, and Golf Fairways. The soils are rated for their use in establishing and maintaining turf for lawns and golf fairways, and ornamental trees and shrubs for residential type landscaping. The ratings are based on the use of soil material at the location with some land smoothing. Irrigation may or may not be needed and is not a criteria for rating. Traps, trees, roughs, or greens are not considered as part of the golf fairway.

The properties considered are those that affect plant growth and trafficability after establishing vegetation. The properties that affect plant growth are the content of salt, sodium and sulfidic materials, soil reaction, depth to water table, depth to bedrock or cemented pan, and the available water capacity of the upper 40 inches of soil. The properties that affect trafficability after vegetation is established are flooding, wetness, slope, stoniness, and the amount of clay, sand or organic matter in the surface layer.

VI. CONSTRUCTION MATERIAL

This section gives the suitability of the soil as source material for construction purposes.

Suitability ratings of good, fair, or poor are given for soils used as a source of roadfill and topsoil. Ratings of probable and improbable are given for sand and gravel.

A rating of probable means that on the basis of the available evidence, the source material is likely to occur in or below the soil. A rating of improbable means that the source material is unlikely to occur within or below the soil. This rating does not consider the quality of the source material because quality depends on how the source material will be used.

Roadfill is soil material used in embankments for roads. The suitability ratings reflect (1) the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage, and (2) the relative ease of excavating the material at borrow areas.

Good or fair roadfill material is rated poor where the depth to bedrock or hardpan is less than about 3 feet.

Sand. Sand as a construction material is usually defined as the size of particles ranging from .074 mm (sieve #200) to 4.76 mm (sieve #4) in diameter. Sand is used in greater quantities in many kinds of construction. Specifications for each purpose vary widely. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the sand for specific purposes is not evaluated.

The properties used to evaluate the soils as a probable source for sand are the grain size as indicated by the Unified Soil Classification, the thickness of the sand layer, and the amount of rock fragments in the soil material.

If the lowest layer of the soil contains sand, the soil is rated as a probable source regardless of thickness. The assumption is that the sand layer below the depth of observation exceeds the minimum thickness.

Gravel. Gravel as a construction material is defined as the size of particles ranging from 4.76 mm (sieve #4) to 76 mm (3 inches) in diameter. Gravel is used in great quantities in many kinds of construction. Specifications for each purpose vary widely. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the gravel for specific purposes is not evaluated.

The properties used to evaluate the soil as a probable source for gravel are grain size as indicated by the Unified Soil Classification, the thickness of the gravel layer and the amount of rock fragments in the soil material. If the lowest layer of the soil contains gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the gravel layer below the depth of observation exceeds the minimum thickness.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as for preparing a seedbed; response of plants when fertilizer is applied; absence of substances toxic to plants; and absence of high amounts of soluble salts or alkali.

Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but also considered in the ratings is damage that will result at the area from which topsoil is taken.

VII. WATER MANAGEMENT

Pond reservoir areas hold water behind a dam or embankment. Features affecting this use are permeability, depth to bedrock, and depth to cemented pan.

Embankments, dikes, and levees are earthfills designed to hold back water. Features affecting these uses are shear strength, compressibility, permeability of the compacted soil, susceptibility to piping, compaction characteristics, shrink-swell potential, and stoniness. Ratings given apply only to small, homogeneous embankments.

Excavated ponds aquifer fed are bodies of water created by excavating a pit or dugout. Excavated ponds may be divided into two types: those fed by ground water aquifers and those fed by surface runoff. Rated here are those fed by aquifers. Excluded are ponds fed by runoff and also embankment-type ponds where the depth of water impounded against the embankment exceeds 3 feet. The assumption is made that the pond is properly designed, located, and constructed, and that the water is of good quality.

Soil properties affecting aquifer-fed ponds are the existence of a permanent water table, permeability of the aquifer, and properties that interfere with excavation--stoniness and rockiness.

Drainage of cropland and pasture is affected by such soil features as permeability; depth to bedrock, cemented pan, fragipan, claypan, or other layers that influence rate of water movement; depth to seasonal water table; slope; stability of ditchbanks; susceptibility to flooding or ponding; salinity or alkalinity; and availability of outlets for drainage.

Irrigation suitability of a soil is affected by such features as slope; susceptibility to stream overflow; water erosion or soil blowing; soil texture; content of stones; accumulations of salts and alkali; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in fragipans or other layers that restrict movement of water; amount of water held available to plants; and need for drainage, or depth to water table.

Terraces and diversions are embankments or ridges constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly into a prepared outlet. Features affecting these uses are percent, length, and shape of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; hazards to water erosion, soil blowing, and soil slipping; availability of outlets; and ease or difficulty in the establishment of vegetation.

Grassed waterways are constructed waterways or outlets shaped or graded and established in suitable vegetation as needed for the safe disposal of runoff from a field, diversion, terrace, or other structure. Soil features affecting this use are slope, susceptibility to erosion, drouthiness, excess alkali and salt, permeability, rooting depth, rock outcrops, stoniness, wetness, and ease or difficulty in the establishment of vegetation.

VIII. RECREATIONAL DEVELOPMENT

Knowledge of soils is necessary in planning, developing, and maintaining areas used for recreation. In this section the soils are rated according to limitations that affect their suitability for camp areas, playgrounds, picnic areas, and paths and trails.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. Soil features affecting this use are wetness, flooding during the season of use, permeability, slope, surface soil texture, amount of pebbles, cobbles, or stones on the surface, presence of rock outcrops, and dustiness.

Playgrounds are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. Soil features affecting this use are wetness, flooding during season of use, permeability, slope, surface soil texture, amount of pebbles, cobbles, or stones on the surface, presence of rock outcrops, dustiness, and depth to bedrock.

Picnic areas are attractive natural or landscaped tracts used primarily for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. Soil features affecting this use are wetness, flooding during the season of use, slope, surface soil texture, amount of pebbles, cobbles, or stones on the surface, presence of rock outcrops, and dustiness.

Paths and trails are used for local and cross country travel by foot or horseback. Design and layout should require little or no cutting or filling. Soil features affecting these uses are wetness, flooding during season of use, slope, surface soil texture, amount of pebbles, cobbles, or stones on the surface, presence of rock outcrops, and dustiness.

IX. CAPABILITY AND PREDICTED YIELDS - CROPS AND PASTURE

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, and other characteristics of the soil; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of the soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soil for range, for forest trees, or for engineering.

In the capability system, all kinds of soils are grouped at three levels: the capability class, subclass, and unit. The capability unit is a grouping of soils into a defined management unit which is not provided on the SPI sheet.

Capability classes - The broadest groups are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impracticable to remove, that limit their use largely to pasture, range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or to esthetic purposes.

Capability subclasses are soil groups with one class; they are designated by adding a small letter--e, w, s, or c--to the class numeral, for example, IIe. The letter e shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, drouthy, or stony; and c, used in only some parts of the United States, shows that the chief limitation is climate that is too hot, too cold, or too dry for production of many crops.

In Class I there are no subclasses because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by w, s, and c because the soils in Class VI are subject to little or no erosion though they have other limitations that restrict their use largely to pasture, range, woodland, or recreation.

Capability classes and subclasses are given for both nonirrigated and irrigated conditions.

Yields are given for nonirrigated or irrigated conditions or both depending on the use of the particular soils. These are predicted average acre yields obtainable under a high level of management. A high level of management consists of farming practices that research, field trials, and experience indicate produce the highest net returns.

X. WOODLAND SUITABILITY

This section deals with the potential productivity and management problems in the use of the soils for woodland production.

The species listed in the column for potential productivity of common trees is the one for which site index is given. Site index is an indication of potential productivity and is based on the average total height of the dominant and codominant trees in the stand at the age of 100 years.

Dominant and codominant Douglas-fir (coast) trees growing in a well-stocked stand on site class 1 soils will reach a height of 186 feet or more at the age of 100 years; those on site class 2 soils will reach heights of 156 to 185 feet; those on site class 3 soils, heights of 126 to 155 feet; those on site class 4 soils, heights of 96 to 125 feet; and those on site class 5 soils, heights of 95 feet or less.

Seven site classes are used for ponderosa pine. Site class 1 soils will reach a height of 113 feet or more at age of 100 years; those on site class 2 soils will reach heights of 99 to 112 feet; those on site class 3 soils, heights of 85 to 98 feet; those on site class 4 soils, heights of 71 to 84 feet; those on site class 5 soils, heights of 57 to 70 feet; those on site class 6 soils, heights of 43 to 56 feet; and those on site class 7 soils, heights of less than 43.

Douglas-fir (interior) growing on site class 1 soils will reach a height of 86 feet or more at the age of 50 years; those on site class 2 soils will reach heights of 76 to 85 feet; those on site class 3 soils, heights of 66 to 75 feet; those on site class 4 soils, heights of 56 to 65 feet; those on site class 5 soils, heights of 46 to 55 feet; those on site class 6 soils, heights of 36 to 45 feet; and those on site class 7 soils, heights less than 36 feet.[1/]

The mean site index is given for the listed species. It is based on field sampling.

The ordination symbol column gives a connotative symbol representing class and subclass. The first element in the ordination is a number that denotes potential productivity in terms of cubic meters of wood per hectare per year for the common tree species listed.[2/] Therefore, 16 means 16 cubic meters per hectare per year of wood is produced at the point where mean annual increment culminates. One cubic meter per hectare equals 14.3 cubic feet per acre. The second element is a letter expressing

[1/] Douglas-fir (interior) site index may also be given using the ponderosa pine growth curves.

[2/] Before March 31, 1982, this number was the site class as determined by site index.

selected soil properties associated with moderate or severe hazards or limitations in woodland use or management. Subclass R represents relief or slope steepness, subclass X represents stoniness or rockiness, subclass W represents excessive wetness, subclass T represents toxic substances, subclass D represents restricted rooting depth, subclass C represents clayey soils, subclass S represents sandy soils, subclass F represents fragmental or skeletal soils, and subclass A represents slight or no limitations. Subclass priorities are in the order listed above.

In the columns below management problems, the ratings used are slight, moderate, and severe.

The erosion hazard is based on the condition of the woodland following cutting or logging operations, or where the soil is exposed along roads, trails, or log-yarding areas.

Equipment limitations are a reflection of limitations in the use of equipment commonly employed in managing or harvesting of the tree crop. Major criteria are slope, rockiness, wetness, and texture.

Seedling mortality is the degree of expected loss of natural or planted tree seedlings as influenced by soil and topography.

Windthrow hazard is the degree of expected blowdown during periods of high wind and excessive soil wetness. It considers the soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly.

Plant competition indicates the potential invasion of undesirable species, usually brush, when openings are made in the tree cover.

The woodland suitability section usually is not completed for soils primarily in cropland and those that do not produce commercial trees.

XI. WINDBREAKS

This section deals with windbreak and shelterbelt plantings. The intent is to provide information on the tree species that are best suited for the particular soils. The height expected at 20 years of age is indicated for each species shown. In areas, where windbreaks are not normally needed, an entry of "none" is shown.

XII. WILDLIFE HABITAT SUITABILITY

This section rates soils on their potential for producing various kinds of wildlife habitat. Soil suitability is one of the important factors necessary to produce desired populations of wildlife. Other

important factors, such as present land use and existing wildlife populations, require onsite investigation for their evaluation and are not considered here.

Each soil is rated for those habitat elements listed by columns, and from these ratings, each soil is rated for its suitability to produce various kinds of wildlife habitat--openland habitat, woodland wildlife habitat, wetland wildlife habitat, and rangeland wildlife habitat. Soils are rated for rangeland wildlife habitat only if native range plants are a dominant part of the natural plant community. They are rated for woodland wildlife habitat if trees are a dominant part of the natural plant community. Soils rated for woodland wildlife habitat usually are not rated for rangeland wildlife habitat and vice versa. Openland wildlife habitat includes cropland and pasture.

Levels of suitability are expressed in terms of good, fair, poor, and very poor.

The grain and seed and grass and legume columns have a close relationship to the Capability and Predicted Yields section. Wild herbaceous plants and shrubs columns have a close relationship to the Rangeland and Woodland Suitability sections. The hardwood trees and conifer plants columns have a close relationship to the Woodland Suitability section. However, dry soils in eastern Oregon that do not produce trees other than juniper may have no relationship to the Woodland Suitability section where these soils are irrigated.

XIII. POTENTIAL NATIVE PLANT COMMUNITY
(Rangeland or Forest Understory Vegetation)

Common plant name. Common names of the major plants (usually those that contribute more than 5 percent of the composition) in the potential (climax) plant community are listed.

Percentage composition is an approximate percentage or percentage range of total annual production, dry weight, that each plant contributes to the total potential (climax) production.

The potential production in pounds per acre dry weight is the approximate total annual production of all plants normally growing on the soil in climax condition. In favorable years production is significantly greater than average; in normal years production is a long-term average; and in unfavorable years production is below average.

XIV. TERMS AND DEFINITIONS OF RESTRICTIVE FEATURES USED ON "SPI" SHEETS

AREA RECLAIM	Borrow areas are difficult to reclaim, and revegetation and erosion control on these areas are extremely difficult.
CEMENTED PAN	Cemented pan too close to surface.
COMPLEX SLOPE	Short and irregular slopes. Planning and construction of terraces, diversions, and other water-control measures are difficult.
CUTBANKS CAVE	Walls of cuts are not stable. The soil sloughs easily.
DEEP TO WATER	Deep to permanent water table during dry season.
DEPTH TO ROCK	Bedrock is so near the surface that it affects specified use of the soil.
DROUGHTY	Soil holds too little water for plants during dry periods.
DUSTY	Soil particles detach easily and cause dust.
ERODES EASILY	Water erodes soil easily.
EXCESS FINES	The soil contains too much silt and clay for use as gravel or sand in construction.
EXCESS HUMUS	Too much organic matter.
EXCESS LIME	The amount of carbonates in the soil is so high that it restricts the growth of some plants.
EXCESS SALT	The amount of soluble salt in the soil is so high that it restricts the growth of most plants.
EXCESS SODIUM	Exchangeable sodium imparts poor physical properties that restrict the growth of plants.
FAST INTAKE	Water infiltrates rapidly into the soil.
FAVORABLE	Features of the soil are favorable for the intended use.
FLOODS	Soil flooded by moving water from stream overflow, runoff, or high tides.

FRAGILE	Soil easily damaged by use or distrubance.
FROST ACTION	Freezing and thawing may damage structures.
HARD TO PACK	Difficult to compact.
LARGE STONES	Rock fragments greater than 3 inches across affect the specified use.
LOW STRENGTH	The soil has inadequate strength to support loads.
NO WATER	Too deep to ground water.
NOT NEEDED	Practice not applicable.
PERCS SLOWLY	Water moves through the soil slowly, affecting the specified use.
PERMAFROST	The soil contains frozen layers throughout the year.
PIPING	The soil is susceptible to the formation of tunnels or pipelike cavities by moving water.
PITTING	The soil is susceptible to the formation of pits caused by the melting of ground ice when the plant cover is removed.
PONDING	Soil in closed depressions inundated by standing water that is removed only by percolation or evapotranspiration.
POOR OUTLETS	Surface or subsurface drainage outlets are difficult or expensive to install.
ROOTING DEPTH	A layer that greatly restricts the downward rooting of plants -- occurs at a shallow depth.
SALTY WATER	Water too salty for livestock consumption.
SEEPAGE	Water moves through the soil so quickly that it affects the specified use.
SHRINK-SWELL	The soil expands on wetting and shrinks on drying, which may cause damage to roads, dams, building foundations, or other structures.
SLIPPAGE	Soil mass is susceptible to movement downslope when loaded, excavated, or wet.
SLOPE	Slope too great.

SLOW INTAKE	Water infiltrates slowly into the soil.
SLOW REFILL	Ponds fill slowly because the permeability of the soil is restricted.
SMALL STONES	Rock fragments that are 3 inches or less across may affect the specified use.
SOIL BLOWING	Soil easily moved and deposited by wind.
SUBSIDES	Settlement of organic soils or of soils containing semifluid layers.
THIN LAYER	Suitable soil material is not thick enough for use as borrow material or topsoil.
TOO ACID	The soil is so acid that growth of plants is restricted.
TOO CLAYEY	Soil slippery and sticky when wet and slow to dry.
TOO SANDY	Soil soft and loose; droughty and low in fertility.
UNSTABLE FILL	Banks of fill are likely to cave in or slough or uneven settlement is likely.
WETNESS	Soil wet during period of use.

XV. GLOSSARY

AEROBIC -- Living or active only in the presence of oxygen. Pertaining to aerobic decomposition by aerobic microbes.

ANIMAL UNIT MONTH -- The amount of forage it takes to support an animal unit (basically a cow with calf or the equivalent) for one month.

CLIMAX PLANT COMMUNITY -- The one best adapted to the particular environment of the site.

CODOMINANT TREES -- Trees with crowns forming the general level of the forest canopy and receiving full light from above but comparatively little from the sides; usually with medium-sized crowns more or less crowded on the sides.

DOMINANT TREES -- Trees with crowns extending above the general level of the forest canopy and receiving full light from above and partly from the sides; larger than average trees in the stand, with crowns well-developed, possibly somewhat crowded on the sides.

EVAPOTRANSPIRATION -- The sum of water removed by vegetation and that lost by evaporation for a particular area during a specified time.

FIELD CAPACITY -- The moisture content of soil in the field 2 or 3 days after a thorough wetting of the soil profile by rain or irrigation water. Field capacity is expressed as moisture percentage, dry-weight basis.

FRAGIPAN -- A dense, brittle subsurface horizon that restricts water movement and root penetration.

FRAGMENTAL SOILS -- Soils with so many stones, cobbles, pebbles, or coarse sands that there are voids greater than 1 mm.

HARDPAN -- A subsoil layer cemented by silica and/or carbonates that is very difficult to excavate and makes a nearly impenetrable barrier to roots and water.

HORIZON--SOIL -- A layer of soil, approximately parallel to the land surface, that has distinct characteristics produced by soil-forming processes.

INFILTRATION (RATE) -- The rate at which surface soil absorbs water.

INORGANIC SILTS -- Silts formed from parent material of a mineral nature.

KEY SPECIES -- Those species that differentiate one range site from another.

LEACHATES -- Liquids that have percolated through a soil and that contain substances in solution or suspension.

MAJOR LAND RESOURCE AREA -- Consists of geographic areas of land with particular but broad patterns of soil, climate, water resources, land use and type of farming.

MMHO - MILLIMHO -- $\frac{1}{1000}$ of an mho which is a reciprocal ohm (ohm spelled backward). MHO is a unit of conductivity and ohm is a unit of resistivity.

MAPPING UNITS, SOIL -- Areas shown on a soil map.

ORGANIC SOIL -- A naturally wet soil that may or may not be artificially drained, with 20 to 30 percent or more of plant residues either with or without mineral soil components.

PROPERTIES, SOIL -- Any or all of the measurable physical or chemical characteristics of a soil such as color, texture, structure, reaction, or exchange capacity.

QUALITIES, SOIL -- Inferences made by interpreting soil properties, such as drainage class is inferred from soil mottling.

SATURATION EXTRACT -- The solution removed from a soil completely filled with liquid, at less than 1/3 atmosphere.

SERIES, SOIL -- Consists of soils that have profiles almost alike.

SHEAR STRENGTH -- Ability to resist sliding along internal surfaces within a mass.

SKELETAL SOILS -- Soils with 35 percent or more, by volume, of fragments greater than 2 mm.

SOIL SLIPPING -- The downhill movement of a mass of soil under wet or saturated conditions.

STANDARD DEVIATION -- This is a measure of the spread of values about their arithmetic mean. It indicates that 2/3 of the samples (values) vary this much from the mean.

STRUCTURE, SOIL -- The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles.

TEXTURE, SOIL -- The relative proportions of sand, silt, and clay particles in a mass of soil.

TOPSOIL -- A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

UNIVERSAL SOIL LOSS EQUATION -- A computed soil loss based on rainfall, soil-erodibility, slope length, slope gradient, cropping management, and erosion control practices.

WATER TABLES (SEASONAL) --

Apparent - The periodic occurrence of the water table as indicated by soil characteristics such as mottles and/or concretions.

Artesian - Ground water that is confined between impermeable layers and forced toward the surface by pressure.

Perched - Water which is prevented from percolating through the soil by a restrictive layer, such as impermeable bedrock or hard pans, and is separated from the ground water by a relatively dry zone.

Rev. June 1982

ATTACHMENT D – EXHIBIT 14

"Soil Survey Single Phase Interpretation Sheets in Oregon"

SOIL INTERPRETATIONS RECORD

49C WAMIC LOAM 5 TO 12 PERCENT NORTH SLOPES

THE WAMIC SERIES CONSISTS OF DEEP WELL DRAINED SOILS FORMED IN AEOLIAN MATERIALS ON RIDGETOPS AND PLATEAUS. TYPICALLY, THE SURFACE LAYER IS VERY DARK GRAYISH BROWN LOAM ABOUT 7 INCHES THICK. THE SUBSOIL IS DARK BROWN LOAM ABOUT 21 INCHES THICK. THE SUBSTRATUM IS DARK BROWN LOAM ABOUT 16 INCHES THICK. DEPTH TO BEDROCK IS 40 TO 60 INCHES OR MORE. ELEVATION IS 1000 TO 3600 FEET. MEAN ANNUAL PRECIP. IS 14 TO 20 INCHES. MEAN ANNUAL AIR TEMP. IS 46 TO 50 DEGREES F. THE FROST-FREE PERIOD IS 100 TO 150 DAYS.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-7	L	ML, CL-ML	A-4	0	95-100	95-100	90-95	55-75	20-25	NP-5
7-28	L, SIL	ML, CL-ML	A-4	0	95-100	95-100	90-95	55-75	20-25	NP-5
28-44	L, SCL	ML	A-4	0	95-100	95-100	90-95	55-75	30-35	5-10
44	UWB									

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	EROSION FACTORS T	WIND ERODIBILITY GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-7	15-25	1.10-1.30	0.6-2.0	0.19-0.22	6.6-7.3	-	LOW	.49	4	-	1-2	MODERATE	LOW
7-28	18-27	1.20-1.35	0.6-2.0	0.19-0.22	6.6-7.3	-	LOW	.43					
28-44	20-30	1.30-1.45	0.2-0.6	0.13-0.15	6.6-7.3	-	LOW	.43					
44													

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYDROLOGIC GRP	POTENTIAL FROST ACTION
NONE			>6.0			-		40-60	HARD	-	-	B	MODERATE

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-PERCS SLOWLY
SEWAGE LAGOON AREAS	SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	SEVERE-DEPTH TO ROCK
SANITARY LANDFILL (AREA)	MODERATE-DEPTH TO ROCK, SLOPE
DAILY COVER FOR LANDFILL	FAIR-AREA RECLAIM, SLOPE, THIN LAYER

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	MODERATE-DEPTH TO ROCK, SLOPE
DWELLINGS WITHOUT BASEMENTS	MODERATE-SLOPE
DWELLINGS WITH BASEMENTS	MODERATE-DEPTH TO ROCK, SLOPE
SMALL COMMERCIAL BUILDINGS	SEVERE-SLOPE
LOCAL ROADS AND STREETS	MODERATE-SLOPE, FROST ACTION
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	MODERATE-SLOPE

CONSTRUCTION MATERIAL

ROADFILL	FAIR-AREA RECLAIM, THIN LAYER
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	FAIR-SLOPE

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-PIPING
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	SLOPE, ERODES EASILY
TERRACES AND DIVERSIONS	SLOPE, ERODES EASILY
GRASSED WATERWAYS	SLOPE, ERODES EASILY

RECREATIONAL DEVELOPMENT

CAMP AREAS	MODERATE-SLOPE,DUSTY	PLAYGROUNDS	SEVERE-SLOPE
PICNIC AREAS	MODERATE-SLOPE,DUSTY	PATHS AND TRAILS	SEVERE-ERODES EASILY

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPABILITY		WHEAT, WINTER (BU)		GRASS HAY (TONS)											
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
	4E		35		1.5											

Severe limitations (E) erosion

WOODLAND SUITABILITY

	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
	4A	MODERATE	SLIGHT	MODERATE	SLIGHT	SEVERE	PONDEROSA PINE OREGON WHITE OAK	70.*	PONDEROSA PINE

I=4 cubic meters/hectare/yr. = 57.2 ft³/ac

A= slight or no limitations

D.F. Avg = 44 ft³/ac/yr.

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
FAIR	GOOD	GOOD	FAIR	FAIR	FAIR	V. POOR	V. POOR	FAIR	FAIR	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)
IDAHO FESCUE	FEID	45
BLUEBUNCH WHEATGRASS	AGSP	10
SANDBERG BLUEGRASS	POSE	5
ARROWLEAF BALSAMROOT	BASA3	2
ANTELOPE BITTERBRUSH	PUTR2	10
OREGON WHITE OAK	QUGA4	5
PONDEROSA PINE	PIPO	5
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		950
NORMAL YEARS		800
UNFAVORABLE YEARS		450

FOOTNOTES

* SITE INDEX IS A SUMMARY OF 5 OR MORE MEASUREMENTS ON THIS SOIL.

SOIL INTERPRETATIONS RECORD

500 WAMIC LOAM, 12 TO 20 PERCENT SLOPES

WAMIC SERIES CONSISTS OF DEEP WELL DRAINED SOILS FORMED IN AEOLIAN MATERIALS ON RIDGETOPS AND PLATEAUS. TYPICALLY, THE SURFACE LAYER IS VERY DARK GRAYISH BROWN LOAM ABOUT 7 INCHES THICK. THE SUBSOIL IS DARK BROWN LOAM ABOUT 21 INCHES THICK. THE SUBSTRATUM IS DARK BROWN LOAM ABOUT 16 INCHES THICK. DEPTH TO BEDROCK IS 40 TO 60 INCHES OR MORE. ELEVATION IS 1000 TO 3600 FEET. MEAN ANNUAL PRECIP. IS 14 TO 20 INCHES. MEAN ANNUAL AIR TEMP. IS 46 TO 50 DEGREES F. THE FROST-FREE PERIOD IS 100 TO 150 DAYS.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-7	L	ML, CL-ML	A-4	0	95-100	95-100	90-95	55-75	20-25	NP-5
7-28	L, SIL	ML, CL-ML	A-4	0	95-100	95-100	90-95	55-75	20-25	NP-5
28-44	L, SCL	ML	A-4	0	95-100	95-100	90-95	55-75	30-35	5-10
44	UWB									

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-7	15-25	1.10-1.30	0.6-2.0	0.19-0.22	6.6-7.3	-	LOW	.49	4	-	1-2	MODERATE	LOW
7-28	18-27	1.20-1.35	0.6-2.0	0.19-0.22	6.6-7.3	-	LOW	.43					
28-44	20-30	1.30-1.45	0.2-0.6	0.13-0.15	6.6-7.3	-	LOW	.43					
44													

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENTIAL FROST ACTION
NONE			26.0			-		40-60	HARD	-		B	MODERATE

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-PERCS SLOWLY, SLOPE
SEWAGE LAGOON AREAS	SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	SEVERE-DEPTH TO ROCK, SLOPE
SANITARY LANDFILL (AREA)	SEVERE-SLOPE
DAILY COVER FOR LANDFILL	POOR-SLOPE

CONSTRUCTION MATERIAL

ROADFILL	FAIR-AREA RECLAIM, THIN LAYER, SLOPE
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	POOR-SLOPE

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-PIPING
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	SLOPE, ERODES EASILY
TERRACES AND DIVERSIONS	SLOPE, ERODES EASILY
GRASSED WATERWAYS	SLOPE, ERODES EASILY

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-SLOPE
DWELLINGS WITHOUT BASEMENTS	SEVERE-SLOPE
DWELLINGS WITH BASEMENTS	SEVERE-SLOPE
SMALL COMMERCIAL BUILDINGS	SEVERE-SLOPE
LOCAL ROADS AND STREETS	SEVERE-SLOPE
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-SLOPE

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-SLOPE	PLAYGROUNDS	SEVERE-SLOPE
PICNIC AREAS	SEVERE-SLOPE	PATHS AND TRAILS	SEVERE-ERODES EASILY

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPABILITY		WHEAT, WINTER (BU)		GRASS HAY (TONS)											
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
	4E		35		1.5											

WOODLAND SUITABILITY

ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT.*	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
4A	MODERATE	MODERATE	MODERATE	SLIGHT	SEVERE	PONDEROSA PINE OREGON WHITE OAK	70 *	PONDEROSA PINE

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	*	SPECIES	HT
NONE								

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	POTENTIAL AS HABITAT FOR: WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
POOR	FAIR	GOOD	FAIR	FAIR	FAIR	V. POOR	V. POOR	FAIR	FAIR	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)
IDAHO FESCUE	FEID	45
SANDBERG BLUEGRASS	POSE	5
BLUEBUNCH WHEATGRASS	AGSP	10
ARROWLEAF BALSAMROOT	BASA3	2
ANTELOPE BITTERBRUSH	PUTR2	10
OREGON WHITE OAK	QUGA4	5
PONDEROSA PINE	PIPO	5
POTENTIAL PRODUCTION (LBS./AC. DRY WT):		
FAVORABLE YEARS		950
NORMAL YEARS		800
UNFAVORABLE YEARS		450

FOOTNOTES

* SITE INDEX IS A SUMMARY OF 5 OR MORE MEASUREMENTS ON THIS SOIL.

SOIL INTERPRETATIONS RECORD

51D- WAMIC-SKYLINE COMPLEX, 2 TO 20 PERCENT SLOPES
SKYLINE PART

E SKYLINE SERIES CONSISTS OF SHALLOW WELL DRAINED SOILS FORMED IN AEOLIAN MATERIALS MIXED WITH COLLUVIUM ON OUNTAINOUS AREAS. TYPICALLY, THE SURFACE LAYER IS VERY DARK GRAYISH BROWN VERY COBBLY LOAM AND COBBLY LOAM 9 INCHES THICK. THE SUBSOIL IS DARK BROWN GRAVELLY LOAM ABOUT 5 INCHES THICK. DEPTH TO BEDROCCK IS 12 TO 20 INCHES. ELEVATION IS 500 TO 3500 FEET. THE MEAN ANNUAL PRECIP. IS 14 TO 20 INCHES. THE MEAN ANNUAL AIR TEMP IS 47 TO 49 DEGREES F. THE FROST-FREE PERIOD IS 110 TO 140 DAYS.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-9	CBV-L	GM	A-2, A-4	30-50	55-65	50-60	40-55	30-45	25-30	NP-5
9-14	GR-L	ML, SM, GM	A-4, A-2	5-15	65-80	60-75	50-70	35-55	25-30	NP-5
14	WB									

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-9	12-18	1.10-1.25	0.6-2.0	0.10-0.15	6.6-7.3	-	LOW	.10	1	-	1-4	MODERATE	LOW
9-14	12-18	1.20-1.35	0.6-2.0	0.10-0.15	6.6-7.3	-	LOW	.20					
14													

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENTIAL FROST ACTION
NONE			>6.0			-		12-20	SOFT	-	-	D	MODERATE

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-DEPTH TO ROCK
SEWAGE LAGOON AREAS	SEVERE-DEPTH TO ROCK, SLOPE, LARGE STONES
SANITARY LANDFILL (TRENCH)	SEVERE-DEPTH TO ROCK, LARGE STONES
SANITARY LANDFILL (AREA)	SEVERE-DEPTH TO ROCK
DAILY COVER FOR LANDFILL	POOR-AREA RECLAIM, SMALL STONES

CONSTRUCTION MATERIAL

ROADFILL	POOR-AREA RECLAIM
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	POOR-AREA RECLAIM, SMALL STONES

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-DEPTH TO ROCK, SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-PIPING, LARGE STONES
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	LARGE STONES, DEPTH TO ROCK, SLOPE
TERRACES AND DIVERSIONS	SLOPE, LARGE STONES, DEPTH TO ROCK
GRASSED WATERWAYS	LARGE STONES, SLOPE, DEPTH TO ROCK

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-DEPTH TO ROCK
DWELLINGS WITHOUT BASEMENTS	MODERATE-SLOPE, DEPTH TO ROCK
DWELLINGS WITH BASEMENTS	SEVERE-DEPTH TO ROCK
SMALL COMMERCIAL BUILDINGS	SEVERE-SLOPE
LOCAL ROADS AND STREETS	MODERATE-DEPTH TO ROCK, SLOPE, FROST ACTION
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-LARGE STONES, THIN LAYER

510• WAMIC-SKYLINE COMPLEX, 2 TO 20 PERCENT SLOPES
SKYLINE PART

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-LARGE STONES,DEPTH TO ROCK	PLAYGROUNDS	SEVERE-LARGE STONES,SLOPE,SMALL STONES
PICNIC AREAS	SEVERE-LARGE STONES,DEPTH TO ROCK	PATHS AND TRAILS	MODERATE-LARGE STONES,DUSTY

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CAPABILITY																	
NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
7S	-																

WOODLAND SUITABILITY

ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY		TREES TO PLANT
	EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	COMMON TREES	SITE INDX	
						NONE		

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
V. POOR	V. POOR	FAIR	V. POOR	-	V. POOR	V. POOR	V. POOR	POOR	-	V. POOR	POOR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)
BLUEBUNCH WHEATGRASS	AGSP	70
SANDBERG BLUEGRASS	POSE	20

POTENTIAL PRODUCTION (LBS./AC. DRY WT):	
FAVORABLE YEARS	950
NORMAL YEARS	800
UNFAVORABLE YEARS	400

RANGE SITE -- BISCUT

FOOTNOTES

SOIL INTERPRETATIONS RECORD

10E. BODELL COBBLY LOAM, 5 TO 45 PERCENT SLOPES

THE BODELL SERIES CONSISTS OF SHALLOW WELL DRAINED SOILS FORMED IN AEOLIAN MATERIALS MIXED WITH COLLUVIUM ON MOUNTAINOUS AREAS. TYPICALLY, THE SURFACE LAYER IS DARK BROWN COBBLY LOAM ABOUT 5 INCHES THICK. THE SUBSOIL IS DARK BROWN VERY COBBLY LOAM AND VERY COBBLY CLAY LOAM ABOUT 13 INCHES THICK. DEPTH TO BEDROCK IS 12 TO 20 INCHES. ELEVATION IS 200 TO 2500 FEET. MEAN ANNUAL PRECIP. IS 20 TO 30 INCHES. MEAN ANNUAL AIR TEMP. IS 48 TO 51 DEGREES F. THE FROST-FREE PERIOD IS 100 TO 140 DAYS.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-5	CB-L	ML, SM	A-4	20-30	70-85	70-80	50-70	35-55	25-30	NP-5
5-18	CB-L, CB-CL, CBV-L	GM	A-4	45-70	55-65	50-60	45-55	35-50	25-35	NP-10
18	UWB									

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-5	18-27	1.10-1.20	0.6-2.0	0.06-0.14	6.6-7.3	-	LOW	.17	1	-	1-5	MODERATE	LOW
5-18	18-30	1.10-1.30	0.6-2.0	0.06-0.11	6.6-7.3	-	LOW	.10					
18													

FLOODING

FREQUENCY	DURATION	MONTHS
NONE		

HIGH WATER TABLE

DEPTH (FT)	KIND	MONTHS
>6.0		

CEMENTED PAN

DEPTH (IN)	HARDNESS
-	

BEDROCK

DEPTH (IN)	HARDNESS
12-20	HARD

SUBSIDENCE

INIT. (IN)	TOTAL (IN)
-	

HYD GRP	POTENTIAL FROST ACTION
D	MODERATE

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-DEPTH TO ROCK, SLOPE, LARGE STONES
SEWAGE LAGOON AREAS	SEVERE-DEPTH TO ROCK, SLOPE, LARGE STONES
SANITARY LANDFILL (TRENCH)	SEVERE-DEPTH TO ROCK, SLOPE, LARGE STONES
SANITARY LANDFILL (AREA)	SEVERE-DEPTH TO ROCK, SLOPE
DAILY COVER FOR LANDFILL	POOR-AREA RECLAIM, LARGE STONES, SLOPE

CONSTRUCTION MATERIAL

ROADFILL	POOR-AREA RECLAIM, LARGE STONES, SLOPE
SAND	IMPROBABLE-EXCESS FINES, LARGE STONES
GRAVEL	IMPROBABLE-EXCESS FINES, LARGE STONES
TOPSOIL	POOR-AREA RECLAIM, LARGE STONES, SLOPE

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-DEPTH TO ROCK, SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-LARGE STONES
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	LARGE STONES, DROUGHTY, DEPTH TO ROCK
TERRACES AND DIVERSIONS	SLOPE, LARGE STONES, DEPTH TO ROCK
GRASSED WATERWAYS	LARGE STONES, SLOPE, DROUGHTY

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-DEPTH TO ROCK, LARGE STONES, SLOPE
DWELLINGS WITHOUT BASEMENTS	SEVERE-SLOPE, DEPTH TO ROCK, LARGE STONES
DWELLINGS WITH BASEMENTS	SEVERE-DEPTH TO ROCK, SLOPE, LARGE STONES
SMALL COMMERCIAL BUILDINGS	SEVERE-SLOPE, DEPTH TO ROCK, LARGE STONES
LOCAL ROADS AND STREETS	SEVERE-DEPTH TO ROCK, SLOPE, LARGE STONES
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-THIN LAYER

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-SLOPE,DEPTH TO ROCK	PLAYGROUNDS	SEVERE-LARGE STONES,SLOPE,SMALL STONES
PICNIC AREAS	SEVERE-SLOPE,DEPTH TO ROCK	PATHS AND TRAILS	SEVERE-SLOPE

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTE (HIGH LEVEL MANAGEMENT)

	CAPA-BILITY	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
	7E																		

WOODLAND SUITABILITY

ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPET.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
						NONE		

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF	POTENTIAL AS HABITAT FOR:
V. POOR	POOR	POOR	-	-	V. POOR	V. POOR	V. POOR	V. POOR	-	V. POOR	V. POOR	

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

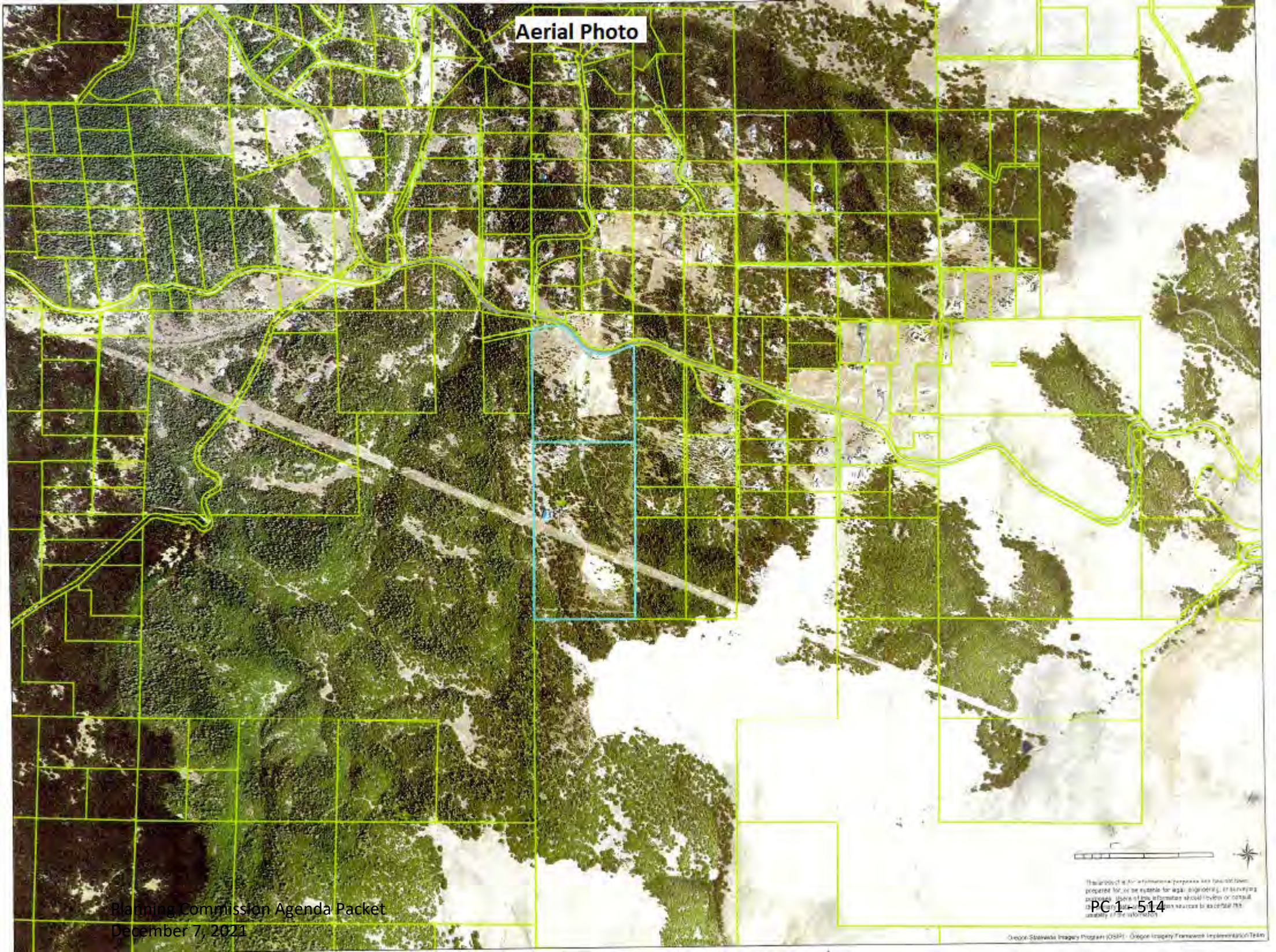
COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)
IDAHO FESCUE	FEID	50
BLUEBUNCH WHEATGRASS	AGSP	15
LETTERMAN NEEDLEGRASS	STLE4	5
SANDBERG BLUEGRASS	POSE	10
OREGON BLUEGRASS	POVA	2
ARROWLEAF BALSAMROOT	BASA3	5
BUCKWHEAT	ERIOG	2
BIGHEAD CLOVER	TRMA3	5
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		1400
NORMAL YEARS		1200
UNFAVORABLE YEARS		800

ANGE SITE -- SOUTH EXPOSURE

FOOTNOTES

ATTACHMENT D – EXHIBIT 15

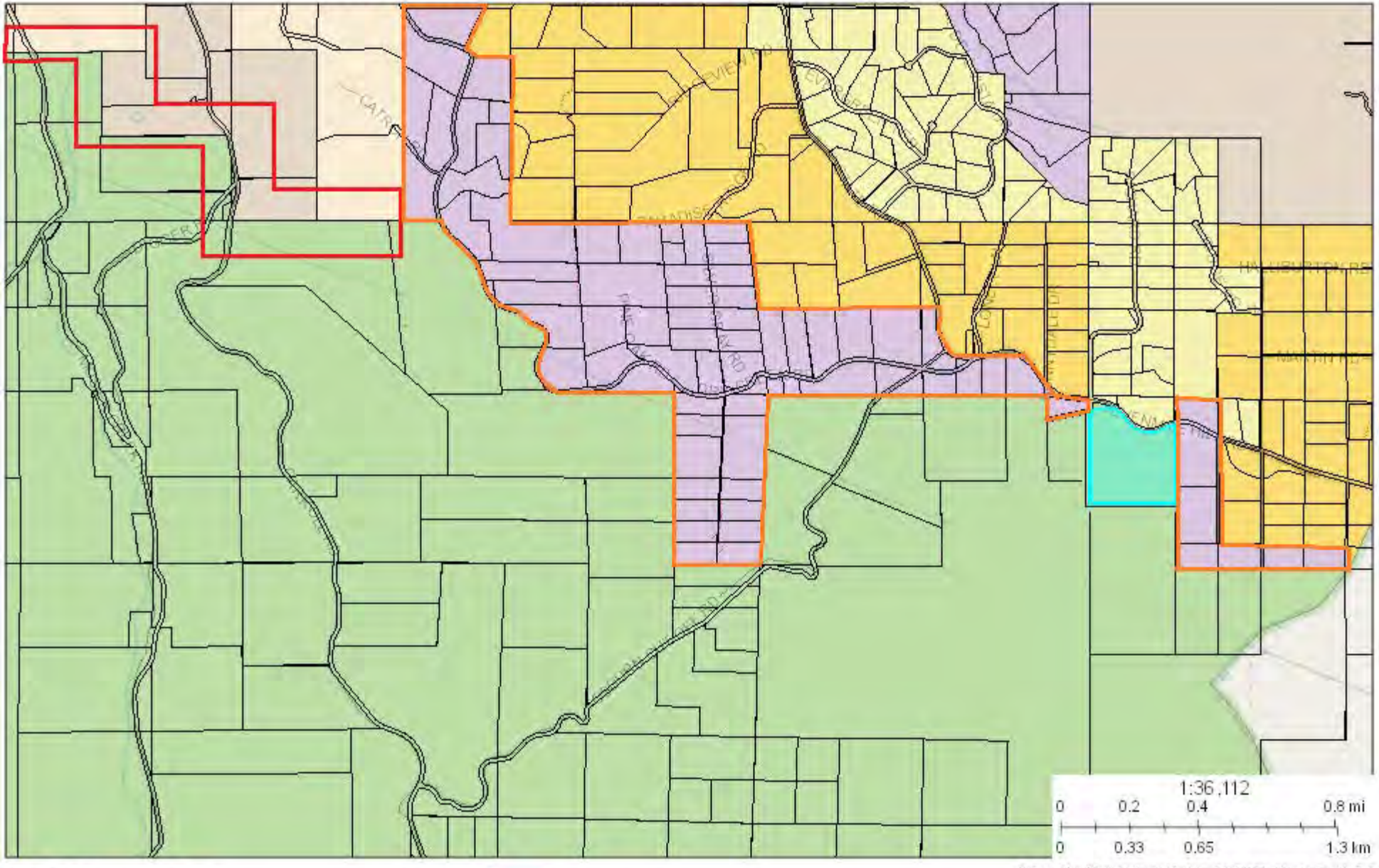
A copy of the “Applicant Site Map”, “Aerial Photo”, and ALL MAPS created for this Staff Report.


Aerial Photo


Labels
Not to Scale
= Septic
= Water
= Power
= Tel/Com
N
Backup Drain Field
Septic Drain Field
Pump House
Well
Septic Drain Field
Lean To
Road = 20' Wide
Power Pole
Barn
Old Homestead
Pond
Barn
Transformer
Log Cabin
Trailer Site
Well
Old Barn
Septic Drain Field
Former Bird Sanctuary
Transformer
Pond (Seasonal)
Trailer Site
Trailer Site
Hand Dug Spring


Power Line Distance Estimate
Labels
Not to Scale
= Septic
= Water
= Power
= Tel/Com
N
PL #8 (440'L)
Backup Drain Field
Septic Drain Field
Pump House
Well
Septic Drain Field
PL #4 (335'L)
Lean To
Road = 20' Wide
Power Pole
PL #3 (185'L)
Barn
PL # 5 (560'L)
Old Homestead
Pond
Barn
Trailer Site
Transformer
Log Cabin
PL #2 (530'L)
PL # 7 (235'L)
PL # 6 (840'L)
Well
Old Barn
Septic Drain Field
Pond (Seasonal)
Former Bird Sanctuary
Transformer
Trailer Site
Trailer Site
PL # 1 (635'L)
Hand Dug Spring
PL = Power Lines

Border between F-2(80) & Residential Lands



1:36,112
0 0.2 0.4 0.8 mi
0 0.33 0.65 1.3 km

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11/22/2021, 12:02:08 PM

WC-Zone

F-2(80) R-R(10) A-1(40) Taxlots

F-F(10) R-R(5) A-1(160) Subject Parcel

Border between lands zoned for resource use

Border between lands zoned for resource use and residential use

N

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Physical Development Map



1:4,514

0 0.03 0.05 0.1 mi

0 0.04 0.09 0.17 km

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Wasco County Planning

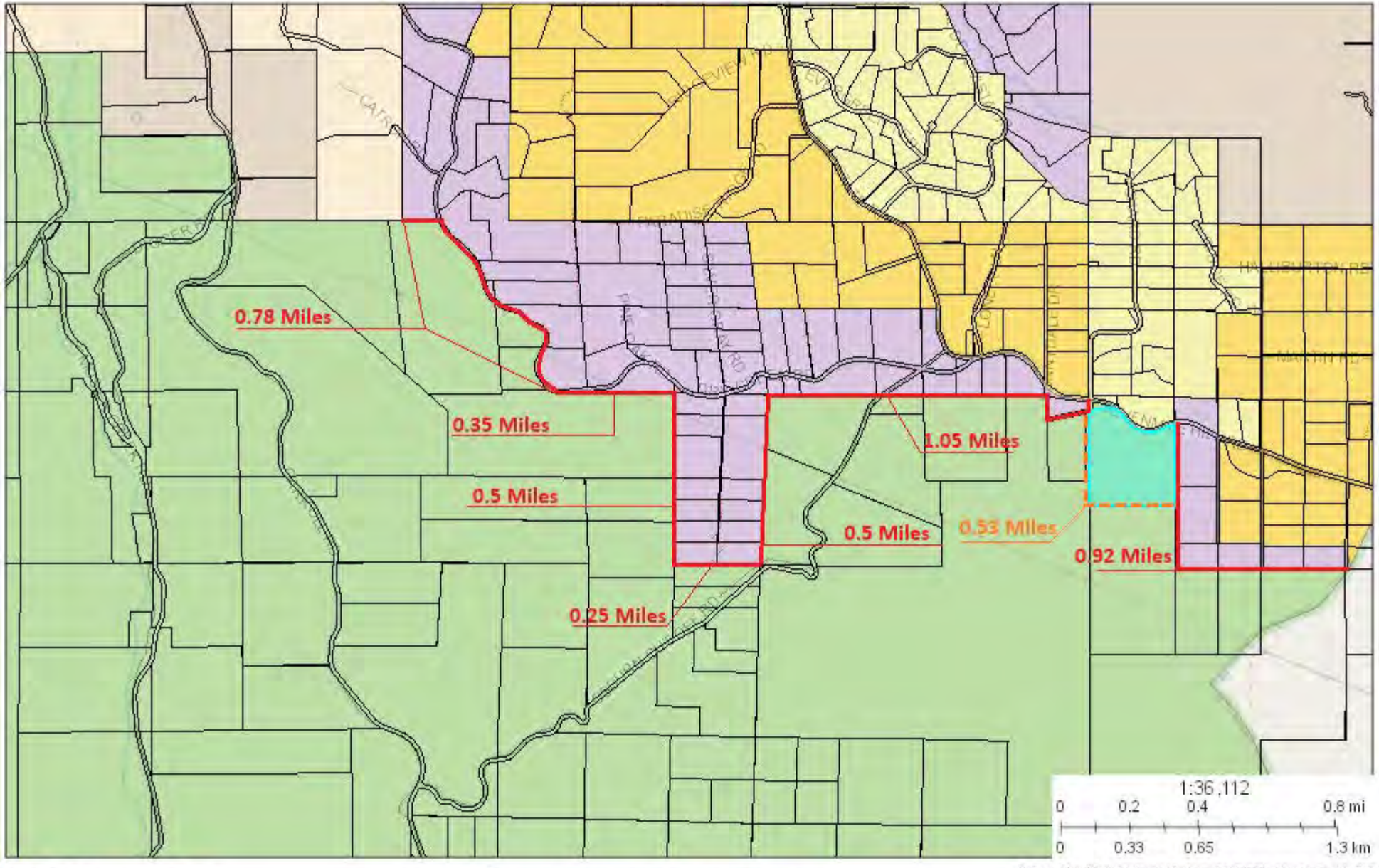
Subject Parcel

Developed Areas

N

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Border Distance between F-F(10) & F-2(80) Zoned Lands



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WC-Zone

F-2(80) R-R(10) A-1(40) Taxlots

F-F(10) R-R(5) A-1(160) Subject Parcel

4.35 Miles F-F(10) & F-2(80) Border

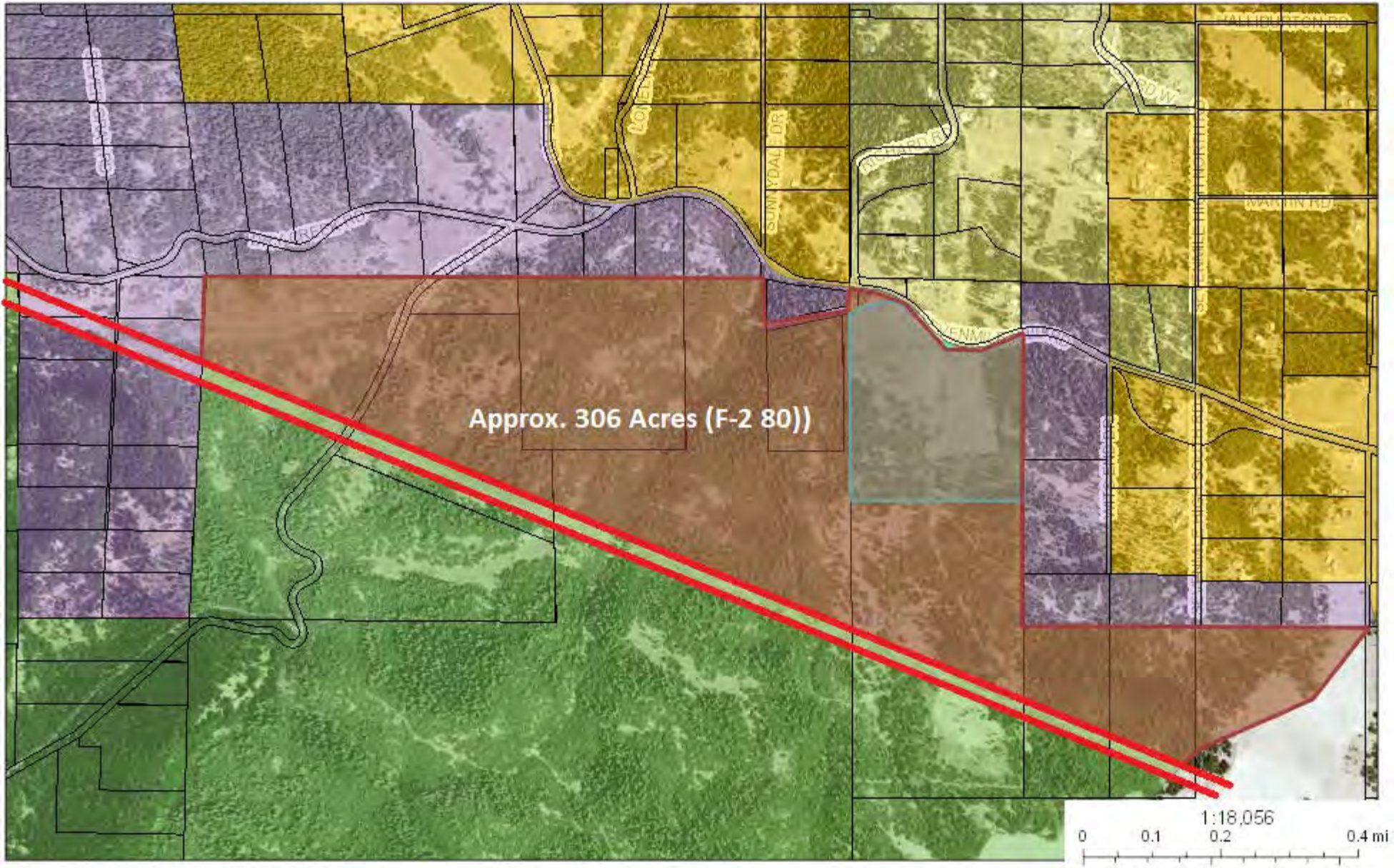
0.53 Miles (subject parcel) property line

If rezoned, F-F(10) & F-2(80) Border would increase to approximately 4.88 Miles.

N

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Forest Lands North of the BPA Line



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WC-Zone

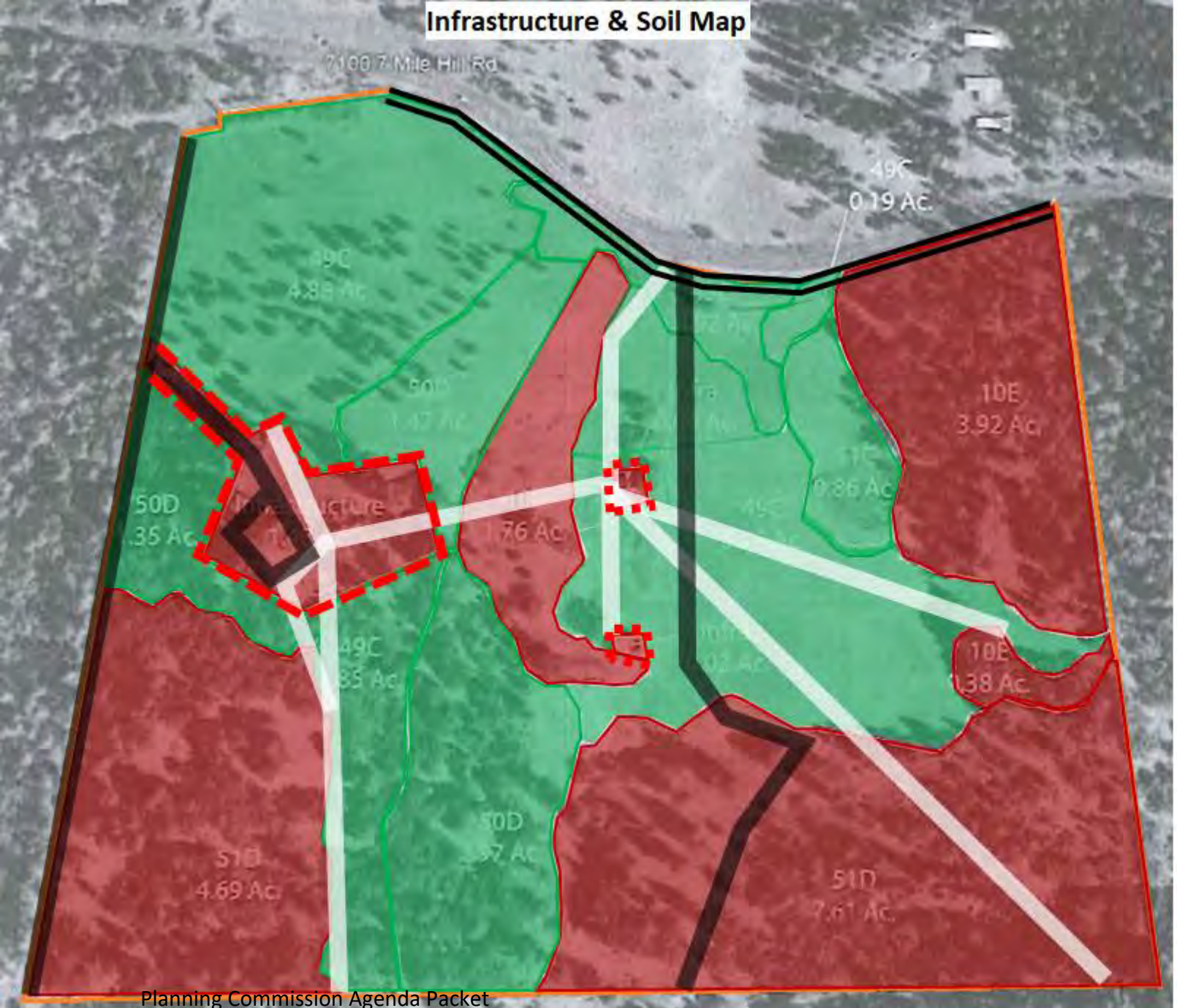
F-2(80) R-R(10) A-1(40) Taxlots Forest Lands North of BPA Line (Approx. 306 acres).

F-F(10) R-R(5) A-1(160) Subject Parcel BPA-Line

N

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Infrastructure & Soil Map



Subject Parcel

Generally Unsuitable Soils (Class 7 & 8)
Total = 20.79 Acres

Generally Suitable Soils (Class 4 & 6)
Total = 19.34 Acres

Power Line Maintenance Easement

Access Fire Fuel Break Areas

Public Road Maintenance Area

Fire Fuel Break for Physical Development & Infrastructure Soil Mapping Unit Area

18% Physically Developed

51.8% Mapped Soils = Generally Unsuitable

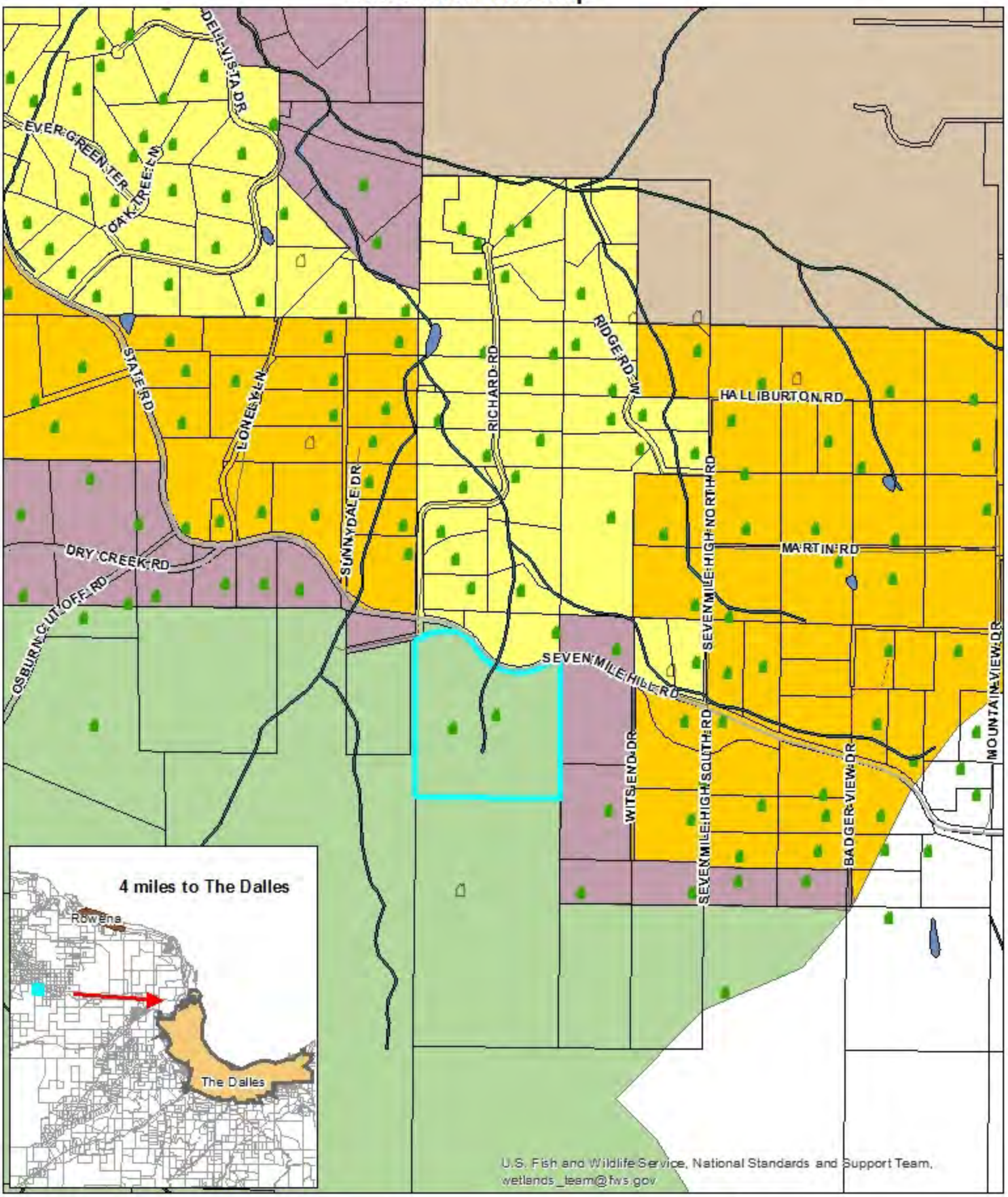
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11-21-2021

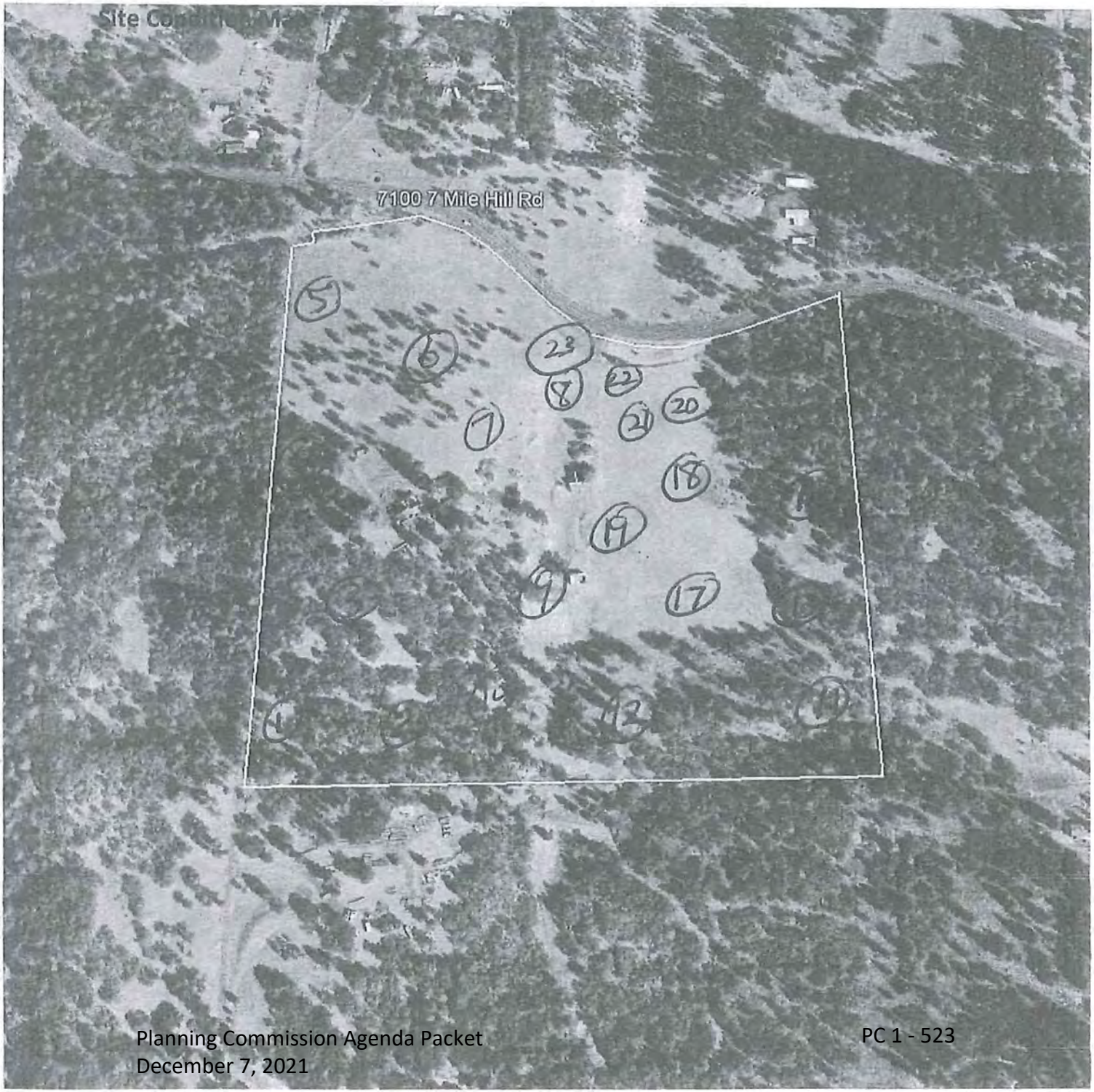
Source: "Wilson – Order 1 Soil Survey"

Location & Zone Map

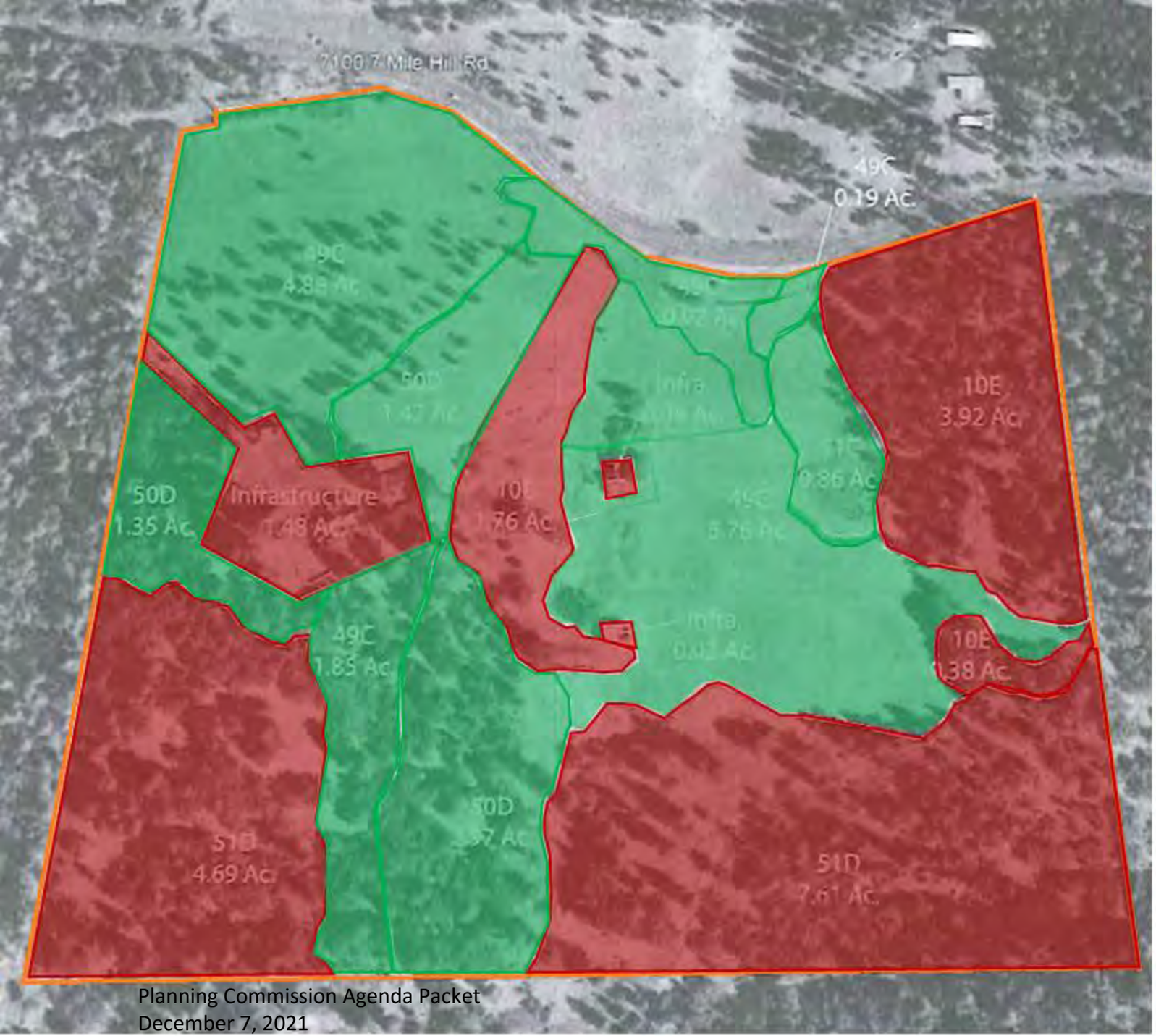


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Wilson
T2N R12E Sec. 23C TL# 4400
Site Condition Map




7100 7 Mile Hill Rd
49C
0.19 Ac.
49C
4.88 Ac.
49C
0.92 Ac.
50D
1.42 Ac.
Infra.
0.06 Ac.
10E
3.92 Ac.
51C
0.86 Ac.
50D
1.35 Ac.
Infrastructure
1.48 Ac.
10E
1.76 Ac.
49C
5.76 Ac.
Infra.
0.03 Ac.
49C
1.85 Ac.
10E
0.38 Ac.
50D
2.97 Ac.
51D
4.69 Ac.
51D
7.61 Ac.



Soil Suitability Map

Subject Parcel

Generally Unsuitable Soils (Class 7 & 8)
- 51D Skyline = 12.30 Acres
- 10E Bodell = 6.06 Acres
- Infrastructure = 1.57 Acres

Total = 20.79 Acres (51.8% of parcel)

Generally Suitable Soils (Class 4 & 6)
- 50D Wamic = 15.74 Acres
- 49C Wamic = 12.68 Acres
- 49 C Wamic (Wet) = 0.92 Acres

Total = 19.34 Acres (48.2% of parcel)

N

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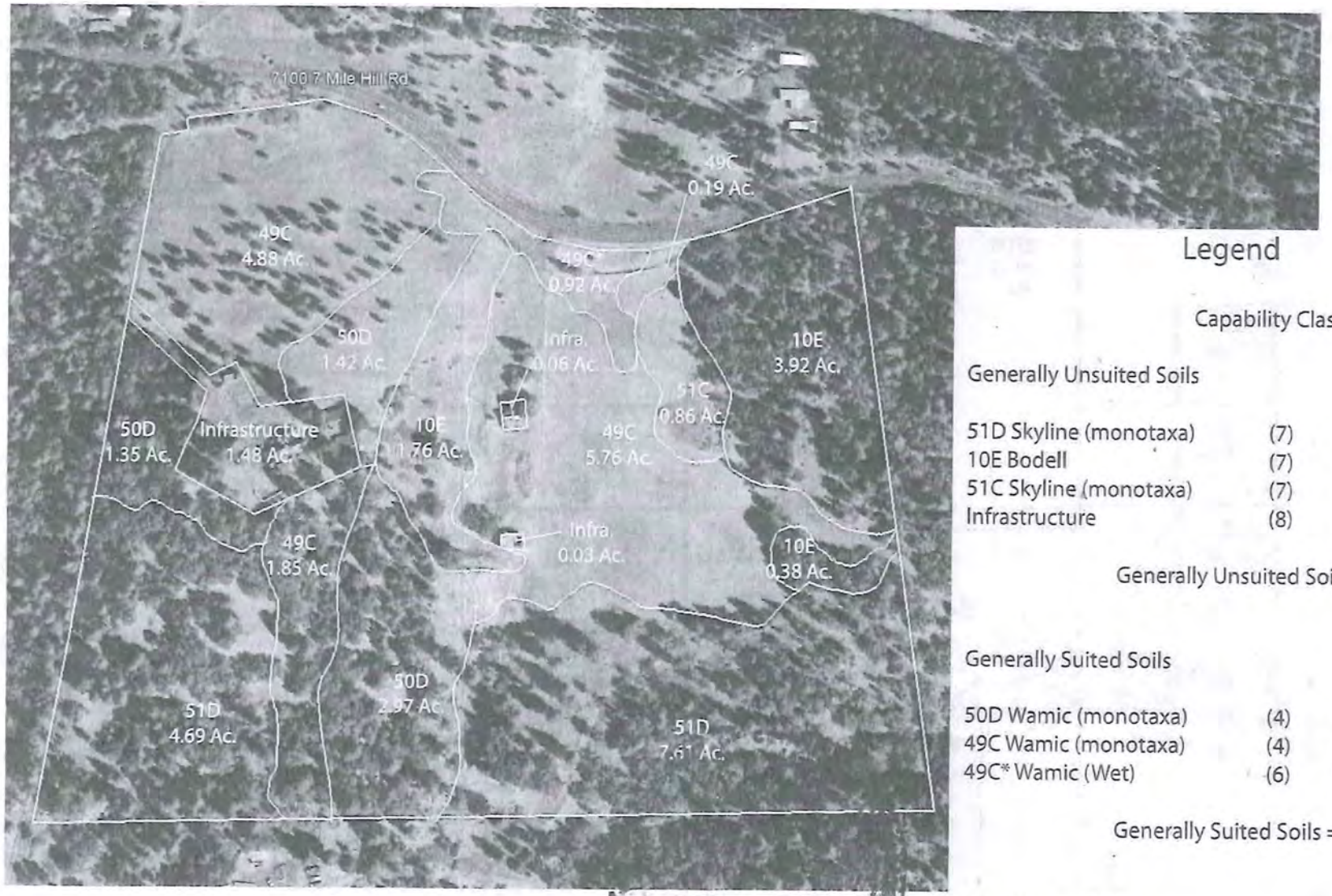
11-21-2021

Source: "Wilson – Order 1 Soil Survey"

Wilson Property

Seven Mile Hill Rd
The Dalles, Oregon
T2N R12E Sec. 22 TL#4400

Order 1 Soil Survey



N

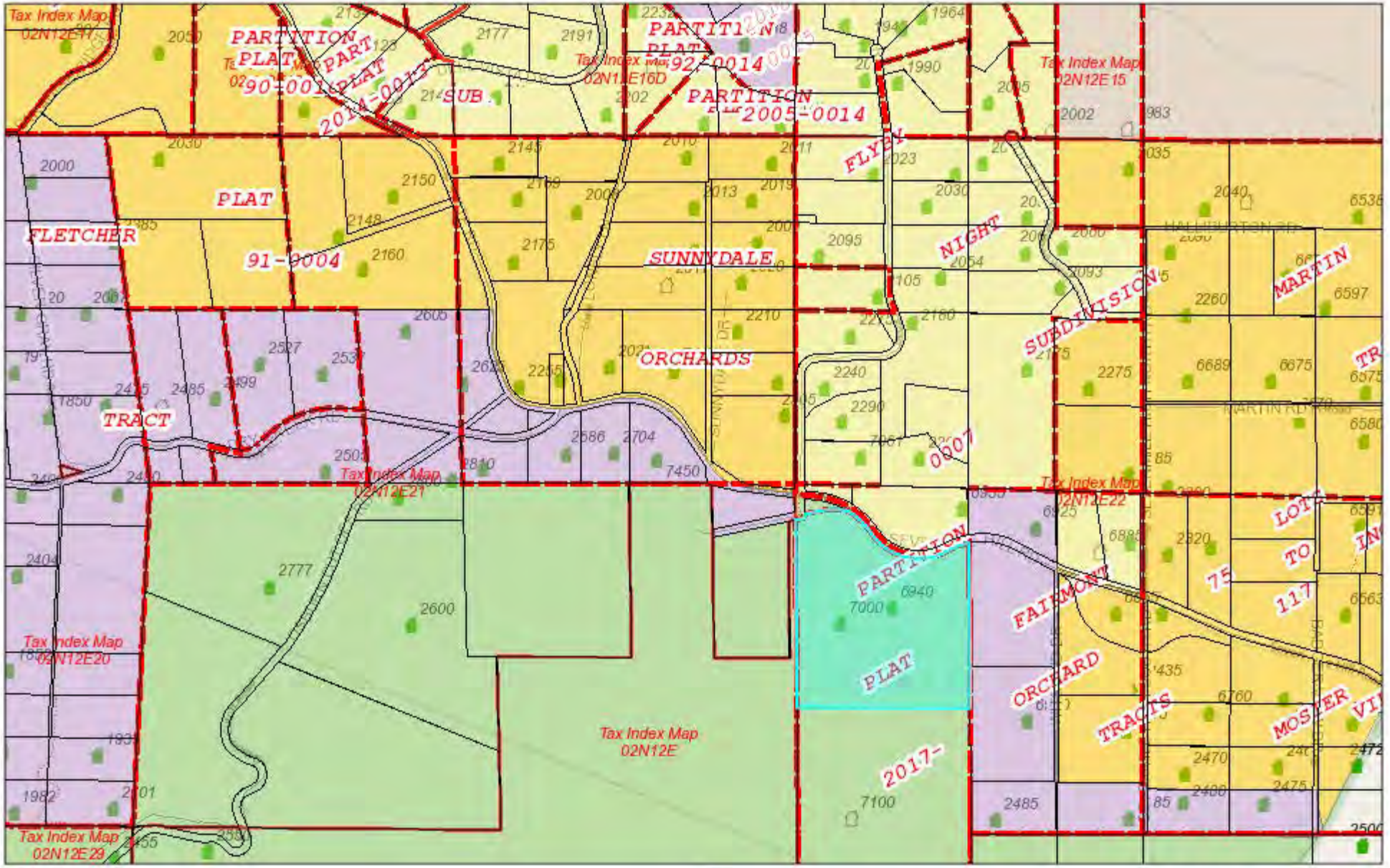
Legend

	Capability Class	Acreage
Generally Unsuited Soils		
51D Skyline (monotaxa)	(7)	= 12.30 Acres
10E Bodell	(7)	= 6.06 Acres
51C Skyline (monotaxa)	(7)	= 0.86 Acres
Infrastructure	(8)	= 1.57 Acres
		Generally Unsuited Soils = 20.79 Acres
Generally Suited Soils		
50D Wamic (monotaxa)	(4)	= 5.74 Acres
49C Wamic (monotaxa)	(4)	= 12.68 Acres
49C* Wamic (Wet)	(6)	= 0.92 Acres
		Generally Suited Soils = 19.34 Acres

13

Total Acres: 40.13 Acres
Percentage of Generally Unsuited Soils: 51.8%

Subdivision & Registered Addresses Map



11/21/2021, 4:24:47 PM

Taxlots

Tax Map Index

Subdivision Line

Registered Dwellings

N

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1:18,056

0 0.1 0.2 0.4 mi

0 0.15 0.3 0.6 km

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Statewide Wetlands Inventory

Riverine

National Hyrography Dataset

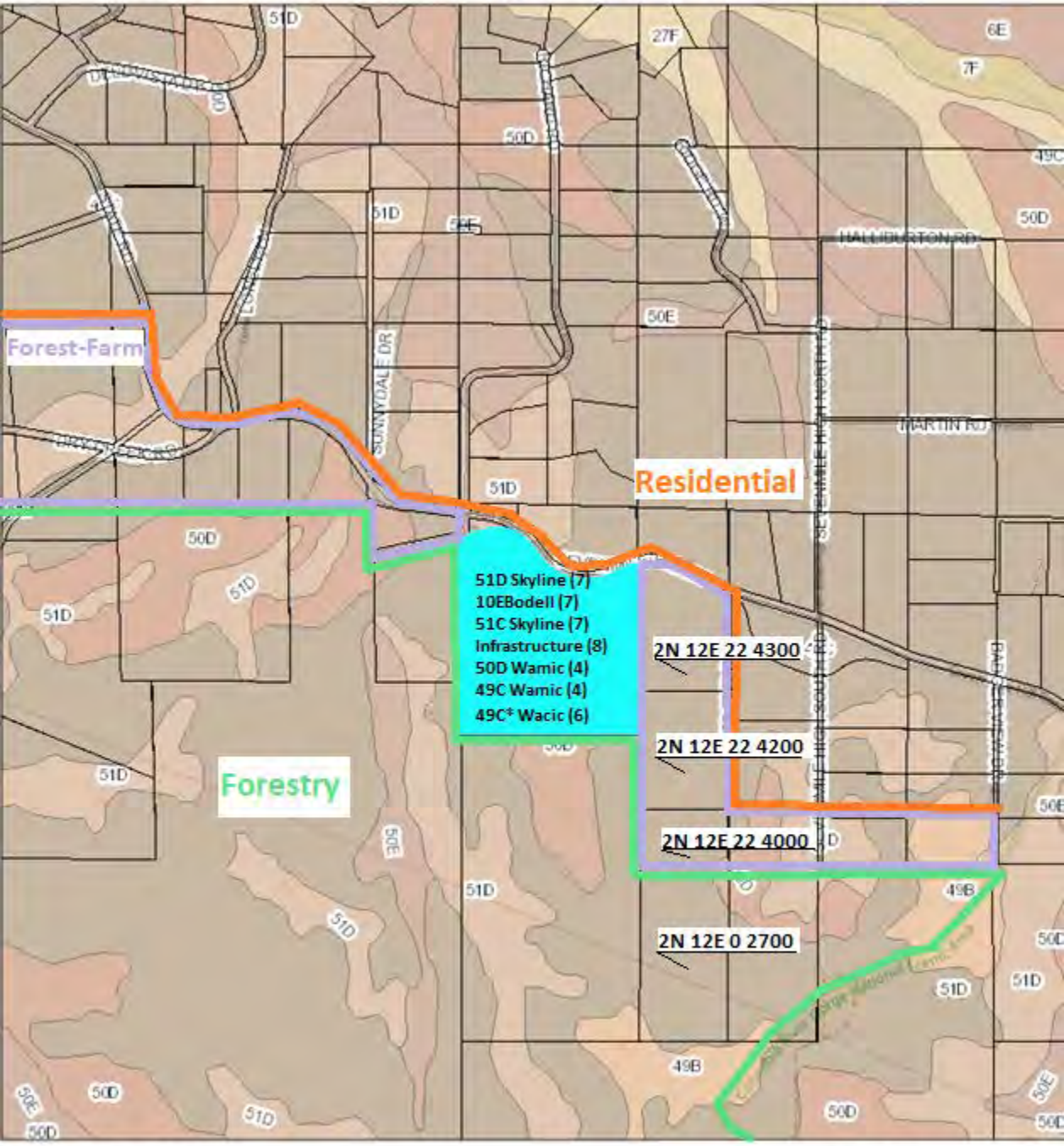
Waterbody - Large Scale (Pond)

Flowline - Large Scale (Stream)

N

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Adjacent Property Soil Mapping Units & Designation



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Taxlots

N

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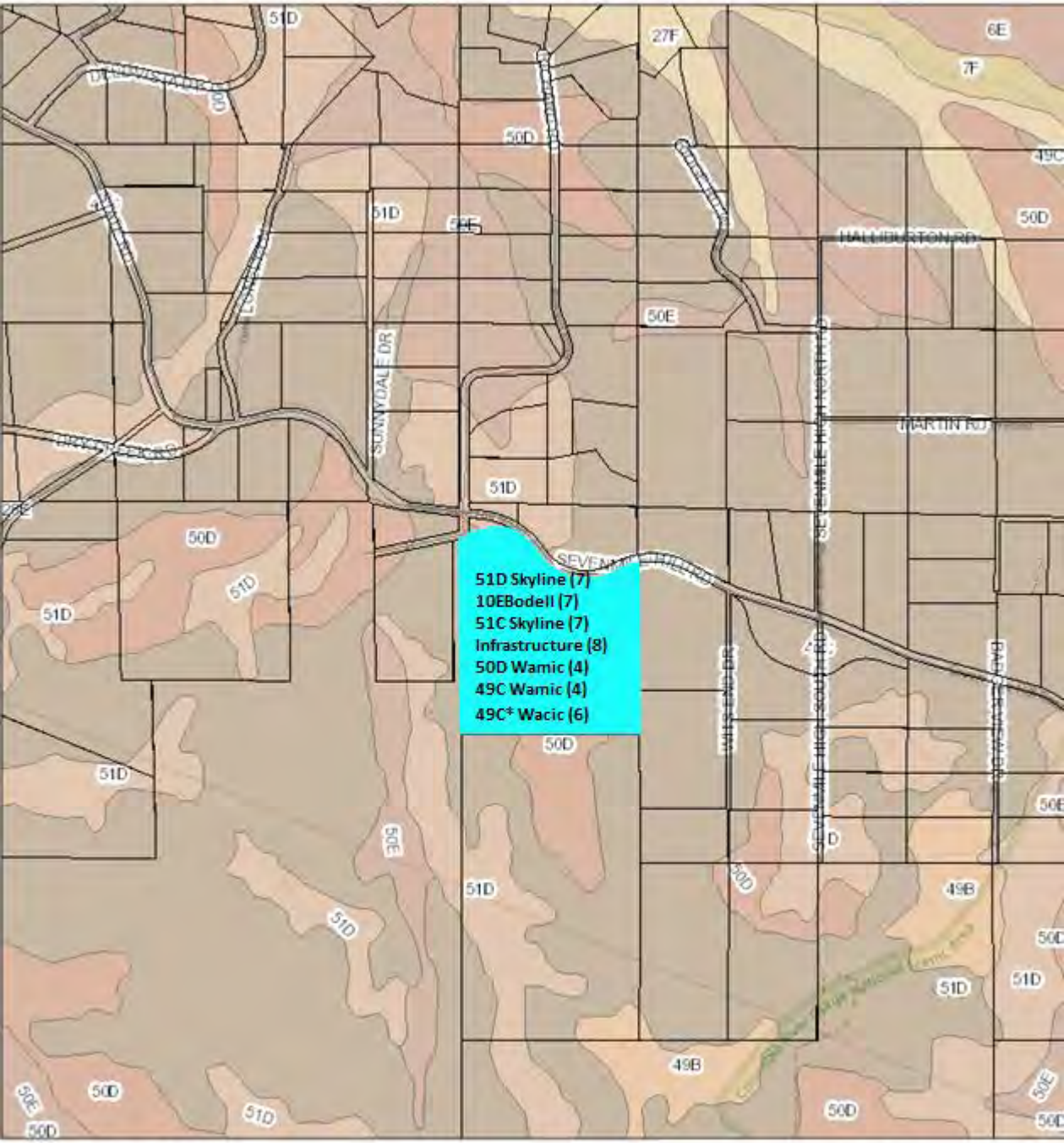
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0 0.1 0.2 0.4 mi

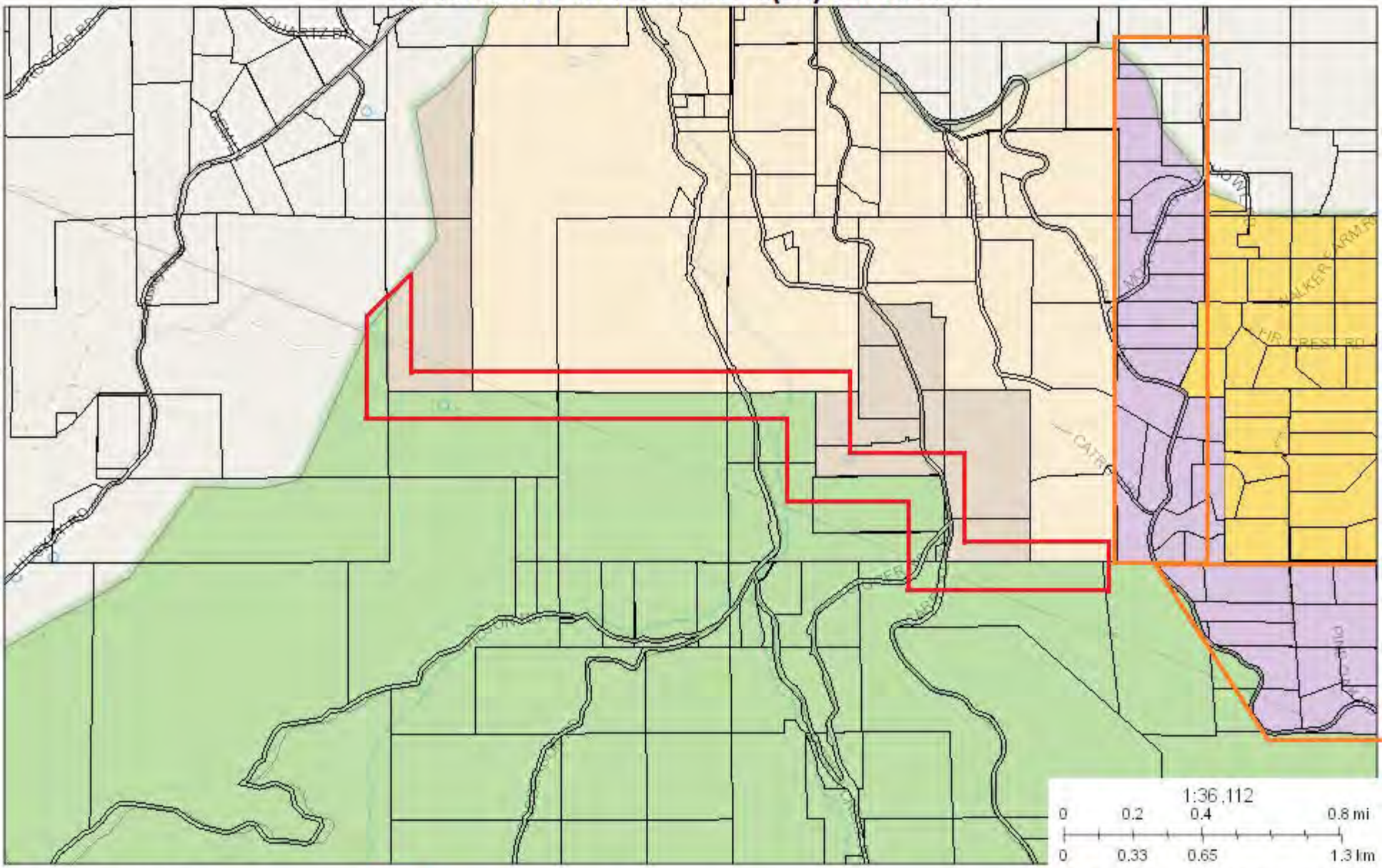
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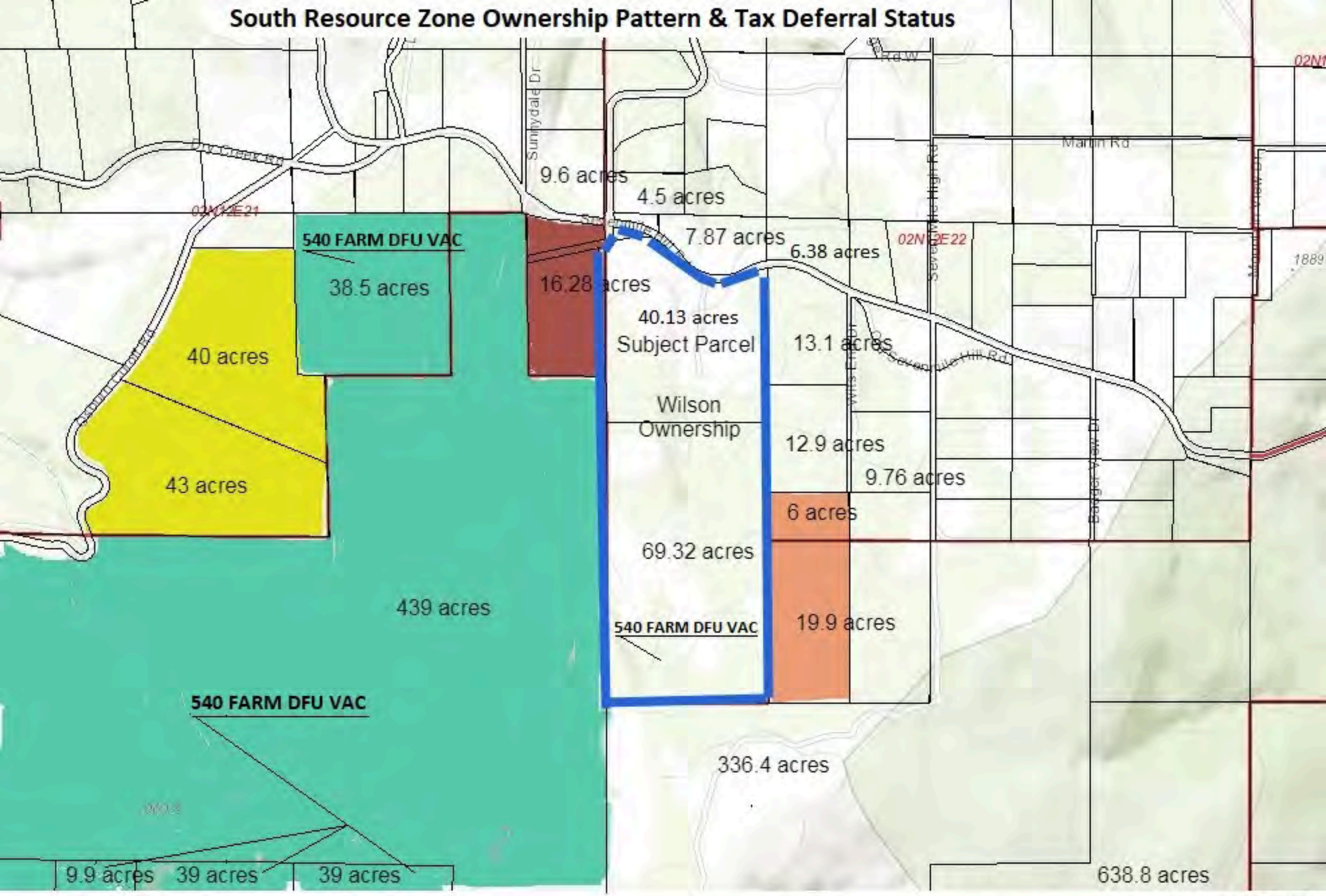
Adjacent Property Soil Mapping Units


51D Skyline (7)
10EBodell (7)
51C Skyline (7)
Infrastructure (8)
50D Wamic (4)
49C Wamic (4)
49C* Wacic (6)
SUNNYDALE DR
SE HALLIBURTON RD
MARTIN RD
SEVENTH STREET RD
UNDERWOOD DR
SE THIRD ST
SE FOURTH ST
SE FIFTH ST
SE SIXTH ST
SE SEVENTH ST
SE EIGHTH ST
SE NINTH ST
SE TENTH ST
SE ELEVENTH ST
SE TWELFTH ST
SE THIRTEENTH ST
SE FOURTEENTH ST
SE FIFTEENTH ST
SE SIXTEENTH ST
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SE NINETEENTH ST
SE TWENTIETH ST
SE TWENTY-FIRST ST
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SE EIGHTY-FOURTH ST
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SE EIGHTY-NINTH ST
SE NINETIETH ST
SE NINETY-FIRST ST
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SE NINETY-FOURTH ST
SE NINETY-FIFTH ST
SE NINETY-SIXTH ST
SE NINETY-SEVENTH ST
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SE ONE HUNDRED AND THIRD ST
SE ONE HUNDRED AND FOURTH ST
SE ONE HUNDRED AND FIFTH ST
SE ONE HUNDRED AND SIXTH ST
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SE ONE HUNDRED AND TENTH ST
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SE ONE HUNDRED AND TWENTY-FIRST ST
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SE SIX HUNDRED AND FIFTIETH ST
SE SIX HUNDRED AND FIFTY-FIRST ST
SE SIX HUNDRED AND FIFTY-SECOND ST
SE SIX HUNDRED AND FIFTY-THIRD ST
SE SIX HUNDRED AND FIFTY-FOURTH ST
SE SIX HUNDRED AND FIFTY-FIFTH ST
SE SIX HUNDRED AND FIFTY-SIXTH ST
SE SIX HUNDRED AND FIFTY-SEVENTH ST
SE

Border between EFU A-1 & F-2(80) Zoned Lands



South Resource Zone Ownership Pattern & Tax Deferral Status



Contiguous Ownership

- KENNETH A THOMAS
- DAVID & JOLENE WILSON
- RICHARD & HOPE VANCE
- STEVEN A BLEILER
- DENNIS L & MARY R DAVIS

Single Parcel (Split-Zone)
F-F(10 & F-2(80)

11-24-2021

Not colored = No contiguous ownership

540 FARM DFU VAC = In tax deferral

N

This product is for informational purposes and has not been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Data Used:
WC-Assessor, WC-GIS

ATTACHMENT D – EXHIBIT 16

All created diagrams for this Staff Report.

Legend

	Capability Class	Acreage
Generally Unsuited Soils		
51D Skyline (monotaxa)	(7)	= 12.30 Acres
10E Bodell	(7)	= 6.06 Acres
51C Skyline (monotaxa)	(7)	= 0.86 Acres
Infrastructure	(8)	= 1.57 Acres

Generally Unsuited Soils = 20.79 Acres

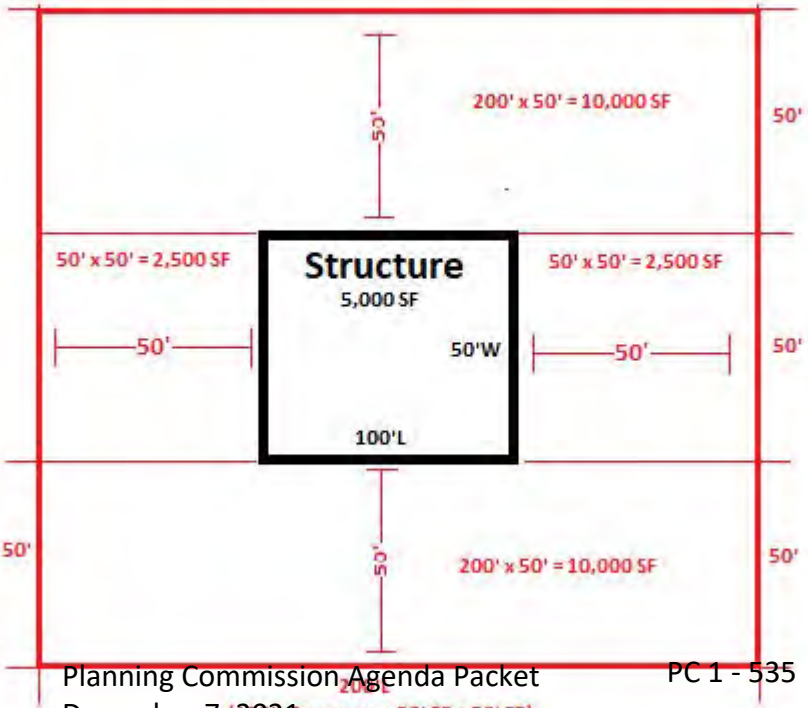
Generally Suited Soils		
50D Wamic (monotaxa)	(4)	= 5.74 Acres
49C Wamic (monotaxa)	(4)	= 12.68 Acres
49C* Wamic (Wet)	(6)	= 0.92 Acres

Generally Suited Soils = 19.34 Acres

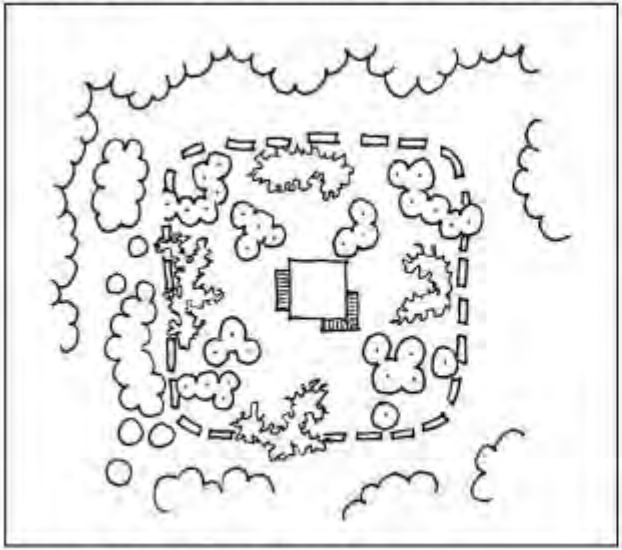
Total Acres: 40.13 Acres

Percentage of Generally Unsuited Soils: 51.8%

25,000 Square Feet (Approximate Total Fire Fuel Break Buffer Area)



Is your building surrounded by a 50-foot wide fire fuel break?

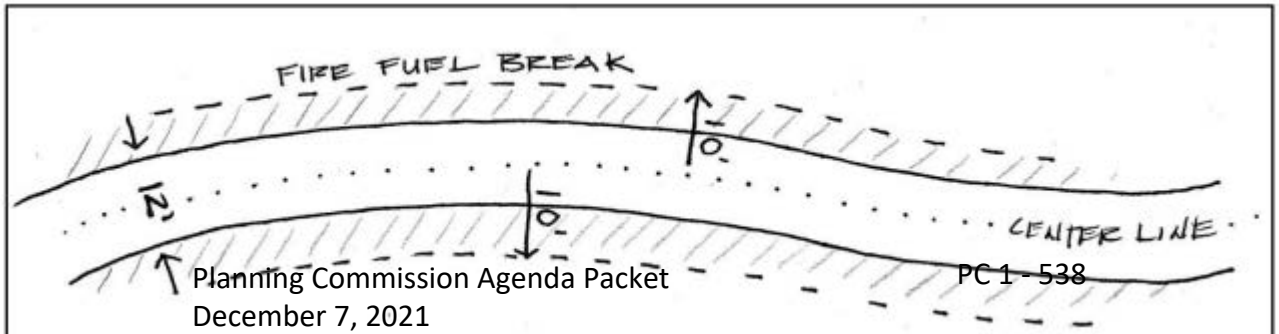


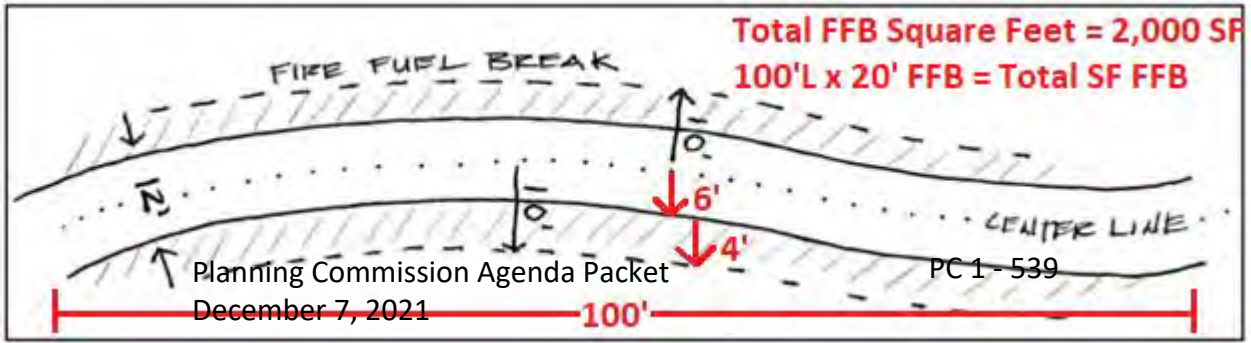
Fire Fuel Break Illustration



Fire Fuel Break Area Sample


14' VERTICLE CLEARANCE
12-16' SURFACE
HORIZONTAL CLEARANCE


FIRE FUEL BREAK
N
CENTER LINE


Total FFB Square Feet = 2,000 SF
100'L x 20' FFB = Total SF FFB
FIRE FUEL BREAK
N
0
0
6'
4'
CENTER LINE
100'

ATTACHMENT D – EXHIBIT 17

Pertinent deeds and minor partitions for this Staff Report.

FORM No. 4—DEED—QUITCLAIM. STEVENS-NESS LAW PUB. CO. PORTLAND

BOOK 114 PAGE 176

KNOW ALL MEN BY THESE PRESENTS, That We, Wm. M. Howell and Lila C. Howell, husband and wife,

in consideration of Ten and no/100ths *Dollars,* and other good and valuable considerations *to* us *paid by* C. J. Marshall and Sarah Marshall, husband and wife,

do hereby remise, release and forever QUITCLAIM unto the said C. J. Marshall and Sarah Marshall, husband and wife, as tenants by the entirety/ and not as tenants in community property *and unto* their *heirs and assigns all* our *right, title and interest in and to the following described parcel of real estate, together with the tenements, hereditaments and appurtenances, situate in* ....., *County of* Wasco, *State of Oregon, to-wit:*

North half of Northwest Quarter (N½NW¼) of Section Twenty-seven, Township Two North, Range 12 East of the Willamette Meridian. Also Tracts Two(2), Three (3), Five (5) and Six (6) of Fairmont Orchard Tracts. ALSO the West half of the Southwest Quarter (W½SW¼) Section 22, Township 2 North Range 12 East of the Willamette Meridian, SAVE AND EXCEPT therefrom all that part of Tract "C", Fairmont Orchard Tracts, lying West of that certain spring situated in said Tract "C", the East line thereof to run parallel with the West boundary line of said Tract "C".

Subject to enough water for household purposes for Iva E. McConnell, her successors or assigns to serve the Westerly part of said Tract "C", not hereby conveyed.

This deed is given for the purpose of correcting a mistake in the description of property as described in deed executed between the parties hereto and recorded in Book 109, Deed Records of Wasco County, Oregon, at Page 185.

TO HAVE AND TO HOLD the same to the said C. J. Marshall and Sarah Marshall, husband and wife / as tenants by the entirety *and to* their *heirs and assigns forever.*

IN WITNESS WHEREOF, we *have hereunto set* our *hand* and *seals* this 5th *day of* August *A. D. 19* 48

Executed in the presence of

..... (SEAL)

..... (SEAL)

..... (SEAL)

..... (SEAL)

STATE OF OREGON,
County of Clackamas } ss.

BE IT REMEMBERED, That on this 5th day of August A. D. 1948 before me, the undersigned, a notary public in and for said County and State, personally appeared the within named Wm. M. Howell and Lila C. Howell, husband and wife, who are known to me to be the identical individual s described in and who executed the within instrument and acknowledged to me that they executed the same freely and voluntarily.

IN TESTIMONY WHEREOF, I have hereunto set my hand and official seal the day and year last above written.

Geo. Blaisdell
Notary Public for Oregon.

My Commission expires Sept. 18, 1949

NOTARY PUBLIC STATE OF OREGON

MY COMMISSION EXPIRES SEPT. 18, 1949

69400

QUITCLAIM DEED

Wm. M. Howell and Lila C. Howell, husband and wife,

TO

C. J. Marshall and Sarah Marshall, husband and wife.

STATE OF OREGON, County of Wasco, } ss

I, D. V. BOLTON, County Clerk and ex officio Recorder of Conveyances, in and for said county, do hereby certify that the within instrument of writing was received for record and recorded in the record of DEEDS of said county at

FILED
COUNTY CLERK'S OFFICE

1948 AUG 13 PM 1 50

D. V. BOLTON
COUNTY CLERK

In Book 114 On Page

Witness my hand and seal of office affixed at The Dalles, Oregon

D. V. BOLTON, County Clerk

By Deputy

Return to

Street

City

PLANNING AND ECONOMIC DEVELOPMENT OFFICE
WASCO COUNTY

2705 EAST SECOND STREET THE DALLES, OREGON 97058

KIMBERLY J. JACOBSEN, Director PHONE: (503) 298-5169 FAX: (503) 296-3769

June 30, 1992

Harry Ketchum
Ketchum Realty
700 East 3rd St.
The Dalles, OR 97058

RE: Lot-of-Record Status of Property Described as Township 2 North, Range 12 East, Tax Lot 11691

Dear Harry:

This letter is to confirm this offices recent decision that the above described tax lot is considered a lot-of-record as defined by the Wasco County Land Use and Development Ordinance.

Upon review of the minor partition which resulted in the creation of this parcel, it was discovered the subject parcel in question was an isolated parcel, not a parcel of the partition. However, since this oversight was not identified and corrected at the time of application, November 1984, it is current office policy to recognize the result of this oversight.

As such, this parcel shall be afforded all the rights of any other lot-of-record in the applicable zone.

If you have any questions or if I can be of further assistance please feel free to call me at 298-5169

Best regards,

Dave Kammerman
Planner

cc: Kimberly Jacobsen, Planning Director
file #MlP-84-118-WAF24-A

WASCO COUNTY PLANNING OFFICE

1721 W. 10th STREET THE DALLES, OREGON 97058

DANIEL C. DUROW, Director of Planning PHONE: (503) 298-5169

November 14, 1984

Garth Davis, P.R.
Earl L. Davis EST
c/o 508 Washington St.
The Dalles, OR 97058

MIP-84-118 - MF24

Dear Mr. Davis:

This letter will serve as your official notification that your minor partition has been accepted by the Planning Office. This partition applies to property located in Township 2 North, Range 12 East, Section(s) 21 & 28 Tax Lot(s) 11600, 11690, and is zoned "F-2 (40)" Forest zone.

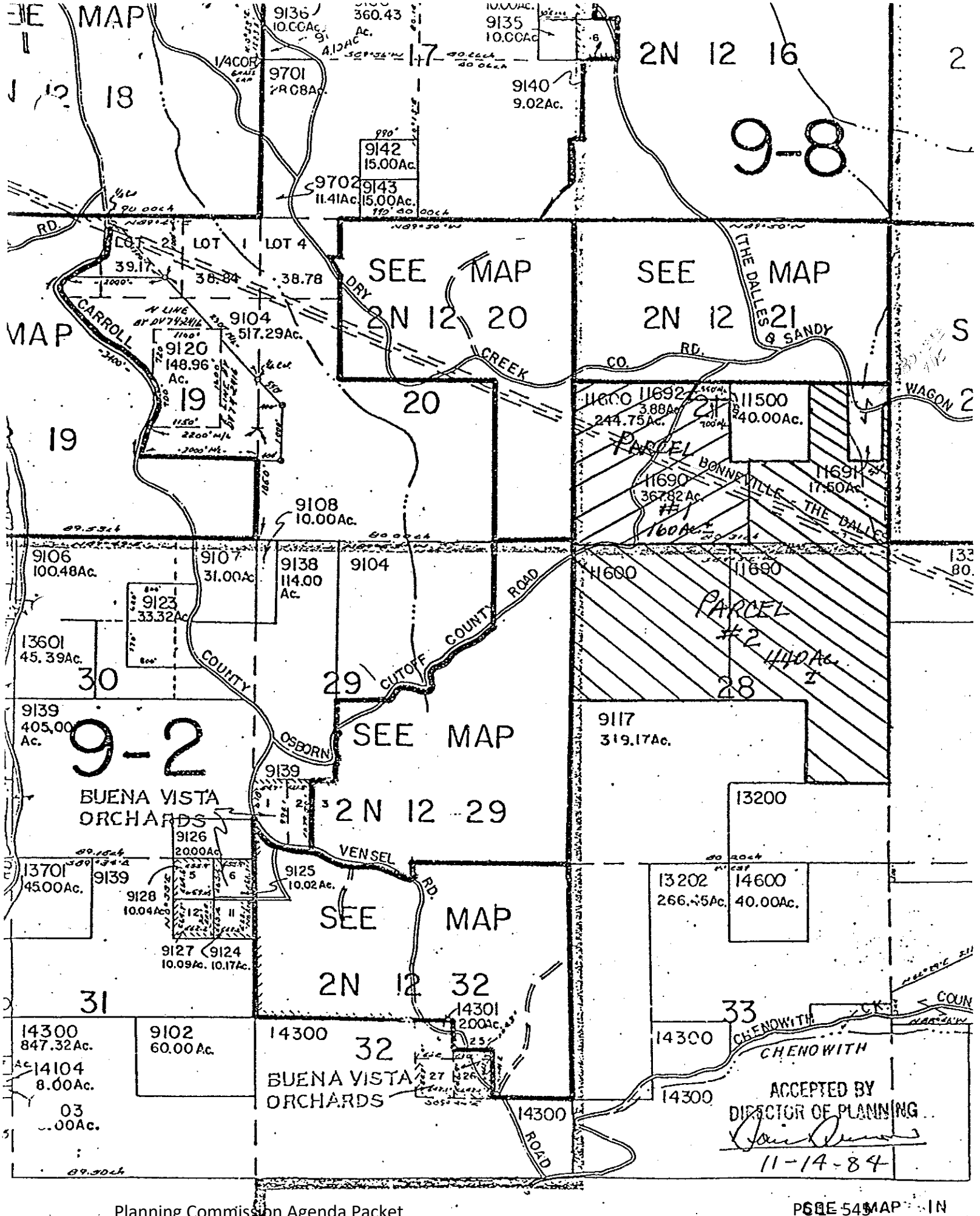
We are returning a copy for your files. Please note that this partition was filed with the Wasco County Clerk on November 14, 1984.

Sincerely,

Dan Durow
Director of Planning

Encl. (Copy-Minor Part. Plan)

dm


SEE MAP
9136
10.00Ac.
360.43
Ac.
9135
10.00Ac.
2N 12 16
1/4COR
9701
9140
9.02Ac.
9142
15.00Ac.
9143
15.00Ac.
9702
11.41Ac.
9-8
LOT 2
LOT 1
LOT 4
39.17
38.84
38.78
SEE MAP
2N 12 20
SEE MAP
2N 12 21
CARROLL
9104
517.29Ac.
9120
148.96
Ac.
19
20
11692
3.88Ac.
244.75Ac.
11500
40.00Ac.
PARCEL
11690
367.82Ac.
#1
160Ac.
11691
17.50Ac.
BONNEVILLE - THE DALLES
9108
10.00Ac.
9106
100.48Ac.
9107
31.00Ac.
9138
114.00
Ac.
9104
9123
33.32Ac.
11600
11690
PARCEL
#2 1140Ac.
13601
45.39Ac.
30
29
28
COUNTY ROAD
CUTOFF
9139
405.00
Ac.
9-2
BUENA VISTA
ORCHARDS
OSBORN
SEE MAP
9117
319.17Ac.
9139
2N 12 29
13200
9126
20.00Ac.
VENSEL
RD.
13701
45.00Ac.
9139
9125
10.02Ac.
9128
10.04Ac.
13202
266.45Ac.
14600
40.00Ac.
SEE MAP
9127
10.09Ac.
9124
10.17Ac.
2N 12 32
31
14301
2.00Ac.
33
14300
847.32Ac.
9102
60.00Ac.
14300
32
CHENOWITH
CK
14104
8.00Ac.
BUENA VISTA
ORCHARDS
14300
ACCEPTED BY
DIRECTOR OF PLANNING
11-14-84
14300
ROAD
SEE MAP IN

PARCEL #1

PARCEL ONE

The Southwest quarter, Section 21, Township 2 North, Range 12 East of the Willamette Meridian in Wasco County, Oregon, excepting therefrom the following: Beginning at the Northeast corner of the Southwest quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, Wasco County, Oregon; thence South along the East line of the Southwest quarter 285 feet; thence West, parallel with the North line of said Southwest quarter, a distance of 700 feet, more or less to the center line of Cutoff County Road; thence Northeasterly along said center line, to the intersection of the North line of said Southwest quarter; thence East along said North line 550 feet, more or less to the point of beginning.

PARCEL TWO

Beginning at the Southeast corner of the Southwest quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, Wasco County, Oregon, thence East along the South boundary of said Section a distance of 227.7 feet; thence North and parallel to the East line of said Section, 1,320 feet more or less to the South line of the Northwest quarter of the Southeast quarter of said Section; thence West and parallel to the South line of said Section, 227.7 feet to the East line of said Section; thence South along the East line of said Section to the point of beginning.

Subject to all encumbrances of record including but not limited to Federal tax liens and real property taxes.

PARCEL #2

PARCEL I

The South half of the Southeast quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, EXCEPTING THEREFROM the following described property: Commencing at the Southeast corner of the Southwest quarter of said Section 21, thence East along the South line of said Section a distance of 227.7 feet to a point; thence North and parallel to the West line of said Section a distance of 1,320 feet more or less to the South line of the Northwest quarter of the Southeast quarter of said Section; thence West along the South line of the Northwest quarter of the Southeast quarter of said Section to the East line of the Southwest quarter of said Section; thence South along said East line to the point of beginning.

PARCEL II

The Northeast quarter of the Southeast quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, EXCEPTING THEREFROM two parcels as conveyed by Warranty Deed Earl L. Davis, et al to Earl L. Davis et ux., dated May 9, 1980, recorded May 13, 1980, Wasco County, Oregon, Microfilm No. 80-1353, said two tracts being more particularly described as follows:

Tract 1

That portion of the East half of the Northeast quarter of the Southeast quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, Wasco County, Oregon, lying South of the Southerly right of way of the existing 60 foot wide county road, excepting therefrom the East 50 feet thereof.

Tract 2

A tract of land in the Northeast quarter of the Southeast quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, Wasco County, Oregon, more particularly described as follows: The East one-half of the Northeast one-quarter of the Southeast one-quarter lying North of the Northerly right-of-way of the existing 60 foot wide county road.
TOGETHER WITH a tract of land in the West one-half of the Northeast one-quarter of the Southeast one-quarter of said Section 21, Township 2 North, Range 12 East of the Willamette Meridian, lying Northerly and Easterly of the easterly right-of-way of the existing 60 foot wide county road.

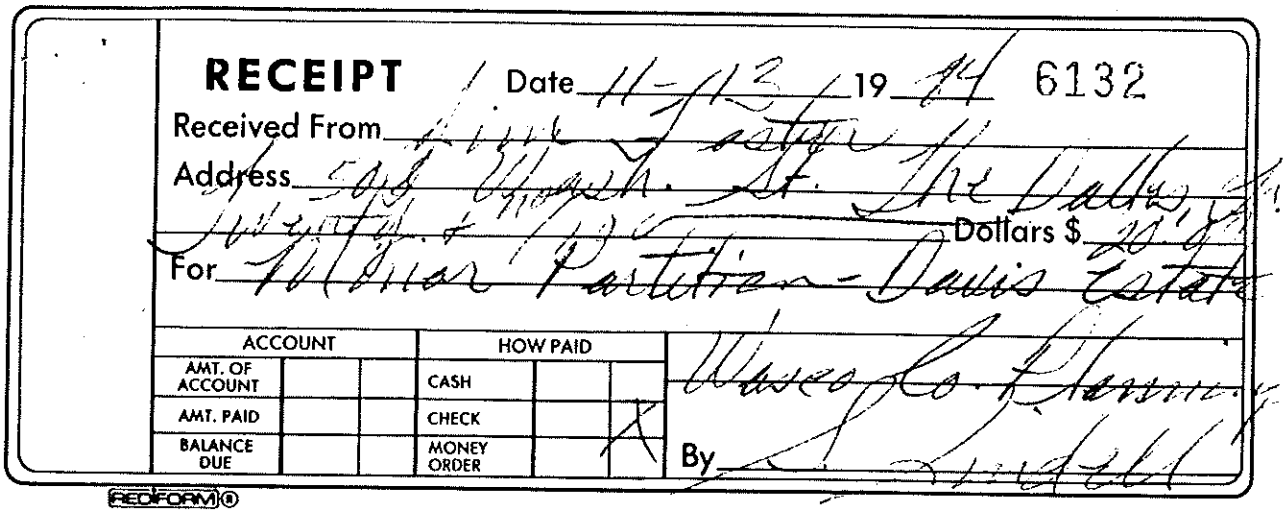
PARCEL III

The North half and the Northeast quarter of the Southeast quarter of Section 28, Township 2 North, Range 12 East of the Willamette Meridian.

PARCEL IV

Lot 13, SUNNYDALE ORCHARDS, Wasco County, Oregon

All in the County of Wasco and State of Oregon.
SUBJECT TO all easements and encumbrances of record.



RECEIPT Date 11-12 19 24 6132

Received From Linn & Carter

Address 508 Union St. The Dalles, Or.

Dollars $ 20.00

For Partition - Davis Estate

ACCOUNT			HOW PAID		
AMT. OF ACCOUNT			CASH		
AMT. PAID			CHECK		
BALANCE DUE			MONEY ORDER		X

Wasco Co. Treasurer

By

REDIFORM®

APPLICATION FOR MINOR PARTITION

APPLICANT:

Earl L. Davis Estate - Garth Davis P.R. 296-5477
(Last Name) (First) (Middle) (Telephone)

508 Wash. St. The Dalles Or 97058
(Street or P.O. Box) (City or Town) (State) (Zip)

LOCATION OF SUBJECT PROPERTY: 11600 11690 S
~~1691~~

Township: 2N Range: 12 Section: 21 & 28 Tax Lot: 11600 11690 S

Legal Owner: Earl L. Davis Beulah Lundell Rue Klepper Dora E. Findley
(If not legal owner, state interest in property)

Size of Parcel: 600 acres +
(Total contiguous acreage owned by the applicant)

Existing Zoning: EZ-40 Minimum Lot Size: 40 Ac.

Existing Land Use: Rangeland

Approximate acreage of proposed parcels being partitioned (up to 3 parcels):

PARCEL #1 160 Acres Dimensions: Width: ± 2700' (not square)
Depth: ≈ 3000'

Name of Road providing public access: Osborn Cutoff County Road

PARCEL #2 439 Acres Dimensions: Width: 1 mile ± (not square)
Depth: ± 4550'

Name of Road providing public access: Osborne Cutoff Rd.

PARCEL #3 _____ Acres Dimensions: Width: _____
Depth: _____

Name of Road providing public access: _____

Suitability Statement, if applicable: (See Brochure, #7, "Information Required on Tentative Plan")

~~Not Applicable~~ No investigation has been made of the suitability of any given parcel by an authorized representative of the DEQ; no warranty is made that any parcel will be usable for subsurface sewage disposal.

ACCEPTED BY
DIRECTOR OF PLANNING

RECEIVED
NOV 13 1984
Wasco Co. Planning Office

BOOK 144 PAGE 335

STEVENS-NESS LAW PUB. CO., PORTLAND

FORM No. 633—WARRANTY DEED.

KA

KNOW ALL MEN BY THESE PRESENTS, That Henry Streiff and Clara O.Streiff, husband and wife, *grantors*, *in consideration of* Ten dollars, ($10.00) --------- *Dollars, to* them *paid by* Melvin C. Doyle and Maxine Doyle, husband and wife, *grantees*, *do hereby grant, bargain, sell and convey unto the said grantees, their heirs and assigns, all the following real property, with the tenements, hereditaments and appurtenances, situated in the County of* Wasco *and State of Oregon, bounded and described as follows, to-wit:*

The Northwest quarter of the Southeast quarter, ($NW\frac{1}{4}SE\frac{1}{4}$) of Sec. Twenty one (21) Township Two North (2N) Range Twelve (12) East of the willamette Meridian, Wasco County, State of Oregon, containing in all forty acres more or less.

The consideration for this deed is less than $100.00

To Have and to Hold the above described and granted premises unto the said grantees, their heirs and assigns forever.

And we *the grantors do covenant that* we are *lawfully seized in fee simple of the above granted premises free from all encumbrances, and that* we *will and* our *heirs, executors and administrators, shall warrant and forever defend the above granted premises, and every part and parcel thereof, against the lawful claims and demands of all persons whomsoever.*

Witness our *hands and seals this* 25th *day of* September, *1961*

Clara O Streiff (SEAL)

Henry Streiff (SEAL)

(SEAL)

(SEAL)

STATE OF OREGON, } ss.
County of Wasco,

On this 25th *day of* September, *1961*, *before me, the undersigned, a Notary Public in and for said County and State, personally appeared the within named* Henry Streiff and Clara O. Streiff, husband and wife, *who* are, *known to me to be the identical individuals described in and who executed the within instrument, and acknowledged to me that* they *executed the same freely and voluntarily.*

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

John M. Stapleton

Notary Public for Oregon.

My commission expires Feb. 2nd 1962.

JOHN M. STAPLETON NOTARY PUBLIC OREGON

WARRANTY DEED

Henry Streiff et Ux.

Grantors.

TO

Melvin C. Doyle et Ux.

Grantees.

AFTER RECORDING RETURN TO

DOCKET No. 15333

633

STATE OF OREGON, } ss
County of Wasco,

I, D. V. BOLTON, County Clerk and ex officio Recorder of Conveyances, in and for said county, do hereby certify that the within instrument of writing was received for record and recorded in the records of said county at DEEDS ____ 1961 SEP 29 PM 4 01 On Page ____ In Book 144

Witness my hand and seal of office affixed at The Dalles, Oregon

D. V. BOLTON, County Clerk

By Helen C. Doyle Deputy

Return Melvin C. Doyle

Street Rt 2 Box 149

City The Dalles, Oregon

WASCO COUNTY PLANNING OFFICE
1721 W. 10th STREET THE DALLES, OREGON 97058
PHONE: (503) 298-5169

March 12, 1985

Forrester Brokers, Inc.
By: Karl A. Johnson
1096 Canyon Way W.
The Dalles, OR 97058

MIP-85-103-WAF#4

Dear Karl:

This letter will serve as your official notification that your minor partition has been accepted by the Planning Office. This partition applies to property located in Township 2 North, Range 12 East, Section(s) 21, Tax Lot _____, and is zoned "F2 (40)" Forest.

We are returning a copy for your files. Please note that this partition was filed with the Wasco County Clerk on March 12, 1985.

Sincerely,

Dan Durow
Director of Planning

Encl. (Minor Partition Plan Application - copy)

dm

PLICATION FOR MINOR PART: ON

APPLICANT: Forrester Brokers Inc. by

JOHNSON	KARL	A.	478-3526
(Last Name)	(First)	(Middle)	(Telephone)

1096 Canyon WayW.,	The Dalles,	OREGON,	97053
(Street or P.O. Box)	(City or Town)	(State)	(Zip)

FILED WASCO CTY
THE DALLES, OR.
MAR 12 10 5 AM '85
SUE A. PROFFITT
COUNTY CLERK

LOCATION OF SUBJECT PROPERTY:

Township: T2N Range: 12E Section: 21 Tax Lot: _____

Legal Owner: Contract Purchaser
(If not legal owner, state interest in property)

Size of Parcel: 160 acres
(Total contiguous acreage owned by the applicant)

Existing Zoning: F-2(40) Minimum Lot Size: 40 acres

Existing Land Use: Grazing

Approximate acreage of proposed parcels being partitioned (up to 3 parcels):

PARCEL #1 40 acres ± Acres Dimensions: Width: IRREGULAR
Depth: _____
Name of Road providing public access: Osborn Cut-Off County Road

PARCEL #2 40 acres ± Acres Dimensions: Width: IRREGULAR
Depth: _____
Name of Road providing public access: Osborn Cut-Off County Road

PARCEL #3 _____ Acres Dimensions: Width: _____
Depth: _____
Name of Road providing public access: _____

Suitability Statement, if applicable: (See Brochure, #7, "Information Required on Tentative Plan")

No investigation has been made of the suitability of any given parcel by an authorized representative of the DEQ. No warranty is made that any parcel will be usable for subsurface sewage disposal.

ACCEPTED BY
DIRECTOR OF PLANNING
3-11-85
Daniel R. Thom

Contiguous property owners to the proposed Minor Partition, and those which may be affected by the partition:

NAME	ADDRESS
Estate of Earl Davis- Beulah Lundell	115 W. 14th St., The Dalles, Ore. 97058
Jim Foote	2505 Dry Creek Road, Mosier, Ore. 97040

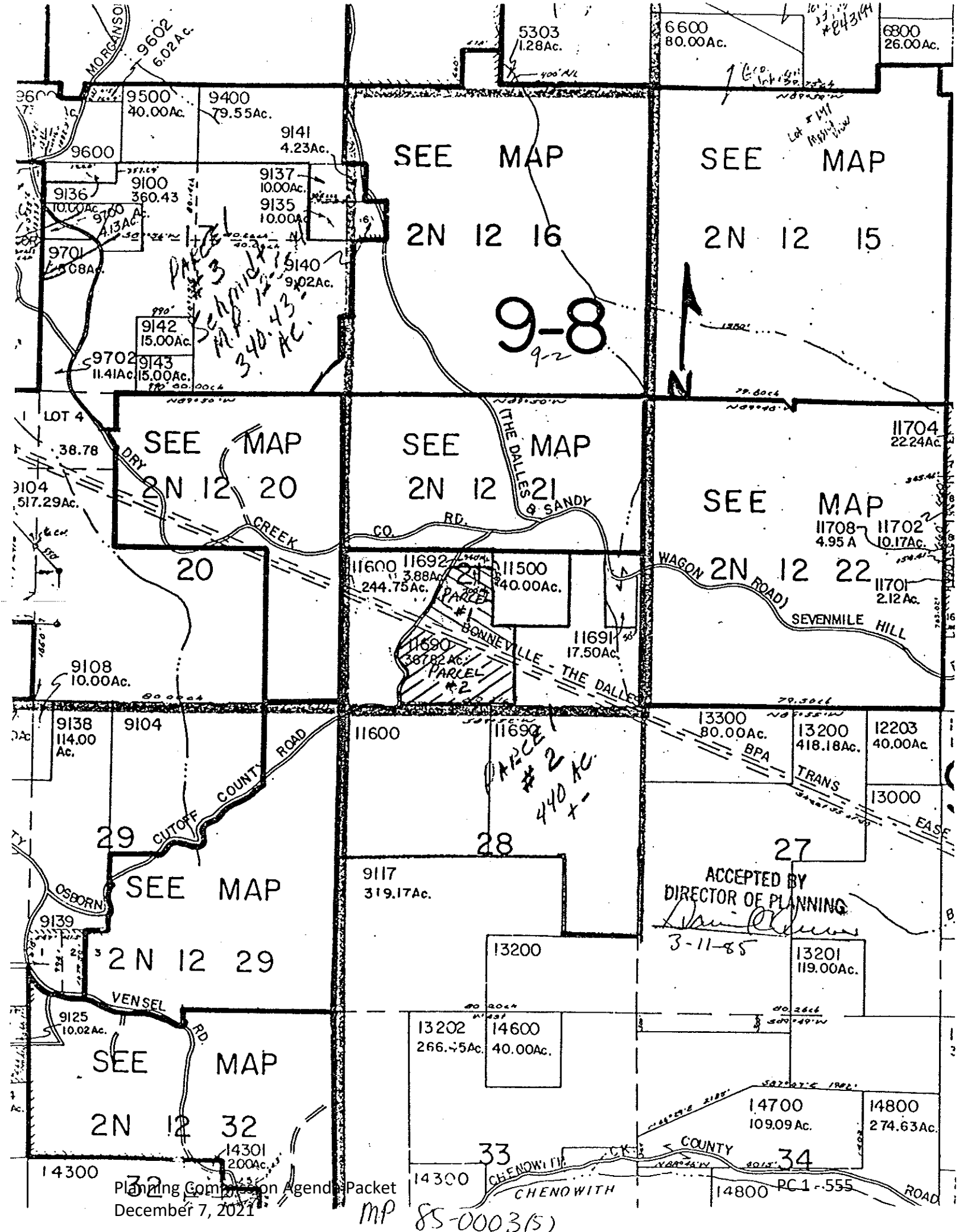
NOTE: Submit two (2) copies of a tentative plan, approximately to scale, on 8½" by 11" paper. See instructions for additional information needed on the tentative plan.

Petitioner

March 1, 1985
Date

FILING FEE ($20.00) : _____

Make checks payable to the WASCO COUNTY PLANNING OFFICE


SEE MAP
2N 12 16
9-8
SEE MAP
2N 12 15
SEE MAP
2N 12 20
SEE MAP
2N 12 21
SEE MAP
2N 12 22
SEE MAP
2N 12 29
SEE MAP
2N 12 32
9602 6.02Ac.
9500 40.00Ac.
9400 79.55Ac.
9141 4.23Ac.
9600
9136 10.00Ac.
9100 360.43
9137 10.00Ac.
9135 10.00Ac.
9140 9.02Ac.
9701
9142 15.00Ac.
9702 11.41Ac.
9143 15.00Ac.
PARCEL #3 Sevenmile Hill MP 12-43 340.43 AC.
5303 1.28Ac.
6600 80.00Ac.
6800 26.00Ac.
LOT 4 38.78
9104 517.29Ac.
DRY CREEK
CO. RD.
(THE DALLES & SANDY)
11704 22.24Ac.
11708 4.95 A
11702 10.17Ac.
11701 2.12 Ac.
WAGON ROAD
SEVENMILE HILL
20
11600
11692 3.88Ac.
244.75Ac.
11500 40.00Ac.
PARCEL #1
BONNEVILLE - THE DALLES
11690 38.82 Ac.
PARCEL #2
11691 17.50Ac.
9108 10.00Ac.
9138 114.00 Ac.
9104
COUNTY ROAD
CUTOFF
29
11600
11692
PARCEL #2 40 AC
28
27
13300 80.00Ac.
BPA TRANS
13200 418.18Ac.
12203 40.00Ac.
13000
EASE
OSBORN
9139
9117 319.17Ac.
ACCEPTED BY DIRECTOR OF PLANNING
3-11-85
13200
13201 119.00Ac.
VENSEL RD.
9125 10.02Ac.
13202 266.45Ac.
14600 40.00Ac.
14700 109.09Ac.
14800 274.63Ac.
33
34
COUNTY
CHENOWITH
CHENOWITH ROAD
14300
14301 2.00Ac.
32
14300
MP 85-0003(S)

PARCEL #1

Property Description
14-29921

EXHIBIT A

That portion of the Southwest quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, County of Wasco and State of Oregon, which lies Easterly of the Osborn County Cutoff Road and Northeasterly of the Southerly right-of-way line of the Bonneville-The Dalles Bonneville Power Adminsitration Transmission Line Easement as set forth in Judgment on Declaration of Taking, United States of America vs. Agusta P. Crosby, et al., a copy of which was recorded in the Deed Records of Wasco County, Book 91, Page 56 and amended by Amended Judgment on Declaration of Taking, a copy of which was recorded in the Deed Records of Wasco County, Book 91, Page 436.

EXCEPTING THEREFROM beginning at the Northeast corner of the Southwest quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, Wasco County, Oregon; thence Southalong the East line of the Southwest quarter 285 feet; thence West, parallel with the North line of said Southwest quarter, a distance of 700 feet, more or less to the center line of Cutoff County Road; thence Northeasterly along said center line, to the intersection of the North line of said Southwest quarter; thence East along said North line 550 feet, more or less to the point of beginning.

J

PARCEL #2

That portion of the Southwest quarter of Section 21, T2N, R12E of W.M., County of Wasco, State of Oregon that lies Easterly of the Osborn County Cutoff Road and Southerly of the Southerly right-of-way line of the Bonneville-The Dalles Bonneville Power Adm. Transmission Line Easement as set forth in Judgment on Declaration of Taking, United States of America vs. Agusta P. Crosby, et al, a copy of which was recorded in the Deed Records of Wasco County, Oregon, Book 91, Page 56 and amended by Amended Judgment on Declaration of Taking, a copy of which was recorded in the Deed Records of Wasco County, Oregon, Book 91, Page 436.

ALSO, beginning at the Southwest corner of the Southwest quarter, Southeast quarter of Section 21; thence East 227.7 feet on the South border of said Section 21; thence North on a line that is parallel to the quarter section line to a point that is 189 feet perpendicular distance to the centerline of the Bonneville-The Dalles Bonneville Power Administration Transmission Line Easement; thence Northwesterly along said parallel line to a point ~~which a~~ perpendicular distance of 189 feet from centerline of said easement; thence South along said quarter section line to the point of beginning.

WASCO COUNTY PLANNING OFFICE
1721 W. 10th STREET THE DALLES, OREGON 97058
DANIEL C. DUROW, Director of Planning PHONE: (503) 298-5169

March 26, 1986 MP 86-103 WAF24
~~AP 87-110 WAF24~~

Forrester Brokers, Inc.
c/o Karl Johnson
1096 Canyon Way W
The Dalles, OR 97058

Dear Karl:

This letter will serve as your official notification that your preliminary and final minor partition has been approved by the Planning Office. This partition applies to property located in: Township 2 North, Range 12 East, Section 21, Tax Lot(s) 11600 & 11604, and is zoned "F-2(40)" Forest Zone.

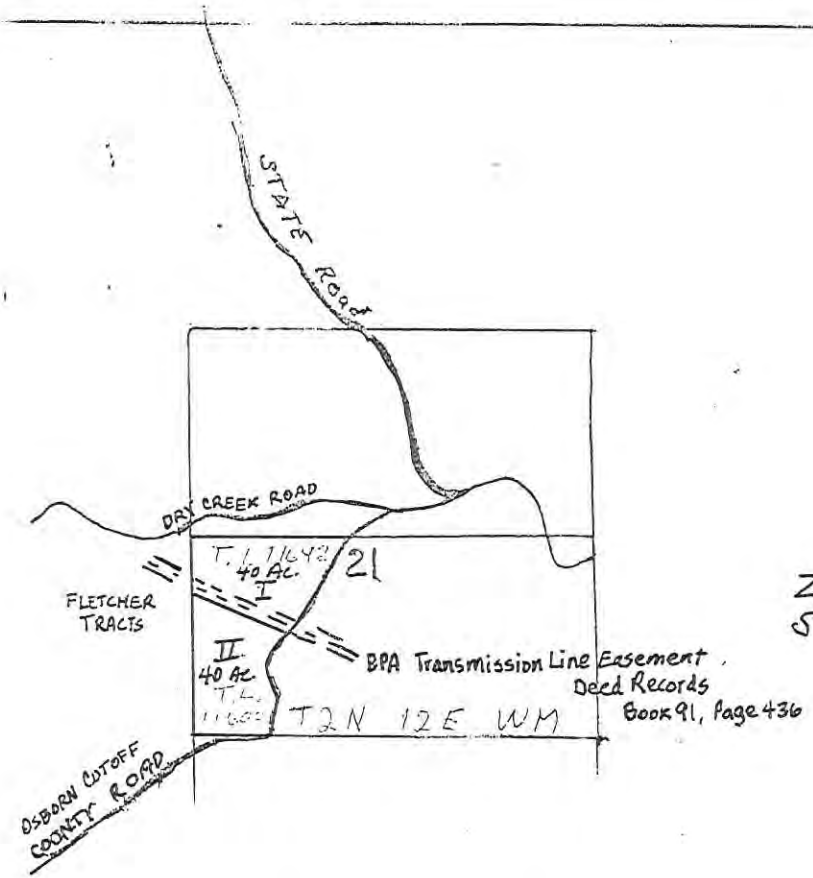
We are returning a copy for your files. Please note that this partition was filed with the Wasco County Clerk on March 25, 1986.

Sincerely,

James W. Johnson

James W. Johnson
Associate Planner

Encl: (Minor Part. Plan Final-copy)



Zoning F-2 (40) Forest Zone
Scale 1" = 2,000'

Minor Partition
for
Forrester Brokers Inc.
3/19/86

No investigation has been made by a representative of the Department of Environmental Quality and no warranty is made that any parcel will be usable for subsurface sewage disposal.

We, the owners of the land shown herein, hereby declare that this division of land has been made with our free consent and in accordance with our desires.

FORRESTER BROKER INC
Ruth L. Johnson - 3/19/86
OWNER DATE

OWNER DATE

Subscribed and sworn before me on this 19th day of March, 19 86.

Notary Public for the State of Oregon
My Commission Expires
JEANI KARR
NOTARY PUBLIC — OREGON
MY COMMISSION EXPIRES 9-15-89

I hereby, certify that this partition was examined and approved this _____ day of _____, 19__.

N/A
Wasco Co. Surveyor

I hereby certify that this partition was examined and approved this 25 day of March, 19 86.

Wasco Co. Planning Dir.

RECORDING INFORMATION
File Number 86-0002
Instrument Received on the 25th day of March 19 86 at 1:50 P. M.

Wasco Co. Clerk

FILED WASCO CO
TH
MAR 25 1
SUE A. PROFFITT
COUNTY CLERK

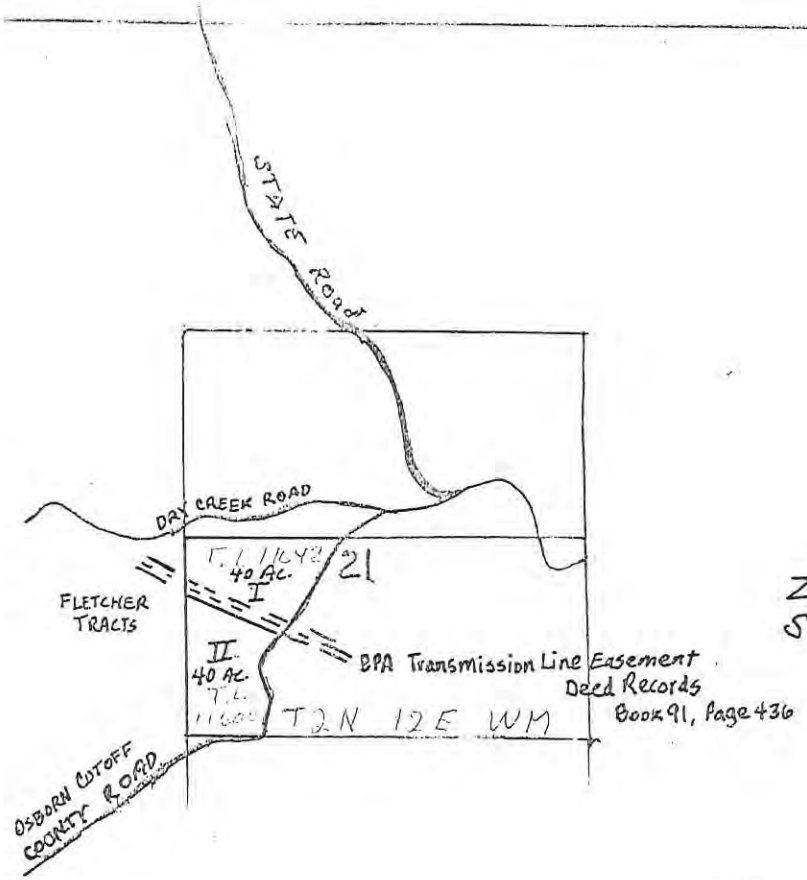
Parcel I

That portion of the Southwest quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, Wasco County Oregon, lying west of the Osborn Cutoff County Road except that property lying southerly of the south boundary of the Bonneville Power Easement.

Parcel II

That portion of the Southwest quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, Wasco County, Oregon, lying southerly of the south boundary of the Bonneville Power Eastment and westerly of the Osborn Cutoff County Road.

ACCEPTED
DIVISION OF PLANNING
3-25-86



Zoning F-2 (40) Forest Zone
Scale 1" = 2,000'

Minor Partition
for
Forrester Brokers Inc.
3/19/86

No investigation has been made by a representative of the Department of Environmental Quality and no warranty is made that any parcel will be usable for subsurface sewage disposal.

We, the owners of the land shown herein, hereby declare that this division of land has been made with our free consent and in accordance with our desires.

FORRESTER BROKERS INC
Mark L. Johnson 3/19/86
OWNER DATE

OWNER DATE

Subscribed and sworn before me on this 19th day of March, 1986.

Notary Public for the State of Oregon
My Commission Expires 9-15-89
JEANI KARP
NOTARY PUBLIC — OREGON
MY COMMISSION EXPIRES

I hereby, certify that this partition was examined and approved this _____ day of _____, 19__.

N/A
Wasco Co. Surveyor

I hereby certify that this partition was examined and approved this 25 day of March, 1986.

Wasco Co. Planning Dir.

RECORDING INFORMATION
File Number 86-000
Instrument Received on the 25th day of March 1986 at 1:50 P.M.

Sue A. Proffitt
Wasco Co. Clerk

PC 1 561
Planning Commission Agenda Packet
December 7, 2021

ASSOCIATE OFFICE
PIONEER NATIONAL TITLE
INSURANCE CO.
TITLE AND TRUST DIVISION
PORTLAND, OREGON

WASCO TITLE, INC.

TITLE INSURANCE - ESCROWS
TELEPHONE (503) 296-2495
512 WASHINGTON STREET
THE DALLES, OREGON 97058

February 26, 1986

Karl Johnson
1096 Canyon Way West
The Dalles, Oregon 97058

Order No. 14-30488

Dear Mr. Johnson:

This company is prepared to issue title insurance policy, in standard form, as of February 26, 1986 at 8:00 o'clock A.M., insuring the title to:

Parcel II That portion of the Southwest quarter of Section 21, Township 2 North, Range 12 East of the Willamette Meridian, Wasco County, Oregon, lying southerly of the south boundary of the Bonneville Power Easement and westerly of the Osborn Cut-Off County Road;

Parcel I in That portion of the SW¼ Sect 21 Twp 2 N R 12 E WM Wasco Co lying West of the Osborn cut off Co Rd except that property lying southerly of the So boundary of the B.P.P. Easement,
FORRESTER BROKERS, INC.,
a Washington corporation;
subject to the usual printed exceptions and conditions contained in said policy, and

1. The usual reservations as contained in patent issued by the United States of America.

2. The rights of the public in and to the portions thereof included within the boundaries of roads and highways.

3. Public utility easements, if any shall be found to exist on the premises.

4. Easement in favor of the United States of America, including but not limited to the following: "Easement as set forth in Judgment on Declaration of Taking, United States of America vs. Agusta P. Crosby, et al., in the U. S. District Court for Oregon, No. 176, a copy of which was filed in the Deed Records of Wasco County, Oregon, Book 91, Page 56, on October 5, 1939. Said decree was amended by Amended Judgment on Declaration of Taking, a copy of which was filed in the Deed Records of Wasco County, Oregon on April 11, 1940, Book 91, Page 436. (Affects Secs. 21 & 28)

5. Oil, Gas and Mineral Lease, including the terms and provisions thereof, Imo G. Klepper, lessor, to Husky Oil Company, lessee, dated December 6, 1980, recorded March 27, 1981, Wasco County, Oregon,Micro-Film No. 81-0764. (Affects additional property also)

Bonneau
643-2457

THIS IS A PRELIMINARY REPORT ONLY. NO LIABILITY IS ASSUMED HEREUNDER UNTIL FULL POLICY PREMIUM HAS BEEN PAID.

6. Oil, Gas and Mineral Lease, including the terms and provisions thereof, Deulah E. Lundell, lessor, to Husky Oil Company, lessee, dated December 5, 1980, recorded March 27, 1981, Wasco County, Oregon, Micro-Film No. 81-0765. (Affects additional property also)

7. Oil, Gas and Mineral Lease, including the terms and provisions thereof, Earl L. Davis, lessor, to Husky Oil Company, lessee, dated December 4, 1980, recorded March 27, 1981, Wasco County, Oregon, Micro-Film No. 81-0763. (Affects additional property also)

8. Oil, Gas and Mineral Lease, including the terms and provisions thereof, Dora C. Findley, lessor, to Husky Oil Company, lessee, dated December 6, 1980, recorded March 27, 1981, Wasco County, Oregon, Micro-Film No. 81-0766. (Affects additional property also)

9. Trust Deed, including the terms and provisions thereof, executed by Forrester Brokers, Inc., to Wasco Title,Inc. as trustee for the Estate of Earl L. Davis, dated December 17, 1984, recorded December 21, 1984, Wasco County, Oregon, Micro-Film No. 84-3169, given to secure the sum of $36,000.00 and interest thereon. (Affects additional property also)

10. Electric Line Right of Way Easement, including the terms and provisions thereof, Forrester Brokers, Inc., (Karl A. Johnson), grantor, to Wasco Electric Cooperative, Inc., grantee, dated December 31, 1984, recorded March 15, 1985, Wasco County, Oregon, Micro-Film No. 85-0505.

OUT 11. Contract, including the terms and provisions thereof, between Forrester Brokers, Inc., a Washington corporation, seller, and William C. Daley and Rebecca P. Daley, buyer, dated and recorded May 8, 1985, Wasco County, Oregon, Micro-Film No. 85-0949.

OUT 12. Easement for ingress and egress as reserved in Contract between Forrester Brokers, Inc., and William C. Daley and Rebecca P. Daley, recorded May 8, 1985, as Micro-Film No. 85-0949, shown above.

OUT 13. 9.2 2N 12 11600 1985-86 taxes, $197.24 and interest, unpaid.
9.2 2N 12 11604 1985-86 taxes, $306.06 and interest, unpaid.

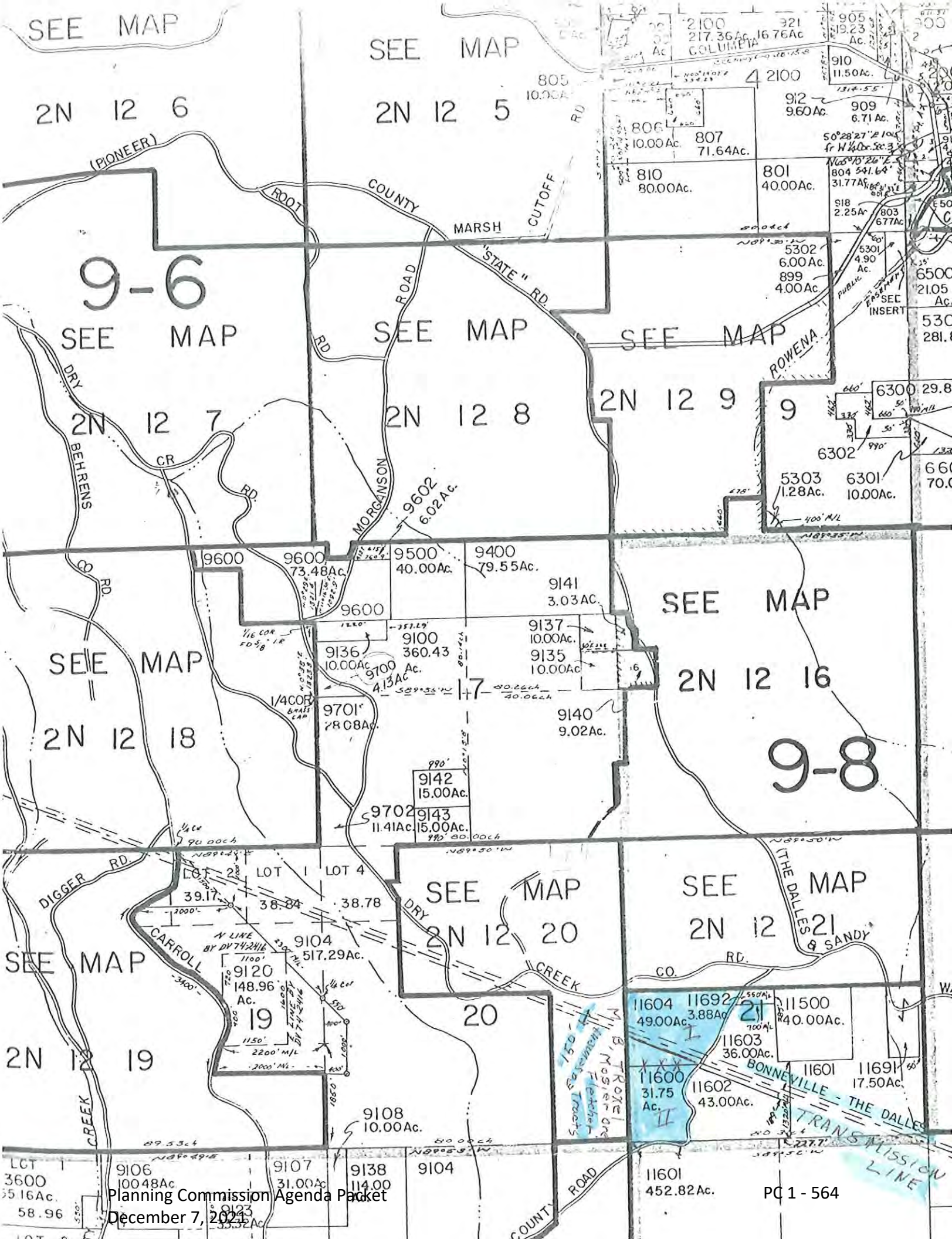
There are no unsatisfied judgments against Paul J. Bonneau or Waiyee Bonneau.

Sincerely,

Wasco Title, Inc.

Pat McLoughlin, President

PMcL/dw
cc: Bonneau


SEE MAP
2N 12 6
SEE MAP
2N 12 5
9-6
SEE MAP
SEE MAP
SEE MAP
2N 12 7
2N 12 8
2N 12 9
SEE MAP
2N 12 18
SEE MAP
2N 12 16
9-8
SEE MAP
SEE MAP
2N 12 19
2N 12 20
2N 12 21
(PIONEER)
ROOT
COUNTY
MARSH
CUTOFF
RD
"STATE" RD.
ROAD
ROWENA
DRY
BEHRENS
CR
RD.
MORGANSON
RD.
DIGGER
RD.
CARROLL
CREEK
DRY
CREEK
(THE DALLES & SANDY)
CO. RD.
BONNEVILLE - THE DALLES
TRANSMISSION LINE
COUNTY ROAD
805
10.00Ac.
2100
217.36Ac.
16.76Ac.
COLUMBIA
905
19.23
Ac.
910
11.50Ac.
912
9.60Ac.
909
6.71 Ac.
806
10.00Ac.
807
71.64Ac.
810
80.00Ac.
801
40.00Ac.
804 541.64'
31.77Ac.
S18
2.25Ac.
803
6.77Ac.
5302
6.00Ac.
5301
4.90
Ac.
899
4.00Ac.
SEE INSERT
6500
21.05
Ac.
6300
6302
5303
1.28Ac.
6301
10.00Ac.
9602
6.02Ac.
9600
9600
73.48Ac.
9500
40.00Ac.
9400
79.55Ac.
9141
3.03AC.
9600
9136
10.00Ac.
9100
360.43
9700
4.13Ac.
9137
10.00Ac.
9135
10.00Ac.
9701
28.08Ac.
9140
9.02Ac.
9142
15.00Ac.
9702
11.41Ac.
9143
15.00Ac.
LOT 2
LOT 1
LOT 4
39.17
38.84
38.78
9104
517.29Ac.
9120
148.96
Ac.
19
20
9108
10.00Ac.
9106
10048Ac
9107
31.00Ac.
9138
114.00
9104
9123
33.32Ac
11604
49.00Ac.
11692
3.88Ac.
21
11500
40.00Ac.
11603
36.00Ac.
11601
11691
17.50Ac.
11600
31.75
Ac.
11602
43.00Ac.
11601
452.82Ac.
150' Easement
Trust
B. Moser and Heather

WASCO COUNTY PRELIMINARY MINOR PARTITION APPLICATION

APPLICANT: SURVEYOR: (If Applicable)

Forrester Brokers INC
(Last) (Middle) (Last) (Last) (First) (Middle)

1096 Canyon Way West
(Street or P.O. Box) (Street or P.O. Box)

The Dalles Ore 97058
(City) (State) (Zip) (City) (State) (Zip)

Telephone: 478 3526

Legal Owner: Forrester Brokers INC

If applicant is not legal owner, state interest in property:

LOCATION OF SUBJECT PROPERTY:

Township: 2 N Range: 12 E Section: 21 Tax Lot: 11600, 11604

PROPERTY CHARACTERISTICS:

Size of Parcel: 40 ACRES
(Total contiguous acreage owned by applicant)

Existing Zoning: F-2 · 40 Plan Designation: Forest

Existing Land Use:

PROPOSED PARTITION:

Parcel #1 40 Acres Dimensions: Width: Irregular
Depth:

Name of road providing public access: Osborn Cut off Co Rd

ACCEPTED BY
DIRECTOR OF PLANNING
3-25-86

Parcel #2 40 Acres Dimensions: Width: Irregular
Depth:

Name of road providing public access: Osborne Cut Off Co. Rd

Parcel #3_____ Acres Dimensions: Width:_____
Depth:_____

Name of road providing public access:_____

Proposed Water Supply: Drilled well

Proposed Sewage Disposal: Septic Tank
(See Note #5)

NOTE: The following supporting documents shall be attached:

1. Preliminary plan map of the partition showing:
   a. boundaries of the total contiguous ownership
   b. boundaries of each proposed tract
   c. the number assigned to each tract
   d. acreage of each tract I 40 ± II 40 ±
   e. location and name of existing roads
   f. any private roads or easements and all relative restrictions or reservations Bonneville The Dalles Transmission line.
   g. location of water supply and sewage disposal on each tract
   h. predominant natural features, such as water courses and their flows, marshes, rock outcroppings, and areas subject to flooding, sliding or other natural hazards
   i. north point, scale and date
2. A vicinity map of such scale to clearly locate the proposed partition in relation to adjacent subdivisions, partitions, roadways and other land parcels.
3. Draft of any proposed restrictions and covenants affecting the partitioned land.
4. Legal description for each of the proposed tracts.
5. If not sewered and located in an "F-1", "F-2", "A-1" and "FF-40" zones, a statement signed by an authorized representative of the

Department of Environmental Quality, State of Oregon, or County Sanitarian regarding the suitability of each parcel to be partitioned for subsurface sewage disposal; or a signed statement shown on the face of the final partition plan that no investigation has been made of representative of the Department of Environmental Quality, and that no warranty is made that any parcel will be usable for subsurface sewage disposal;

If not sewered and located in an "FF-10", "AR", "RR", "R-1", "R-2", "R-3", "RHM-2", "R-C", "C-1", "M-1", "M-2", or "M-3" zone; as statement signed by an authorized representative of the Department of Environmental Quality approving each parcel to be partitioned for subsurface sewage disposal; or a officer of a public sewer district or corporation warranting the availability of sewer hook-ups for each parcel to be partitioned.

FORRESTER BROKERS, INC.
(Ruth L. Johnson)
(Petitioner)

3-19-86
(Date)

NO INVESTIGATION HAS BEEN MADE OF REPRESENTATIVE OF THE DEPARTMENT OF ENVIRONMENTAL QUALITY, AND THAT NO WARRANTY IS MADE THAT ANY PARCEL WILL BE USABLE FOR SUBSURFACE SEWAGE DISPOSAL.

ATTACHMENT D – EXHIBIT 18

Sheila Dooley (Requested comments not be addressed in Staff Report)
Mike Sargetakis, Attorney for Sheila Dooley and Jill Barker (Requested opportunity to testify at hearing)
Jillian Barker (Comments added to PC Packet on November 28, 2021.

November 24, 2021

Dear Wasco County Planning Commissioners,

RE: File #921-18-000086-PLNG. Land Use Board of Appeals Remand (LUBA No. 2019-065) Comprehensive Plan Amendment; Exception to Statewide Planning Goal 4; and Zone Change from Forest, F-2 (80) to Forest-Farm F-F (10) by David Wilson

The following comments are in response to the new evidence submitted by the applicant.

1. Soil Assessment

In William Sumerfield's letter to Interim Director Kelly Howsley-Glover, dated July 9, 2021 on page 2, last sentence, he states: "With over half the property consisting of unsuitable soils, there is virtually no land available to support resource use."

Photographs of the subject parcel contradict this statement as numerous Ponderosa Pine, Oregon White Oak and fir trees are present on the property in the areas that haven't been mowed LUBA Record photographs on pages 977-982 show this. On Google maps (7000 Seven Mile Hill Rd., The Dalles) you can clearly see the furrows/lines where the applicant has mowed. Furthermore the property across the road contains similar soil according to the USDA. In the past it was used to grow alfalfa hay and is now used as a tree farm.

Photo 1: Tree farm across road





The subject property has historically been used for farming, starting from at least the '60s if not earlier. Sam Decker farmed property on both sides of the road and had 3 cuttings of alfalfa per year in the mid-70s according to the neighbors. When the property was sold to Larry Black in the late '70s he purchased Mr. Decker's farm equipment **(bill of sale attached as Exhibit 1)** and continued farming the land and also had cattle grazing there in the late '70s. David Wilson continued the farm use up to the present time as evidenced by the mowing lines.

In the Planning Commission Agenda Packet from the initial approval of this application, staff noted that the USDA soil survey identified two soil types on the subject parcel: 49C and 50D (Wamic Loam – See Exhibit 5) and that both are Class IV soils, type 4a. LUBA Record at p. 1338. The staff report goes on to note that the site index for both is 70 which is an indication of the potential productivity and translates to the high end for potential yield for Class 6 for Ponderosa Pine.

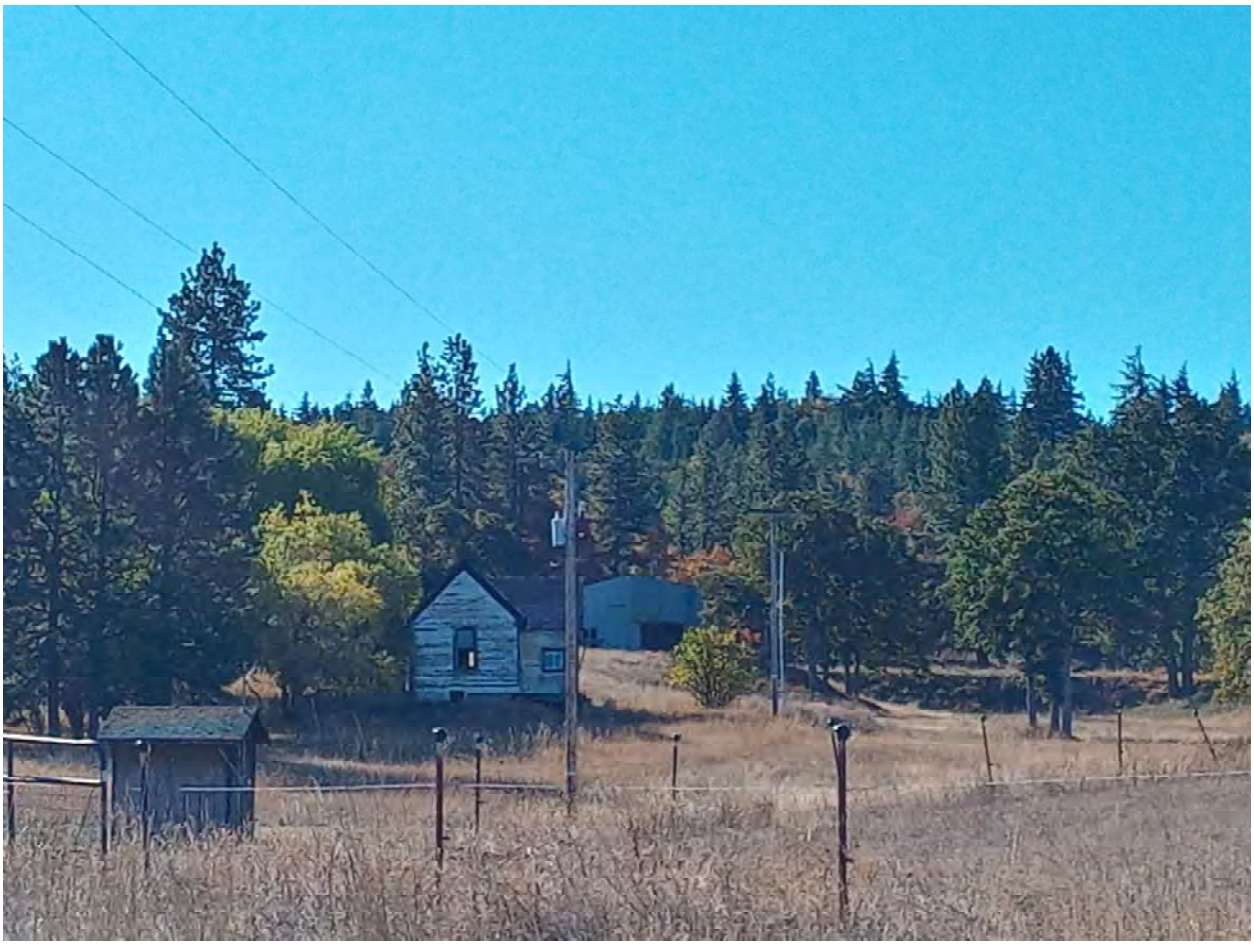
The soil survey done by the USDA found the soils to be more productive than average (p. 821 of LUBA Record) and suited to growing Ponderosa Pine and Oregon white oak. These trees as well as fir trees are growing on the areas not mowed and are visible in the aerial photographs.

On page 3 of the applicant's Soil Assessment it states that "the subject property is complex and diverse." According to the Wasco County Soil and Water Conservation District staff, there are inclusion areas that could help account for this assessment showing poorer soil than what the USDA maps show. Inclusion areas contain other soil types within a soil type. There may be many inclusions present on this property according to WCSWCD.

The areas not used to grow hay on this property are similar in appearance to much of the other Mosier area forest zone properties. Oak, fir and pine trees are often seen growing together throughout the Mosier area. Oak and pine trees are similar in their soil requirements according to the Wasco County Soil and Water Conservation District staff. The oak and pine habitat is a unique habitat of high value to many animal, bird and insect species.

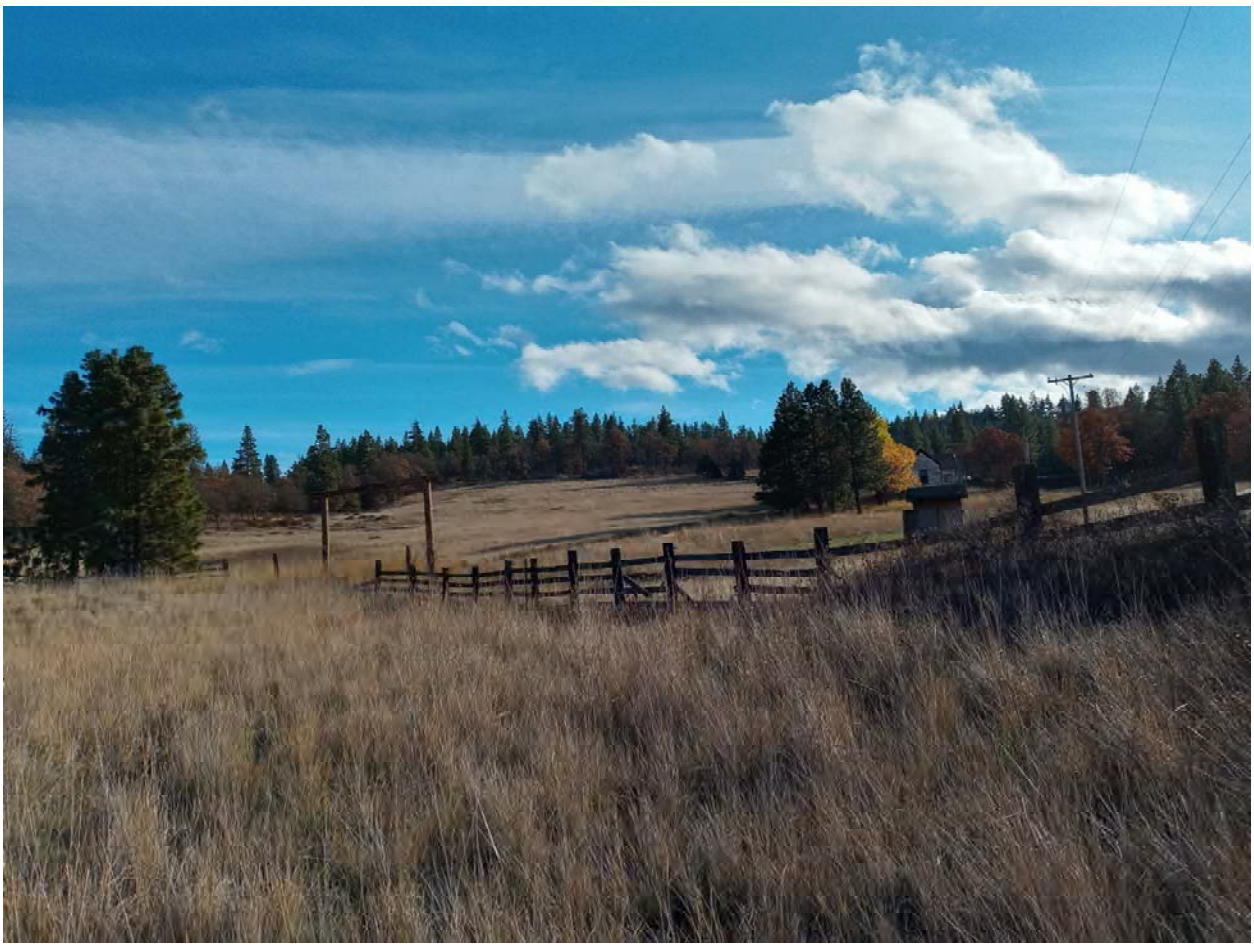
The applicant's Soil Assessment incorrectly states that the soils on the south side of the property are mostly unsuited soils (51D). The photograph taken from the county road facing south clearly shows conifer and Oregon White Oak trees growing throughout this area. The applicant's map shows that these areas are tree covered.

Photo 2: View to south



The area on the east side of the property and the southwest corner that are labeled as unsuitable soils are also tree covered. Approximately 90% of the areas that are labeled by the applicant's lawyer in his recent letter as unsuitable have trees growing on them.

Photo 3: View to east and south



According to the Wasco County Soil and Water Conservation District, the areas that have been used to grow alfalfa hay and oats can also grow trees. If you can grow alfalfa or oats on the soil, you can grow trees.

Photo 4: View to west



Photo 5: View to west



Photo 6: View to west



The applicant's Soil Assessment also incorrectly labels a total of 1.57 acres as infrastructure. The 1.48 acre infrastructure area includes the 2,660 square foot house and a couple of outbuildings. This area also includes vacant land that appears to be in a corral and areas with conifers. The other .09 acres labeled as infrastructure are for the illegal dwelling and a dilapidated unused barn with no roof. These are the only areas classified as Class 8 in the survey.

On page 3 of the Soil Assessment it states that a slim majority (preponderance) of the lot or 51.8% is made up of Class 7 and 8 soils. The Legend on page 13 breaks this down:

20.79 acres generally unsuited soils
19.34 acres generally suited soils

Removing the illegal and unusable buildings changes this to 20.70 unsuited acres and 19.43 suited acres, a difference of 1.27 acres out of 40.13 total acres. If the vacant land and treed areas labeled as infrastructure are instead added to the suited acreage, there is a preponderance of suited soils.

Another consideration is that a total of 23 locations were tested with the results extrapolated to apply to the areas around them. There is also the margin of error to consider especially when inclusion areas containing different soil types are involved.

On page 13 of the Soil Assessment, the map used to calculate the soil type areas does not contain 90 degree angles on the south side. As a result, the supposedly unsuited soil areas are overrepresented.

The Soil Assessment Completeness Review (Page 1) included with the Soil Assessment states that "the county may make its own determination as to the accuracy and acceptability of the soils assessment. DLCD has reviewed the soils assessment for completeness only." The Soil Assessment was done with the stated goal of securing a Plan Amendment Zone Change (page 2 of Soil Assessment Release Form). This was to be accomplished by finding a preponderance of unsuited soil.

2. Aerial Photo of Subject Property and Adjoining Area

In the Remand Request letter on page 3, the applicant states "there is a clear line of demarcation between productive lands further to the west of the subject property, and the subject property, and lands immediately adjacent to the south and west of the subject property." He states that his aerial photo shows a "moonscape" south of the property. This is not evident on Google maps of the surrounding area.



The only line of demarcation between his property and the surrounding properties is to the northwest due to his mowing of the subject property. He has also cleared an area around the house. Soil types don't follow property lines.

Adjoining this property to the south is a 69-acre parcel owned by the applicant and in farm deferral. The subject property is part of the 109-acre tract that he owns. In 2018 the applicant stated that he needed a 7,000 square foot building and a 2,500 square foot agricultural exempt building to support his agricultural/farm use. In January 2018 the Wasco County Planning Commission approved his request on appeal (PLAAPL-17-10- 001 Wilson Appeal) and overturned the Planning Director's denial of retroactive approval of a 7,000 square foot agricultural exempt building located on his adjoining 69 acre parcel. **(See attached Exhibit 2**: Planning Commission meeting minutes of January 23, 2018 page 3)

At the January 2, 2018 hearing Mr. Sumerfield stated that "Applicant makes substantial income from farm production each year the property has been in deferral." **(See attached Exhibit 3:** Planning Commission meeting minutes of January 2, 2018, page 20)

The Planning Commission found that "the applicant has met the need for the size of the building in conjunction with the existing and future farm use as described in the farm plan." (January 23, 2018 meeting minutes, page 3)

South of that is commercial forest land zoned F-2 80. Pages 4 and 5 of the LUBA Final Opinion and Order describe the property and surrounding area in detail. In regards to the property south and west, the record states "To the south of that 69-acre parcel for approximately five miles is that zoned F-2 and managed for forestry and grazing. Record 25. To the west of the subject property lies a split-zoned 16.3 acre property with 5 acres zoned F-F 10, and the remaining approximately 11 acres zone F-2, and a 439-acre parcel zoned F-2 and managed for commercial forestry. All of the parcels that are immediately adjacent to west, east and south of the subject property possess similar soil types and slopes as the subject property."

3. Physically Developed Map & Area Calculations

The 40-acre parcel is part of a 109-acre tract zoned F-2 80 and owned by the applicant. On page 12 of the applicant's Soil Assessment, he has submitted a map of the tax lots in the surrounding area. This map is misleading as many of these tax lots to the south, southeast and west are part of larger tracts, in commercial forestry, zoned F-2 80 and therefore unbuildable. (LUBA Record Vicinity Map, page 8) **(Also see attached Exhibit 4: Tract map)**

In 2013 there was an application to rezone this property and several adjacent parcels to FF-10. The application was denied by the County Commission after the County received a letter from the Department of Land Conservation and Development (DLCD) and Oregon Department of Forestry (ODF) in strong opposition to this rezone due to its value as forest land. (Supplement to Complete LUBA Record pages 788-790)

DLCD rejected the arguments for a rezone (including the being physically developed and irrevocably committed arguments) and recommended that the existing plan and zone designations be retained. At the County Commission hearing there were also concerns expressed by the Board of County Commissioners regarding fire safety and water supply.

In his Remand Request letter (page 3), the applicant stated that he is taking LUBA up on its invitation to attempt to quantify the amount of land unable to be used due to applicable buffers. The letter goes on to identify the following buffers, most of which are not actually required buffers:

a. Power Lines: buffer of 15 ‘ either side from center line

Response: The Wasco Electric Coop usually trims tree limbs so that they do not touch the power lines. Photos 7 and 8 on following pages are examples of trees recently trimmed by the Wasco Electric Coop. These are not on the applicant’s property.





Note: These examples of trees trimmed by Wasco Electric Coop are not on applicant's property.

In his Remand Request letter on page 3, the applicant states that there are 10,024 linear feet of power lines on the property. The LUBA Record on page 9 with his site plan shows overhead power lines running the length of the property, approximately 1,320 linear feet not 10,024 feet. These are the only power lines shown on the site plan submitted with his application. **See attached Exhibit 5: Site Plan.**

The map submitted with the Remand Request does not match the site plan in the application that went to LUBA. It contains proposed, not current, development. The additional power lines are nonexistent and are not visible from the road. The three trailer sites were not part of the original site plan either and I question whether these trailers would be permitted on F-2 80 property. It appears that the applicant is adding this proposed development to make a physically developed case after the fact. LUBA ruled that the property was not physically developed based on the evidence.

b. Structures: buffer of 50' each side from the following structures: Log home, barn #1, barn #2, lean to, old homestead home, and old homestead barn
Response: The Wasco County LUDO does not prohibit trees within 50 feet of a building. The 50-foot wide fire fuel break maintenance standards include having trees limbed up approximately 8 feet from the ground and removing underbrush. (**See attached Exhibit 6:** LUDO Section 10.120: Defensible Space-Clearing and Maintaining a Fire Fuel Break.)

In addition the applicant's buffer calculations include illegal and unusable buildings that should not be included. The old homestead home was replaced by the log home and is an abandoned illegal dwelling. What he refers to as the old homestead barn is an unusable dilapidated metal building with no roof.

The dimensions of the log house are shown as 80 x 100 or 8,000 square feet in his calculations but only 2,660 on the site plan.

c. 50' buffer along 7 Mile Hill Road
Response: Wasco County Public Works Director Arthur Smith (October 28, 2021 email) said that there is no defined or statutory setback for roads. "In Mosier, we have trees and other vegetation within 2 feet of the road shoulder…We would be cutting down trees for 100 years to clear every county road for 50 feet." **See attached Exhibit 7: Arthur Smith October 28, 2021 email**

D. 50' buffer along driveway easement
Response: There is no 50' buffer requirement along the driveway easement. A minimum driveway width of 20 feet is required (Wasco County LUDO Section 10.140 – Access Standards). **See attached Exhibit 8: Wasco County LUDO Section 10.140.** As roads are uses allowed by Goal 4, they are not considered as physical development.

As the entire record, including the new evidence does not demonstrate that the property is either physically developed to such an extent that it is no longer available for resource use or irrevocably committed to non-resource uses, the rezone request should be denied.

Sincerely,

Sheila Dooley
3300 Vensel Rd.
Mosier, Oregon 97040

November 26, 2021

Dear Wasco County Planning Commissioners,

RE: File #921-18-000086-PLNG. Land Use Board of Appeals Remand (LUBA No. 2019-065) Comprehensive Plan Amendment; Exception to Statewide Planning Goal 4; and Zone Change from Forest, F-2 (80) to Forest-Farm F-F (10) by David Wilson

I have the following additional comments regarding the new evidence submitted by the applicant.

According to the Wasco County Soil and Water Conservation District, Ponderosa Pine and Oregon White Oak can't grow on the 10E Bodell soil type. As most of the 6.06 acres labeled as 10E Bodell on the applicant's soil survey contain these trees, it appears that these areas are not correctly identified.

Please see the attached information. It shows the native vegetation that occurs naturally and should be present if the land has been undisturbed by development including farming as well as trees that are commonly planted.

Sincerely,

Sheila Dooley
3300 Vensel Rd.
Mosier, Oregon 97040

Ecological Site/Plant Association and Vegetation (OR)

Wasco County, Oregon, Northern Part

[Composition of forest understory vegetation is based on canopy cover. Composition of rangeland vegetation is based on dry weight]

Map symbol and soil name	Ecological site or plant association	Common trees	Forest understory or rangeland characteristic vegetation	Composition	
				Forest	Range
				Pct	
10E:					
Bodell	SOUTH SLOPES 20-40 PZ (R006XA204OR)	—	Idaho fescue	—	55
			bluebunch wheatgrass	—	15
			Sandberg bluegrass	—	10
49C:					
Wamic, north	LOAMY 14-20 PZ (R006XA300OR)	Oregon white oak ponderosa pine	Idaho fescue	45	45
			bluebunch wheatgrass	10	10
			antelope bitterbrush	8	8
			Oregon white oak	8	8
			ponderosa pine	8	8
			prairie Junegrass	5	5
			Sandberg bluegrass	5	5
50D:					
Wamic	LOAMY 14-20 PZ (R006XA300OR)	Oregon white oak ponderosa pine	Idaho fescue	45	45
			bluebunch wheatgrass	10	10
			antelope bitterbrush	8	8
			Oregon white oak	8	8
			ponderosa pine	8	8
			prairie Junegrass	5	5
			Sandberg bluegrass	5	5
51D:					
Wamic	SOUTH SLOPES 14-20 PZ (R006XA200OR)	Oregon white oak ponderosa pine	bluebunch wheatgrass	—	70
			Oregon white oak	—	10
			Sandberg bluegrass	—	10
			antelope bitterbrush	—	5
			ponderosa pine	—	5

PC 1 - 582

Planning Commission Agenda Packet
December 7, 2021

AFFIDAVIT

STATE OF OREGON)
) ss.
County of Wasco)

I, LARRY BLACK, being first sworn depose and say:

That I did on or about the 26th day of January, 1977 receive from Samuel A. Decker and Betty J. Decker a Bill of Sale, the original of which is attached hereto, conveying to me the items listed thereon.

That the consideration for the conveyance was part of the ranch sale transaction wherein I purchased from Samuel and Betty Decker certain real property as well as the personal property itemized on the Bill of Sale.

Larry Black

SUBSCRIBED AND SWORN to before me this 16th day of February, 1978.

NOTARY PUBLIC STATE OF OREGON

Meredith D. Van Vleet

Notary Public for Oregon
My Commission expires: 1-4-84

780515(3)

620 RV-2

FORM No. 1—BILL OF SALE. EXHIBIT "A"

KNOW ALL MEN BY THESE PRESENTS, That SAMUEL A. DECKER AND BETTY J. DECKER

.....the part IES of the first part, for and in consideration of the sum of TEN ..... Dollars, to THEM in hand paid by LARRY BLACK

.....

.....

the part Y of the second part, the receipt whereof is hereby acknowledged, do by these presents, bargain, sell and deliver unto the said part Y of the second part, HIS executors, administrators and assigns, all of the following described personal property, to-wit:

ONE CASE WHEEL TRACTOR
ONE INTERNATIONAL TD6 CRAWLER
ONE MOWER
ONE HAY RAKE
ONE DISC
ONE GRAIN DRILL
ONE FERTILIZER SPREADER
ONE PLOW
ONE HARROW
ONE NEW HOLLAND HAY BAILER
ONE TANDEM 18" DISC PLOW
ONE HAY CONVEYOR
ONE SPRINGTOOTH
ONE HAY SKID
ONE 500 GALLON FUEL TANK
ONE 300 GALLON FUEL TANK
ALL IRRIGATION PIPE AND FITTINGS ON THE PROPERTY
ALL POSTS AND BUILDING MATERIAL ON THE PROPERTY

620 RV-2

780515 (3)

To have and to hold the same unto the said part Y of the second part, HIS executors, administrators and assigns forever.

And DO hereby covenant with the said part Y of the second part that THEY ARE the lawful owner S of said goods and chattels; that they are free from all encumbrances

that THEY have good right to sell the same as aforesaid, and that THEY will and THEIR executors and administrators shall warrant and defend the title thereto unto the said part Y of the second part, HIS executors, administrators and assigns against the lawful claims and demands of all persons whomsoever.

IN WITNESS WHEREOF, WE have set OUR hand S and seal S this 26TH day of JANUARY, 19 77.

Executed in the presence of:

Samuel A. Decker (SEAL)

Betty J. Decker (SEAL)

STATE OF OREGON,
County of } ss.

I, being duly sworn, depose and say that the sole owner of the property described in the foregoing bill of sale, and that the same is free and clear of liens and encumbrances of every kind and nature,

at date of execution of said bill of sale, and the same have been paid for in full.

Subscribed and sworn to before me this day of, 19

Notary Public for Oregon.
My Commission Expires

BIL OF SALE
(FORM No. 1)

TO

Dated, 19

STATE OF OREGON,
County of Wasco, } ss

I, SUE A. PROFFITT, County Clerk and ex-officio Recorder of Conveyances, in and for said county, do hereby certify that the within instrument of writing was received for record —

FEB 16 4 03 PM '78

and recorded in the —

records of said County under Micro Film

NUMBER: 780515 (5)

INDEXED

Witness my hand & seal affixed at The Dalles
SUE A. PROFFITT, County Clerk
By Deputy
Return to
Address

STATE OF OREGON,
County of } ss.

BE IT REMEMBERED, That on this day of, 19, before me, the undersigned, a Notary Public in and for said County and State, personally appeared the within named

known to me to be the identical individual described in and who executed the within instrument and acknowledged to me that executed the same freely and voluntarily.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

Notary Public for Oregon.
My Commission expires

620 RV-2

Wasco County Planning Commission
January 23, 2018
Meeting begins at 3:00 p.m.
Columbia Gorge Discovery Center
5000 Discovery Dr
Lower Level Classroom
The Dalles, OR 97058

CALL TO ORDER

Members Present: Lynne Erickson, Vicki Ashley, Brad DeHart, Russell Hargrave, Jeff Handley, Chris Shanno,

Absent Members: Mike Davis

Staff Present: Dawn Baird, Angie Brewer, Brenda Coleman

Chair Russell Hargrave called the meeting to order at 3:10 p.m.

Mr. Hargrave asked if there was any public comment for anything not on the agenda. There was none.

Mr. Hargrave then opened for deliberation, the public hearing for PLAAPL-17-10-0001 for David Wilson, of a Type I Review to deny retroactive approval of a 7,000 square foot (SF) agricultural exempt building, and approve a 2,500 SF agricultural exempt building.

Mr. Hargrave then asked Associate Planner Dawn Baird if any new information came in. Dawn responded that new information came in during the 7 day period the commission held the record open which the Commissioners have received in the Agenda Packet. No new information since that time. Planner Baird listed the following received information:

- Information submitted by the Appellant's attorney
- Staff Memo

Deliberation continued
Vice Chair DeHart stated that he has a difficult time not viewing it as an existing building. He feels they might have fell short of finding criteria to justify the building. From the information provided, including the other examples from around the county, he feels the County has not been very consistent with how buildings are reviewed, pertaining to the size of the buildings and use.

Commissioner Ashley stated that she did some research on the tax lots adjacent to or surrounding the examples submitted by the applicant. Being a farmer she understands you don't put your building on your best piece of ground. Generally you put it next to a road, next

to electricity as much as possible. A lot of the big buildings are located on a small parcel. Most of them are just a storage shed, but they are big. She feels that it is too bad that the applicant received misinformation from his neighbors about not needing a permit. But she is afraid that if the County lets this slide, how many more will try it. She feels that there are more out there that we are not aware of, this will be highly publicized and she feels that we are opening a can of worms if we let it go.

Chair Hargrave stated as for not considering the fact that it is there, he is worried about setting a precedent. He asked if the Commission would be setting a precedent and thinks this should hold weight on the decision the Commission makes. He stated that the problem isn't that it doesn't have a permit, but would a permit be allowed in this case.

Commissioner Schanno stated that he does not think the size breaks the rules, therefore it would have been permitted.

Commissioner Handley stated that he wasn't at the first hearing so he wasn't in on everything but he doesn't like the idea of telling someone how large of a structure they can build. He believes that if we go down that road, you will be telling people how large of an ag structure, then how large of a house they can build. He doesn't feel that we should be telling someone what the proper size of a structure they need. He feels it is up to the applicant to determine what size fits their need. **Chair Hargrave** stated that he wanted clarification on outbuildings, is there potential for the applicant to build an accessory building where the size is limited to 75% of the footprint of the size of the dwelling, so the rules for an accessory structure would then be relevant to this property. **Director Brewer** stated that yes, if you for some reason found that the agricultural use was not commercial in nature, then you would be pursuing an accessory structure instead of an agricultural building. **Commissioner DeHart** stated that in that case there would be no way to approve it based upon the size of the house. You would be restricted to 75% of the size of the house. **Director Brewer** stated that she wanted to clarify that the 75% rule is a Wasco County rule on top of the existing state of Oregon land use regulations and is not required by state law.

Commissioner DeHart stated that the only guideline the Commission has is the statewide 20000 sqft. **Director Brewer** stated that the 20000 is a maximum, but that the Wasco County Ordinance requires the planner to evaluate the size need based on the agricultural use and size of the operation. **Commissioner Erickson** asked for clarification of the outcome of the decision if the applicant had put all his equipment and hay in the structure. **Planner Baird** stated that if all the equipment had been there, there would have still been a lot of open space.

Commissioner Ashley asked if the applicant walked into the office today, would he be allowed to build the structure. **Director Brewer** stated that questions would be asked today that would quantify the size of the building based on the acres of the operation.

Commissioner Erickson stated that she thinks if a new application were to come in today, it would be approved. **Director Brewer** stated that she did not believe we would have approved

a 7000 sqft building, she further stated that there would be some back and forth conversations and would have come up with a satisfactory solution.

Commissioner Schanno moved to overturn the Director's Decision and approve the request for a 7000sqft with amended findings and conditions including a requirement that the applicant obtain an agricultural exempt permit from Building Codes.
Commissioner Erickson seconded.

Chair Hargrave called for discussion. There was none.
Chair Hargrave called for the vote. **The motion was approved 4 to 1, with 1 abstained, and 1 absent.**
A listing of the vote, as required by Oregon Revised Statute 192.650.c. is as follows:

Chair Hargrave – yes
Vice-Chair DeHart – yes
Commissioner Handley - abstain
Commissioner Davis – absent
Commissioner Ashley – no
Commissioner Schanno – yes
Commissioner Erickson – yes
Alternate Commissioner Position #1 – vacant
Alternate Commissioner Position #2 – vacant

Vice Chair DeHart moved to not rely on the formula in this case and to find that the applicant has met the need for the size of the building in conjunction with the existing and future farm use as described in the farm plan.
Commissioner Ashley seconded.
Chair Hargrave called for discussion. There was none.
Chair Hargrave called for the vote. **The motion was unanimously approved 6 to 0, with 1 absent.**
A listing of the vote, as required by Oregon Revised Statute 192.650.c. is as follows:

Chair Hargrave – yes
Vice-Chair DeHart – yes
Commissioner Handley - yes
Commissioner Davis – absent
Commissioner Ashley – no
Commissioner Schanno – yes
Commissioner Erickson – yes
Alternate Commissioner Position #1 – vacant
Alternate Commissioner Position #2 – vacant

Results: the decision is overturned and the appeal is granted.

Director Brewer updated the Commission on the situation regarding the Building Codes Department moving into the Wasco County Public Works Building and no longer being a part of the dissolved Mid Columbia Council of Governments. She explained that State Staff will be assisting the county by instituting the building code program.

Meeting Adjourned 4:17pm

_____	_____
Russell Hargrave, Chair	Angie Brewer, Planning Director
Wasco County Planning Commission	Wasco County Planning & Development

Wasco County Planning Commission
January 2, 2018
Meeting begins immediately following the
3:00 p.m. Planning Commission Meeting
Columbia Gorge Discovery Center
5000 Discovery Dr
Lower Level Classroom
The Dalles, OR 97058

CALL TO ORDER

Members Present: Lynne Erickson, Vicki Ashley, Brad DeHart, Russell Hargrave, Mike Davis, Chris Shanno,

Absent Members: Jeff Handley

Staff Present: Dawn Baird, Angie Brewer, William Smith, Riley Marcus,

Chair Russell Hargrave called the meeting to order at 3:10 p.m.

Mr. Hargrave asked if there was any public comment for anything on agenda. There was none. Mr. Hargrave then opened the public hearing for PLAAPL-17-10-0001 for David Wilson, of a Type I Review to deny retroactive approval of a 7,000 square foot (SF) agricultural exempt building, and approve a 2,500 SF agricultural exempt building. Mr. Hargrave then asked Associate Planner Dawn Baird to give her Presentation.

Please see **Attachment A** for Dawn Baird's presentation on PLAAPL-17-10-0001 (Wilson Appeal).

Mr. Hargrave asked the rest of the Planning Commission if they had any questions. Two Commissioners indicated that they would like to wait to ask their questions until after the applicant presented.

Public Testimony:
Bill Summerfield, was the first to present, representing David Wilson. Mr. Summerfield stated that they were not here to discuss prior history or to discuss any prior Code Enforcement actions on the property. Mr. Summerfield stated that they are arguing a case solely on the application for an Agriculture Exempt Building. Mr. Summerfield stated that he had Mr. Wilson pull several past permits from Wasco County Planning Department for Agriculture Exempt Buildings. One of these first retroactive applications that they had pulled was for a greenhouse. Mr. Summerfield stated that this application had not caused any heartache at that time. Mr. Summerfield stated that Mr. Wilson is cleaning up all of the messes that were left on the

property prior to him purchasing it. Mr. Summerfield stated that the Planning Commission needed to look at this application as a clean sheet of paper and stated that he thinks that the application of those laws is arbitrary for this application. Mr. Summerfield stated that he had obtained 71 applications from a Records Request. He stated that he did not submit all of these applications as evidence and instead submitted a spreadsheet that summarized the results from all 71 applications.

Mr. Summerfield stated that he did not know how the department was not aware that he was not involved within the appeal. Stated that he submitted additional materials to staff on the Friday prior to the Commission meeting and hoped that the Planning Commission had enough time to review material. He asked that if more time was needed to better evaluate submitted materials, that it should be taken. Mr. Summerfield stated that the Planning Department was "over their squeeze". He stated that one of the permitted outright uses is an Agricultural Exempt Building and that if you tick all the boxes for items such as setbacks and other requirements, that you should be able to get an Agriculture Building. He stated that at the application stage, you are entitled to put up your building and that statute does not include any size restrictions, and that there is no reference to any yields. He stated that calling technical experts is not authorized by any statutes and is not included in the administrative rules. Mr. Summerfield stated that the LUDO does not explain why you need a Farm Management Plan and that nothing within the LUDO tells you what this requirement is. And if the county were consistently applying, that the LUDO may be deemed unconstitutional or inappropriate and stated that there was not much oversight for an Agriculture Exempt Building on resource lands.

Mr. Summerfield stated that Planning Staff does not have the expertise to tell the farmers how to go about farming or where to keep their bailers, etc. He stated that the Planning Department is only responsible for reviewing applications. Mr. Summerfield stated that it should be "If you meet setbacks, yes. If you have a farm use, yes" and that the application process should remain pretty hands off. He stated that Dawn Baird makes this point by saying that she needed to contact experts and that it should not be the business staff should be in. Mr. Summerfield stated that in the Staff Report, every calculation was based off of 6 acres. And that David Wilson has 70 acres and talks about increasing farming in future. He stated that he thought that Ms. Baird did not evaluate this. He brought up the example of a past application for an Agriculture Exempt Building for Steve Skimore, who has a lavender farm, and that he increased the space for lavender over time. Mr. Summerfield stated that if you have resource land, you are entitled to build agricultural building.

Mr. Summerfield also stated that "if you are going to get out over your squeeze, you need to do it consistently". He stated that this was the real reason why he and Mr. Wilson dug through past applications, especially these ones that were "justifiable" on the surface. He stated that you would expect to see some oversight or some scrutiny, however it was not there. He stated that Dave Wilson is being singled out and treated specially and that it was not right and that the laws did not allow this and that Dave needs to be treated as any other person would. Stated that we need to tick the boxes that need to be ticked.

Mr. Summerfield stated that a Farm Management Plan is a template supplied by county, to show what is passing muster in the county. He stated that this is not super comprehensive. He notes that within the past applications he they gathered that one Floor Plan had been submitted that was essentially empty, and yet it had been approved. Mr. Summerfield states that the Planning Department Staff needed to consistently apply standards and laws to each application. Mr. Summerfield stated that as for the Conditions of Approval, that removal of square footage of the existing illegally placed building was ridiculous and not feasible. Mr. Summerfield stated again that he was not sure why any past history was brought up and that Mr. Wilson had continued to meet the income test each year to remain within Farm Deferral, and that he would continue to do so. He stated that income is not a factor here such as Dawn had stated and that it was not a valid argument. Mr. Summerfield stated that this existing building is not an eyesore, and that it has existed for years. Should have been approved as is, and that is what we are here for today, is to have this building approved as is and to please ask for more time if it is needed.

Mr. Hargrave then asked if Mr. Wilson had submitted a Farm Management Plan. Mr. Summerfield stated that Mr. Wilson had and that it was included within the submitted application materials.

Brad DeHart asked Mr. Summerfield if Mr. Wilson owned any more property. Mr. Wilson responded that he did, and that it was not located within Farm Deferral.

Lynne Erickson asked when the property was purchased and when the building was put up. Mr. Hargrave asked her to hold onto her question so that Mr. Summerfield could take his seat and have Mr. Wilson come forward.

Mr. Wilson stated that he put up the Agriculture Building 18 years ago and he hah never received a permit. He stated that a few years ago he approached the county again to build a new home, and stated that he recognized that he needed to bring the Agriculture Building back into compliance. Mr. Wilson states that he has a 1,000 horsepower grinder, and had annoyed the neighbor due to the noise. Due to this, the code compliance officer came out. He stated that they were there for one reason, but they came out for a bunch of other things. He stated that for example, there were logs sitting on my property that I was going to be using for firewood. He stated that at the time, Kate was the Code Compliance Officer and that she questioned what these logs were going to be used for. He stated that his property use to be the Wrecking Yard, which Mr. Wilson claimed he has completely cleaned up. Mr. Wilson stated that the Code Compliance Officer then went to his other property to see if it might also have violations. It was at this time that the subject parcel with the illegal building in question, was discovered. Mr. Wilson stated that at this time, it had already cost him around $8,000 to clean up the first property. He states that a complaint on one property does not justify visiting another property owned by the same landowner. Mr. Wilson points out that it was at this time

that his property was “red flagged” and that he was now before us to try to get this “unflagging” done to get a future new dwelling.

Mr. Wilson states that at the time Dawn Baird and Joe Ramirez came to look at the illegal building that not all of his farming equipment was inside the building. He stated that when Ms. Baird visited the property, the machines and equipment were out clearing another 6-8 acres for farming purposes.

Vicki Ashley interrupted and addressed that the original Farm Management Plan does not say this. **Ms. Baird** stated that there were revisions on the Farm Management Plan that does include the additional acreage.

Mr. Wilson stated that he thought Dawn’s analysis of the number of farm animals included for the Farm Use was insulting. Mr. Wilson handed out more pictures to give to the Planning Commission. He stated that there was only one pedal toy in the garage and not multiple. And that the refrigerator in the shop was so he could have a cold drink of water and a sandwich in the middle of the summer. He stated that his freezer within the Agriculture Building is used to store frozen meat of his own cattle. Mr. Wilson then stated this his wife is sick and has not had a chance to clear out some of her past antiques and that this is what was covered by a blue tarp within the Agriculture Building.

Mr. Wilson had mentioned that he had discussed with Joseph Ramirez a second time to come out and inspect the Agriculture Building. Mr. Wilson stated that when he finally called back in for this second inspection that when he asked for the Code Compliance Officer to come back out that Joseph Ramirez was no longer the Code Compliance Officer. Wilson stated that all of a sudden the second inspection was no longer needed and instead a decision was being made. Mr. Wilson pointed out that his Agrilcutre Building is not visible, however his neighbor, who had illegal development that was visible, had not yet been penalized. Mr. Wilson stated that this is not enough room for the building, and does not include for an additional 20 acres that will be farmed in the future. Mr. Wilson stated he does not want to file complaints on his neighbors and believes that he has been selected out. Stated that he and Dawn have had arguments in the office in the past and that for Staff to decide that they feel he only needs 2,500 SF “rubs him wrong”. Wilson stated that Planning Staff should not be deciding this for him and that how Planning Staff inprets law is completely different from how a lawyer would and that Staff has no business doing this. Mr. Wilson stated that he has spoken to the Wasco County lawyer Will Carey for three hours and that he agreed with Mr. Wilson; that the county has better things to do. Mr. Wilson stated that he has a paralyzed son who uses a John Deer toy tractor and that it was insulting to him that Dawn would even take the time to write that down. Mr. Wilson returned to his seat.

Russell Hargrave asked if there were any other questions.

Mike Davis asked Mr. Wilson what other farm equipment that there was.

Mr. Wilson stated that the bailer was not inside, and also has a bulldozer. He stated that this because of all these items that his floor plan makes all kinds of sense.

Vicki asked if Building Permits or Electric Permit was ever received?

Mr. Wilson stated that no there were not. He stated that he had been told by multiple other farmers at the time (18 years ago) that he did not need a Permit.

Vicki asked if a loft would be put in.

Mr. Wilson stated no. He also stated that the year before last he had to wait to plow because too much moisture. Then after he plowed there was no moisture at all and therefore he had to wait before planting any more alfalfa. States that none of this matters, never was trying to create a nuisance and that the Planning Staff just did not like him.

Mr. Hargrave again asked if anyone had any questions. No one had any. Mr. Hargrave asked if anyone wanted to speak for the proposition for the illegal Agriculture Building.

David Rogers came forward to provide public testimony. He asked if any of the Planning Commissions or Planning Staff were current farmers. It was at this time that Russell Hargrave interrupted him and asked him to please not interrogate the Commission or Staff as he did not see how it was relevant to the Agriculture Building.

Mr. Rogers then proceeded and stated that the Planning Commission was here to keep Staff in line and that Staff should not be interpreting the law. He stated that Planning Staff was singling Mr. Wilson out.

Mr. Hargrave stated that this was a good point and asked if there were any other questions. Asked if anyone wants to speak in opposition. There were none. At this time several other people in the audience raised their hands and stated that they would like to speak with concerns.

Dean McCallister came forward and stated that he had concerns about the specificity and that everyone should be treated fairly.

Ther Keller(?) stated that he would rather have one oversized building over multiple smaller buildings.

Chuck Cobert stated that he has concerns about the regulations over a size of a building and staff telling them what kind of equipment that they can and cannot have. Used the example that how do we approve a large SF dwelling for just a husband and a wife. He stated that he questions building without a permit, however not any further regulation in terms of equipment.

Chris Schanno asked if the original denial was based on the size of the building.

Ms. Baird stated that yes, it is. And that it also meets setbacks.

Lynne Erickson asked that when Staff looks through Farm Management Plan, does everyone else get the same scrutiny.

Angie Brewer, Planning Director, asked to respond to this question. She stated that a lot of times individuals come to the counter and ask and then get told it will be denied. Or pair it down to an Agriculture use that we cannot support. We want to encourage Agriculture Use in our resource zones. Ms. Brewer stated that she encourages staff to seek out experts. She stated that it looks like there are discrepancies included with two different Farm Management Plans that were submitted, however when we reached out to the technical experts, we reached out when we need to.

Mrs. Erickson again asked if all other Farm Management Plans get this level of scrutiny.

Mrs. Brewer stated yes, that we do review the Floor Plans and the template submitted.

Ms. Baird stated that we also do not typically reach out to the experts because we do not typically receive retroactive requests. She stated that "No, we do not usually go to the experts, however we also do not normally receive such a large building with such a small farm use."

Mr. Wilson made a statement in regards to marijuana and why for the last two years they do not receive this level of scrutiny.

Brad DeHart asked a question from the Staff Report, asked if the italicized portion was included within our Land Use Development Ordinance. Was wondering how much information was provided within these other applications and the level of detail included within the floor plan.

Ms. Baird stated that she cannot speak to all of the other Agriculture Buildings, but that she does look at the current farm use for every application.

Mike Davis asked Staff to help him understand that there was no formula for building sizes.

Angie Brewer stated that we have a Template Farm Plan that guides people, in order to make a farm and equitable decision and that there are different kinds of farms, as well as different kinds of farmers. When we do not feel comfortable, we do not go with our gut feeling, we will reach out to an expert. When we issue a decision, we assume that everything we put in writing, that could affect someone's land, could be taken to court. There is no magical formula because there are so many complexities to the analysis.

Mr. Hargrave closed the hearing for deliberation (4:58pm).

Mike Hargrave stated that he is here to interrupt what staff brings to the commission. Mr. Hargrave stated that he is also here to represent his community and the county and that he is not here to change the LUDO, and that he is here to look at the interpretation. And without question, he states that he is torn. He states that without question, he is trying to place himself within the same situation. He states that he would be excited to have a 7,000 SF Agriculture Building. He does state that before any development occurs, that you should talk to the County. He states that it needed to happen and did not. He states that on the other hand, it is a very small piece of property in comparison of thousands of acres that we are used to. His concern is how traumatic it would be for Mr. Wilson to have to remove a large portion of his Building and states that he would need to get this to code for public safety.

Chris Schanno stated he is not within the business of telling someone how to run their business. And if they meet Fire Safety Standards and Setbacks, is Wasco County in the business of telling someone how big of a building they need to run their operation? He states that he made a mistake, and that it seems excessive.

Angie Brewer stated we are resolving a violation by addressing this. We have an ordinance that requires us to have enough information to meet state statute. The way that we do this is to ask for a Floor Plan and a Farm Management Plan.

Vicki Ashley stated that her issue was no permits. She also states that this is an excessive amount of building for the size of the parcel.

Russell Hargrave stated that he has been on this Commission for a very long time, and just because you meet setbacks does not mean you can do whatever you want. This is F-2 land. This is the reason why we require supporting documentation and because whether it is permitted or not, depends on the use. In this case it is permitted outright. And that we need to start there, take a look at the use. I think that the fact that it is there is not any reason to approve it. I am bothered by that as a mechanical engineer. It is a relatively low profile building. In my experience, a building of this size is usually much taller in size. I feel like I have a good level set of the area, and is trying to determine if this case is being treated differently. The pictures do not necessarily determine the use. I was struck that this building has been here 18 years, and had been used for Ag use for this long as I did not see the second story, the extra bathroom, etc. Said he thought it showed very little evidence of non-farm uses. Farm Deferral, being taxed on it, so not just a one year idea, seems to be a very serious farming operation. Agrees one big building is better than equipment scattered all over your yard or multiple smaller buildings. What is the outcome that we want?

Brad DeHart states that he agrees, and he is not comfortable with permitting “Shedville”, indicating multiple sheds. Wishes we had a guide like we did for accessory structures. States he is trying to not take into account as the cost will be much higher for part of the building being

torn down. Should be either all or nothing; seems too difficult to enforce. Thinks Staff has done an outstanding job, and in going down this path, the information we have received led us to a decision that he believes that none of us wanted to see. I can say right now that I don't know if we need to continue this, but I am certainly not ready to approve staff recommendation tonight. I think that this warrants more time.

Lynne Erickson states that she has concerns with the somewhat ambiguous/ not clear standards that are in place to base that size of the building on. Seems to me that there is ambiguity that I am wrestling with. Inclined to agree with Brad that she would not feel comfortable with supporting the recommendation in its entirety.

Mike Davis stated he agrees, impossible to remove a portion of a building and instead see this turned. Under the circumstances, let's leave the building alone, and state that it will only be used for agricultural purposes. It keeps the rest of his equipement out of the neighbnorhood, because it is a small neighbored. I would love to put a little Tygh Valley in this area. I would like to see a slight modification to let the building stand, however ensure that everything else is brought to code.

Russell Hargrave states that the building being already constructed should not play into this at all.

Vicki Ashley stated that this sets precedent. That a building that has existed for 18 years and never received permits getting approval will set precent.

Brad DeHart stated that Staff was taking on what they were handed and trying to build a case for somehow making it possible to stay. So if we were to back up and try and take another run at this as if the building were not there, could we somehow make another case to somehow make a case for this building to stay?

Russell Hargrave stated that it is not about the size, but is about the use. Stated that he did not see any other non ag use related items within the pictures. This does not corrupt the building from it's agricultural use. Does not see any use that would indicate that this does not have an agricultural use. What is the use? I do not see a robust farm

Mike Davis stated that if we are going to go down this path, then the conflicting information in regards to a Farm Management Plan, basically we are kind of erasing and restarting this as a new application?

Russell Hargrave stated that the facts were balanced, and he appreciates the work that the Department did and hopes others see this too. Mr. Hargrave stated that he was not factoring in the fact that building is already there, and that he understands buildings get built without permits. Not bothered by building being there, and not going for a permit for an Ag Building, because at that time was not that clear. But that I still go back to the use. Not inconsistent with

what is going on within the area. I am going to recognize that we do not have a precise formula.

Angie Brewer stated that we do have to be able to find that there is indeed an Agricultural Use.

Russell Hargrave stated that you need to show that you have an approved use. Sees Farm Deferral, taxes, Farm Management Plan that has been submitted. But that it is a Farm Use. I do not sese a lot of Non farm Agricultural Use. And that is what strikes me about it.

Mike Davis asked if the building had everything within it, would it be an approved building?

Angie Brewer stated that Staff is using the most reputable information and technical expertise to make these decisions. I defer to your discretion and authority to make this decision.

Russell Hargrave would anyone like to make a motion?

Brad DeHart said he would like more time and would not be making a motion. Stated that the stakes are high for this particular information, as well as for setting precedents.

Russell Hargrave stated that he supported this decision. Chris Schanno and Mike Davis both agreed.

Vicki Ashley stated that we have to have this resolved as this happened and we let it go and I think that we need something more clear and precise.

Brad DeHart part of the reason I need more time is to think through what some alternatives might be. I understand electricity has been done. That Mr. Wilson may not own this property forever.

Mike Davis called into question the use and application of the Farm Management Plan. Would like to propose we delay this, and contact another round of experts to see what can help us, as this will set precedence.

Vicki Ashley talked about how different zones may be different in terms of a Farm Management Plan.

Vicki Ashley moved that we continue hearing to Jan 23 at 3:00pm at the Discovery Center.

Russell Hargrave and **Mike Davis** both seconded.

Chair Hargrave called for the vote.
The motion was approved 6 to 0, 1 absent (Commissioner Handley).

A listing of the vote, as required by Oregon Revised Statute 192.650.c. is as follows:

Chair Hargrave – yes
Vice Chair Ashley – yes
Vice Chair DeHart - yes
Commissioner Handley - absent
Commissioner Davis – yes
Commissioner Schanno – yes
Commissioner Erickson – yes
Alternate Commissioner #1 – vacant
Alternate Commissioner #2 – vacant

Bill Summerfield requested that the record be held open for 7 days.

Russell Hargrave stated that the record would be held open for 7 days, closing at 4:00 pm, January 9, 2018.

Russell Hargrave moved to close the hearing (5:45pm)

Chris Schanno moved to keep Russell Hargrave as chair. Mike Davis seconded.
Chair Hargrave called for the vote.
The motion was approved 5 to 0, 1 abstain (Commissioner Hargrave), 1 absent (Commissioner Handley).

A listing of the vote, as required by Oregon Revised Statute 192.650.c. is as follows:

Chair Hargrave – abstain
Commissioner Ashley – yes
Vice Chair DeHart - yes
Commissioner Handley - absent
Commissioner Davis – yes
Commissioner Schanno – yes
Commissioner Erickson – yes
Alternate Commissioner #1 – vacant
Alternate Commissioner #2 – vacant

Mike Davis nominated Brad DeHart as Vice Chair. Chris Schanno seconded.
Chair Hargrave called for the vote.
The motion was approved 5 to 0, 1 abstain (Commissioner DeHart), 1 absent (Commissioner Handley).

A listing of the vote, as required by Oregon Revised Statute 192.650.c. is as follows:

Chair Hargrave – yes
Commissioner Ashley – yes
Vice Chair DeHart - abstain
Commissioner Handley - absent
Commissioner Davis – yes
Commissioner Schanno – yes
Commissioner Erickson – yes
Alternate Commissioner #1 – vacant
Alternate Commissioner #2 – vacant

Approving of minutes was moved to the next meeting.

Russell Hargrave adjourned at 5:50pm.

_____	_____
Russell Hargrave, Chair	Angie Brewer, Planning Director
Wasco County Planning Commission	Wasco County Planning & Development

ATTACHMENT A

PLANNING COMMISSION PRESENTATION: December 5, 2017
PLAAPL-17-10-0001 (David Wilson)

Thank you and Good Afternoon. For the record my name is Dawn Baird and I am an Associate Planner for the Wasco County Planning Department. I am going to present the background information in this case.

1. **Request**: As the Chair indicated, today we will be discussing an appeal application from David Wilson, of a Type 1 Review to deny retroactive approval of a 100'L x 70'W x 14'T, 7,000 square foot (SF) agricultural exempt building, and approve a 2,500 SF agricultural exempt building.

2. **Location**: The subject property is located approximately 0.3 mile south of Sevenmile Hill Road southeast of Richard Road, approximately 4.3 miles northwest of The Dalles, Oregon; more specifically described 2N 12E 22 4100, Accounts 14901, 13446, and 2N 12E 0 2800, Account 804. The subject property is 69.32 acres in size.

3. **Staff Recommendation**: The full Staff Recommendation was mailed in the Planning Commission's agenda packets. It was available for review at the counter one week prior to this hearing, and it is considered a part of the record.

4. **History of this request:**

   In 2013, the Planning Commission held a public hearing to consider an application for Comprehensive Plan Amendment, Zone Change, and Exception to Statewide Planning Goal 4 – Forest Lands, for several tax lots on Sevenmile Hill Road and Dry Creek Road. This application was denied.

   David Wilson decided to pursue a CPA/ZNC/Exception for 40 acres of property he owned and he submitted an application for this request on September 1, 2015. Staff processed the request, but found out prior to the hearing that Mr. Wilson's property had been improperly divided by a prior owner. In a discussion with Senior Planner, Dustin Nilsen, two weeks prior to the scheduled PC hearing for the CPA/ZNC/Exception, David Wilson stated that he was probably also going to have to get a permit for the 7,000 SF building since he had not gotten one. (Note: A former Code Compliance Officer found an illegally constructed 7,000 SF building on one of the illegal parcels. She documented it, but did not pursue enforcement action on the building.) Once David Wilson stated he had not obtained a permit for the 7,000 SF building, the Planning Department had clear evidence of 2 violations (illegal parcel, illegal building) on the property and could not pursue the CPA/ZNC/Exception until they were resolved.

On May 16, 2017, David Wilson submitted a Type 2 application for a partition to legalize the subject properties. In addition, he submitted a Type 1 application for the 7,000 SF "agricultural exempt" building. Staff issued the Notice of Decision and Staff Report approving the partition request on June 15, 2017. The final partition plat was recorded on September 8, 2017.

Once the partition was completed, staff issued a decision on the retroactive approval of the 7,000 SF "agricultural exempt" building on October 5, 2017. The decision denied the 7,000 SF building, but approved a 2,500 SF building. This decision was appealed on October 13, 2017.

5. Let's discuss why the request is before the Planning Commission…

An appeal of the Planning Director's decision is heard by the Planning Commission. Once the appeal was submitted to the Planning Department, staff scheduled the public hearing before the Planning Commission for December 5, 2017.

Stage in the Process: Staff found the appeal request to be complete on October 19, 2017, and scheduled for a public hearing on today's date. The required 20-day public notice was given on November 22, 2017 (20 days). The Staff Recommendation, with findings, conditions and conclusions, was issued on November 28, 2017, and was provided to the Planning Commission on the same day. On November 28, 2017, Mr. Wilson's attorney, whom we did not know was involved in the process, requested postponement of the hearing, and agreed to today, January 2, 2018, to hear the matter. If the Planning Commission feels they have all the necessary information to make a **decision**, they will vote to do so today.

6. Criteria: The applicable standards used to evaluate each request include:

A. Oregon Administrative Rule (OAR) 660-006-0025, Uses Authorized in Forest Zones

B. Wasco County Land Use & Development Ordinance (LUDO)

1. **Chapter 1 – Introductory Provisions**
   Section 1.090, Definitions – Agricultural Structure

2. **Chapter 3 – Basic Provisions, Section 3.120, F-2, Forest Zone**
   Section 3.127, Property Development Standards
   Section 3.129.D., Additional Standards – Siting Requirements

3. **Chapter 10 – Fire Safety Standards**

Section 10.130, Construction Standards For Dwellings And Structures – Decreasing The Ignition Risks By Planning For A More Fire-Safe Structure

4. **Chapter 15 – Administration & Enforcement**
   Section 15.030, Authority
   Section 15.060, Violation of Ordinance as a Nuisance
   Section 15.070, Wasco County Code Compliance and Nuisance Abatement Ordinance

7. **Findings:**

In reviewing the request for retroactive approval of the 7,000 SF agricultural building, staff relied heavily on experts from Oregon State departments, particularly Mylen Bohle of the Oregon State Extension Office, and Robert Wood of the Water Resources Department, who provided projected yields, information about hay storage, and water rights. Staff gave the benefit of the doubt in all cases to the applicant. For instance, when OSU Extension Office staff indicated that hay is typically stored in 6' tall or 13.5' tall bales, staff calculated the space needed for 6' tall bales, which takes up more space than 13.5' tall bales.

Joseph Ramirez, former Code Compliance Officer, and I conducted a site visit to the property on May 31, 2017. We viewed the agricultural exempt structure and noted that it contained many personal items such as 4 upright freezers and 1 chest freezer, a pile of Mrs. Wilson's antiques under a tarp in the far left corner of the building, an electric wheelchair, 2 four-wheelers, a gun safe, toy pedal cars which Mr. Wilson said are used by his grandchildren for farming when they come to visit. There was a lot of vacant space in the "agricultural" building and Mr. Wilson explained that he didn't have all of his farm equipment in the building and some of the space was intended for hay storage.

In considering the expert testimony of the State of Oregon, all of the Ordinance criteria that must be met for this request, especially the definition of "Agricultural Structure", it is clear that a 7,000 SF building is not needed for the farm operation.

The County cannot consider the possibility that the applicant may expand his farm use in the future without considering the fact that he could abandon the farm use altogether. He has not harvested a crop of barley in the last 2 seasons. During the May 31st site visit dozens of items not included in the farm use on the land were being stored in the building.

Grounds for Appeal #1: The Planning Department erred in its interpretation of Wasco County Land Use & Development Ordinance (LUDO) 1.090, which requires that the applicant provide a Farm Management Plan to be reviewed and approved by the Planning Department.

STAFF RESPONSE: As discussed on page 3 of the Staff Recommendation, the definition of "Agricultural Structure" includes a requirement that a Farm Management Plan be submitted for an Agricultural Exempt Building. The Planning Department required submittal of a Farm Management Plan consistent with Section 1.090, Definitions of the Wasco County LUDO. The definition of Agricultural Structure includes the requirement of a Farm Management Plan to ensure an agricultural building is only used for farm uses and is not so large that the owner may use it for non-farm uses instead, or in addition to the permitted farm use. Based on the LUDO adopted by the Board of Commissioners, and acknowledged by the Oregon Department of Land Conservation & Development, specifically Section 1.090, Definition of "Agricultural Structure," the Planning Director must require a Farm Management Plan.

Staff finds that the Planning Director has the right to review and approve a Farm Management Plan for the proposed use, and Grounds for Appeal #1 is not a valid reason for overturning the Decision of the Director.

Grounds for Appeal #2: The Planning Department erred in finding that the applicant's application and Farm Management Plan did not support the approval of a 7,000 SF agricultural building.

STAFF RESPONSE: As discussed on page 4 of the Staff Recommendation, staff contacted the Watermaster's Office to determine if the subject parcel contained water rights for irrigation. According to Bob Wood, Watermaster, the subject parcel does not contain any registered water rights. Staff contacted the Oregon State Extension Office to find out how much area it takes to store 6 acres of hay. According to Mylen Bohle, Oregon State Extension Office, non-irrigated barley would produce an annual crop of approximately 0.5 – 1.5 tons per acre under conditions in northern Wasco County. This means that 6 acres of non-irrigated barley would generate between 3-9 tons.

Based on projected barley yields, storage of 9 tons of hay in 6' tall stacks, would require slightly less than 400 SF. Associated equipment such as a tractor, baler, etc., would require less than 2,000 SF of space. The entire farm operation could occur in a building containing less than 2,500 SF. Many of the items the applicant states he intends to store in the agricultural building are not currently stored in the building. Based on common accepted farming practices, many hay operations do not store the rake, swather, etc., under cover because the implements are difficult to access within a building. When staff conducted a site visit to the subject parcel on May 31, 2017, the rake and swather were stored outside. The applicant's proposed floor plan shows an excessive amount of space will be used for these farm implements

which were not being stored inside prior to the site visit. Staff concludes that since these implements were not being stored in the building

Staff finds that retroactive approval of the owner's 7,000 SF agricultural building is not justified because the existing farm use can be accommodated in a 2,500 SF building.

Grounds for Appeal #3: The Planning Department erred in making unwarranted and unsupported assumptions about the applicant's farm yields and farm practices.

STAFF RESPONSE: As discussed on page 4 of the Staff Recommendation, and above in Grounds for Appeal #2, staff contacted the agricultural experts at Oregon State University Extension Office to request data about potential yields and space for storage for 6 acres of barley hay in northern Wasco County.

Staff contacted the Oregon State Extension Office to find out how much area it takes to store 6 acres of hay. According to Mylen Bohle, Oregon State Extension Office, non-irrigated barley would produce an annual crop of approximately 0.5 – 1.5 tons per acre under conditions in northern Wasco County. This means that 6 acres of non-irrigated barley would generate between 3-9 tons. This is not unwarranted and unsupported assumptions about farm yields and practices, but based on factual data collected by Oregon State University Extension Office for decades pertaining to soil types, climate conditions, precipitation, improvements in farm practices, etc. Grounds for Appeal #3 does not support overturning the Decision of the Planning Director because the Planning Department did not make unwarranted and unsupported assumptions about the applicant's farm yields and farm practices.

Grounds for Appeal #4: The Planning Department erred in making calculations about applicant's needs and projected use of the agricultural building based on its unwarranted and unsupported assumptions.

STAFF RESPONSE: As discussed on page 4 of the Staff Recommendation, Oregon State University Extension Office provided calculations about potential yields and storage requirements for the barley hay. Regarding the needs and projected use of the agricultural building, the building is proposed to be used for agricultural storage of farm equipment for the production of barley hay, oats, and seasonal grazing (cattle). The owner states that he needs this large building for the current farm use yet much of his farm equipment was stored outside when staff conducted a site visit to the property on May 31, 2017.

Mr. Wilson stated that he has been plowing additional land adjacent to the current 6 acres of barley/oats and plans to continue to expand the farm use and increase the number of cattle grazed on the property. He indicated he was not able to plant a

crop in 2017 due to a lack of moisture in the soil and that he did not get "much of a crop" in 2016 which was not worth harvesting.

Staff concedes that they are not experts regarding agricultural production and sought input from experts at the State of Oregon, and Oregon State Extension Office, as well as from Bob Wood, Watermaster, Oregon Water Resources Department. Based on the information provided below,

Staff asked Oregon State Extension Office's "Ask an Expert" website how much area it takes to store 6 acres of hay. Their response states:

"Hay crop yields can vary between crop varieties and irrigation. With a highly productive irrigated crop you could see between 8-10 tons per acre for the entire season. Therefore about 60 tons would be about the highest production you could see for one year.

Assuming a harrowbed is used for stacking which stacks 9 bales high (13.5'), 1440 bales (24 bales per ton) would require about 1,050 square feet (14,140 cubic feet). If only stacked 4 bales high (about 6' tall) it would require 2,360 square feet."

If cropland is irrigated it requires a Water Right from the Oregon Water Resources Department. On June 21, 2017, Robert Wood, Watermaster for Wasco County, confirmed that the existing barley field does not have a water right.

According to Mylen Bohle, Oregon State Extension Office, non-irrigated barley would produce approximately an annual crop of 0.5 – 1.5 tons per acre under conditions in northern Wasco County. This means that 6 acres of non-irrigated barley would generate 3-9 tons.

Based on projected barley yields, storage of 9 tons of hay in 6' tall stacks, would require slightly less than 400 SF. Associated equipment such as a tractor, baler, etc., would require less than 2,000 SF of space. The entire farm operation could occur in a building containing less than 2,500 SF. Based on common accepted farming practices, many farmers do not store their rake, swather, and hay baler in an agricultural building because it is difficult to maneuver the tractor within the building to hook up these farm implements. The applicant's proposed floor plan shows an excessive amount of space will be used for these farm implements. This finding is based on expert input from Oregon Water Resources Department and the Oregon State Extension Office and is not based on "unwarranted and unsupported assumptions about the applicant's farm yields and farm practices as stated in Applicant's Assignment of Error #3. Hay storage calculations are based on OSU Extension Office experts' input, and staff's calculations about the projected equipment storage.

Grounds for Appeal #4 does not support overturning the Decision of the Planning Director because the Planning Department did not make unwarranted and unsupported assumptions about the applicant's farm yields and farm practices, but made the decision based on information from the OSU Extension Office and by the owner's storage of farm implements during their site visit to the parcel on May 31, 2017.

Grounds for Appeal #5: The Planning Department erred in determining that the applicant's application supports only a 2,500 SF agricultural building

STAFF RESPONSE: As discussed on pages 4 and 5 of the Staff Recommendation, staff provides justification for the need for approximately 400 SF of space to store hay, and less than 2,000 SF for farm equipment/machinery. Allowing 2,500 SF of building space is slightly larger than needed for the farm operation. Based on common accepted farming practices for a hay operation, staff finds that a maximum of 2,500 SF is adequate for the existing farm operation and the Planning Department did not err in their determination.

Grounds for Appeal #6: The Planning Department erred in conditioning the approval of the agricultural building on applicant removing 4,500 SF of the agricultural building.

STAFF RESPONSE: As discussed on pages 4 and 5 of the Staff Recommendation, staff provides justification for the need of approximately 400 SF of space to store hay, and less than 2,000 SF for farm equipment/machinery. Allowing 2,500 SF of building space is slightly larger than needed for the farm operation. Based on common accepted farming practices for a hay operation, staff finds that a maximum of 2,500 SF is adequate for the existing farm operation, therefore 4,500 SF of the building should be removed.

The owner has not provided any reasoning describing why this condition was an error. Staff recommends Grounds for Appeal #6 be denied.

Grounds for Appeal #7: The Planning Department's decision contains numerous factual errors, such as the statement that the application is for a "three-sided building" and erroneous descriptions of surrounding properties.

STAFF RESPONSE: The owner is correct that the building is not three-sided (see photo below showing the front of the building). The property owner did not describe the remaining "numerous factual errors" in the report. Staff has limited information about surrounding properties. It is unlikely that descriptions of surrounding properties will change the basic fact that a 7,000 SF agricultural building is not necessary for 6 acres of hay, three cows and five chickens.

Staff recommends Grounds for Appeal #7 be denied. The fact that the building is not 3-sided does not change the fact that a 7,000 SF building is not needed for the existing farm operation, nor does the use of surrounding properties change anything about the farm use on the applicant's land.

Additional information was submitted by the applicant's attorney on Friday, December 29, 2017, and first seen by staff this morning. I e-mailed it to the Planning Commission by mid-morning. The following is my response to the attorney's comments.

Summerfield: The decision is arbitrary and capricious because the Department has never challenged a farm management plan or tied the requested building size to the acreage or the projected farm fields.

*Scrutiny of the proposed use: Department **always** looked at the farm management plan and scrutinized, however it was not done in writing because these are type 1 reviews and do not generally require findings.*

Summerfield: There are no denied agricultural exempt building permits.

Property owners typically do not apply for an agricultural exempt building if they will be denied because if there is a legally placed dwelling on the property they can build one or more detached accessory buildings subject to the 75% size limit. Regarding permits cited by the applicant, nearly all of these are located on one tax lot, but the applicants often own much more farm land than the identified tax lot. For instance, the identified agricultural building constructed on a 21.61 acre property owned by Filbin is part of a 2,096 acre ranch.

Summerfield: Farm Management Plan: 6 acres alfalfa/oats, 5 poultry, 3 cattle seasonally

Hand out chart of cited agricultural building permits. This chart shows overall acres owned by the applicant of agricultural permits, and the existing farm use. Most of the larger buildings are related to marijuana production, a relatively new farm use in Oregon. Inside grow operations are limited to 10,000 SF of growing. Other larger buildings are in conjunction with ranches and farms that contain hundreds and thousands of acres and are justified for the existing use.

Summerfield: Building has existed for 18 years without complaints.

The building cannot be seen unless one drives ¼ mile south of Sevenmile Hill Road onto the property. The lack of complaints does not justify approving an illegally constructed building. If the applicant had requested approval of the

*building before it was constructed, it would have been denied. Please remember that when staff visited the building last May, there were more things in the building **not** related to farm use than were related to farm use and staff must assume that it would have continued to be improperly used.*

Summerfield: Future expansion of farm use: Farm management plan shows intention to farm more of his property than the Department acknowledged in analyzing his projected farm-related needs.

Most people plan for the future. Plans do not always come to fruition. Staff reviews the existing farm use and generally makes their decision based on what is on the ground. Exceptions are sometimes made when the property owner can show they have invested in the future expansion. For example, if they can show receipts for new orchard trees or vineyard plants, or that they have paid for more cattle yet to be delivered, investment in irrigation system supplies, etc. Other than saying he has plans to expand his farm use when he retires sometime in the future, staff has not seen that he has invested in future expansion. (Mason Road – Jamison Farms – vineyard)

Summerfield: Applicant makes substantial income from farm production each year the property has been in deferral.

Would not be able to support himself on his income. He has an excavation business that staff assumes is his primary income.

When I first went to work in the planning field in 1979 in Hood River County, one of the first things I learned was that the Oregon Legislature created agricultural exempt permits for full-time farmers and ranchers. Like the farm deferral program, it was intended to give farmers and ranchers a financial break so that they could continue to bring food to the public. It was not for part-time farmers who had other jobs to support themselves. And please let me say that part-time farmers are very important, but this was not who the Legislature was trying to help: it was family farms and ranches where this was their full-time job. The owner constructed a building without permits. Staff is uncertain whether an electrical permit was obtained for electricity in the building. The owner has the ability to construct multiple detached accessory buildings to satisfy his needs but is unwilling to do so because he already constructed the building. Staff does not believe the existence of the building is justification to allow it to remain. It is important to consistently implement land use regulations so that all persons are treated equally. If Mr. Wilson's building is permitted to remain, he will be getting a benefit not given to any other property owner in Wasco County, which is not fair to other property owners.

8. **Planning Commission Decision Options:**

A. Uphold the decision of the Planning Director and deny the Appeal, with the proposed Conditions and Findings in the Staff Recommendation

B. Uphold the decision of the Planning Director and deny the appeal, with amended Conditions and Findings.

C. Overturn the decision of the Planning Director and approve the request for a 7,000 SF (or other size) agricultural exempt building with amended Conditions and Findings in the Staff Recommendation; or

D. Continue the hearing to a date and time certain if additional information or review time is needed to determine whether standards and criteria are sufficiently addressed.

9. Proposed Conditions:

A. After expiration of the 12-day appeal period the Owner shall comply with the following conditions:

1. A 2,500 square foot (SF) agricultural building is approved. The owner shall remove 4,500 SF from the existing building no later than May 1, 2018.

2. Obtain an Approach Road Permit from the Wasco County Public Works Department within 30 days of final approval for the existing driveway approach onto Sevenmile Hill Road.

3. The owner shall record a restrictive covenant in the deed records of Wasco County stating that the agricultural building will only be used for agricultural uses

B. Miscellaneous Conditions

1. Outdoor lighting shall be sited, limited in intensity, shielded and hooded in a manner that prevents the lighting from projecting onto adjacent properties, roadways, and waterways. Shielding and hooding materials shall be composed of nonreflective, opaque materials. If the existing outdoor lighting is motion-activated, no hooding and shielding materials are required, however if the lighting is on from dusk to dawn, the lighting shall meet the outdoor lighting standard.

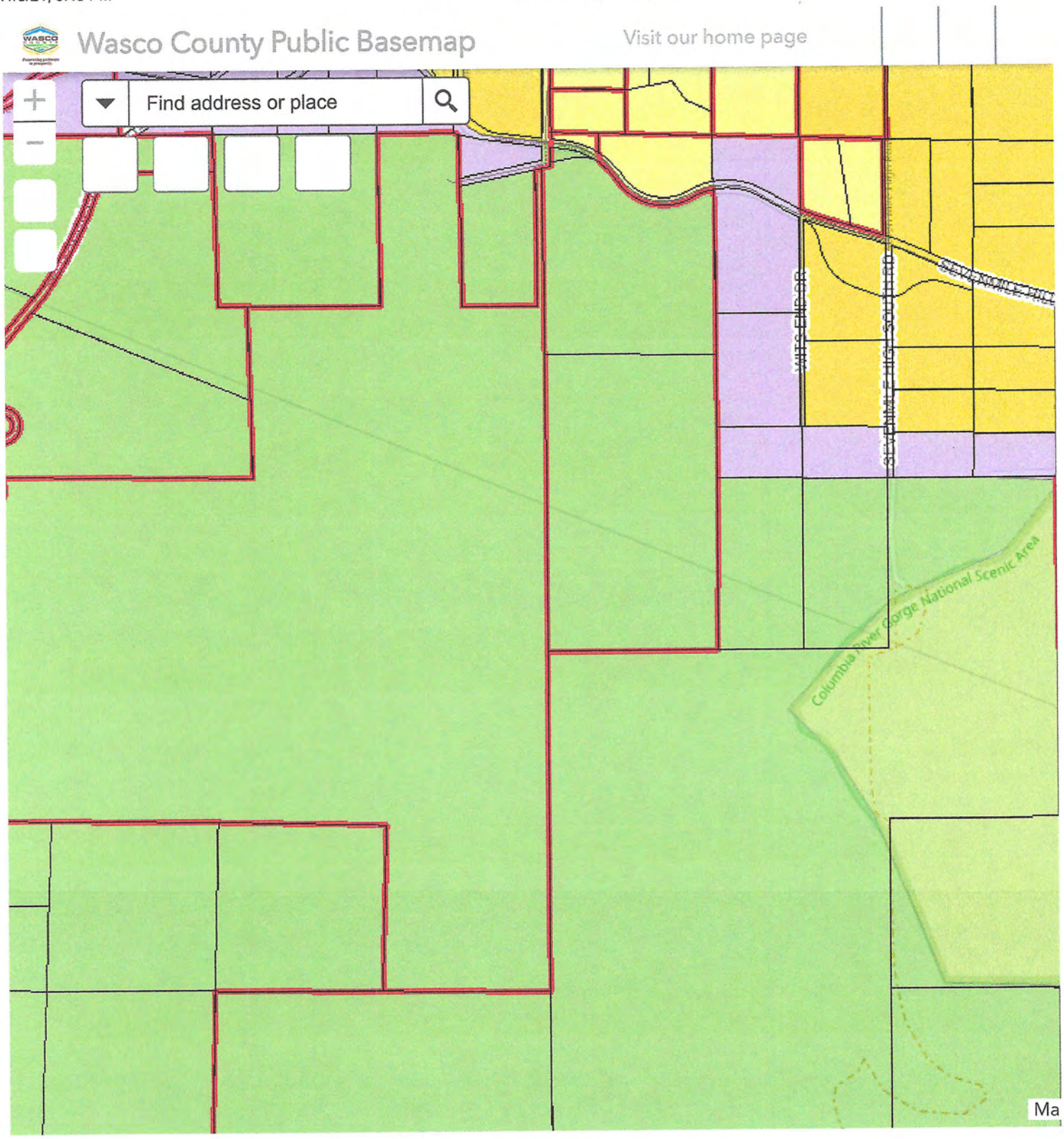
2. Failure to meet all conditions of approval will result in enforcement action by Wasco County through the Code Compliance and Nuisance Abatement Ordinance.

10. **Staff Recommendation:** Staff recommends Option A – Uphold the Decision of the Planning Director and deny the Appeal, with the proposed Conditions and Findings in the Staff Recommendation.

Staff is not aware of any reason to continue this public hearing and believes the Planning Commission has sufficient information to make a decision on this request.

That concludes my presentation and I would be glad to answer any questions the Commission may have.

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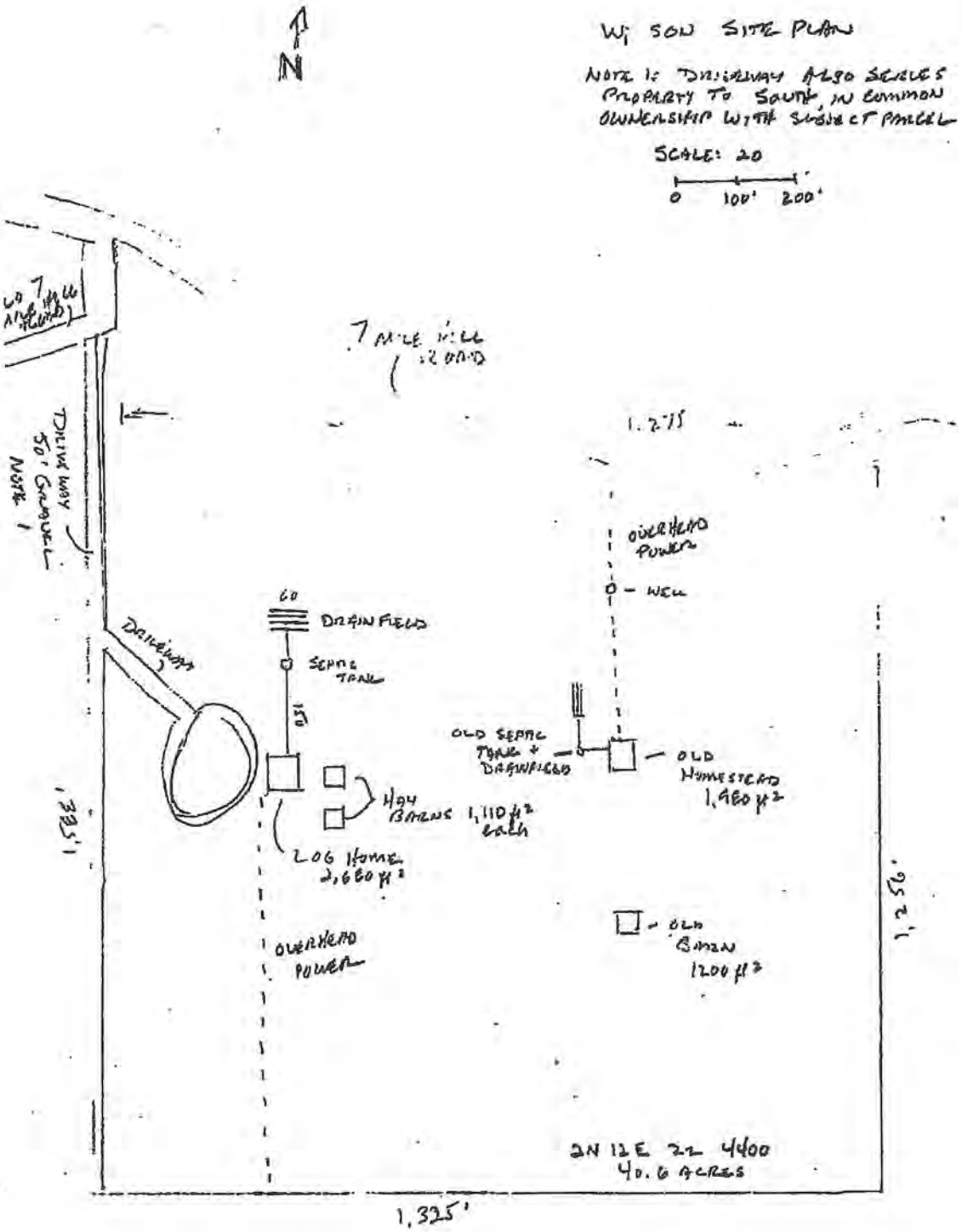
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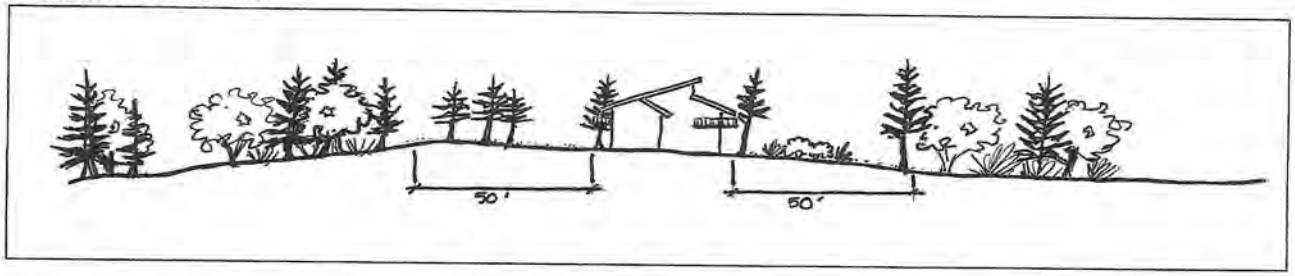
ATTACHMENT B – MAPS

Site Plan



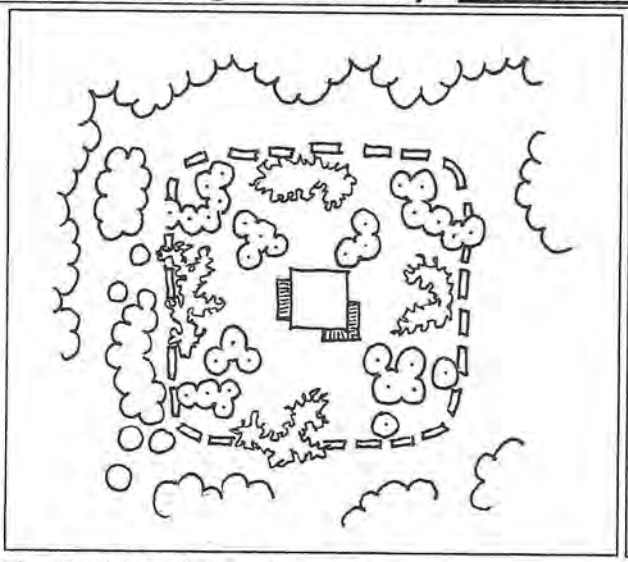
Section 10.120 - Defensible Space – Clearing and Maintaining a Fire Fuel Break

DEFENSIBLE SPACE



Fire Fuel Break Includes: Irrigated fire resistant domestic plantings, low volume slow burning plantings, and trees encouraged to provide shade and ground cooling. Trees should be grouped. Groups of trees shall be spaced to avoid creation of a continuous tree canopy. Trees shall be kept in healthy fire resistant condition. Trees shall be limbed up to create a vacant area between ground fuels and canopy fuels. Under story vegetation shall be minimized and ground cover shall be kept trimmed low to the ground.

Is your building surrounded by a 50-foot wide fire fuel break?



Fire Fuel Break Area Plan View Illustration



Fire Fuel Break Area Sample

MAINTENANCE STANDARDS FOR FIRE FUEL BREAK AREA:

- Ground cover maximum 4 inches tall;
- Trees limbed up approximately 8 feet from the ground,
- Trees kept free from dead, dry, or flammable material;
- Ladder fuels must be removed;
- No shrubs or tall plants under trees;
- Shrubs only in isolated groupings that maximize edges of ornamental beds to avoid continuous blocks of ground fuel;

Re: Road buffer

From: Arthur Smith (arthurs@co.wasco.or.us)

To: sdooley3300@yahoo.com

Date: Thursday, October 28, 2021, 09:46 AM PDT

There is no defined or statutory setback for roads.

County road right-of-way is usually 60 feet in width - 30 feet either side of the centerline stripe. Our road crews like to keep a clear zone from the shoulder of the road, so they can perform maintenance work, but that can vary from road to road and area to area. In Mosier, we have trees and other vegetation within 2 feet of the road shoulder. In that area, it is natural for denser vegetation and it does not cause an unsafe situation. In Wamic, there may not be a tree or shrub for the entire 60 feet of right-of-way. There are trees, mailboxes, fences and all sorts of other objects located within the right-of-way. If you think there is an unsafe situation, I can take a look.

Arthur

On Thu, Oct 28, 2021 at 9:32 AM Sheila Dooley <sdooley3300@yahoo.com> wrote:

So what is the setback?

Sheila

On Thursday, October 28, 2021, 07:41:13 AM PDT, Arthur Smith <arthurs@co.wasco.or.us> wrote:

No, there is no requirement like that. We would be cutting down trees for 100 years to clear every county road for 50 feet.

Arthur

On Wed, Oct 27, 2021 at 4:46 PM Sheila Dooley <sdooley3300@yahoo.com> wrote:

Hi Arthur,

Is there a requirement that trees not be planted within 50 feet of county roads?

Thanks,

Sheila

Sent from Mail for Windows

--

Arthur Smith | ***Director***
PUBLIC WORKS

arthurs@co.wasco.or.us | www.co.wasco.or.us
541-506-2645 | Fax 541-506-2641
2705 East 2nd Street | The Dalles, OR 97058

Pioneering pathways to prosperity.

--

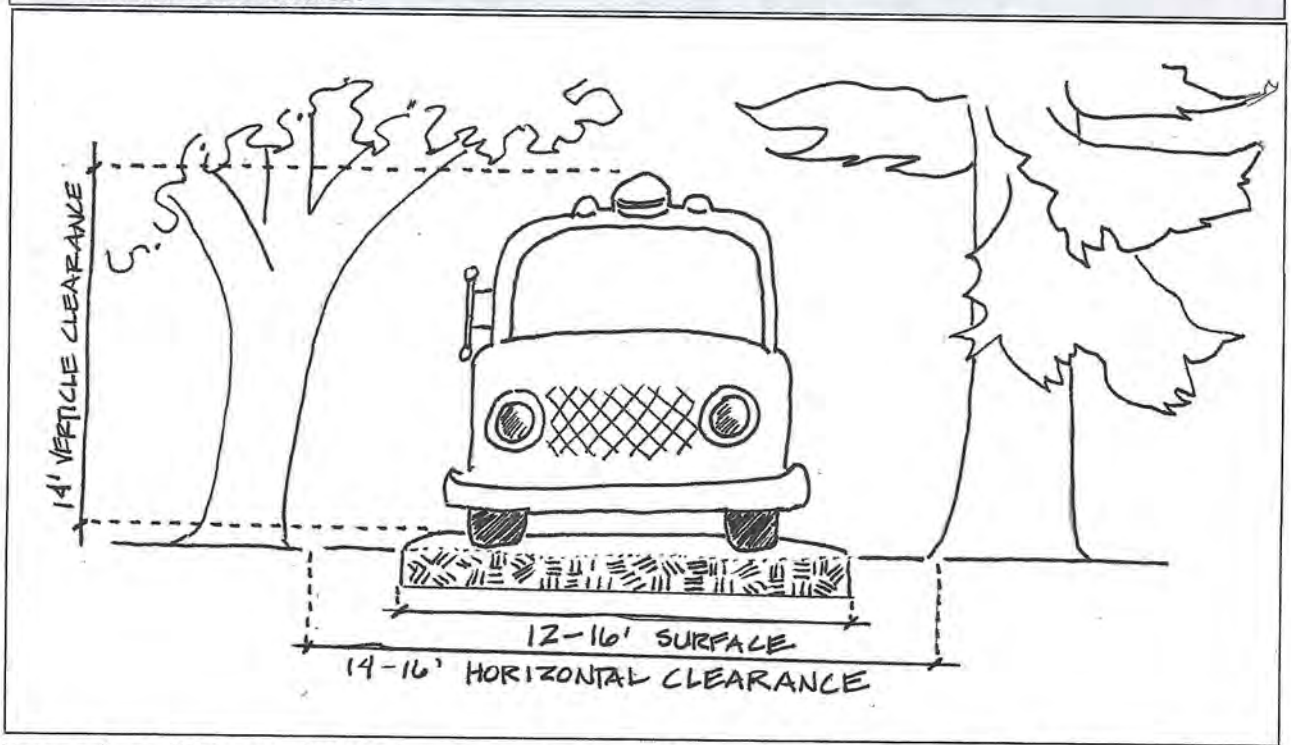
Arthur Smith | ***Director***
PUBLIC WORKS

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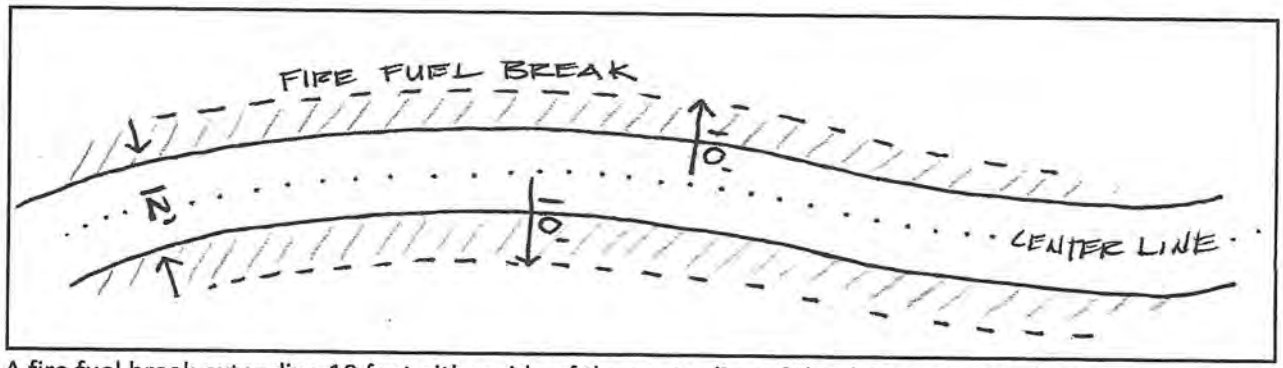
Pioneering pathways to prosperity.

B. This Standard is applicable to all residential driveways in: -All Zones	
B. If Yes Then	**B. If No Then**
• Emergency responders will be able to bring all vehicles onto your property and to your building site. • You will be able to get off your property as the fire equipment accesses the site.	See **(A)** above.

C. Does your residential driveway provide adequate clearance for emergency vehicles and is there sufficient clear area along the driveway to allow responders to maneuver safely around their vehicles?



Responding vehicles need over 13 vertical feet and a minimum of 14 horizontal feet of clearance to pass through vegetation along a driveway.



A fire fuel break extending 10 feet either side of the center line of the driveway is required.

Daniel Dougherty <danield@co.wasco.or.us>

Testimony for Packet

11 messages

Sheila Dooley <sdooley3300@yahoo.com> Wed, Nov 24, 2021 at 1:02 PM
To: Daniel Dougherty <danield@co.wasco.or.us>

Daniel,

Attached are my testimony and 8 exhibits for the December 7th Planning Commission packet. Please do not address my comments in the staff report. Also can you please let me know that you received them.

Thank you,

Sheila Dooley

9 attachments

- **Wilson remand testmony 11-24-21.docx** 10877K
- **Exhibit 1 Farm equipment bill of sale.pdf** 1887K
- **Exhibit 2 Planning Commission meeting minutes of Jan 23, 2018_.pdf** 97K
- **Exhibit 3 Planning Commission meeting minutes of Jan. 2, 2018.pdf** 213K
- **Exhibit 4 Tract map.pdf** 822K
- **Exhibit 5 Site plan.pdf** 235K
- **Exhibit 6 LUDO Section 10.120 Defensible Space.pdf** 729K
- **Exhibit 7 Arthur Smith October 28, 2021 email.pdf** 515K
- **Exhibit 8 LUDO Section 10.140 Access Standards.pdf** 633K

Daniel Dougherty <danield@co.wasco.or.us> Wed, Nov 24, 2021 at 1:16 PM
To: Sheila Dooley <sdooley3300@yahoo.com>

Good afternoon,

Your materials have been received and will be added to the record. I will do my best to directly address comments prior to the PC Packet being submitted.

Respectfully,

Daniel

[Quoted text hidden]

--

Daniel Dougherty | ***Senior Planner***

PLANNING DEPARTMENT

danield@co.wasco.or.us | http://www.co.wasco.or.usdepartments/planning/index.php

541-506-2560 | Fax 541-506-2561
2705 E Second Street | The Dalles, OR 97058

Office Notice about COVID-19

Welcome back! We have resumed in-person customer service. Office hours are Tuesday and Thursday, 10am to 4pm with a lunchtime closure. Appointments can be accommodated on Fridays. Masks are required in the office unless you bring your vaccination card to demonstrate you are a full two weeks out from your final COVID-19 vaccination.
Email is still the best way to reach me! Please view our website for office hours and COVID-19 accommodations.

This correspondence does not constitute a Land Use Decision per ORS 197.015.
It is informational only and a matter of public record.

Sheila Dooley <sdooley3300@yahoo.com> Wed, Nov 24, 2021 at 1:19 PM
To: Daniel Dougherty <danield@co.wasco.or.us>

I don't want my comments addressed. Thanks.

[Quoted text hidden]

Daniel Dougherty <danield@co.wasco.or.us> Wed, Nov 24, 2021 at 1:43 PM
To: Sheila Dooley <sdooley3300@yahoo.com>

Hi Sheila,

Will do.

Respectfully,

Daniel
[Quoted text hidden]

Sheila Dooley <sdooley3300@yahoo.com> Wed, Nov 24, 2021 at 2:32 PM
To: Daniel Dougherty <danield@co.wasco.or.us>

Hi Daniel,

Thanks! Have a good Thanksgiving,

Sheila

[Quoted text hidden]

Sheila Dooley <sdooley3300@yahoo.com> Sun, Nov 28, 2021 at 8:28 AM
To: Daniel Dougherty <danield@co.wasco.or.us>

Hi Daniel,

Is it too late to make a correction to my testimony and send in a corrected version to replace what I already sent you? The exhibits would stay the same.

Thanks,

Sheila

[Quoted text hidden]

Daniel Dougherty <danield@co.wasco.or.us> Sun, Nov 28, 2021 at 9:08 AM
To: Sheila Dooley <sdooley3300@yahoo.com>

Good morning,

I'm building the packet for tomorrow. Much of it is already put together, which has been time consuming. Please submit your final version, and I'll add it to the packet.

Respectfully,

Daniel
[Quoted text hidden]

Sheila Dooley <sdooley3300@yahoo.com> Sun, Nov 28, 2021 at 9:47 AM
To: Daniel Dougherty <danield@co.wasco.or.us>

Thanks, Daniel. Attached is the final version below. I didn't know if I needed to resubmit the exhibits that go with it so have attached them anyway although they haven't changed.

Also I assume you received the additional testimony that I sent Friday that I want included in the packet also.

Thanks again,

Sheila

[Quoted text hidden]

---

9 attachments

Wilson remand testmony rev. 11-28-21.docx
10879K

Exhibit 1 Farm equipment bill of sale.pdf
1887K

Exhibit 2 Planning Commission meeting minutes of Jan 23, 2018_.pdf
97K

Exhibit 3 Planning Commission meeting minutes of Jan. 2, 2018.pdf
213K

Exhibit 4 Tract map.pdf
822K

Exhibit 5 Site plan.pdf
235K

Exhibit 6 LUDO Section 10.120 Defensible Space.pdf
729K

Exhibit 7 Arthur Smith October 28, 2021 email.pdf
515K

Exhibit 8 LUDO Section 10.140 Access Standards.pdf
633K

Sheila Dooley <sdooley3300@yahoo.com> Sun, Nov 28, 2021 at 10:50 AM
To: Daniel Dougherty <danield@co.wasco.or.us>

Please let me know that you received this. Thanks.

[Quoted text hidden]

Sheila Dooley <sdooley3300@yahoo.com> Sun, Nov 28, 2021 at 1:07 PM
To: Daniel Dougherty <danield@co.wasco.or.us>

I changed the date on the document name to Wilson Remand testimony 11-28-21. I didn't change it on the actual document which still says November 24, 2021. Hope this isn't confusing.

[Quoted text hidden]

Daniel Dougherty <danield@co.wasco.or.us> Sun, Nov 28, 2021 at 8:31 PM
To: Sheila Dooley <sdooley3300@yahoo.com>

Good evening,

Your original, supplemental, and recent update has been received. They are added to the PC Packet.

Respectfully,

Daniel
[Quoted text hidden]

Daniel Dougherty <danield@co.wasco.or.us>

Wilson Remand Hearing - Oral Testimony

2 messages

Mike Sargetakis <mike@sargetakis.com> Wed, Nov 24, 2021 at 2:33 PM
To: Daniel Dougherty <danield@co.wasco.or.us>

Hi Daniel-

I believe written testimony appearing in the staff report for the Wilson remand is due today. I wanted to make sure I requested an opportunity to at least testify orally at the hearing. I may submit written testimony as well, with the understanding that it is unlikely to appear in the packet.

Thanks
Happy thanksgiving
Mike Sargetakis
Attorney for Sheila Dooley and Jill Barker

--

Mike Sargetakis (he/him)
Attorney | Law Office of Mike Sargetakis
735 SW 1st Ave., 2nd Floor
Portland, OR 97204
tel. (971) 808-1495
mike@sargetakis.com

Daniel Dougherty <danield@co.wasco.or.us> Wed, Nov 24, 2021 at 2:36 PM
To: Mike Sargetakis <mike@sargetakis.com>

Good afternoon,

Acknowledged and received. I'll add this email to the record.

Respectfully,

Daniel
[Quoted text hidden]
--

Daniel Dougherty | ***Senior Planner***
PLANNING DEPARTMENT

danield@co.wasco.or.us | **http://www.co.wasco.or.usdepartments/planning/index.php**

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Office Notice about COVID-19

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Email is still the best way to reach me! Please view our website for office hours and COVID-19 accommodations.

This correspondence does not constitute a Land Use Decision per ORS 197.015.

It is informational only and a matter of public record.

Daniel Dougherty <danield@co.wasco.or.us>

Wilson Remand Application - 2021

1 message

Jillian Barker <bjillian187@gmail.com> Sun, Nov 28, 2021 at 11:06 AM
To: danield@co.wasco.or.us

November 26, 2021

Dear Wasco County Planning Commissioners,

I have the following concerns regarding the Wilson Remand (File # 921-18-000086-PLNG. Land Use Board of Appeals Remand (LUBA No. 2019-965):

I find it obviously refutable to claim that soils on the applicant's property that are presently voluntarily growing many trees, are nevertheless categorized in the applicant's soil study as incapable of growing trees due to unsuitable soil classifications. This appears to be an error or misinterpretation of the conclusions of the soil study.

Some years ago in the process of doing fire fuel reduction on the property, the mechanical grub-hoeing of the understory has removed many young seedling and sapling conifer and oak trees in those areas. In spite of this there are still numerous oak and conifer trees in the alleged "unsuitable soil" areas in the east and south parts of the property which are not mowed, as evidenced in the current aerial photos.

The areas that have been mowed are very suitable for trees and in the past produced three crops of alfalfa each year. In 1977 I assisted in the purchase of alfalfa hay from that same field. The fact that the applicant is not using most of his property for forest purposes and has not replanted the open field with trees (or let them grow back naturally) does not make it any less valuable as forest land.

I fully concur with Sheila Dooley in her analysis of the Remand application issues, regarding the physically developed or irrevocably committed exception requirements. I am surprised that the new site plan map submitted with the Remand application does not match the site plan map that was originally submitted to Wasco County and LUBA in 2019. There are many new non-existing plans and infrastructure drawn on this new site plan map that were not included in the original map. This has totally changed the application and these proposed changes are not relevant to the Remand application.

Additionally, the "literal moonscape nature of the adjoining properties south of the subject property" are merely natural dry grasslands and wheat/hay/grazing fields in summertime (on overexposed film) and are irrelevant to the Remand application.

Thank you for your attention.

Sincerely,

Jill Barker

P.O. Box 572

Mosier, Oregon 97040

PHILLIPS REYNIER SUMERFIELD & CLINE, LLP

ATTORNEYS AT LAW

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RONALD H. REYNIER
WILLIAM H. SUMERFIELD
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P. O. BOX 758
718 STATE STREET
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(541) 386-4264
FAX: (541) 386-2557
E-MAIL: bill@phillipsreynier.com

Licensed in Oregon & Washington

July 9, 2021

Kelly Howsley-Glover, Interim Director
Wasco County Planning Department
2705 E. Second Street
The Dalles, OR 97058

Hand Delivered

RE: **PLAQJR-15-09-0002**
921-18-000086-PLNG
LUBA No. 2019-065
David Wilson zone change, comprehensive plan amendment, and goal exception applications – remand hearing

Greetings,

I represent the applicant, David Wilson, in the above matters. By decision dated January 14, 2020, LUBA remanded the above zone change approval. Mr. Wilson is prepared to proceed with the remand hearing, and submits the following new evidence for consideration. Applicant also anticipates submitting written argument prior to the hearing, and appearing at the hearing to present the new evidence and make argument. All of the matters raised in this letter will be addressed in more detail in the written argument to be submitted prior to the hearing.

The remand hearing fee of $350.00 is included with this letter.

Soils Assessment

The application previously proceeded using the Wasco County NCRS soils map for the subject property. That map indicated the subject property contained two Class IV soil types.

On December 18, 2020, Soils Scientist Gary Kitzrow conducted a soils study at the subject property. Mr. Kitzrow found that the subject property consists predominantly of generally unsuitable Class 7 and Class 8 soils. Mr. Kitzrow submitted a report to DLCD on January 23, 2021, which report was reviewed and accepted by Hilary Foote, DLCD Farm, Forest Specialist on March 20, 2021.[1]

On January 15, 2021, Applicant Wilson signed the Soils Assessment Release Form authorizing release of the assessment to Wasco County Planning. Presumably, DLCD provided Wasco County with a copy after Ms. Foote's review and acceptance. A complete copy of Mr.

[1] Ms. Foote's Completeness Review letter is erroneously dated March 29, ***2001.*** This is obviously a typographical error.

Kitzrow's report and DLCD's review is included with this letter for inclusion in evidence and consideration on remand.

Aerial Photo of Subject Property and Adjoining Area

Previous aerial photos submitted tended to focus tightly on the subject property and on the adjoining residential enclaves. There are lands west and south of the subject parcel which are zoned for resource use, and a portion of those lands are in commercial timber production. LUBA faulted the county for failing to adequately address those lands:

> "The findings do not address at all the relationship of the subject property to the adjacent approximately 450 acres of F-2 zoned lands located to the west of the subject property that are in timber production and/or that possess soils suitable for forestry production, or the approximately 2,000 acres of resource land that are in forest use located immediately south of intervenor's 69-acre adjacent F-2 parcel to the south of the subject property, or the potential for resources use of the property in conjunction with the adjacent F-2 zoned properties." *LUBA decision, p. 12, lines 1-8.*

What the local decision-making bodies knew, and what LUBA failed to grasp, is that there is a clear line of demarcation between productive lands further to the west of the subject property, and the subject property and lands immediately adjacent to the south and west of the subject property. This aerial photo, taken with a much wider perspective, clearly shows the literal moonscape nature of the adjoining properties south of the subject property.

Physically Developed Map & Area Calculations

On appeal, Appellants claimed, and LUBA accepted the claim, that only approximately 12 percent of the subject property was physically developed, while more than 87 percent of the property was undeveloped. LUBA cited the administrative rule discussing the necessary findings:

> "Whether land has been physically developed with uses not allowed by an applicable goal, will depend on the situation at the site of the exception. The exact nature and extent of the areas found to be physically developed shall be clearly set forth in the justification for the exception. The specific area(s) must be shown on a map or otherwise described and keyed to the appropriate findings of fact. The findings of fact shall identify the extent and location of the existing physical development on the land and can include information on structures, roads, sewer and water facilities, and utility facilities. Uses allowed by the applicable goal(s) to which an exception is being taken shall not be used to justify a physically developed exception." OAR 660-004-0025(2).

While there is a comprehensive site plan in the record which formed the basis for the County's findings,[2] Applicant submits a more comprehensive map with this letter for additional clarity.

[2] Record on Appeal at 215.

Wasco County Planning Department
July 9, 2021
Wilson Remand Hearing

In the previous hearings, Applicant testified as to his knowledge of applicable buffers, and argued that common sense required recognition of reasonable buffers around such development as power lines, structures, and septic drain fields. The county decision makers accepted that argument. LUBA was not impressed by this application of common sense:

> "Intervenor responds that managing the subject property for commercial forestry would require 'extensive' fire buffers along the eastern and northern borders that are adjacent to developed residential areas and around the existing dwelling on the property. Intervenor's Response Brief 27. Intervenor also points out that 'two strings' of overhead power lines are located on the property, and that forestry uses would require a buffer from those lines. *Id.* We understand intervenor to argue that such extensive buffers mean that the property is 'physically developed to the extent it is no longer available' for forestry uses.
>
> *****
>
> Further, we agree with petitioners that the county's decision is not supported by substantial evidence in the record, where the evidence in the record is that the property has available at least 87 percent of its area for forestry. Intervenor does not attempt to quantify the amount of buffer that would be required to conduct forestry uses or quantify the amount by which that buffer would decrease the amount of property available for forestry uses to such an extent that the property 'is no longer available for forestry uses.' We conclude that the county's findings in support of its approval of a physically developed exception are not supported by substantial evidence in the record."

Applicant takes LUBA up on its invitation to attempt to quantify the amount of land unable to be used due to applicable buffers. Applicant has again discussed the powerline buffer with the power company (15' from centerline), and has applied those in the attached calculations, in addition to a 50' buffer around each structure. Excluding the many roads on the subject property, and ignoring the pond and septic drain fields, the developed area comprises approximately 24.5% of the subject property. Adding 50' buffers along Seven Mile Hill Road and the driveway easement serving properties to the south increases this figure to 32.81%. With over half the property consisting of unsuitable soils, there is virtually no land available to support resource use.

Please add this letter and supporting materials to the record on remand. I look forward to working with you to schedule a hearing.

Sincerely,

William H. Sumerfield

WHS/

Enclosures (*Soils Assessment, Aerial Photo, Development Map, Developed Area Calculations)*

Power Lines

15' either side from center line

10,024 linear feet x 30' = 300,730 ft^2

Structures

50' each side from dimensions below

Log Home 80 x 100 = 36,000 ft^2

Barn #1 24 x 35 = 16,740 ft^2

Barn #2 30 x 30 = 16,900 ft^2

Lean To 16 x 30 = 15,627 ft^2

Old Homestead Home 55 x 55 = 24,025 ft^2

Old Homestead Barn 25 x 55 = 16,875 ft^2

Total square footage developed area 426,887 ft^2

40 acres = 1,742,700 ft^2

426,887/1,740,700 = .2452 (24.52% of total area)

Note: Total does not include roads, natural features, buffers near road or property boundaries, or septic tanks and drainfields

50' buffer along 7 Mile Hill Road = 65,000 ft^2

50' buffer along driveway easement = 79,300 ft^2

571,187/1,740,700 =.3281 (32.81% of total area)

Oregon
Kate Brown, Governor

Department of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, Oregon 97301-2540
Phone: 503-373-0050
Fax: 503-378-5518
www.oregon.gov/LCD

Soil Assessment Completeness Review

In accordance with OAR 660-033-0045(6)(a), the Department of Land Conservation and Development (DLCD) finds that this soils assessment is complete and consistent with reporting requirements for agricultural soils capability. The county may make its own determination as to the accuracy and acceptability of the soils assessment. DLCD has reviewed the soils assessment for completeness only and has not assessed whether the parcel qualifies as agricultural land as defined in OAR 660-033-0020(1) and 660-033-0030.

Hilary Foote
DLCD Farm Forest Specialist
March 29, 2001

The department will consider soil assessments under OAR 660-033-0030 to be complete if they meet the following standards:

(1) General information, to include:

(a) Title of the report; Wildon – Order 1 Soil Survey
(b) Person making request for soils assessment; David Wilson
(c) Names of soil scientist/classifier conducting the field work and preparer of the report, along with their certification numbers; Gary Kitzrow, CPSC/CPSS #1741
(d) Land use case file number (if available); n/a
(e) County in which the assessment was conducted; Wasco
(f) Location of the project site, including the township, range, section and tax lot numbers; Township 2N Range 12E Section 23 Taxlot 4400, Wasco County, Oregon
(g) Present zoning designation; EFU
(h) Current land use; unknown
(i) Parcel acreage: 40.13 ; evaluated: 40.13 ,and
(j) A description of the purpose of the assessment. Zone Change

(2) Previous Mapping or Background: The soil scientist/classifier shall provide a copy of the applicable and most current National Cooperative Soil Survey map(s) provided by the Natural Resources Conservation Service (NRCS) on the Web Soil Survey, with the area of investigation outlined on the map(s). The scale of the map(s) shall be identified and a list of the map units under investigation shall be listed. The applicable

interpretations and minor components (inclusions) for the map units for which the investigation is being made shall also be provided. NRCS mapped soils include: Wamic loam, 5 to 12 percent north slopes (acpability class 4e), Wamic laom, 12 to 20 percent slopes (capability class 4e) and Wamic-Skyline complex, 2 to 20 percent slopes (capability class 4e (Wamic components) and 7s (skyline componenets)). See pages 8-9.

(3) Methods Used by Soil Scientist/Classifier: The soil scientist/classifier shall describe the methodologies used for the preparation of the report and shall include the following:

(a) The level of order of survey used in the field survey, scale and type of maps used for field investigations, number of sample locations and observation points all confirming or disagreeing with the NRCS mapping units. The survey shall be one or more level of order higher than the NRCS survey as described in the NRCS Soil Survey Manual, 1993. Note that an Order 1 survey is more detailed than an Order 2 or greater survey. Order 1 soil survey was conducted

(b) The date(s) of the field investigation; December 18-19, 2020

(c) The methods used for observations (backhoe, auger, shovel, etc.) and methods used for documentation (for slope, color, pH, etc.); Backhoe, field texturing, munsell chart comparison, soil pH, field assessment, etc as described on page 1.

(d) The number and location of borings either shown on an aerial photograph base map of the parcel or provided in a table with latitude and longitude coordinates. In conducting Order 1 soil surveys, the scale of the base maps used for the survey needs to be large enough to enable the identification of polygons of soil map units as consociation map units. Soil map units identified as a complex, association, or undifferentiated group should be avoided as this defeats the purpose of an Order 1 survey. If, however, the soils are so intermingled that they cannot be mapped at a reasonable scale so as to identify consociation map unit polygons, then there should be sufficient sampling and documentation of the complex to demonstrate this soil component distribution. A percentage of each member of the complex will used in determining area of extent and the reported percentages will be based on this sampling and its documentation, including soil profile descriptions, boring locations and, where useful, photographs. 23 locations. Coordinates listed on page 1 and mapped on page 10

(e) Geomorphic and vegetation correlations supporting the interpretation of land capability classes of soils that differ from those in the official soil survey information; and Described on page 2.

(f) A notation of any limitations encountered during the field investigation, such as soil depth, drainage, slope or inaccessibility. No limitations noted (page 2).

(4) Results, Findings, and Decisions: The soils report shall describe how the level of order of survey used in this investigation differs from that used by NRCS in the original soil survey. The soils report shall also include:

(a) An overview of the geology or geologic setting, describing sources of parent material, bedrock and related factors; Described on page 2

(b) A description of the landforms and topography, confirming the relationship of landforms to soil mapping units; Described on pages 2 and 3

(c) A description of on-site and adjacent hydrology, including surface and subsurface features, intermittent versus perennial, floodplain and floodways and other related information; Described on page 3.

(d) A description of the revised soil mapping units with their range of characteristics, explaining how and why they differ from NRCS soil mapping. The soils report shall include a summary of soil variability incorporating significance of preceding weather (above or below average), where known and crops and natural vegetation present; and Described on page 3

(e) A tabulation of all previous and revised soil mapping units complete with their acreages and land capability classification. Pages 3, 8, 9 and 13

(5) Summary or Conclusion: The soils report shall contain a section reiterating the purpose of the investigation, explaining the significance of the revised soil mapping and describing any other significant issues related to the report's purpose. Page 3

(6) References: This section may list any manuals or publications utilized or referenced by the report. Page 3

(7) Attachments: Other informational materials provided as attachments, such as maps, figures or appendices shall include the following and shall be printed on 8 ½ x 11" wherever possible:

(a) Vicinity map at a scale of 1:48,000 or smaller showing the project location; Map included on page 11

(b) The NRCS soils map generated from Web Soil Survey at a scale of 1:20,000 or larger outlining the project site; Map included on page 7

(c) Site condition map (aerial photo) at a scale of 1:5,000 or larger outlining the project site and showing the location of site investigations (borings) and other relevant features; Map included on page 10

(d) Topography map at a scale of 1:24,000 or larger outlining the project site; Map included on page 11

(e) Assessor's map at a scale of 1:5,000 or larger outlining the project site; Map included on page 12

(f) Revised soils map of the project site at a scale of 1:5,000 or larger; Map included on page 13

(g) Soil profile descriptions and site observation notes; and Pages 14-36
(h) Representative soil profile descriptions of any soil type identified in the project area that is not described or identified in the published soil survey for the area mapped. Page 37

(8) Soils reports shall be submitted electronically to the department to hilary.foote @state.or.us, accompanied by a Soils Assessment Submittal Form. Payment of a non-refundable administrative fee of $625 should be sent by check.

Oregon
Kate Brown, Governor

Department of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, Oregon 97301-2540
Phone: 503-373-0050
Fax: 503-378-5518
www.oregon.gov/LCD

Soils Assessment Submittal Form

Soils Professional Information
Soils professional*: Gary A. Kitzrow Certification number: 1741

Property Information
Person who requested soils assessment: David Wilson
Mailing address: 7100 7 Mile Hill Rd The Dalles Or 97058
Email address: None Telephone number: 541-490-3730
Property owner (if different):
Property address (if different): 7000 7 Mile Hill Rd The Dalles Or 97058
County: Wasco Township: 2N Range: 12E Section: 22
Tax lot(s): 4400 Parcel Acreage: 40.13 Acres Evaluated: 40.13
Comprehensive Plan designation: — Zone: EFU
Proposed land use action: Plan Amendment Zone change To RR10

The soils professional must submit an electronic copy of the soils assessment together with this form to Timothy Murphy, Farm and Forest Lands Specialist, at the above address. The person requesting the soils assessment or the property owner must submit a check for a non-refundable administrative fee of $625 made out to the Department of Land Conservation and Development, to Timothy Murphy, at the same address.

Soils assessments must be consistent with the Soils Assessment Report Requirements and will be checked for completeness and be subject to audits as described in OAR 660-033-0030(9). Some soils assessments will additionally be subject to review and field checks by a DLCD-contracted soils professional as described in OAR 660-033-0030(9). Property owners and soils professionals will be notified of any negative reviews or field checks. Soils assessments will not be released to local governments without submittal of a signed release form by the property owner and person who requested the soils assessment; however, when released, any negative reviews or field checks will accompany the soils assessments.

The department and the Land Conservation and Development Commission will not be held liable for non-performance or information that is contained in soils assessments, or for negative reviews, field checks or audits of soils assessments. For the protection of the department and commission, we ask that you read and sign the following authorization and disclaimer:

I hereby expressly give my consent, should I be notified by the department that the submitted soils assessment for my property is selected for a review and field check, to authorize timely

access to my property by a DLCD-contracted soils professional to perform a field check to corroborate the information provided in the submitted soils assessment. I understand that failure to authorize access to the property may result in a negative review.

I hereby waive my right to pursue a claim for relief or cause of action alleging injury from the content of soils assessments or from any negative reviews, field checks or audits conducted by the department and any and all soils professionals used by the department under OAR 660-033-0030(5) and (9). I hold these entities harmless and release them from liability for any injury or damage that may occur in conjunction with the submitted soils assessment.

In exchange for the department's review of this submittal under the soils assessment program, I expressly agree to forever waive and give up all claims, suits, actions, proceedings, losses, damages, liabilities, awards and costs of every kind and description, including any and all federal and state claims, reasonable attorney's fees, and expenses at trial (collectively "claims") which I have or may have a right to bring against any agency, department, the state, or their agents, officials or employees arising out of or related to my participation and performance in the soil assessment program, including but not limited to claims for mistake or negligence of the department, the state of Oregon, and their officers, employees and agents. I further agree that the provisions of this Liability Waiver and Release from Federal and State Claims shall be effective and binding upon my heirs, executors, administrators, successors, assigns, beneficiaries, or delegatees and shall inure to the benefit of the department, the State of Oregon, and their officers, employees and agents.

David Wilson David Wilson — 1/15/21

Person who requested soils assessment — Date

Property owner (if different) — Date

In addition to agreeing to the above, I hereby certify that the attached soils assessment that I performed for the property identified on this form is soundly and scientifically based and meets the reporting requirements established by the department.

Soils professional — 1/10/21

Date

* Must be from the posted list of qualified soils professionals at: http://www.oregon.gov/LCD/pages/soilsassessment.aspx

12/22

Oregon
Department of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, Oregon 97301-2540
Phone: 503-373-0050
Fax: 503-378-5518
www.oregon.gov/LCD
Kate Brown, Governor

Soils Assessment Release Form

Soils Professional Information

Soils professional*: Gary A. Kitzrow Certification number: 1741

Date of submittal of soils assessment to department: Jan 23, 2021

Property Information

Person who requested soils assessment: David Wilson

Mailing address: 7100 7 Mile Hill Rd The Dalles Or 97058

Email address: none Telephone number: 541-490-3230

Property owner (if different):

Property address (if different): 7000 7 mile Hill Rd The Dalles Or 97058

County: Wasco Township: 2N Range: 12E Section: 22

Tax lot(s): 4400 Parcel Acreage: 40.13 Acres Evaluated: 40.13

Comprehensive Plan designation: — Zone: EFU

Proposed land use action: Plan Amendment Zone change to RR10

If you would like the soils assessment for the subject property to be released to a County planning department for its consideration in a land use proceeding, please sign this form and send it to Timothy Murphy at the above address, or email to: timothy.murphy@state.or.us.

I hereby request that the Department of Land Conservation and Development release the soils assessment submitted to the department on the above date regarding the above-described property to the Wasco County Planning Department, as well as any department notifications of deficiencies. I understand that any and all previous soils assessments applying to this property produced under this rule, as well as any department notifications of deficiencies in such soils assessments, will also be released to the local government.

David Wilson 1/15/21

Person who requested soils assessment — Date

Property owner (if different) — Date

Wilson- Order 1 Soil Survey Report
RE: OAR 660-033-0030

1). General Information

a). Order 1 Soil Survey Report—Wilson Property, Oregon
b). David Wilson
c). Gary A. Kitzrow, M.S., CPSC/CPSS # 1741, Master of Science
d). None
e). Wasco
f). RE: T2N R12E Sec. 23C TL# 4400
g). EFU
h). Zone change
i). 40.13 Ac./40.13 acres
j). complete a site-specific soil survey for the above parcel to determine if a preponderance of the property is comprised of generally unsuited soils. The goal is to secure a Plan Amendment Zone Change.

2). Enclosed

a). Scale of enclosed USDA-NRCS Soil maps: 1:3170;--USDA Soil Legend: 49C Wamic 29.8 Acs.; 50D Wamic 10.5 Acs.; 51D Wamic-Skyline Complex 0.5 Acs.

a). We completed a total of 23 descriptions for the 40.13-acre study site.

b). December 18-19, 2020

c). A Backhoe was used to excavate the study area Field texturing was completed; Munsell color chart was used for soil colors; standard soil pH kit was used; field assessment for structure, consistence, pores, drainage class, root distribution, effective/absolute rooting depths and related morphology testing.

d). Enclosed Is a map showing all description locations.

1). 45.63857' N -121.31456' W
2). 45.63825' N -121.31395' W
3). 45.63832' N -121.31380' W
4). 45.63857' N -121.31344' W
5). 45.63876' N -121.31392' W
6). 45.63891' N -121.31370' W
7). 45.64031' N -121.31458' W
8). 45.63857' N -121.31456' W
9). 45.64071' N -121.31207' W
10). 45.64030' N -121.31235' W
11). 45.64063' N -121.31125' W
12). 45.64030' N -121.31113' W
13). 45.64003' N -121.31100' W
14). 45.63979' N -121.31075' W
15). 45.63871' N -121.31071' W
16). 45.63897' N -121.31229' W
17). 45.63804' N -121.31140' W
18). 45.63827' N -121.31133' W
19). 45.63889' N -121.30940' W
20). 45.63926' N -121.30998' W
21). 45.63980' N -121.30980' W
22). 45.64031' N -121.30998' W
23). 45.63926' N -121.30991' W

e). There are excellent correlations of soil mapping units and vegetation for this study area. The dominant Skyline and Bodell soil units are droughty due to shallow bedrock (< 20"), loamy matricies and very high rock content in the case of the Bodell soil mapping unit (10E). Grasses and hardwood are noted on the mapping units and have not been cultivated in perpetuity. The moderately deep Wamic mapping unit is droughty but does have an argillic horizon hence increased water holding capacities and increased clay content in the Control Section. This area is generally tree-free and has been growing grasses for many years. This particular property is very complex with the vegetative and soil communities NOT aspect related.

Regarding the geomorphic surfaces and soil mapping units; the determining factor for mapping No alluvium soils are present.

(f). No limitations were encountered in completing this Soil Survey. It is noteworthy; this portion of the *Wasco County Soil Survey Area* is apparently under-represented regarding USDA Order 3 Reporting Standards and the number and diversity of Soil Mapping Units on the Wasco County USDA Soil Legend. By completing offsite reviews of surrounding properties and detailed Order I Soil Survey for the current subject property, Wamic soils are over-represented mapping units given the confirmed diverse and wide range of landforms and geomorphic surfaces in this specific region. Wamic soils are mapped on virtually every landform in this area. Although a pervasive soil series, there are many other soils in this region and we would not expect only one soil to be mapped in such a large geographic domain. Oregon is an extremely diverse state and unlike states such as Iowa where indeed the same soil may be found over a many square mile area, that is not the case in Oregon. This current subject property is a good example of the natural complexity expected in most Oregon areas where hills, valleys and competing landscapes are confirmed.

(4) Results, Findings and Decisions:

(a) The bedrock geology for this land base is basalt mixed with areas in the southwest portion of the property exhibiting a paralithic contact with and without a duripan which all occur at less than 20". Little direct hard rock is noted in this area transitioning from definable soil. Soil development is generally a function of the presence or absence of ejected ash moving into or out from the subject study area. The basalt itself yields very immature, shallow soils when soils erode *from* the site hence the Class 7 (Bodell and Skyline). Conversely, where soil accumulates via erosion (central area and central northern areas), soils deepen up, Soil Capability Class gets better and Wamic soils become dominant. The Wamic soils are more of a function of accretion NOT soil removal but basalt is a common thread underlying all areas on this parcel. Lithic verses paralithic geologic contacts are important on this subject property. Where paralithic contacts are present (SW ¼ and some SE ¼) of the ownership, soils shallow-up and the bedrock becomes a more dominant portion of the land capability.

(b) The landforms present on this study site include planar to planar concave, non-colluvial lava plains and basins with local microsites. In the bottomland area (mid northern property) some mixed alluvium and terrace remnants may be present but are truncated and ill-defined. The soils we found strongly correlate to these landforms. Rolling convex

areas in the northwest ¼ (north of the developed infrastructure areas) are classified as indistinct uplands showing suited Wamic soils throughout. Contiguous areas due south exhibit ancient infrastructure dating back to the 1980s. The eastern 1/3 of the survey area shows harder bedrock and much rock in the soil profile as a function of the more sharply overt convex slopes some of which face west and northwest. These eastern areas show landforms which are much more dissected and abbreviated as compared with area in the western 1/3. The soils reflect these contrasting landforms. Much of the eastern 1/3 of the ownership exhibits harsh growing conditions.

(c) No natural drainageways are confirmed within the parcel. The nearest drainageway is about 2 miles southeast and 4 miles due east.

(d) Our Order I Soil Survey confirms Skyline, Wamic, Bodell and Infrastructure are the only soil mapping units confirmed on the subject property. Presence or absence of a paralithic geologic contact combined with landscape position principally govern the soil series and mapping units present. The subject property is complex and diverse. Shallow Bodell and Skyline soils are consistently present but are spread out throughout the ownership. Wamic soils are found where ash has eroded from surrounding low hillslopes.

(e) Previous USDA Survey: 49C Wamic 29.8 Acs.; 50D Wamic 10.5 Acs.; 51D Wamic-Skyline Complex 0.5 Acs. GSEA: Final Order I Soil Survey Mapping units: See attached Soil Map.

(5) Summary and Conclusions:

A slim majority, (preponderance) of this proposed lot is made up of the shallow, generally unsuited Class 7 Skyline, Bodell units and Class 8 Infrastructure. (irrigated and non-irrigated). The lithic, entic Bodell soil mapping units are shallow, very rocky with restrictive rooting capabilities and low water holding capacities. Skyline soils, which are very definable and modal, on this parcel similarly has shallowness due to a somewhat indurated paralithic contact beginning at less than 20 inches consistently. Conversely, Wamic soils are somewhat deeper, have thicker and more defined topsoils with more clay build-up (hence water holding capacity

<u>This study area and legal lot of record is comprised of 51.8% (20.79 Ac.) of generally unsuited soils Capability Class 7 and Class 8 by Wasco County and DLCD definitions</u>.

References: Official Soil Series Descriptions USDA NRCS-Wasco County: Bodell, Wamic and Skyline Soil Series
Soil Survey Report, Soil Survey, Wasco County
Soil Survey Manual, USDA

(6) Attachments:

(a) Vicinity Map
(b) NRCS Soil Map for property
(c) Site Condition map
(d) Topography map outlining the subject property
(e) Assessor's map outlining the study parcel
(f) Revised Order I Soil Map
(g) Soil Profile descriptions: Wamic, Skyline and Bodell Soils
(h) Representative Soil profile descriptions

Please call with questions,



Gary A. Kitzrow, Master of Science
Certified Professional Soil Classifier, Certified Professional Soil Scientist #1741
Principal Soil Taxonomist
GROWING SOILS ENVIRONMENTAL ASSOCIATES

Wilson
T2N R12E Sec. 23C TL# 4400
Vicinity Map



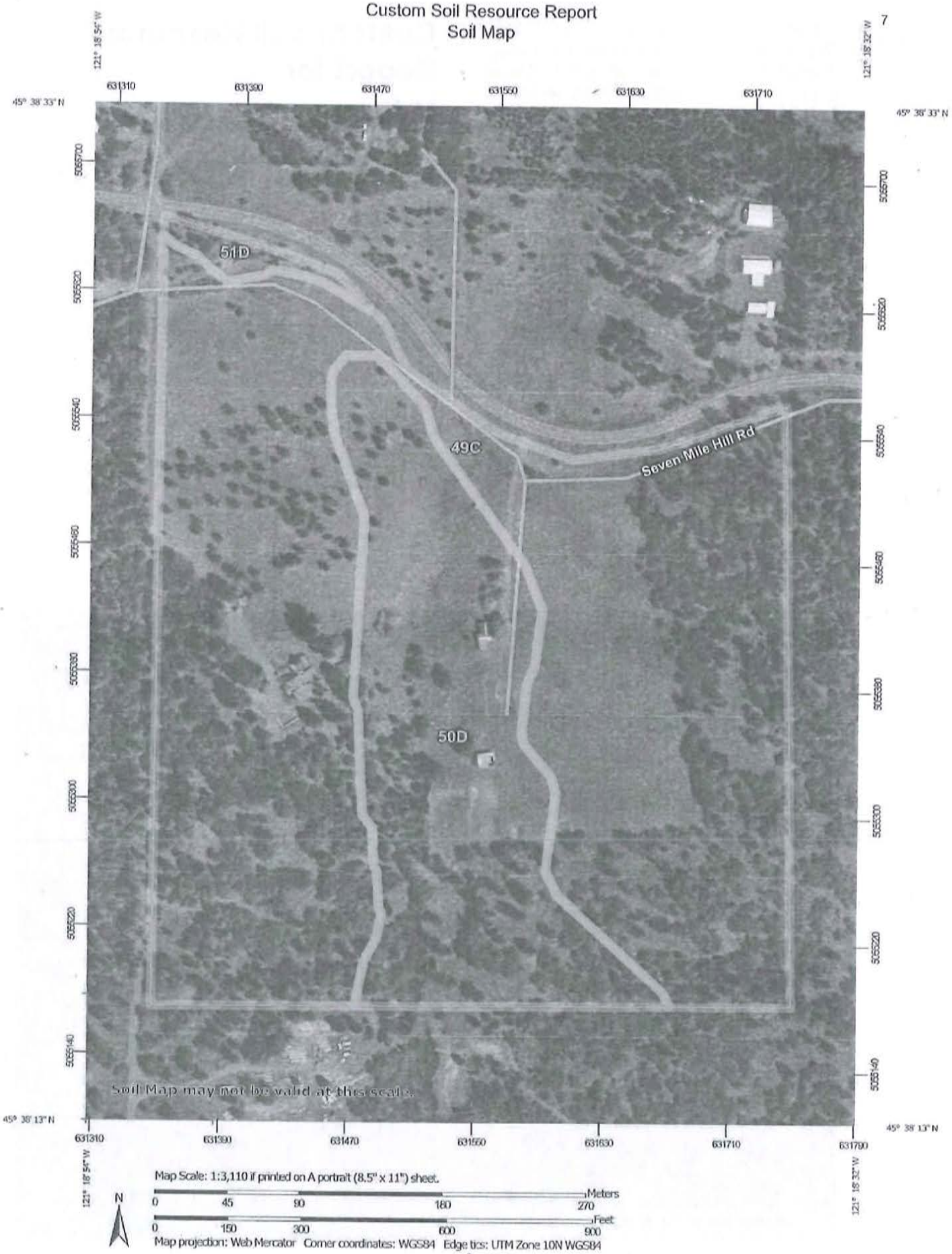
USDA United States Department of Agriculture

NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wasco County, Oregon, Northern Part




121° 18' 54" W
121° 18' 32" W
45° 38' 33" N
631310
631390
631470
631550
631630
631710
631790
5065700
5065920
5065640
5065480
5065360
5065300
5065220
5065140
51D
49C
50D
Seven Mile Hill Rd
Soil Map may not be valid at this scale.
45° 38' 13" N
Map Scale: 1:3,110 if printed on A portrait (8.5" x 11") sheet.
N
0 45 90 180 270 Meters
0 150 300 600 900 Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
49C	Wamic loam 5 to 12 percent north slopes	28.6	72.0%
50D	Wamic loam, 12 to 20 percent slopes	10.7	26.8%
51D	Wamic-Skyline complex, 2 to 20 percent slopes	0.5	1.3%
Totals for Area of Interest		**39.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

- Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion.

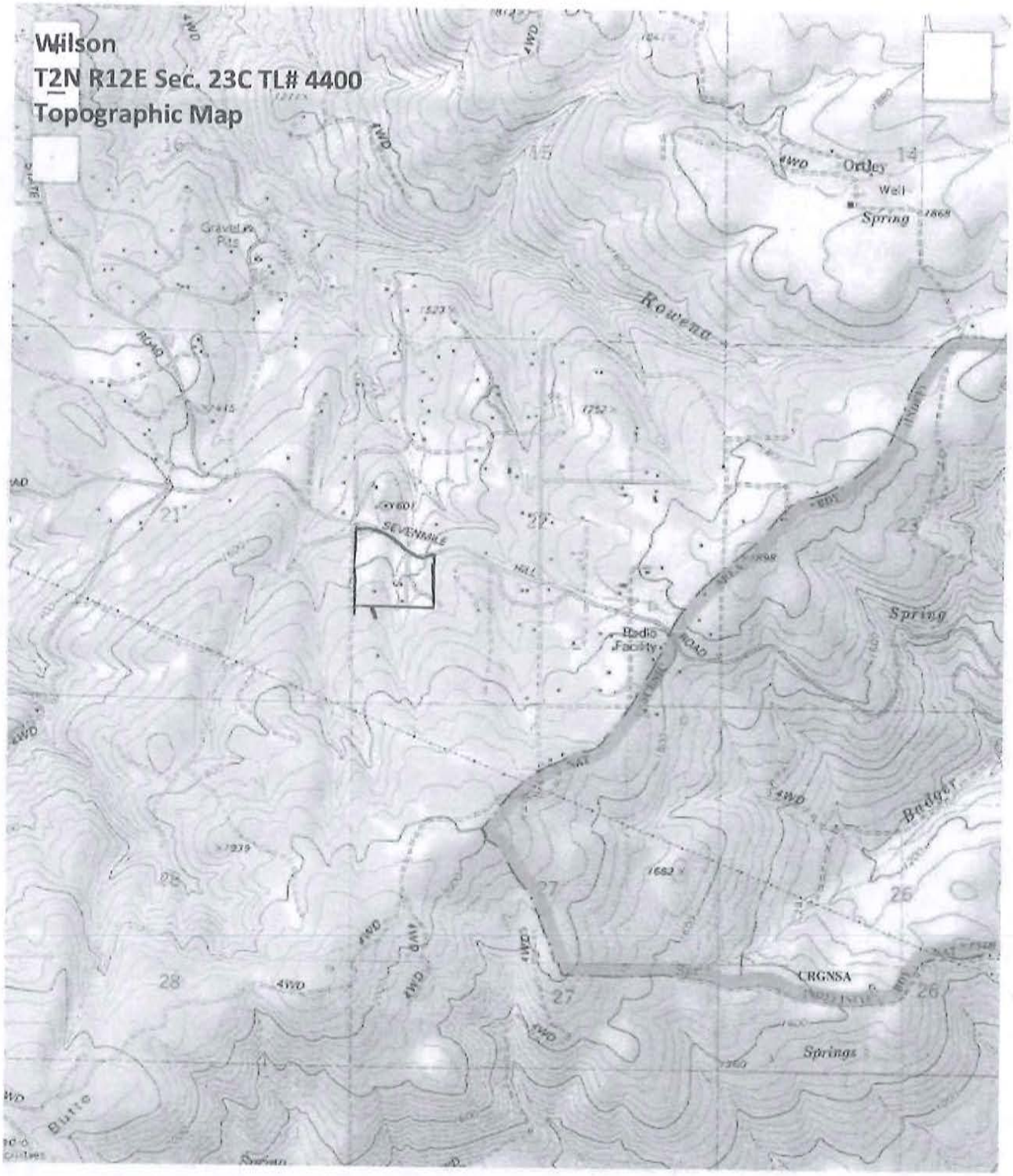
Report—Land Capability Classification

Land Capability Classification–Wasco County, Oregon, Northern Part				
Map unit symbol and name	Pct. of map unit	Component name	Land Capability Subclass	
			Nonirrigated	Irrigated
49C—Wamic loam 5 to 12 percent north slopes				
	90	Wamic, north	4e	—
50D—Wamic loam, 12 to 20 percent slopes				
	90	Wamic	4e	—
51D—Wamic-Skyline complex, 2 to 20 percent slopes				
	60	Wamic	4e	—
	20	Skyline	7s	—

Wilson
T2N R12E Sec. 23C TL# 4400
Site Co[illegible] Map



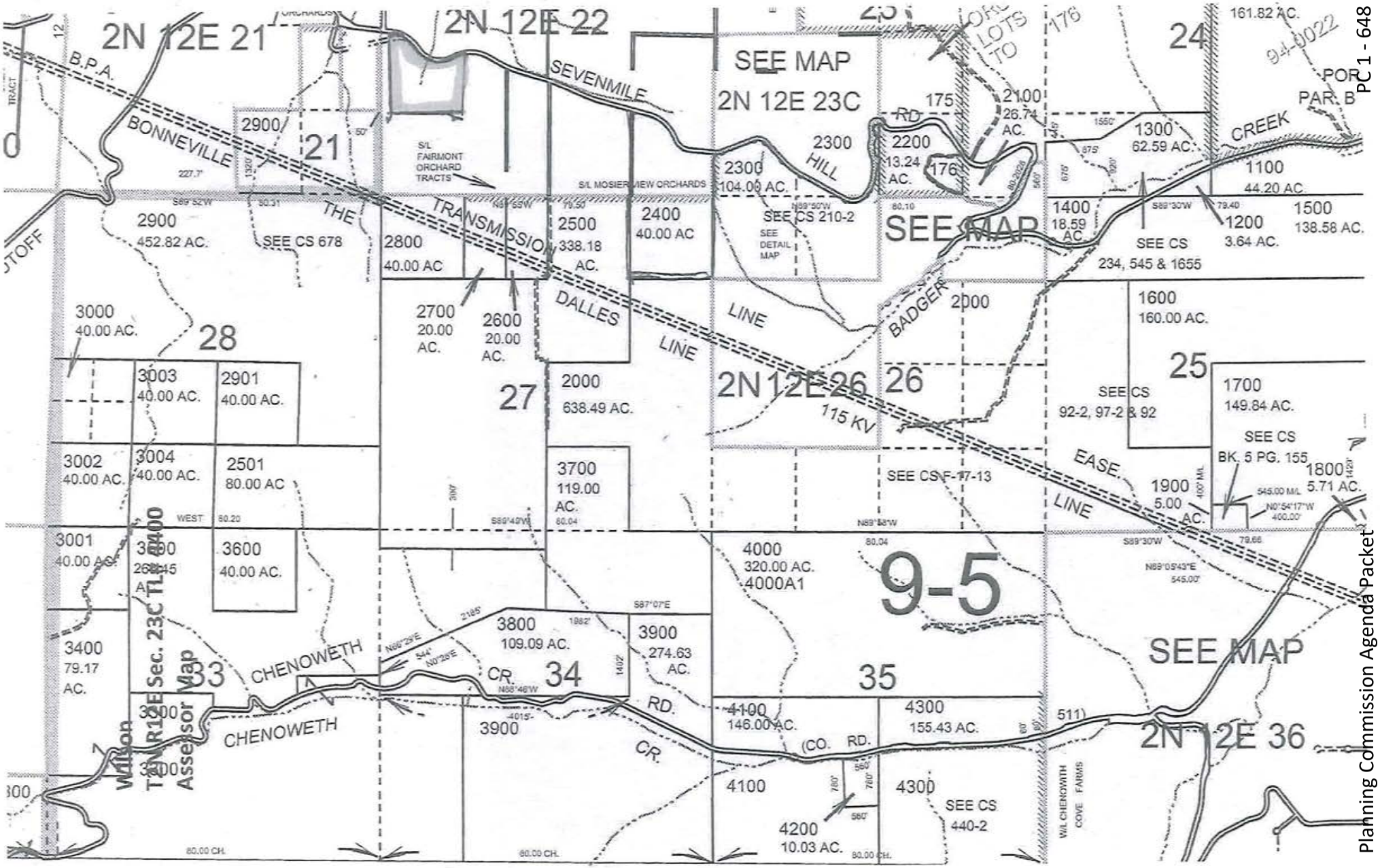
The Dalles Topo Map in Wasco County Oregon



Print this map

Map provided by TopoZone.com

2N12E

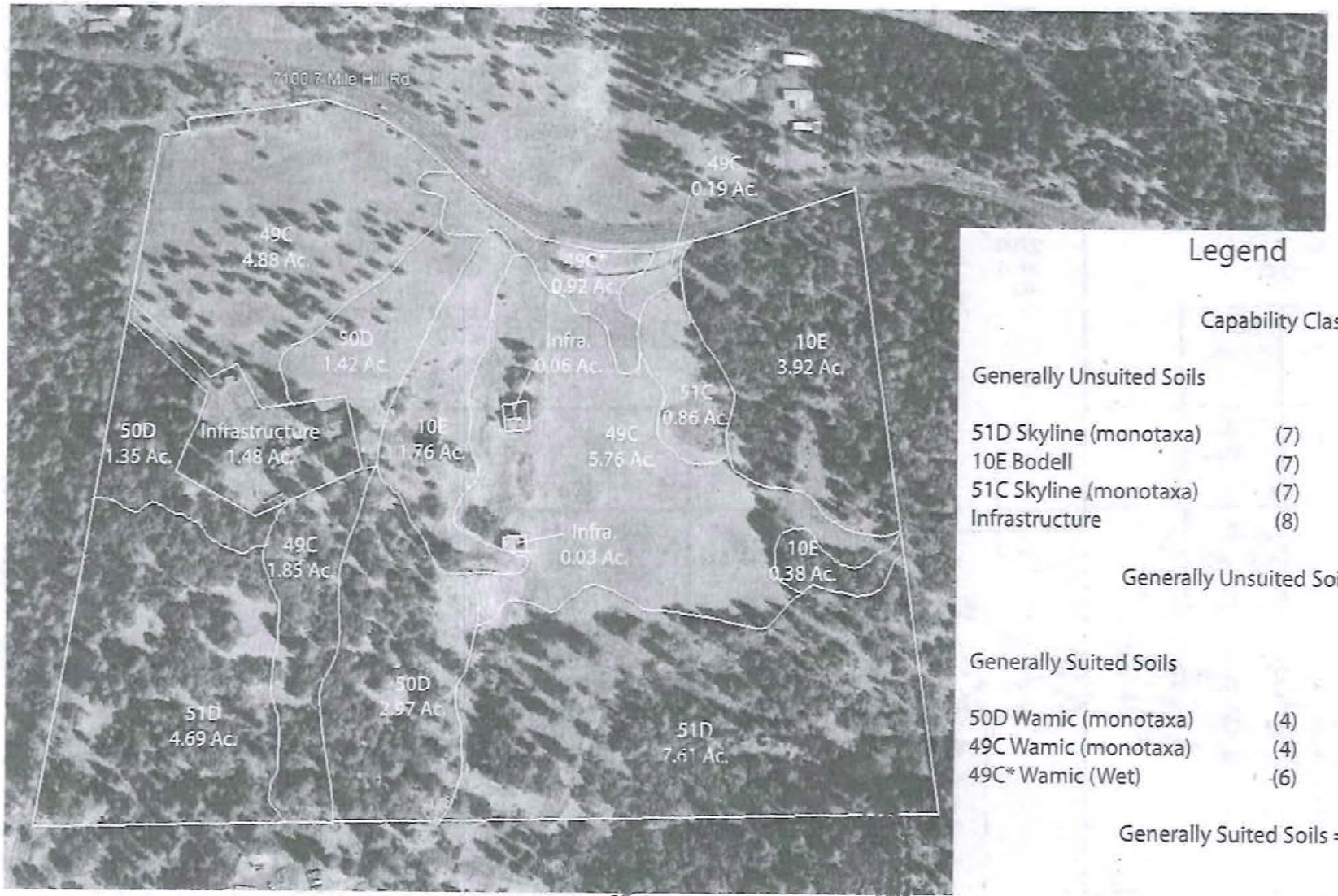


PC 1 - 648
Planning Commission Agenda Packet
December 7, 2021

Wilson Property

Seven Mile Hill Rd
The Dalles, Oregon
T2N R12E Sec. 22 TL#4400

Order 1 Soil Survey



Legend

	Capability Class	Acreage
Generally Unsuited Soils		
51D Skyline (monotaxa)	(7)	= 12.30 Acres
10E Bodell	(7)	= 6.06 Acres
51C Skyline (monotaxa)	(7)	= 0.86 Acres
Infrastructure	(8)	= 1.57 Acres
		Generally Unsuited Soils = 20.79 Acres
Generally Suited Soils		
50D Wamic (monotaxa)	(4)	= 5.74 Acres
49C Wamic (monotaxa)	(4)	= 12.68 Acres
49C* Wamic (Wet)	(6)	= 0.92 Acres
		Generally Suited Soils = 19.34 Acres

Total Acres: 40.13 Acres
Percentage of Generally Unsuited Soils: 51.8%

N

Planning Commission Agenda Packet
December 7, 2021
PC 1 - 649

Growing Soils Environmental Associates

14

impenetrable below ~15" Poor

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # (1) Location SW extreme corner
GPS Coordinates see report
Slope 5 Elevation ° Landform (plains / hills)
Geology/Genesis ash over ~~sediment~~
Vegetation trees ~ HW

BRIEF PROFILE DESCRIPTION

Good roots to 15" Then Abrupt stop

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR	0	L 14%		10	cm 1-15 yes	1½	fr	0	0 x=	mod
BA	6-12	10YR	0	L 16	SBK	1%	cm 6-12 yes	2'	fi	0	0 x=	mod
CB	12-15	10YR	0	L	11	1%	yes	2"	fi	0	0 x=	mod slow
2CR	15" \ +	Dense clay substratum									1+ x=	0 None
		Consolidated Not cemented									x=	
											x=	

~~Continuity duripan~~

Remarks V poor soil below 14"
⊖ Basalt
⊖ Diagnostic hor

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Loamy
Soil Drainage Class W Soil Erodibility Index .29+ Series Skyline
Hydrologic Group D/C Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to shallow paralithic contact
Flooding Potential 0 Wetland Conditions 0

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # (2) Location SW extreme corner Area
GPS Coordinates see report
Slope ____ Elevation ____ Landform uplands / hills / Plateau
Geology/Genesis ash over (sediments)
Vegetation HW Trees, Xerophytes

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-5	10YR 3/2	Ø	L		1 f gr	10	cm 1-2 yes	1½	fr	Ø	Ø x=	mod
AB	5-6	10YR 3/3	Ø	L		1 f m SBK	10	cm 1 yes	1"	fi	Ø	Ø x=	mod
BC	6-21	10YR 4/4	Ø	L		11	10	soft yes	1"	fi	Ø	2 x=	mod
2CR	21"+	fractured + saprolitic Sediments (Alkent?)										(1+ 2+) x=	Ø
												x=	

(+) Abbreviated
(-) Andic
(+) Indurated
(+) Cemented

Remarks
Abrupt geologic contact

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Aboriptic Xerochrept Family Loamy
Soil Drainage Class well D Soil Erodibility Index .277 Series Skyline
A Hydrologic Group D Depth to Mottles Ø Effective Rooting Depth <10"
Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø
Runoff Potential mod due to shallow paralithic contact
Flooding Potential Ø Wetland Conditions Ø

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # 3 Location SW corner
GPS Coordinates see report
Slope 1/6 Elevation ~ Landform uplands / hills
Geology/Genesis ash over sediment
Vegetation

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
AB	0-4	10YR 3/2	Ø	L	18%		10	cm 1-2 yes	1½	fr	Ø	Ø x=	mod
AB2	4-8	10YR 3/3	Ø	L	1 msg		12	cm <0.5 yes	1	fi	Ø	Ø x=	mod
BCB	8-25	10YR (4/4)	Ø	L	11		10	yes	1½	fi	Ø Ø	Ø Ø x=	mod slow
2CR	25+	highly weathered saprolite										1+ 2+ x=	Ø
													Mohs ~ 2-3

Remarks
Ø highly erodible
Ø Diagnostic hor.
Ø soft frags in Control Section

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Loamy
Soil Drainage Class WD Soil Erodibility Index .30+ Series Skyline
Hydrologic Group A Depth to Mottles Ø Effective Rooting Depth <10 in.
Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø
Runoff Potential mod due to shallow paralithic contact
Flooding Potential Ø Wetland Conditions Ø

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # (4) Location Western mid Limit
GPS Coordinates see report
Slope 7 Elevation ~ Landform uplands / hills
Geology/Genesis ash over sediment
Vegetation Trees - Htw & upland shrubs

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR	0	L	1C gr	10	cm yes 1½		fr	0	0 x=	very
AB	6-18	10YR	0	L	1m SBK	10	cm yes 2½		fi	0	0 x=	
BW	18-24	10YR	0	L	1m SBK	10	yes 2"		fi	0	0 x=	
2CR	(24)+	X	Paralithic contact							1+	2+ x=	0
										hardness	2.5-3 x=	
											x=	

Remarks Borderline Skyline / Wamic

Capability Class 7/6 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification fine loamy, Andic Xeroch-ept Family Loamy
Soil Drainage Class WD Soil Erodibility Index .20 Series Skyline / Wam
Hydrologic Group A/B/C/D Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to shallow paralithic contact
Flooding Potential 0 Wetland Conditions 0

freely drained

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/18/20 Preparer Kitzrow
Stop # 5 Location NW¼, near access Rd
GPS Coordinates see enclosed report
Slope 7 Elevation: Landform Upland / Low rolling hill / Basin
Geology/Genesis residuum
Vegetation monocots

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR 3/2	Ø	L	1 fgr	<15	cm/ yes	1"	fr	Ø	Ø X=	mod
										Ø	Ø	
BW,	6-17"	10YR 4/3	Ø	L	[m, f SBK	<10	cm/ yes	1"	fi	Ø	Ø X=	mod
										Ø	Ø	
BW2	17-24"	10YR 4/3	Ø	L	"	10	yes	1"	fi/fr	Ø	Ø X=	mod
										Ø	Ø	
BC	24-29"	10YR 5/4	Ø	L	"	12	yes	1½"	fi	Ø	Ø X=	mod
										Ø	Ø	
R	29"	basalt (fractured)									Ø X=	X
		⊕ Lithic									X=	

Remarks
- AP
Ø Bt but close
mixed medial properties
no low BD

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index Series Wamic
Hydrologic Group A Depth to Mottles Ø Effective Rooting Depth
Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø
Runoff Potential mod due to basalt rock
Flooding Potential Ø Wetland Conditions Ø

Growing Soils Environmental Associates

East facing, slope somewhat protected

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/18/20 Preparer Kitzrow
Stop # 6 Location NW 1/4 - Above steeper drop off
GPS Coordinates see enclosed report
Slope 10% Elevation: ~ Landform upland / low rolling hill / Basin
Geology/Genesis residuum / colluvium ??
Vegetation monocots, scattered Trees (open grown) Hardwoods

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-8	10YR 3/2	0	L	1m gr	<15	cm 1 yes	1"	fr	0	0 x=	mod
										0	0	
BW1	8-16	10YR 4/3	0	L	1f,m SBK	10	cm 1 yes	1"	fi	0	0 x=	mod
										0	0	
BW2	16-31	10YR 5/4	0	L	1"	15	yes	2"	fi	0	0 x=	mod
										0	0	
BC	31-37	10YR 5/4	0	HL	1"	10	yes	2"	fi	0	0 x=	mod
										0	0	
R	37"+	basalt -	Mohs ~ 4		X						0 x=	X
											x=	

Remarks AP @ 37" HL = ~ 28-30% clay

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification mesic, Xerochrepts Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index Series Wamic
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to basalt rock
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

1D slope" N. of house (50D)

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # 9 Location West central Edge
GPS Coordinates see report
Slope 7 Elevation — Landform uplands / hills
Geology/Genesis ash over sediments
Vegetation trees - conifers + HW

BRIEF PROFILE DESCRIPTION

DNA

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
AB	0-6	10YR	0	L		10	cm yes	1½	fr	0	0 x=	mod
AB	6-9	10YR	0	L		10	cm yes	1½	fi	0	0 x=	mod
BW	9-30"	10YR	0	L		10	yes	1½	fi	0	0 x=	mod
											1+ x=	0
2CR	30"			Saprolitic sediments							2+	
											x=	
											x=	

bedrock

Remarks 22" WAMIC

Capability Class 7b Suitability = Gen. suited / Gen. unsuited WHC = >2" / <2"

Classification fine loamy, mixed, mesic Typic xeorthents Family Loamy
Soil Drainage Class WD Soil Erodibility Index .24-.28 Series Skyline/Loamy
Hydrologic Group A/B/C Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to shallow paralithic contact
Flooding Potential 0 Wetland Conditions 0

SOIL PROFILE DOCUMENTATION SHEET

Steep, dry East. face slope

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow

Stop # 3 Location North central portion

GPS Coordinates see report

14 Slope ~~0-30~~ Elevation ~ Landform Low Hillslopes

Geology/Genesis resistant basalt

Vegetation V few Hardwoods @ Xerophytes - Mostly open @ monocots @ shrubs

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Andic Cem	Andic X=	Indur Cem	Indur X=	Sat Intake
A	0-3	10YR 3/3	D	CB L	1mgr	25	cm 1-2 yes	1"	fr	0	0		0		mod
BC	3-11	10YR 4/3	D	CB L	1C sbk	30	cm 1-2 yes	1"	fi	0	0		0		mod
BC_2	11-18	10YR 5/4	D	CB L	(mss)	35	yes	(2")	fi	0	0		0		mod slow
R	18"+	Basalt / Geo. contact											0		

Remarks → ** ↑ clay 2° TO Din PM to basalt

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification _____ Family Lo-Sk/clafl

Soil Drainage Class WD Soil Erodibility Index .27 Series Bodell

Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5 ft

Depth Current Water Table 0 Est Depth Seasonal High Water Table 0

Runoff Potential mod due to rocky, shallow soils

Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

'E' slope

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/18/20 Preparer Kitzrow
Stop # (9) Location mid property
GPS Coordinates see report
Slope 6 - 8 Elevation ~ Landform Low Hillslopes
Geology/Genesis resistant basalt
Vegetation Hardwoods, Xerophytes

BRIEF PROFILE DESCRIPTION

1% Surface Rock

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Andic Cem	Indur	Sat Intake
A	0-6	10YR 2/2 D		SiL 16% gr		25	cm 1-2 yes	1½"	fr	0	0		mod
										0	0	x=	
BC	6-12	10YR 4/3 D		L gr	1 f SBK	30	cm 4 yes		fr	0	0		mod
										0	0	x=	
BC/R	12-18	10YR 5/4 D		CL gr	11	35	yes	↓	fr	0	0		mod slow
										0	0	x=	
R	18"	Basalt / Geo. contact											
												x=	
												x=	

10YR

Remarks next to old house

steep microsite

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification _____ Family Lo-Sk Lateral
Soil Drainage Class WD Soil Erodibility Index _____ Series Bodell
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5 ft
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to rocky, shallow soils
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # 10 Location mid south East Asp
GPS Coordinates see report
Slope 10 Elevation : " Landform uplands / hills
Geology/Genesis ash over sediment
Vegetation Trees w/ natl open area w/ forbes

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Bail Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR 3/2	Ø	L	1C SBK	10	cm 1 yes	1½	fr	~~1+~~ ~~wk~~	Ø x= Ø	M
BW1	~~X~~ 6-14	10YR 4/4	Ø	L	1C SBK	10	cm L yes	1½	fi	~~1+~~ ~~wk~~	Ø x= Ø	
BW	14-30	10YR 4/6	Ø	L	1	10	yes	1½	fi	Ø Ø	Ø x= Ø	
2CR	30+			paralithic contact							1+ x= 2+	Ø
											x=	
R	~~2~~ 54										x=	

Remarks Humic on steep E slope

Capability Class 7 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification fine-loamy mixed mestic Andic does yes Family Loamy

Soil Drainage Class WD Soil Erodibility Index .24 Series [illegible]

Hydrologic Group [illegible] Depth to Mottles Ø Effective Rooting Depth <10"

Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø

Runoff Potential mod due to shallow paralithic contact

Flooding Potential Ø Wetland Conditions Ø

A

Growing Soils Environmental Associates

24

Strong CC 7

Clay content $\bar{X}$ = 20-22%.

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7mile Hill Date 12/18/20 Preparer Kitzrow
Stop # (11) Location SE corner of property
GPS Coordinates see report
Slope 11 Elevation — Landform uplands / hills
Geology/Genesis ash over sediment & ~~Andesite basalt~~
Vegetation solid trees HWs a few conifers

284° Aspect

BRIEF PROFILE DESCRIPTION

Offsite

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-4	10YR	0	L	1fsbk	10	cm 1 yes	1½	fr	0	0 x=	mod
AB	4-6	7.5YR	0	L	1f,m sbk	10	cm≤5 yes	1½"	fi	0	0 x=	mod
BC	6-15	7.5YR	0	L	11	5	yes	1"	fi	0	0 x=	mod slow
2CX vs 2CR	15+			distinct (CR)	X	X					1+ x=	0
											2+	
											x=	
											x=	

CR Mobile 2 to 3

Duripan @ 15"
No rooting Ability

Remarks

Paddock

Diagnostic

AWD = 15"

Capability Class 7 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification Entic Abruptic Durochrepts Family Loamy
Soil Drainage Class wD Soil Erodibility Index .24 Series Skyline
Hydrologic Group D/C Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to shallow paralithic contact
Flooding Potential 0 Wetland Conditions 0

BRC 22"

Growing Soils Environmental Associates

25

Small Inclusions slope Area

% Compiled into Transition between 49C & 50D

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/18/20 Preparer K. Tarrant

Stop # ~~9~~ 12 Location South central Area - 100' N of S. CM border

GPS Coordinates see enclosed report

Slope 16 Elevation : Landform Upland / Low rolling hill / Basin

Geology/Genesis residuums only

Vegetation trees mixed monocots ~ Isolated hardwoods No V few conch

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Color	Moist	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR 3/3	Ø		L			<15	cm yes	1"	fr	Ø	Ø x=	mod
BW1	6-9	10YR 4/3	Ø		L			5	cm yes	1"	fi	Ø	Ø x=	mod
BW2	9-15	7.5YR 5/4	Ø		SL			15	yes	1"	fi	Ø	Ø x=	mod
BC	15-20	7.5YR 5/4	Ø		SL			15	yes	2"	fi	Ø	Ø x=	mod
2R	20"	highly basalt			H-weathered, fractured								Ø x=	Xstn
R begins @ 50" & between 20 & 50" ~ Xston permeable													x=	

Remarks ~~Borderline~~ Wamic & Skylone

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy

Soil Drainage Class WD Soil Erodibility Index Series Wamic/Skylone

Hydrologic Group A Depth to Mottles Ø Effective Rooting Depth

Depth Current Water Table Ø Est Depth Seasonal High Water Table Ø

Runoff Potential mod due to basalt rock

Flooding Potential Ø Wetland Conditions Ø

Growing Soils Environmental Associates

ARD = 27" * # Mod Wamic but a little shallow

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/14/20 Preparer Kitzrow
Stop # 13 Location SE Edge of hay field
GPS Coordinates see enclosed report
Slope 4-6 Elevation : Landform upland / Low rolling hill / Basin
Geology/Genesis residuum - basalt
Vegetation monocots

Near steep "E" slope where there is a major soil change ??

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib- bon	Con- sist	Andic Smear	Indur Cem	Sat Intake
A	0-5	10YR 3/2 θ	L	1fm gr	<15	cm 6-2 yes	1"	fr	(WK)	θ	θ x=	mod
BW1	5-14	10YR 4/3 θ	L	1fsbk	10	cm yes	1"	fi	(WK)	θ	θ	—
BW2	14-20	10YR 5/4 θ	SL	"	15	yes	1"	fi	θ	θ	θ x=	mod
BC	20-28	10YR 5/4 θ	L	"	15	yes	1"	fi	θ	θ	θ	—
2CR	28"+	basalt - highly weathered - saprolitic								θ	θ x=	θ
											x=	

X Even distribution of roots in upper 15+"

Remarks Good moderately deep soils
Possibly modified upper 1+
X X Even root distribution top to bottom

Capability Class 4 Suitability = (Gen. suited) Gen. unsuited WHC = (>2") <2"

Classification Vitrandic Xerochrepts Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index .24 Series Wamic
Hydrologic Group A Depth to Mottles θ Effective Rooting Depth
Depth Current Water Table θ Est Depth Seasonal High Water Table θ
Runoff Potential mod due to basalt rock
Flooding Potential θ Wetland Conditions θ

X X X (+) Paralithic Contact

Growing Soils Environmental Associates

Modal Bodell

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 14 Location East Units near opening
GPS Coordinates see report
Slope 6-8 Elevation ~ Landform Low Hillslopes
Geology/Genesis resistant basalt
Vegetation Hardwoods, xerophytes, dissected landscape = Floral Diversity

ARD = 22"

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Andic Cem	Indur	Sat Intake
A	0-4	10YR 3/2 D		Stony Hfsl	b	25	cm 1 yes	2"	fr	0	0		mod
BC	4-14	10YR 3/4 D		CB L	1m SBK	30	cm 1-2 yes	2"		0	0	x=	mod
BC	14-24	10YR 5/4 D		CB L	11	35	yes	2"		0	0	x=	mod to mod slow
* CR/R	24"	Basalt / Geo. contact									0	x=	X
		Fractured large										x=	
		Lithic contact		boulders								x=	

Remarks Paralithic

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Lithic Abruptic Family Lo-Skeletal
Soil Drainage Class WD Soil Erodibility Index .25-.30 Series Bodell (10E)
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5 ft.
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to rocky, shallow soils/dissected landscape
Flooding Potential 0 Wetland Conditions 0

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 15 Location NE 1/4 ~ 80' west of prop limits
GPS Coordinates see report
Slope 15% Elevation ~ Landform Low Hillslopes (west face)
Geology/Genesis resistant basalt
Vegetation Dense Hardwoods, Xerophytes, no monocots
Balsamroot

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	10YR 3/2 D		VCB L	1MGR	25	cm yes 2"		fr	0 0	0 0 X=	mod
BC	6-14	10YR 4/3 D		CB L	1C CBK	30	cm yes		G	0 0	0 0 X=	mod
BC	14-20	10YR 5/4 D		stony L	ONA	35	yes			0 0	0 0 X=	mod slow
R	20"	Basalt / Geo. contact									0 X=	
		NO CR									X=	
											X=	

Remarks ARD = 18"
Diagnostic hoizon

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Lo-Sk/Ck/Ld
Soil Drainage Class WD Soil Erodibility Index .25"+ Series Bodell
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5"
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to rocky, shallow soils
Flooding Potential 0 Wetland Conditions 0

highly skeletal :. CC 7 V Wtr

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 10 Location NE extreme corner
GPS Coordinates see report
Slope 6 - 8 Elevation ~ Landform Low Hillslopes
Geology/Genesis resistant basalt
Vegetation Hardwoods, Xerophytes

BRIEF PROFILE DESCRIPTION

some weak modified properties

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-7	10YR	D	VCB L		25	cm yes		fr	~~1+~~ ~~WK~~	~~0~~ 0 X=	mod
BW	7-20	10YR	D	VCB L		40	cm yes		fi	~~1+~~ ~~WK~~	~~0~~ 0 X=	mod
BC	20-25	10YR	D	VCB L		35	yes		fr	~~0~~ 0	~~0~~ 0 X=	mod slow
R	25+	Basalt / Geo. contact									~~0~~ X=	

Remarks Strongly skeletal ARD = 25"
Overtly convex

Capability Class ~~7~~ Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Lo-Skltl, Andic Xerochrept Family Lo-Skeletal
Soil Drainage Class WD Soil Erodibility Index 2.2 Series Bodell
Hydrologic Group A Depth to Mottles ~~A~~ Effective Rooting Depth <45"
Depth Current Water Table ~~0~~ Est Depth Seasonal High Water Table ~~0~~
Runoff Potential mod due to rocky, shallow soils
Flooding Potential ~~0~~ Wetland Conditions ~~0~~

49C

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson Date 12/19/20 Preparer K Tappan
Stop # 17 Location SE 1/4 open hayfield
GPS Coordinates See Report
Slope 5 Elevation ____ Landform upland
Geology/Genesis residuum basalt
Vegetation no trees, dead grasses + weeds

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-6	7.5YR 3/2	0	L	1M gr	5	cm yes	1 1/2"	fr	0 WK	0 x= 0	mod
BW	6-11	4/3	0	L	1C SBK	0	cm		fi	1t WK	0 x= 0	mod
BW	11-18	5/4	0	L	1M BLK	5			fi	0 0	0 x= 0	mod
BC	18-29	↓	↓	L	1C BLK	0		2"	VG	0 0	0 x= 0	mod
CR	29+	saprolitic sediment									x=	
											x=	

Remarks geologic contact close by probed 22"

Capability Class 4 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification Andic Xerochrepts Family fine
Soil Drainage Class WD Soil Erodibility Index .24 Series Wamic
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth 10+
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential Low due to ↑ Soil depth
Flooding Potential 0 Wetland Conditions 0

harsh site

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 16 Location NE 1/4
GPS Coordinates see report
Slope 6-8 Elevation ~ Landform Low Hillslopes ~ microsite
Geology/Genesis resistant basalt
Vegetation Hardwoods, Xerophytes

v Thin topsoil

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-2	10YR	0	stony L			25 cm	yes	2	vfr	0 / 0 X=	mod
BC	2-11	10YR	0	stony L			30 cm	yes	2	fi	0 / 0 X=	mod
BCg	11-17	10YR	0	stony L			35	yes	2	fi	0 / 0 X=	mod slow
17+ R	hard Basalt / Geo. contact										0 X=	
	Mohs hardness 7+										X=	
											X=	

Remarks Perched H2O table down to hard rock

Capability Class 7 Suitability = Gen. suited Gen. unsuited WHC = >2" <2"

Classification Family Lo-Sk/e loam
Soil Drainage Class WD Soil Erodibility Index 12+ Series Bodell
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5 ft
Depth Current Water Table 2 ft Est Depth Seasonal High Water Table 2 ft
Runoff Potential mod due to rocky, shallow soils
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

32

49 C

Suited

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/18/20 Preparer Kitzrow
Stop # 19 Location Mid Property
GPS Coordinates see enclosed report
Slope 3 Elevation 1 Landform upland / Low rolling hill / Basin
Geology/Genesis residuum
Vegetation monocots only (slight depression nearby = localized relief

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text	Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-7	10YR 3/2	0	L		1f,m,sbk	<15	cm 1 yes	1"	fr	0	0 x=	mod
BW1	7-14	10YR 3/3	0	L		1m SBK	0	cm 1 yes	1"	fr	0	0 x=	mod
BW2	14-21	7.5YR 3/4	0	L		1m,c f SBK	0	yes	1"	fr	0	0 x=	mod
BW3	21-29	7.5YR 3/4	0	L		massive SBK	10	yes	1"	fr	0	0 x=	mod
CR	29"+	basalt fractured - borderline saprolitic					X					0 x=	X
R	>45"											x=	

Remarks BRD=25 to 30" Good Modal Wamic
No Argillic but Good cambic

Capability Class 4/6 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index Series Wamic
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to basalt rock
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / 7 Mile Hill Date 12/19/20 Preparer Kitzrow
Stop # 20 Location North end
GPS Coordinates see report
Slope 6-8 Elevation ~ Landform Low Hillslopes
Geology/Genesis resistant basalt
Vegetation Hardwoods, Xerophytes

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Bail Hold	Rib-bon	Con-sist	Andic Smear	Indur Cem	Sat Intake
A	0-7	10YR 3/2	D	SiCL			25 cm yes	2+	fr	0	0 x=	mod 27
										0	0	
BC	7-11	10YR 4/3	D	CL			30 cm yes		fr	0	0 x=	mod slow
										0	0	
BC	11-20	10YR 5/4	D	CL			35 yes		VFr	0	0 x=	mod slow
CR	20+	Basalt / Geo. contact									th x=	Indurated
		Mohs hard ≈ 2.5-3									x=	
		can chip with tile spade									x=	

Remarks FLOOR

Capability Class 7 Suitability = Gen. suited (Gen. unsuited) WHC = >2" (<2")

Classification Family Lo-Skeletal
Soil Drainage Class WD Soil Erodibility Index 24 Series Bodell/SKylg
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth <5 ft
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to rocky, shallow soils
Flooding Potential 0 Wetland Conditions 0

Wilson
T2N R12E Sec. 23C TL# 4400
Typifying Pedons

Wamic

A 0- 8" loam; 10YR 3/2; weakly smeary, low bulk density weak fine, medium granular structure; friable; slightly sticky, non-plastic; 10% cobbles; common fine and medium roots; clear wavy boundary
Bw1 8-16" loam; 10YR 4/3; weakly smeary, moderate fine, coarse sub angular structure; firm; slightly sticky, non-plastic; 10% cobbles and stones; few fine roots; gradual, wavy boundary, pH 7.4
Bw2 16-26" loam; 10YR 4/3; moderate fine, coarse sub angular structure; firm; slightly sticky, non-plastic; 5% cobbles and gravel; clear smooth boundary, pH 7.6
BC 26-38" loam; 10YR 5/4; weak fine, coarse sub angular structure parting to blocky; firm; slightly sticky, non plastic;, 5% cobbles; few fine roots; pH. 7.6
38"+ Paralithic contact, indurated but non-cemented basalt; non-calacreous

Bodell

A 0-5" stony loam, 10YR3/3, 20% gravels, 15% cobbles; friable, weak fine granular structure; few fibrous roots, non-sticky, non-plastic, clear wavy boundary pH=7.7
Bw 5-10" very cobbly loam, 10YR5/4, 10% gravels, 25% cobbles; friable consistence, weak fine, medium sub angular-blocky structure; no roots; slightly sticky, non- plastic, pH=7.9
BC 10-16" cobbly loam, 10YR5/4, 5% gravels, 25% cobbles; very firm consistence, weak medium subangular blocky structure; common interstitial and tubular pores; slightly-sticky, non- plastic, pH=7.9
16"+ hard, Massive Basalt; non-saprolitic, lithic

Skyline

A 0- 3" loam; 10YR 3/2; non-smeary, weak fine, medium granular structure; friable; slightly sticky, non-plastic; 10% cobbles; common fine and medium roots; clear wavy boundary
BC1 3-11" loam; 10YR 4/3; weakly smeary, moderate fine, coarse sub angular structure; firm; slightly sticky, non-plastic; 10% cobbles and stones; few fine roots; gradual, wavy boundary, pH 7.4
BC2 11-18" loam; 10YR 4/3; moderate fine, coarse sub angular structure; firm; slightly sticky, non-plastic; 5% cobbles and gravel; clear smooth boundary, pH 7.6
18"+ Paralithic contact, sedimentary origin

49C #

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/19/20 Preparer Kitzrow
Stop # 23 Location North central extent
GPS Coordinates see enclosed report
Slope <4 Elevation : Landform upland / Low rolling hill / Basin
Geology/Genesis residuum
Vegetation monocots

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Andic Cem	Indur Cem	Sat Intake
AB	0-5	10YR 3/2	0	L	1fm sbk	<15	cm L yes	1"	fr	0	0	0 x=	mod
BW1	5-18	10YR 3/4	0	L	1C sbk	5	cm yes	1½"	fr	0	0	0 x=	mod
BW2	18-30	10YR 5/6	0	L	1C/m sbk	5	yes	1"	fr	0	0	0 x=	mod
BC	30-35+	10YR 3/3	1F	L	1C blk	5	yes	1"	fr	0	0	0 x=	mod
CR	35"	basalt - saprolitic										0 x=	Motts = ≤ 3012

not SBK

estimated

Remarks Transient Water Table

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index .24 Series Wamic wet *
Hydrologic Group A Depth to Mottles 0 Effective Rooting Depth
Depth Current Water Table 0 Est Depth Seasonal High Water Table 0
Runoff Potential mod due to basalt rock
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

49C* = Wet phase [35]

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/14/20 Preparer K. Itzrow
Stop # 22 Location northern central extreme limits
GPS Coordinates see enclosed report
Slope <2 Elevation : Landform ~~upland / Low hillsl~~ V Basin
Geology/Genesis residuum
Vegetation monocots (Isolated Fac wet forbs)

* DTM = 35"

BRIEF PROFILE DESCRIPTION (Lowest elevation in parcel & lowest landscape pos)

Horiz	Depth	Moist Color	Mott	Text	Struct	Frag Clay%	Bail Hold	Rib bon	Con- sist	Andic Smear	Indur Cem	Set	Intake
A	0-7	10YR 3/2	0	L	1f,m,c gr	<15	cm yes	1"	fr	0	0	X=	mod
BW1	7-14	10YR 3/3	0	L	1m,c SBK	<10	cm yes	2"	fr	0	0	X=	mod
BW2	14-30	10YR 5/4	0	AL	1C SBK	<5	yes	2"	fr	0	0	X=	mod slow
BC	30-35	10YR	0	AL	??	<5	yes	2"	fr	0	0	X=	mod slow
CR	35"	basalt fractured								0		X=	X
		Abrupt geo cont								0		X=	.6-2"/hr

Remarks Broader than upslope Areas
no rock

Capability Class 4 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification _____ Family Fl-loamy
Soil Drainage Class MWD Soil Erodibility Index .28+ Series Wamic Wet
Hydrologic Group A/B Depth to Mottles 0 Effective Rooting Depth <10"
Depth Current Water Table 50" Est Depth Seasonal High Water Table 40-50"
Runoff Potential mod due to basalt rock
Flooding Potential 0 Wetland Conditions 0

Growing Soils Environmental Associates

hydrology alteration in area 2 to 7 mile Hill Rd

Border depression Area

SOIL PROFILE DOCUMENTATION SHEET

Job Name Wilson / Seven Mile Date 12/19/20 Preparer Kitzrow
Stop # 21 Location North Central extreme
GPS Coordinates see enclosed report
Slope 23 Elevation Landform Upland / Low rolling hill / Basin
Geology/Genesis residuum + some colluvium
Vegetation monocots, isolated Fac monocots

BRIEF PROFILE DESCRIPTION

Horiz	Depth	Moist Color	Mott	Text Clay%	Struct	Frag	Ball Hold	Rib-bon	Con-sist	Andic Smear	Andic Cem	Indur Cem	Sat Intake
A		10YR 3/2 θ		L	1fm gr	<15	cm+ yes	1"	fr	θ	θ	θ X=	mod
										θ	θ		
BW1		10YR 3/3 θ		L	1c SBK	10	cm+ yes	2"	fi	θ	θ	θ X=	mod
										θ	θ		
BW2		10YR 4/3 θ		L	11	10	yes	2"	fi	θ	θ	θ X=	mod
										θ	θ		
BC		10YR 3/3 (10) θ		L	11	5	yes	1 3/4"	fi	θ	θ	θ X=	mod
R	55"+	basalt weathered										X=	

Highly erodible

Remarks .5Y- interpore locations

Wet Warm Half full

Capability Class 4/6 Suitability = Gen. suited, Gen. unsuited WHC = >2" <2"

Classification Family Fi-loamy
Soil Drainage Class WD Soil Erodibility Index .27-.35 Series Wamic
Hydrologic Group A Depth to Mottles 38+ Effective Rooting Depth
Depth Current Water Table 50"+ Est Depth Seasonal High Water Table 50" or less
Runoff Potential mod due to basalt rock
Flooding Potential D Wetland Conditions A to I

This product is for informational purposes and has not been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Oregon Statewide Imagery Program (OSIP) - Oregon Imagery Framework Implementation Team


Labels
*Not to Scale
= Septic
= Water
= Power
= Tel/Com
N
Backup Drain Field
Septic Drain Field
Pump House
Well
Septic Drain Field
Lean To
Road = 20' Wide
Power Pole
Barn
Old Homestead
Pond
Barn
Trailer Site
Transformer
Log Cabin
Well
Old Barn
Septic Drain Field
Pond (Seasonal)
Former Bird Sanctuary
Transformer
Trailer Site
Trailer Site
Hand Dug Spring