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- Tree Retention Plan-

DuPont Industrial Warehouse Site

1700 Center Drive
DuPont, WA

Prepared for: Barghausen Consulting Engineers

Prepared by: Washington Forestry Consultants, Inc.

Report Date: November 11, 2022

Introduction

The project proponent is planning to build warehouse space on approximately 19.38 acres of a 25.29 acre parcel in DuPont, Washington. The proponent has retained WFCI to:

- Evaluate and inventory all trees on the site pursuant to **DuPont Municipal Code 25.120 Tree Retention**.
- Make recommendations for tree retention, along with any required protection and cultural measures.

Observations

Methodology

WFCI has evaluated all surveyed and mapped trees. Generally these were trees that are 4 inches diameter at breast height (DBH) and larger in the proposed project area. We then assessed their potential to be incorporated into the new project. A 100% inventory of all landmark trees was conducted to determine the location and condition of the landmark trees on the parcel. Tree locations and species information was gathered from survey data.

The tree evaluation phase used methodology developed by Nelda Matheny and Dr. James Clark in their 1998 publication Trees and Development: A Technical Guide to Preservation of Trees during Land Development.

Site Description

The site consists of one tax parcel (#0119262019). It is relatively flat with some rolling hills and small depressions. The Sequalitchew Creek Trail passes through the southern portion of the parcel. There are no buildings on the site. Access to the site is by Sequalitchew Dr. The parcel is bordered by Sequalitchew Creek on the south and west, forested parcels to the north, and a multi-family residential development to the east.

Soil Depth and Productivity

According to the USDA Web Soil Survey, there is one soil type on the parcel, the Spanaway gravelly sandy loam.

The Spanaway gravelly sandy loam is a very deep, somewhat excessively drained soil found on terraces. It is formed in glacial outwash and volcanic ash. Permeability is moderately rapid in the subsoil and very rapid in the substratum. Available water capacity is low. The effective rooting depth for trees is 48 inches or more. The potential for windthrow of trees is slight under normal conditions. New trees require irrigation for establishment.

Tree Conditions

There are 2 cover types on this 25.29 acre parcel for the purposes of description. Type I was forested and Type II is non-forest brush land (see Attachment #1). We found and evaluated a total of 744 trees in the project area. Most of the trees were considered to be healthy, long-term trees if they were saved. The following is a description of the forest cover types:

Type I. – This type is a mixed stand of deciduous and conifer trees. It covers approximately 15 acres and includes all of the Specimen, Landmark, and other trees on the site that are 4 inches and larger in diameter. There are 744 trees in this type that had their tree location surveyed. The tree species include Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), Oregon white oak (*Quercus garryana*), Pacific yew (*Taxus brevifolia*), Pacific madrone (*Arbutus menziesii*), and bigleaf maple (*Acer macrophyllum*). Tree size ranges from 4 to over 50 inches DBH. Tree condition ranges from ‘Poor’ to ‘Good’, with the large majority of trees described as being in the ‘Fair’ or ‘Good’ condition class.

Table 1: Summary of Trees in Cover Type I

Species	DBH Range (in)	# of Healthy Trees*	# of Unhealthy Trees**	Total
Douglas-fir	4 – 50+	410	38	448
Oregon White Oak	4 – 42	184	17	201
Western Redcedar	12 – 36	70	6	76
Bigleaf Maple	18 – 41	9	1	10
Pacific Madrone	12 – 18	4	0	4
Pacific Yew	13 – 17	3	0	3
Western Hemlock	13 – 33	2	0	2
Total		682	62	744

*Trees in ‘Fair’ or ‘Good’ Condition

**Trees in ‘Poor’ or ‘Very Poor’ Condition

Understory shrubs include salal (*Gaultheria shallon*), sword fern (*Polystichum munitum*), trailing blackberry, (*Rubus ursinus*), bracken fern (*Pteridium aquilinum*), Indian plum (*Oemleria cerasiformis*), red huckleberry (*Vaccinium parvifolium*), western hazelnut (*Corylus cornuta*), grasses, and broadleaved weeds.



Photo 1: View of typical trees in Cover Type I

Type II. – This 10.3 acre cover type consists of mostly open, highly disturbed ground with only small thickets of young Douglas-fir trees. No trees were inventoried or surveyed in this Type. Other vegetation in this area includes abundant Scotch broom (*Cytisus scoparius*), grasses, and broadleaf weeds.



Photo 2: Non-forest - Cover Type II

Landmark Trees

There are a total of 76 landmark trees in the project area. Landmark trees include Oregon white oak, Pacific yew, and Pacific madrone 24 inches DBH and larger, or Douglas-fir, western redcedar, bigleaf maple, and western hemlock that are 30 inches DBH and larger. *Landmark Oregon White Oak trees are not allowed to be removed without approval from the City of Dupont under a Type I Tree Removal Permit application.*

Locations of landmark trees are indicated on the site plan (Attachment #2). A total of **20** healthy landmark trees can be retained on the site. Fifty-six (**56**) landmark trees will need to be removed because they are either unhealthy or located under the footprint of proposed buildings, roads, storm ponds, or parking lots. Other than Oregon white oak, there is no requirement to retain these landmark trees under the footprint of the buildings, storm ponds, and parking lots, as long as tree retention is achieved in the street boundaries and abutting a residential district. All landmark trees are labeled with a blue number at the base corresponding to the table in Attachment 3.

There is an existing 42 inch Oregon White Oak tree (#12) needs to be removed due to its location in the future Y street right of way.

Potential Tree Retention

The property is located in the Manufacturing/Research Park zoning district of DuPont. The DuPont Municipal Code (DMC) requires that a minimum of 1.5 trees per acre shall be retained on 19.38 acre project area within the 25.29 acre site. Therefore, at least 29 healthy trees will need to be retained on site.

The site plan shows that the new construction will extend to the northern edge of the parcel, leaving open space for tree retention the southern, southwestern, and western areas. The eastern portion of the parcel will be developed under a separate land use application. The following is a summary of the proposed tree retention:

Total Project Acreage:	19.38 acres
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Total # of Healthy Trees:	682 trees
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Tree Retention Requirement (1.5 Trees per Acre):	29 trees
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Projected Tree Retention*:	
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Tree Retention Area A	61 trees
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Tree Retention Area B	145 trees
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Tree Retention Area C	12 trees
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Tree Retention Area D	<u>7 trees</u>
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Total Projected Trees in Tree Retention Areas	225 trees
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Excess of Tree Retention over the Tree Requirement	196 trees
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Projected # of Healthy Trees to be Removed	457 trees
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Tree Replacement

Planned tree retention exceeds the minimum requirement by 196 trees, so no tree replacement is required beyond that required by the landscape code requirements.

Tree Protection Measures

Trees to be saved must be protected during construction by a six foot high temporary chain link fencing (Attachment #4), located 5 feet outside of the drip line of the trees. Placards shall be placed on the fencing every 50 feet indicating the words, "NO TRESPASSING - Protected Trees". The individual CRZ are a radius of one foot for each one inch of DBH (6 feet minimum), unless otherwise delineated by WFCI.

Tree protection fences should be placed around the edge of the critical root zone (CRZ). The fence should be erected after logging but prior to the start of clearing. The fences should be maintained until the start of the landscape installation.

There should be no equipment activity (including rototilling) within the critical root zone. No irrigation lines, trenches, or other utilities should be installed within the CRZ. Cuts or fills should impact no more than 25% of a tree's root system. If topsoil is added to the root zone of a protected tree, the depth should not exceed 2 inches of a sandy loam or loamy fine sand topsoil and should not cover more than 25% of the root system.

If roots are encountered outside the CRZ during construction, they should be cut cleanly with a saw and covered immediately with moist soil. Noxious vegetation within the critical root zone should be removed by hand. If a proposed save tree must be impacted by grading or fills, then the tree should be re-evaluated by WFCI to determine if the tree can be saved with mitigating measures, or if the tree should be removed.

Pruning and Thinning

All individual trees to be saved near or within developed areas should have their crowns raised to provide a minimum of 8 feet of ground clearance over sidewalks and landscape areas, 15 feet over parking lots or streets, and at least 10 feet of building clearance.

All pruning should be done according to the ANSI A300 standards for proper pruning, and be completed by an International Society of Arboriculture Certified Arborist®, or be supervised by a Certified Arborist®.

Conclusions and Timeline for Activity

1. At least 29 trees (1.5 healthy trees per acre) need to be retained in the project area. A total of 225 trees are projected to be within the 4 tree protection areas. No tree replacement should be required.
2. The final, approved tree protection plan map should be included in the construction drawings for bid and construction of the project and should be labeled as such.
3. Stake and heavily flag the clearing limits.
4. Contact WFCI to attend pre-job conference and discuss tree protection issues with contractors. WFCI can verify all trees to be saved and/or removed are adequately marked for retention. A tally of the trees within the final tree retention area boundaries can be done at this time to confirm that the minimum 29 tree retention requirement is met.
5. Complete logging. Complete necessary hazard tree removals and invasive plant removals from the tree protection areas. No equipment should enter the tree protection areas during logging.
6. Install tree protection fences along the 'limits of construction'. The fences should be located at the limits of construction or 5 feet outside of the drip line of the save tree or as otherwise specified by WFCI. Maintain fences throughout construction.
7. Complete clearing of the project.
8. Do not excavate stumps within 10' of trees to be saved. These should be individually evaluated by WFCI to determine the method of removal.
9. Complete all necessary pruning on save trees or stand edges to provide at least 8' of ground clearance near sidewalks and trails, and 15' above all driveways or access roads.
10. Complete grading and construction of the project.

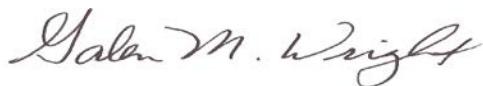
Summary

We found 682 healthy significant trees in the project area, including 76 Landmark trees. The City of DuPont requires that 1.5 healthy trees per acre are retained in a Manufacturing/Research Park zoned site. Therefore, at least 29 trees will need to be retained as part of this project. This plan retains (projected) 225 trees within 4 tree retention areas. No tree replacement plan should be required.

Please give us a call if you have further questions.

Respectfully submitted,

Washington Forestry Consultants



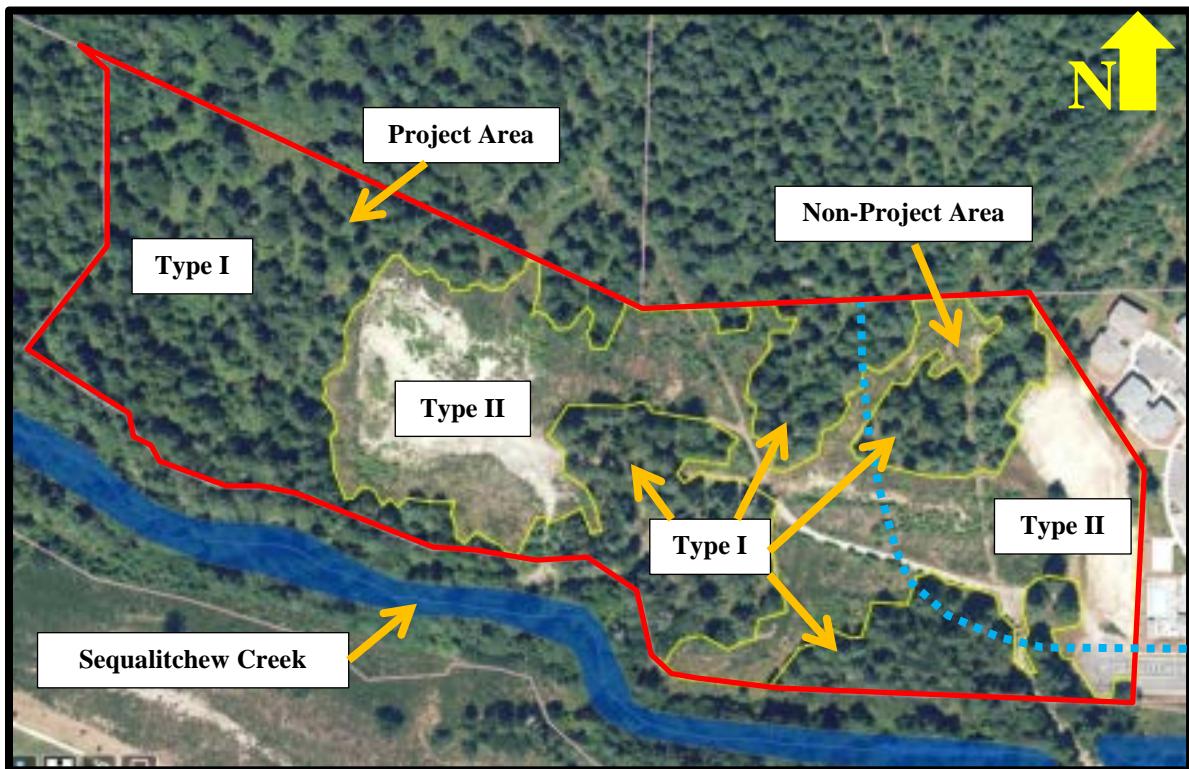
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ISA Tree Risk Assessor Qualified
ASCA Tree and Plant Appraisal Qualified



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Attachment 1. Aerial Photo of DuPont Industrial Warehouse with Cover Types Labeled

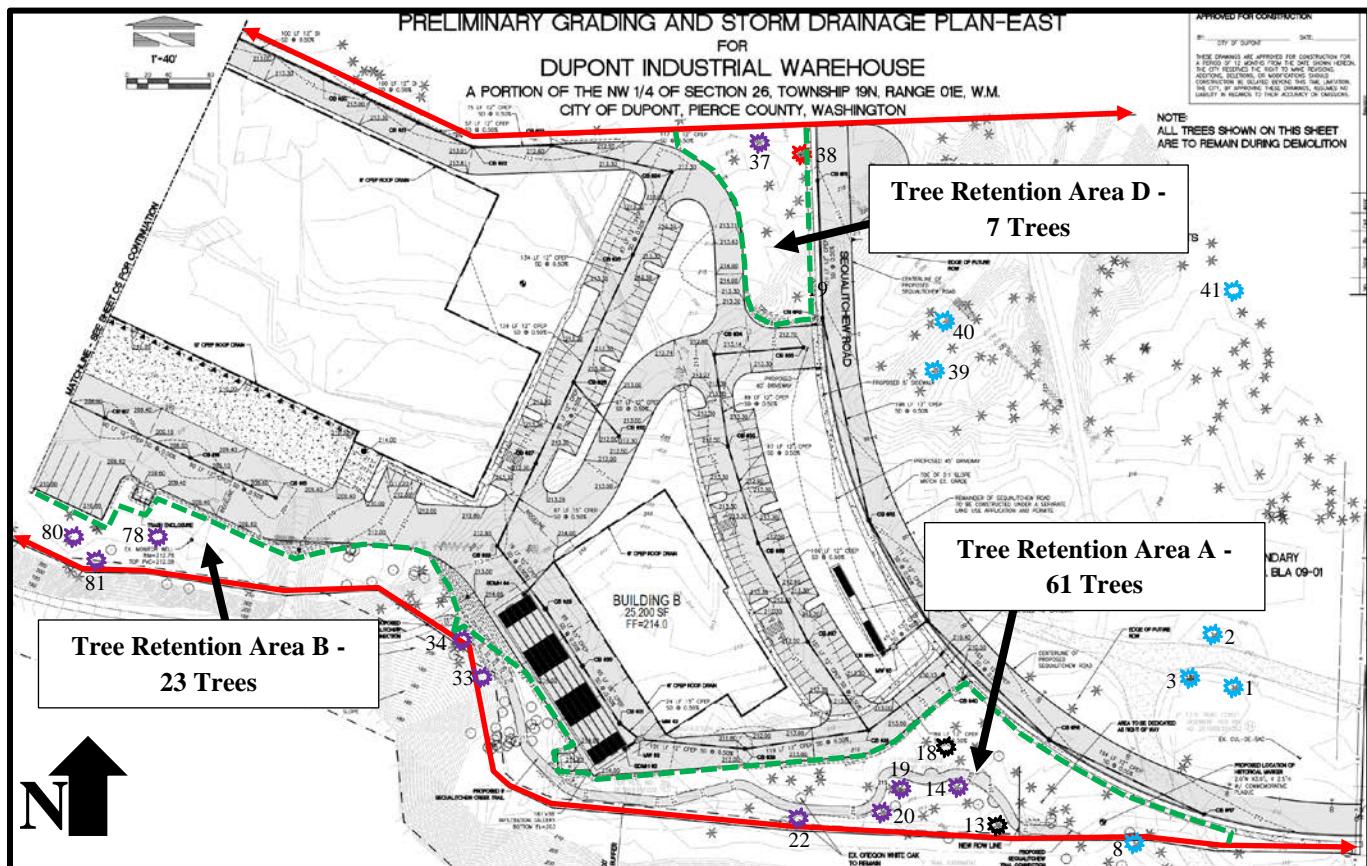
(Pierce County GIS)

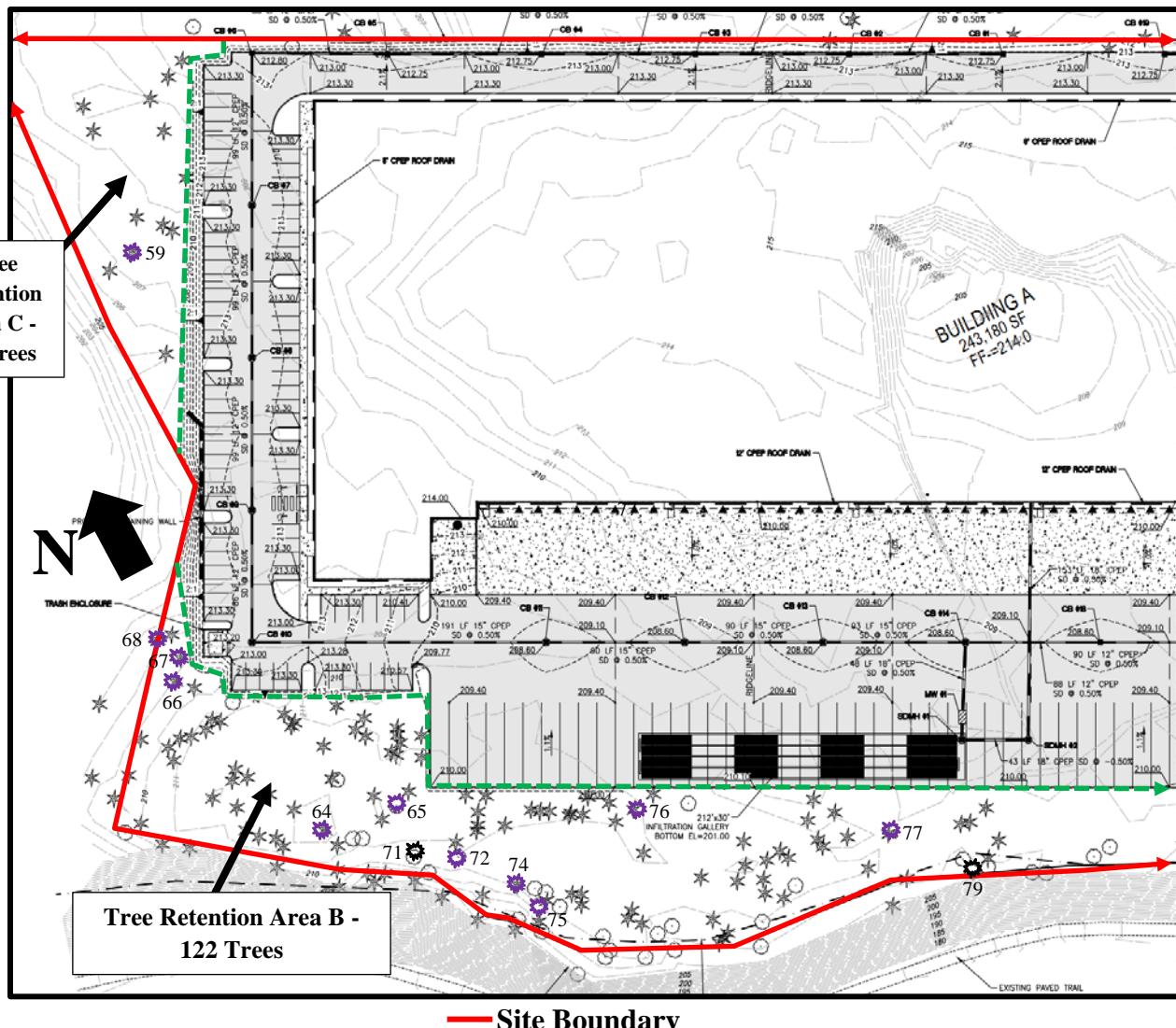


— Parcel Boundary
— Cover Type Boundary
- - - Project Area Boundary (Approximate)

Attachment 2. Site Plan/Tree Map with Landmark Tree Locations Indicated

(2 Pages)





Attachment 3. List of Landmark Trees at 1700 Center Dr. in DuPont

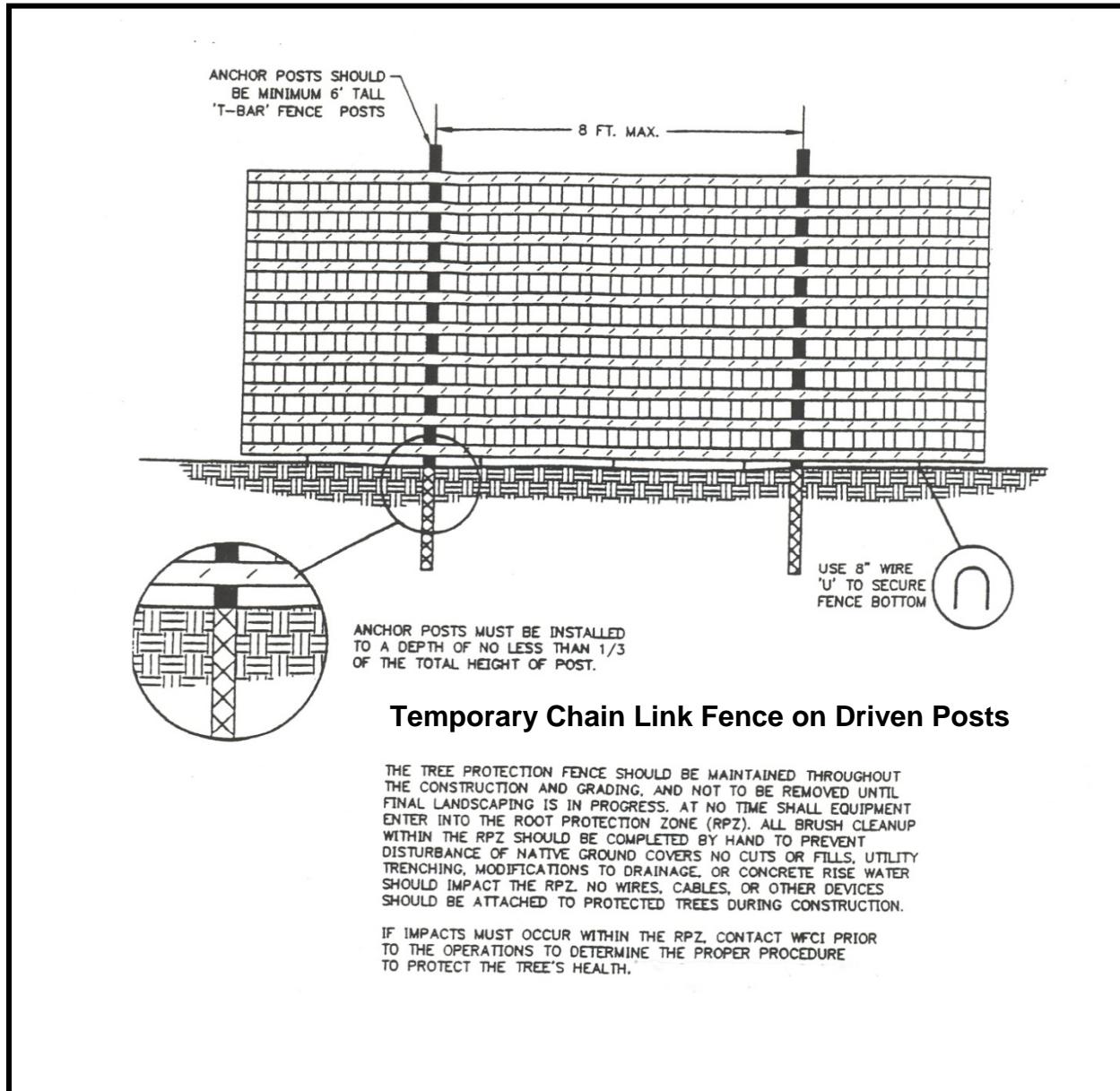
Tree #	Species	DBH (in.)	Condition	Savable Based on Tree Condition Alone? Yes or No	Project Plan? Save or Remove	Minimum Recommended Root Protection Zone Radius (ft.)	Comment
1	Douglas-fir	38	Good	Yes	N/A		Outside Project Area
2	Douglas-fir	41	Fair	Yes	N/A		Outside Project Area
3	Douglas-fir	32	Fair	Yes	N/A		Outside Project Area
4	Douglas-fir	33	Fair	Yes	Remove	26	
5	Douglas-fir	28	Good	Yes	Remove	28	
6	Douglas-fir	14, 9, 10, 16, 10, 10	Fair	Yes	Remove		
7	Douglas-fir	48	Good	Yes	Remove	36	
8	Douglas-fir	36	Fair	Yes	N/A	28	Off-Site
9	Oregon white oak	19, 18, 15, 16, 14, 15	Fair	Yes	Remove	42	
10	Douglas-fir	33, 33	Good	Yes	Remove	30	
11	Douglas-fir	35	Fair	Yes	Remove	30	
12	Oregon white oak	42	Fair	Yes	Remove	40	
13	Douglas-fir	34	Poor	No	Remove		Stem Decay
14	Douglas-fir	32	Fair	Yes	Save	28	
15	Douglas-fir	42	Good	Yes	Remove	36	
16	Douglas-fir	33	Fair	Yes	Remove	28	
17	Douglas-fir	30	Fair	Yes	Remove	26	
18	Oregon white oak	18, 19	Poor	No	Remove		Stem Defect, Decay
19	Douglas-fir	41	Fair	Yes	Save	30	
20	Douglas-fir	37	Good	Yes	Save	30	
21	Douglas-fir	31.5	Fair	Yes	Remove	28	
22	Oregon white oak	16, 23, 13	Fair	Yes	Save	30	
23	Douglas-fir	33	Poor	No	Remove		1 dead stem
24	Douglas-fir	33	Fair	Yes	Remove	28	
25	Douglas-fir	41	Good	Yes	Remove	32	

DuPont Industrial - Tree Protection Plan

Tree #	Species	DBH (in.)	Condition	Savable Based on Tree Condition Alone? Yes or No	Project Plan? Save or Remove	Minimum Recommended Root Protection Zone Radius (ft.)	Comment
26	Douglas-fir	41, 28	Fair	Yes	Remove		
27	Douglas-fir	40	Good	Yes	Remove		
28	Douglas-fir	37	Good	Yes	Remove		
29	Douglas-fir	50	Good	Yes	Remove		
30	Douglas-fir	35	Fair	Yes	Remove		
31	Douglas-fir	41	Fair	Yes	Remove		
32	Douglas-fir	32	Fair	Yes	Remove	26	
33	Douglas-fir	19, 19, 17	Fair	Yes	Save	28	
34	Douglas-fir	37	Fair	Yes	Save	28	
35	Douglas-fir	31	Fair	Yes	Remove		
36	Douglas-fir	41	Good	Yes	Remove		
37	Douglas-fir	31	Good	Yes	Save		
38	Douglas-fir	34	Fair	Yes	Remove		
39	Douglas-fir	32.5	Good	Yes	N/A		Outside Project Area
40	Douglas-fir	38	Good	Yes	N/A		Outside Project Area
41	Douglas-fir	40	Good	Yes	N/A		Outside Project Area
42	Douglas-fir	28, 22, 28	Fair	Yes	Remove		
43	Douglas-fir	50, 50, 30	Poor	No	Remove		Stem defect, Red ring rot
44	Douglas-fir	38	Good	Yes	Remove		
45	Douglas-fir	40	Fair	Yes	Remove		
46	Douglas-fir	35	Fair	Yes	Remove		
47	Douglas-fir	42.5	Good	Yes	Remove		
48	Douglas-fir	33	Good	Yes	Remove		
49	Douglas-fir	35	Fair	Yes	Remove		
50	Douglas-fir	34	Fair	Yes	Remove		
51	Douglas-fir	32	Fair	Yes	Remove		
52	Douglas-fir	30	Good	Yes	Remove		
53	Douglas-fir	33	Good	Yes	Remove		
54	Douglas-fir	37	Good	Yes	Remove		
55	Bigleaf maple	33	Good	Yes	Remove		
56	Douglas-fir	34	Poor	No	Remove		Red ring rot

Tree #	Species	DBH (in.)	Condition	Savable Based on Tree Condition Alone? Yes or No	Project Plan? Save or Remove	Minimum Recommended Root Protection Zone Radius (ft.)	Comment
57	Douglas-fir	36	Good	Yes	Remove		
58	Bigleaf maple	41	Good	Yes	Remove		
59	Hemlock	33	Fair	Yes	Save	28E	
60	Douglas-fir	38.5	Fair	Yes	Remove		
61	Bigleaf maple	36	Good	Yes	Remove		
62	Bigleaf maple	24, 24	Good	Yes	Remove		
63	Douglas-fir	31.5	Good	Yes	Remove		
64	Western redcedar	36	Fair	Yes	Save	30	
65	Oregon white oak	16, 14	Fair	Yes	Save		
66	Western redcedar	31	Fair	Yes	Save	22	
67	Western redcedar	31.5	Fair	Yes	Save	22	
68	Western redcedar	35	Fair	Yes	Save	26	
69	Western redcedar	31	Good	Yes	Remove		
70	Douglas-fir	31.5	Fair	Yes	Remove		
71	Douglas-fir	31.5	Poor	No	Remove		Dead top
72	Western redcedar	31	Fair	Yes	Save	26	
73	Douglas-fir	37	Good	Yes	Remove		
74	Douglas-fir	36	Good	Yes	Save	24	
75	Bigleaf maple	22, 14, 16	Good	Yes	Save		
76	Douglas-fir	31.5	Fair	Yes	Save	24	
77	Douglas-fir	42	Fair	Yes	Save	30	
78	Douglas-fir	38	Good	Yes	Save	32	
79	Oregon white oak	18,8	Poor	No	Remove		suppressed
80	Oregon white oak	24	Good	Yes	Save	28	
81	Oregon white oak	24.8	Good	Yes	Save	30	
82	Douglas-fir	34	Good	Yes	Remove		

Attachment 4. Tree Protection Fence Detail



Attachment 5. Individual Tree Rating Key for Tree Condition

RATING	SYMBOL	DEFINITION
Very Good	VG	<ul style="list-style-type: none"> • Balanced crown that is characteristic of the species • Normal lateral and terminal branch growth rates for the species and soil type • Stem sound, normal bark vigor • No root problems • No insect or disease problems • Long-term, attractive tree
Good	G	<ul style="list-style-type: none"> • Crown lacking symmetry but nearly balanced • Normal lateral and terminal branch growth rates for the species and soil type • Minor twig dieback O.K. • Stem sound, normal bark vigor • No root problems • No or minor insect or disease problems – insignificant • Long-term tree
Fair	F	<ul style="list-style-type: none"> • Crown lacking symmetry due to branch loss • Slow lateral and terminal branch growth rates for the species and soil type • Minor and major twig dieback – starting to decline • Stem partly unsound, slow diameter growth and low bark vigor • Minor root problems • Minor insect or disease problems • Short-term tree 10-30 years
Poor	P	<ul style="list-style-type: none"> • Major branch loss – unsymmetrical crown • Greatly reduced growth • Several structurally import dead or branch scaffold branches • Stem has bark loss and significant decay with poor bark vigor • Root damage • Insect or disease problems – remedy required • Short-term tree 1-10 years
Very Poor	VP	<ul style="list-style-type: none"> • Lacking adequate live crown for survival and growth • Severe decline • Minor and major twig dieback • Stem unsound, bark sloughing, previous stem or large branch failures, very poor bark vigor • Severe root problems or disease • No or minor insect or disease problems • Mortality expected within the next few years
Dead	DEAD	<ul style="list-style-type: none"> • Dead

Attachment 6. Description of Tree Evaluation Methodology

The evaluation of the tree condition on this site included the visual assessment of:

1. Live-crown ratio,
2. Lateral and terminal branch growth rates,
3. Presence of dieback in minor and major scaffold branches and twigs,
4. Foliage color,
5. Stem soundness and other structural defects,
6. Visual root collar examination,
7. Presence of insect or disease problems.
8. Windfirmness: if tree removal will expose this tree to failure.

In cases where signs of internal defect or disease were suspected, a core sample was taken to look for stain, decay, and diameter growth rates. Also, root collars were exposed to look for the presence of root disease.

In all cases, the overall appearance of the tree was considered relative to its ability to add value to either an individual lot or the entire subdivision. Also, the scale of the tree and its proximity to both proposed and existing houses was considered.

Lastly, the potential for incorporation into the project design is evaluated, as well as potential site plan modifications that may allow otherwise removed tree(s) to be both saved and protected in the development.

Trees that are preserved in a development must be carefully selected to make sure that they can survive construction impacts, adapt to a new environment, and perform well in the landscape. Healthy, vigorous trees are better able to tolerate impacts such as root injury, changes in soils moisture regimes, and soil compaction than are low vigor trees.

Structural characteristics are also important in assessing suitability. Trees with significant decay and other structural defects that cannot be treated are likely to fail. Such trees should not be preserved in areas where damage to people or property could occur.

Trees that have developed in a forest stand are adapted to the close, dense conditions found in such stands. When surrounding trees are removed during clearing and grading, the remaining trees are exposed to extremes in wind, temperature, solar radiation, which causes sunscald, and other influences. Young, vigorous trees with well-developed crowns are best able to adapt to these changing site conditions.

Attachment 7. Glossary of Forestry and Arboricultural Terminology

DBH: Diameter at Breast Height (measured 4.5 ft. above the ground line on the high side of the tree).

Live Crown Ratio: Ratio of live foliage on the stem of the tree. Example: A 100' tall tree with 40 feet of live crown would have a 40% live crown ratio. Conifers with less than 30% live crown ratio are generally not considered to be long-term trees in forestry.

Crown: Portion of a trees stem covered by live foliage.

Crown Position: Position of the crown with respect to other trees in the stand.

Dominant Crown Position: Receives light from above and from the sides.

Codominant Crown Position: Receives light from above and some from the sides.

Intermediate Crown Position: Receives little light from above and none from the sides. Trees tend to be slender with poor live crown ratios.

Suppressed Crown Position: Receives no light from above and none from the sides. Trees tend to be slender with poor live crown ratios.

Attachment 8. Assumptions and Limiting Conditions

- 1) Any legal description provided to the Washington Forestry Consultants, Inc. is assumed to be correct. Any titles and ownership's to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as though free and clear, under responsible ownership and competent management.
- 2) It is assumed that any property is not in violation of any applicable codes, ordinances, statutes, or other governmental regulations, unless otherwise stated.
- 3) Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, Washington Forestry Consultants, Inc. can neither guarantee nor be responsible for the accuracy of information.
- 4) Washington Forestry Consultants, Inc. shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.
- 5) Loss or alteration of any part of this report invalidated the entire report.
- 6) Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of Washington Forestry Consultants, Inc.
- 7) Neither all or any part of the contents of this report, nor copy thereof, shall be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales or other media, without the prior expressed written or verbal consent of Washington Forestry Consultants, Inc. -- particularly as to value conclusions, identity of Washington Forestry Consultants, Inc., or any reference to any professional society or to any initialed designation conferred upon Washington Forestry Consultants, Inc. as stated in its qualifications.
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- 9) Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.
- 10) Unless expressed otherwise: 1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and 2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the tree or other plant or property in question may not arise in the future.

Note: Even healthy trees can fail under normal or storm conditions. The only way to eliminate all risk is to remove all trees within reach of all targets. Annual monitoring by an ISA Certified Arborist or Certified Forester will reduce the potential of tree failures. It is impossible to predict with certainty that a tree will stand or fail, or the timing of the failure. It is considered an 'Act of God' when a tree fails, unless it is directly felled or pushed over by man's actions.