TREE MANAGEMENT PLAN

4680 HEADQUARTERS ROAD

COURTENAY, BC

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current ENVIRONMENTAL

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1 INTRODUCTION

This Tree Management Plan (TMP) was prepared by Current Environmental Ltd. (CEL) on behalf of Monterra Projects Ltd. (the Client) at 4680 Headquarters Road, Courtenay, BC (the Property) as part of an Environmental Development Permit application. The greenfield Property is 2.65 hectares in size and extends northeast of Headquarters Road. This TMP includes the results and discussion of a tree inventory and limited visual assessment (level 1) risk assessment conducted on all trees greater than 20 cm diameter at breast height (DBH) on the Property.

This report includes a Level 1 TRAQ assessment and is intended to supplement and reinforce the initial *Arborist Assessment and Inventory of Trees at: 4680 & 4694 Headquarters Road* conducted by Aaron Salt of Grow Tree Care (2022)[1], wherein red alder, cottonwood, and the majority of bitter cherry trees were not inventoried nor assessed at that time. This assessment also considers the Client's conceptual development plans and provides recommendations for retention of existing trees on the periphery of the development footprint to help maintain ecological functions on the site where possible. Tree management recommendations made herein will correspond with related measures to protect the environment described in the project Environmental Impact Assessment (EIA) and Construction Environmental management Plan (CEMP).

2 METHODS

The following sub-sections outline methods utilized during the 2024 inventory and risk assessment.

2.1 TREE INVENTORY

Numerical metal tags were attached to individual trees for identification in the field. GPS points were taken and are represented on Figures 2-7. For the purposes of this report, the following information was recorded: Tree ID, species, diameter at breast height (DBH), height, number of stems, tree condition, live crown ratio (LCR), and general comments.

2.1.1 Definitions

Diameter at Breast Height (DBH): diameter of trunk, measured in centimetres at 1.4 m above ground level. For trees with multiple stems, DBH is the sum of 100% of the diameter of the largest stem and 60% of the diameter of the next two largest stems.

Tree Condition: refers to the overall tree health. It is a rating system developed by the Council of Tree and Landscape Appraisers[2]. This system takes into account the tree's vigor, presence of pest issues, and any stress symptoms. Tree structure and form are also considered. Ratings are out of 100 with trees rated below 70% having a below-average life expectancy for the species.

Live Crown Ratio (LCR): measurement to indicate tree vigor. The percentage of a tree's total height that has foliage.

[1] Aaron Salt (May 11, 2022). Arborist Assessment and Inventory of Trees at: 4680 & 4694 Headquarters Road, Courtenay, BC.

[2] https://www.extension.purdue.edu/extmedia/FNR/FNR-473-W.pdf

Tree Protection Zone (TPZ): A calculated radial measurement in metres from the trunk of the tree. It is the optimal size of tree protection zone and is calculated by multiplying the DBH of the tree by 12 and dividing by 100, which is the industry Best Management Practice.

Note these measurements do not consider factors such as restricted root growth, limited soil volumes, age, crown spread, health, or structure. Tree Protection Zones laid out in the field will be based on tree specific knowledge and the findings of the assessment found in Tables 2 and 3.

Only protected species, as defined by the City of Courtenay Tree Protection Bylaw No. 2850[3], trees found within 3 m of the stream SPEA setback, and trees proposed for retention received TPZ calculations.

2.2 TREE RISK ASSESSMENT

A limited visual assessment (Level 1) was conducted on each tree, in accordance with Tree Risk Assessment Qualification (TRAQ) methods[4] and International Society of Arboriculture (ISA) Best Management Practices in conjunction with the tree inventory on November 15 and 18, 2024, on the context of the existing land use. Table 1 outlines 2 targets considered within the existing land use.

Table 1. Targets for existing land use.

Target	Occupancy Rate
Users of Old Island Highway (Vehicles and Pedestrians)	Frequent
Existing House	Frequent

Consideration was also given to future targets resulting from proposed development activities. However, because the exact location and nature of these targets are currently unknown, they were not classified as a formal target for this risk assessment.

3 RESULTS

The development area contains a mixture of coniferous and deciduous native tree species and is considered to be part of the eastern variant of the very dry maritime subzone of the Coastal Western Hemlock bio-geoclimatic Zone (Figure 1). Understory species observed include: salmonberry, American skunk-cabbage, slough sedge, oceanspray, and maple saplings. Invasive species such as holly and Himalayan blackberry have a significant presence on site.

Results of the tree inventory and tree risk assessment can be found in Sections 3.1 and 3.2, respectively.

[3] City of Courtenay. (2016). *Tree Protection and Management Bylaw No. 2850*. Accessed from: BYLAW NO. 2850 CONSOLIDATED VERSION (courtenay.ca)

[4] 2017. Tree Risk Assessment Manual, Second Edition. Dunster et. al.

Figure 1. 4680 Headquarters - Site Overview

3.1 TREE INVENTORY

On November 15th and 18th, 2024, an inventory of trees greater than 20 cm diameter at breast height (DBH) was conducted at 4680 Headquarters Road. 166 trees were inventoried in 2024 and are provided in Table 1, while 150 trees were inventoried by Grow Tree Care in 2022 and are provided in Table 2. Three hundred and sixteen (316) trees were inventoried in total. Trees inventoried in 2022 were re-assessed in 2024 and found to be in equal condition.

Tree inventory results can be found in Table 2 (2024 results) and Table 3 (2022 results). Of significance there were 68 bitter cherry (22 %), 100 Douglas fir (32 %), 102 red alder (32 %), and 7 Garry oak (2%), with the remaining 39 trees (7%) comprised of native and non-native species. Native tree species found in this area include: Garry oak, black hawthorn, grand fir, Sitka spruce, Douglas fir, bitter cherry, red alder, and black cottonwood. Non-native tree species observed on the subject property include: sycamore maple, weeping willow, Lombardy poplar, cypress, and black pine.

The steep slope extending up the back of the property toward the Old Island Highway is characterized by three different forest communities. Red alder dominates the lower areas of site toward the neighbouring property at 4694 Headquarters as shown on Figures 4 and 5. These alders are in various states of health, ranging from moderate to standing dead. Mid-slope is characterized by bitter cherry and red alder, while the upper slope closest to the highway is dominated by mature second-growth Douglas fir (Figures 4, 6, and 7). The bitter cherry and Douglas fir forests are in moderate to good health. The understory of the forest is sparsely vegetated or colonized by invasive species.

3.2 TREE RISK ASSESSMENT

There were no trees observed to be moderate, high, or extreme risk within the context of existing land use. Therefore, given present conditions, no trees would require hazard abatement to eliminate present and/or future risk within a 1-year period from the time of this assessment. It is recommended that retained trees be reassessed at 3-year and 5-years post construction and following any significant disturbance from the development.

3.3 PROTECTED TREES AND ENVIRONMENTALLY SENSTIVE AREAS

As mentioned previously, there were 7 Garry oaks inventoried on the subject property. This tree species is protected within the *City of Courtenay Tree Protection and Management Bylaw No. 2850*[5] and detailed in Section 4.1.

There is an unnamed stream tributary to the Tsolum River in the west corner of site, adjacent 3011 Glacier Road and 4694 Headquarters Road (Figure 5). This stream flows into the constructed channel and wetlands on 4694 Headquarters Road completed summer 2024 and requires further biological assessment to confirm setbacks. For this report, Streamside Protection and Enhancement Area (SPEA) setbacks are estimated to be 10 m, which is consistent with previous calculations at 4694 Headquarters. The SPEA is an estimated 0.10 hectares and contains approximately 27 trees with DBH > 20 cm: 4 bitter cherry and 23 red alder (Table 4). Trees within 3 m of the stream SPEA are included in Table 4 due to variable GPS accuracy. Further discussion is found in Section 4.2.

[5] City of Courtenay. (2016). *Tree Protection and Management Bylaw No. 2850*. Accessed from: BYLAW NO. 2850 CONSOLIDATED VERSION (courtenay.ca)

Table 2. 2024 tree Inventory results at 4680 Headquarters Road (Current Environmental).

Tree ID	Species		DBH (cm)	Height (m)	Number of Stems	Protected (Y/N)	Tree Condition (%)	Live Crown Ratio (LCR)	TPZ (m)	Comments
	Common	Scientific								
020	Western Redcedar	*Thuja plicata*	72.2	20	3	N	80	90		
022	Red alder	*Alnus rubra*	48.2	28	2	N	70	70	5.8	Member of potential retention stand.
028	Western Redcedar	*Thuja plicata*	38	20	1	N	80	90		
029	Douglas fir	*Pseudotsuga menziesii*	38	27	1	N	80	90		
030	Western Redcedar	*Thuja plicata*	46	25	1	N	80	70		
031	Douglas fir	*Pseudotsuga menziesii*	40	30	1	N	70	70		
033	Douglas fir	*Pseudotsuga menziesii*	37	27	1	N	70	70		
034	Garry oak	*Quercus garryana*	75	30	1	Y	70	60	9.0	Retain
035	Grand fir	*Abies grandis*	63	30	1	N	70	70	7.6	Member of potential retention stand.
036	Garry oak	*Quercus garryana*	62	27	1	Y	70	60	7.4	Retain
037	Garry oak	*Quercus garryana*	65	32	1	Y	70	80	7.8	Retain
038	Malus sp.	*Malus sp.*	35	10	1	N	80	80		
040	Douglas fir	*Pseudotsuga menziesii*	30	26	1	N	60	60		
041	Bitter cherry	Prunus emarginata	29	22	1	N	60	60	3.5	Member of potential retention stand.
042	Garry oak	*Quercus garryana*	42	25	1	Y	70	70	5.0	Retain
044	Douglas fir	*Pseudotsuga menziesii*	45	30	1	N	80	80		
045	Bitter cherry	Prunus emarginata	24	21	1	N	70	40		
049	Red alder	*Alnus rubra*	48	30	1	N	70	80	5.8	Member of potential retention stand.
050	Garry oak	*Quercus garryana*	47	27	1	Y	70	70	5.6	Retain
051	Garry oak	*Quercus garryana*	28	15	1	Y	50	50	3.4	Retain
059	Grand fir	*Abies grandis*	43	30	1	N	80	50		
060	Red alder	*Alnus rubra*	25	28	1	N	50	50		
061	Western Redcedar	*Thuja plicata*	57.8	20	2	N	70	90		
062	Red alder	*Alnus rubra*	35	16	1	N	50	50		
064	Red alder	*Alnus rubra*	73.4	26	4	N	60	60		
065	Red alder	*Alnus rubra*	46.6	30	2	N	70	60		
066	Black cottonwood	*Populus trichocarpa*	46	22	1	N	70	70		

Tree ID	Species		DBH (cm)	Height (m)	Number of Stems	Protected (Y/N)	Tree Condition (%)	Live Crown Ratio (LCR)	TPZ (m)	Comments
	Common	Scientific								
068	Bitter cherry	Prunus emarginata	24	23	1	N	60	60		
069	Red alder	*Alnus rubra*	88.8	30	4	N	80	80		
070	Red alder	*Alnus rubra*	40	26	1	N	70	70		
071	Red alder	*Alnus rubra*	23	17	1	N	70	60		
072	Bitter cherry	Prunus emarginata	25	17	1	N	60	70		
073	Red alder	*Alnus rubra*	81	31	3	N	70	70		
074	Red alder	*Alnus rubra*	26	25	1	N	60	70		
076	Red alder	*Alnus rubra*	28	25	1	N	60	60		
078	Bitter cherry	Prunus emarginata	27	25	1	N	60	70		
080	Red alder	*Alnus rubra*	29	26	1	N	70	80		
081	Red alder	*Alnus rubra*	48.2	15	2	N	60	70		
082	Red alder	*Alnus rubra*	48	30	1	N	60	70		
083	Bitter cherry	Prunus emarginata	40	29	1	N	70	60		
084	Red alder	*Alnus rubra*	45	30	1	N	70	80		
085	Douglas fir	*Pseudotsuga menziesii*	40	25	1	N	80	80		
086	Red alder	*Alnus rubra*	22	27	1	N	40	40		
087	Bitter cherry	Prunus emarginata	36	23	1	N	70	80		
092	Red alder	*Alnus rubra*	51.2	28	2	N	60	60		
093	Red alder	*Alnus rubra*	88	30	3	N	50	80		Large lateral failure. In decline.
094	Bitter cherry	Prunus emarginata	27	25	1	N	60	70		
095	Red alder	*Alnus rubra*	25	27	1	N	60	40		
096	Black cottonwood	*Populus trichocarpa*	48	23	1	N	70	80		
097	Red alder	*Alnus rubra*	65	20	1	N	50	80		In decline, missing large lateral. Missing top.
098	Red alder	*Alnus rubra*	58	30	2	N	80	60		
100	Red alder	*Alnus rubra*	24	12	1	N	40	20		Broken off top.
303	Red alder	*Alnus rubra*	31	30	1	N	60	60		
304	Bitter cherry	Prunus emarginata	24	20	1	N	70	80		
305	Bitter cherry	Prunus emarginata	32	20	1	N	70	60		

Tree ID	Species		DBH (cm)	Height (m)	Number of Stems	Protected (Y/N)	Tree Condition (%)	Live Crown Ratio (LCR)	TPZ (m)	Comments
	Common	Scientific								
306	Bitter Cherry	Prunus emarginata	50	25	2	N	50	40	6.0	Heavy ivy infestation. Within 3 m of approximate stream SPEA.
307	Red alder	*Alnus rubra*	28	30	1	N	60	30		
308	Red alder	*Alnus rubra*	44		1	N			5.3	Within 3 m of approximate stream SPEA.
311	Bitter cherry	Prunus emarginata	24	26	1	N	70	70		
325	Red alder	*Alnus rubra*	26		1	N				Previously included as a removal on TCP2414.
330	Red alder	*Alnus rubra*	26		1	N				Previously included as a removal on TCP2414.
351	Red alder	*Alnus rubra*	40	25	1	N	50	40	4.8	Within 3 m of approximate stream SPEA.
384	Red alder	*Alnus rubra*	27		1	N				
385	Red alder	*Alnus rubra*	21		1	N				
386	Red alder	*Alnus rubra*	34		1	N				Previously included as a removal on TCP2414.
390	Red alder	*Alnus rubra*	24	27	1	N	60	50		
394	Red alder	*Alnus rubra*	30	31	1	N	50	40		
395	Red alder	*Alnus rubra*	35	25	1	N	70	70		
401	Red alder	*Alnus rubra*	33	29	1	N	60	50		
402	Bitter Cherry	Prunus emarginata	33	26	1	N	60	40		
403	Red alder	*Alnus rubra*	30	27	1	N	60	50		
404	Red alder	*Alnus rubra*	53	27	1	N	50	60	6.4	Root rot, ivy in canopy.
405	Red alder	*Alnus rubra*	72	23	2	N	60	50		
406	Red alder	*Alnus rubra*	21	18	1	N	60	40		
407	Red alder	*Alnus rubra*	40	28	1	N	60	50	4.8	Within 3 m of approximate stream SPEA.
408	Red alder	*Alnus rubra*	29	30	1	N	60	40		
409	Red alder	*Alnus rubra*	57	25	2	N	80	60		
410	Bitter cherry	Prunus emarginata	27	26	1	N	70	50		
411	Bitter cherry	Prunus emarginata	24	28	1	N	70	50		
412	Red alder	*Alnus rubra*	25	22	1	N	60	50	3.0	Within 3 m of approximate stream SPEA.
413	Red alder	*Alnus rubra*	28	20	1	N	80			Standing dead.
414	Red alder	*Alnus rubra*	46	28	1	N	50	50	5.5	Heavy ivy infestation. Within 3 m of approximate stream SPEA.

Tree ID	Species		DBH (cm)	Height (m)	Number of Stems	Protected (Y/N)	Tree Condition (%)	Live Crown Ratio (LCR)	TPZ (m)	Comments
	Common	Scientific								
415	Bitter cherry	Prunus emarginata	22	27	1	N	60	50		
416	Red alder	*Alnus rubra*	50	30	1	N	80	70		
417	Red alder	*Alnus rubra*	48	28	1	N	70	70		
418	Red alder	*Alnus rubra*	21	20	1	N	40	50		
419	Red alder	*Alnus rubra*	23	20	1	N	40	40		
420	Red alder	*Alnus rubra*	33	25	1	N	40	60		In decline.
421	Red alder	*Alnus rubra*	28	22	1	N	40	20		
422	Red alder	*Alnus rubra*	32	24	1	N	70	70		
423	Red alder	*Alnus rubra*	32	24	1	N	60	30		
424	Red alder	*Alnus rubra*	23	20	1	N	40	80		In decline.
425	Bitter cherry	Prunus emarginata	23	22	1	N	60	40		
426	Bitter Cherry	Prunus emarginata	39.4	21	2	N	70	60		
427	Bitter cherry	Prunus emarginata	28	26	1	N	60	40		
428	Bitter cherry	Prunus emarginata	36	28	1	N	60	60		
429	Bitter cherry	Prunus emarginata	41	32	1	N	70	60		
430	Red alder	*Alnus rubra*	35	21	1	N	50	60		
431	Red alder	*Alnus rubra*	38	17	1	N	40	40		Root plate lifting, uncorrected lean, hung up on adjacent tree.
432	Bitter cherry	Prunus emarginata	34	23	1	N	70	60		
433	Red alder	*Alnus rubra*	51.2	27	2	N	50	40	6.1	Heavy ivy infestation. Within 3 m of approximate stream SPEA.
434	Bitter cherry	Prunus emarginata	27	25	1	N	70	60		
435	Bitter cherry	Prunus emarginata	31	22	1	N	50	80		Cavity at base.
436	Bitter cherry	Prunus emarginata	29	24	1	N	70	60		
437	Red alder	*Alnus rubra*	29	27	1	N	60	40		
438	Bitter cherry	Prunus emarginata	24	25	1	N	60	50		
439	Red alder	*Alnus rubra*	61.2	32	2	N	20	30	7.3	Two types of fruiting bodies on truck/roots. Within 3 m of approximate stream SPEA.
440	Red alder	*Alnus rubra*	53.8	27	2	N	60	60	6.5	Within 3 m of approximate stream SPEA.
441	Red alder	*Alnus rubra*	37	26	1	N	70	50		

Tree ID	Species		DBH (cm)	Height (m)	Number of Stems	Protected (Y/N)	Tree Condition (%)	Live Crown Ratio (LCR)	TPZ (m)	Comments
	Common	Scientific								
442	Bitter cherry	Prunus emarginata	27	23	1	N	80	80		
443	Red alder	*Alnus rubra*	28	30	1	N	70	50		
444	Red alder	*Alnus rubra*	25	24	1	N	60	40		
445	Red alder	*Alnus rubra*	52	28	1	N	80	60		
446	Red alder	*Alnus rubra*	52	30	1	N	50	60		
447	Red alder	*Alnus rubra*	47	24	1	N	60	40	5.6	Within 3 m of approximate stream SPEA.
448	Red alder	*Alnus rubra*	45	20	1	N				Standing dead.
449	Bitter Cherry	Prunus emarginata	26	25	1	N	70	60	3.1	Within 3 m of approximate stream SPEA.
450	Bitter cherry	Prunus emarginata	28	28	1	N	70	60		
451	Red alder	*Alnus rubra*	40	30	1	N	80	70	4.8	Within 3 m of approximate stream SPEA.
452	Red alder	*Alnus rubra*	27	23	1	N	50	40	3.2	Large cavity @ 2 m above ground surface. Within 3 m of approximate stream SPEA.
453	Red alder	*Alnus rubra*	37	22	1	N	50	40	4.4	Within 3 m of approximate stream SPEA.
454	Red alder	*Alnus rubra*	21	22	1	N	60	30		
455	Red alder	*Alnus rubra*	31	30	1	N	60	40		
456	Bitter cherry	Prunus emarginata	21	23	1	N	70	40		Next to dug well/old foundation.
457	Bitter cherry	Prunus emarginata	29	25	1	N	70	50		
458	Bitter cherry	Prunus emarginata	33.2	24	5	N	70	50		Next to dug well/old foundation.
459	Red alder	*Alnus rubra*	35	17	1	N	70	60		
460	Red alder	*Alnus rubra*	24	25	1	N	30	80		In decline.
461	Red alder	*Alnus rubra*	34	30	1	N	70	60		
462	Red alder	*Alnus rubra*	31	28	1	N	60	40		
463	Bitter cherry	Prunus emarginata	20	20	1	N	40	50		
465	Red alder	*Alnus rubra*	27	25	1	N	40	70		
466	Bitter cherry	Prunus emarginata	20	22	1	N	70	70		
467	Bitter cherry	Prunus emarginata	24	24	1	N	60	30		
468	Red alder	*Alnus rubra*	30	27	1	N	70	40		
469	Red alder	*Alnus rubra*	33	27	1	N	50	50		
470	Red alder	*Alnus rubra*	25	25	1	N	70	20		

Tree ID	Species		DBH (cm)	Height (m)	Number of Stems	Protected (Y/N)	Tree Condition (%)	Live Crown Ratio (LCR)	TPZ (m)	Comments
	Common	Scientific								
471	Red alder	*Alnus rubra*	40	28	1	N	60	70	4.8	Within 3 m of approximate stream SPEA.
472	Red alder	*Alnus rubra*	34	28	1	N	70	50	4.1	Corrected lean. Within 3 m of approximate stream SPEA.
473	Red alder	*Alnus rubra*	25	25	1	N	70	60	3.0	Within 3 m of approximate stream SPEA.
474	Red alder	*Alnus rubra*	30	28	1	N	60	50		
475	Red alder	*Alnus rubra*	32	30	1	N	60	50		
476	Bitter cherry	Prunus emarginata	27	23	1	N	60	60		
477	Red alder	*Alnus rubra*	34	31	1	N	80	60		
478	Red alder	*Alnus rubra*	48	22	1	N	10	60		Actively failing, root/trunk decay, hung up on adjacent tree.
479	Red alder	*Alnus rubra*	41.6	22	2	N	70	60		
480	Red alder	*Alnus rubra*	21	21	1	N	60	40		
481	Red alder	*Alnus rubra*	36	25	1	N	70	60		
482	Red alder	*Alnus rubra*	23	22	1	N	60	40		
483	Red alder	*Alnus rubra*	32	25	1	N	70	40		
484	Red alder	*Alnus rubra*	53	30	1	N	70	60		
485	Bitter cherry	Prunus emarginata	20	25	1	N	60	30		
486	Red alder	*Alnus rubra*	36	26	1	N	60	60	4.3	Within 3 m of approximate stream SPEA.
487	Red alder	*Alnus rubra*	51	30	1	N	60	50	6.1	Heavy ivy infestation. Within 3 m of approximate stream SPEA.
488	Bitter Cherry	Prunus emarginata	50.8	20	3	N	60	60	6.1	Within 3 m of approximate stream SPEA.
489	Bitter Cherry	Prunus emarginata	33.4	21	2	N	80	60	4.0	Within 3 m of approximate stream SPEA.
490	Red alder	*Alnus rubra*	35	20	1	N	60	40	4.2	Within 3 m of approximate stream SPEA.
491	Red alder	*Alnus rubra*	26	22	1	N	60	50		
492	Red alder	*Alnus rubra*	27	22	1	N	40	20		
493	Red alder	*Alnus rubra*	23	18	1	N	40	80		
494	Bitter cherry	Prunus emarginata	21	25	1	N	60	30		
495	Bitter cherry	Prunus emarginata	22	25	1	N	70	80		
496	Bitter cherry	Prunus emarginata	28	26	1	N	70	50		
497	Red alder	*Alnus rubra*	29	22	1	N	40	20		
498	Sycamore maple	*Acer pseudoplatanus*	24	15	1	N	60	80		

Tree ID	Species		DBH (cm)	Height (m)	Number of Stems	Protected (Y/N)	Tree Condition (%)	Live Crown Ratio (LCR)	TPZ (m)	Comments
	Common	Scientific								
499	Red alder	*Alnus rubra*	36	24	1	N	60	40	4.3	Within 3 m of approximate stream SPEA.

Table 3. 2022 tree Inventory results at 4680 Headquarters Road (Grow Tree Care).

Tree ID	Species		DBH (cm)	Protected (Y/N)	TPZ (m)	Health	Comments
	Common	Scientific					
542	Black hawthorne	*Crataegus douglasii*	24	N		Good	
546	Weeping willow	*Salix babylonica*	62	N		Good	
547	Douglas fir	*Pseudotsuga menziesii*	80	N	9.6	Good	Member of potential retention stand.
548	Douglas fir	*Pseudotsuga menziesii*	98	N	11.8	Good	Member of potential retention stand.
549	Douglas fir	*Pseudotsuga menziesii*	78	N	9.36	Good	Member of potential retention stand.
550	Douglas fir	*Pseudotsuga menziesii*	55	N	6.6	Fair	Member of potential retention stand.
551	Douglas fir	*Pseudotsuga menziesii*	75	N	9	Fair	Member of potential retention stand.
552	Douglas fir	*Pseudotsuga menziesii*	50	N	6	Fair	Member of potential retention stand.
553	Douglas fir	*Pseudotsuga menziesii*	22	N	2.64	Poor	Member of potential retention stand.
554	Malus sp.	*Malus sp.*	22	N	2.64	Fair	Member of potential retention stand.
555	Douglas fir	*Pseudotsuga menziesii*	70	N	8.4	Good	Member of potential retention stand.
556	Malus sp.	*Malus sp.*	32	N		Fair	
557	Malus sp.	*Malus sp.*	40	N		Fair	
558	Malus sp.	*Malus sp.*	35	N		Poor	
559	Black hawthorn	*Crataegus douglasii*	32	N		Good	
560	Black hawthorn	*Crataegus douglasii*	32	N		Good	
561	Black hawthorn	*Crataegus douglasii*	40	N		Good	
562	Bitter cherry	*Prunus emarginata*	22	N		Fair	
563	Douglas fir	*Pseudotsuga menziesii*	83	N	9.96	Good	Member of potential retention stand.
564	Douglas fir	*Pseudotsuga menziesii*	140	N	16.8	Fair	Member of potential retention stand.
565	Malus sp.	*Malus sp.*	35	N	4.2	Fair	Member of potential retention stand.
566	Malus sp.	*Malus sp.*	24	N	2.88	Fair	Member of potential retention stand.
567	Malus sp.	*Malus sp.*	44	N	5.28	Poor	Member of potential retention stand.
568	Douglas fir	*Pseudotsuga menziesii*	35	N	4.2	Fair	Member of potential retention stand.
569	Bitter cherry	*Prunus emarginata*	30	N	3.6	Fair	Member of potential retention stand.
570	Bitter cherry	*Prunus emarginata*	20	N	2.4	Fair	Member of potential retention stand.
571	Bitter cherry	*Prunus emarginata*	22	N		Fair	
572	Bitter cherry	*Prunus emarginata*	32	N	3.84	Fair	Member of potential retention stand.
573	Bitter cherry	*Prunus emarginata*	35	N	4.2	Fair	Member of potential retention stand.
574	Bigleaf maple	*Acer macrophyllum*	83	N	9.96	Good	Member of potential retention stand.
575	Bitter cherry	*Prunus emarginata*	35	N	4.2	Fair	Member of potential retention stand.
576	Bitter cherry	*Prunus emarginata*	30	N	3.6	Fair	Member of potential retention stand.
577	Bitter cherry	*Prunus emarginata*	38	N	4.56	Fair	Member of potential retention stand.
578	Bitter cherry	*Prunus emarginata*	24	N	2.88	Fair	Member of potential retention stand.

Tree ID	Species		DBH (cm)	Protected (Y/N)	TPZ (m)	Health	Comments
	Common	Scientific					
579	Bitter cherry	*Prunus emarginata*	60	N	7.2	Fair	Member of potential retention stand.
580	Bitter cherry	*Prunus emarginata*	30	N	3.6	Fair	Member of potential retention stand.
581	Bitter cherry	*Prunus emarginata*	22	N	2.64	Good	Member of potential retention stand.
582	Bitter cherry	*Prunus emarginata*	20	N	2.4	Good	Member of potential retention stand.
583	Cascara	*Frangula purshiana*	24	N	2.88	Good	Member of potential retention stand.
584	Cascara	*Frangula purshiana*	32	N	3.84	Poor	Member of potential retention stand.
585	Bitter cherry	*Prunus emarginata*	50	N	6	Poor	Member of potential retention stand.
586	Douglas fir	*Pseudotsuga menziesii*	44	N	5.28	Good	Member of potential retention stand.
587	Malus sp.	*Malus sp.*	40	N	4.8	Good	Member of potential retention stand.
588	Malus sp.	*Malus sp.*	44	N	5.28	Good	Member of potential retention stand.
589	Bitter cherry	*Prunus emarginata*	35	N		Good	
590	Bitter cherry	*Prunus emarginata*	32	N		Good	
591	Bitter cherry	*Prunus emarginata*	27	N		Good	
592	Bitter cherry	*Prunus emarginata*	22	N		Fair	
593	Bitter cherry	*Prunus emarginata*	27	N		Fair	
594	Bitter cherry	*Prunus emarginata*	22	N		Fair	
595	Douglas fir	*Pseudotsuga menziesii*	55	N		Fair	
596	Douglas fir	*Pseudotsuga menziesii*	40	N		Fair	
597	Douglas fir	*Pseudotsuga menziesii*	60	N		Good	
598	Douglas fir	*Pseudotsuga menziesii*	70	N		Good	
599	Douglas fir	*Pseudotsuga menziesii*	62	N		Good	
600	Douglas fir	*Pseudotsuga menziesii*	52	N		Good	
601	Douglas fir	*Pseudotsuga menziesii*	70	N		Good	
602	Douglas fir	*Pseudotsuga menziesii*	104	N		Good	
603	Douglas fir	*Pseudotsuga menziesii*	83	N		Good	Tree tag fell off. Retagged as 464.
604	Sycamore maple	*Acer pseudoplatanus*	48	N		Fair	Previously assessed as a bigleaf maple.
605	Sitka spruce	*Picea sitchensis*	75	N		Fair	
606	Sycamore maple	*Acer pseudoplatanus*	75	N		Good	Tree tag fell off. Retagged as 099. Previously assessed as a bigleaf maple.
607	Douglas fir	*Pseudotsuga menziesii*	50	N		Fair	
608	Douglas fir	*Pseudotsuga menziesii*	57	N		Fair	
609	Douglas fir	*Pseudotsuga menziesii*	62	N		Good	
610	Douglas fir	*Pseudotsuga menziesii*	70	N		Good	
611	Douglas fir	*Pseudotsuga menziesii*	80	N		Good	
612	Douglas fir	*Pseudotsuga menziesii*	78	N		Good	

Tree ID	Species		DBH (cm)	Protected (Y/N)	TPZ (m)	Health	Comments
	Common	Scientific					
613	Douglas fir	*Pseudotsuga menziesii*	91	N		Good	
614	Douglas fir	*Pseudotsuga menziesii*	44	N		Fair	
615	Douglas fir	*Pseudotsuga menziesii*	70	N		Good	
616	Douglas fir	*Pseudotsuga menziesii*	24	N		Poor	
617	Douglas fir	*Pseudotsuga menziesii*	71	N		Good	
618	Douglas fir	*Pseudotsuga menziesii*	91	N		Good	
619	Douglas fir	*Pseudotsuga menziesii*	160	N		Fair	
620	Douglas fir	*Pseudotsuga menziesii*	120	N		Good	
621	Douglas fir	*Pseudotsuga menziesii*	52	N		Fair	
622	Douglas fir	*Pseudotsuga menziesii*	35	N		Fair	
623	Douglas fir	*Pseudotsuga menziesii*	64	N		Poor	
624	Douglas fir	*Pseudotsuga menziesii*	27	N		Poor	
625	Douglas fir	*Pseudotsuga menziesii*	91	N		Good	
626	Douglas fir	*Pseudotsuga menziesii*	24	N		Fair	
627	Grand fir	*Abies grandis*	64	N		Good	
628	Douglas fir	*Pseudotsuga menziesii*	55	N		Good	
629	Douglas fir	*Pseudotsuga menziesii*	55	N		Fair	
630	Douglas fir	*Pseudotsuga menziesii*	35	N		Fair	
631	Douglas fir	*Pseudotsuga menziesii*	35	N		Fair	
632	Douglas fir	*Pseudotsuga menziesii*	24	N		Fair	
633	Douglas fir	*Pseudotsuga menziesii*	63	N		Good	
634	Douglas fir	*Pseudotsuga menziesii*	57	N		Good	
635	Douglas fir	*Pseudotsuga menziesii*	55	N	6.6	Good	Member of potential retention stand.
636	Douglas fir	*Pseudotsuga menziesii*	55	N	6.6	Good	Member of potential retention stand.
637	Douglas fir	*Pseudotsuga menziesii*	68	N		Good	
638	Douglas fir	*Pseudotsuga menziesii*	75	N	9	Good	Member of potential retention stand.
639	Douglas fir	*Pseudotsuga menziesii*	24	N		Fair	
640	Douglas fir	*Pseudotsuga menziesii*	64	N	7.68	Good	Member of potential retention stand.
641	Douglas fir	*Pseudotsuga menziesii*	80	N	9.6	Good	Member of potential retention stand.
642	Douglas fir	*Pseudotsuga menziesii*	57	N	6.84	Good	Member of potential retention stand.
643	Douglas fir	*Pseudotsuga menziesii*	71	N	8.52	Good	Member of potential retention stand.
644	Douglas fir	*Pseudotsuga menziesii*	62	N		Fair	
645	Douglas fir	*Pseudotsuga menziesii*	75	N		Good	
646	Douglas fir	*Pseudotsuga menziesii*	48	N		Fair	
647	Douglas fir	*Pseudotsuga menziesii*	55	N		Fair	

Tree ID	Species		DBH (cm)	Protected (Y/N)	TPZ (m)	Health	Comments
	Common	Scientific					
648	Douglas fir	*Pseudotsuga menziesii*	75	N		Good	
649	Douglas fir	*Pseudotsuga menziesii*	80	N		Good	
650	Douglas fir	*Pseudotsuga menziesii*	52	N		Good	
651	Douglas fir	*Pseudotsuga menziesii*	57	N		Good	
652	Douglas fir	*Pseudotsuga menziesii*	60	N		Fair	
653	Douglas fir	*Pseudotsuga menziesii*	68	N		Good	
654	Douglas fir	*Pseudotsuga menziesii*	63	N		Good	
655	Douglas fir	*Pseudotsuga menziesii*	60	N		Good	
656	Douglas fir	*Pseudotsuga menziesii*	60	N		Fair	
657	Douglas fir	*Pseudotsuga menziesii*	70	N		Good	
657.1	Douglas fir	*Pseudotsuga menziesii*	70	N		Good	
658	Douglas fir	*Pseudotsuga menziesii*	52	N		Good	
659	Douglas fir	*Pseudotsuga menziesii*	80	N		Fair	
660	Douglas fir	*Pseudotsuga menziesii*	64	N		Good	
661	Douglas fir	*Pseudotsuga menziesii*	50	N		Good	
662	Douglas fir	*Pseudotsuga menziesii*	78	N		Good	
663	Douglas fir	*Pseudotsuga menziesii*	63	N		Good	
664	Douglas fir	*Pseudotsuga menziesii*	78	N		Good	
665	Douglas fir	*Pseudotsuga menziesii*	70	N		Good	
666	Douglas fir	*Pseudotsuga menziesii*	50	N		Good	
667	Douglas fir	*Pseudotsuga menziesii*	60	N		Good	
668	Douglas fir	*Pseudotsuga menziesii*	44	N		Good	
669	Douglas fir	*Pseudotsuga menziesii*	78	N		Good	
670	Douglas fir	*Pseudotsuga menziesii*	57	N		Good	
671	Douglas fir	*Pseudotsuga menziesii*	55	N		Good	
672	Cascara	*Frangula purshiana*	40	N		Good	
673	Lombardy poplar	*Populus nigra 'Italica'*	60	N		Good	
674	Lombardy poplar	*Populus nigra 'Italica'*	104	N		Good	
675	Malus sp.	*Malus sp.*	30	N		Good	
677	Black hawthorn	*Crataegus douglasii*	22	N		Good	
678	Douglas fir	*Pseudotsuga menziesii*	88	N		Good	
679	Bitter cherry	*Prunus emarginata*	55	N		Good	
680	Garry oak	*Quercus garryana*	81	Y	9.72	Good	Retain
681	Douglas fir	*Pseudotsuga menziesii*	156	N		Good	
682	Cypress	*Cupressaceae sp.*	98	N		Good	

Tree ID	Species		DBH (cm)	Protected (Y/N)	TPZ (m)	Health	Comments
	Common	Scientific					
683	Black pine	*Pinus nigra*	68	N		Good	
684	Bitter cherry	*Prunus emarginata*	27	N		Good	
685	Bitter cherry	*Prunus emarginata*	24	N		Good	
686	Douglas fir	*Pseudotsuga menziesii*	44	N		Good	
687	Douglas fir	*Pseudotsuga menziesii*	32	N		Poor	
688	Douglas fir	*Pseudotsuga menziesii*	27	N		Poor	
689	Douglas fir	*Pseudotsuga menziesii*	50	N		Fair	
690	Douglas fir	*Pseudotsuga menziesii*	32	N		Fair	
691	Bigleaf maple	*Acer macrophyllum*	20	N		Good	
692	Bitter cherry	*Prunus emarginata*	60	N		Good	
693	Bitter cherry	*Prunus emarginata*	55	N		Good	
694	Douglas fir	*Pseudotsuga menziesii*	40	N	4.8	Good	Member of potential retention stand.

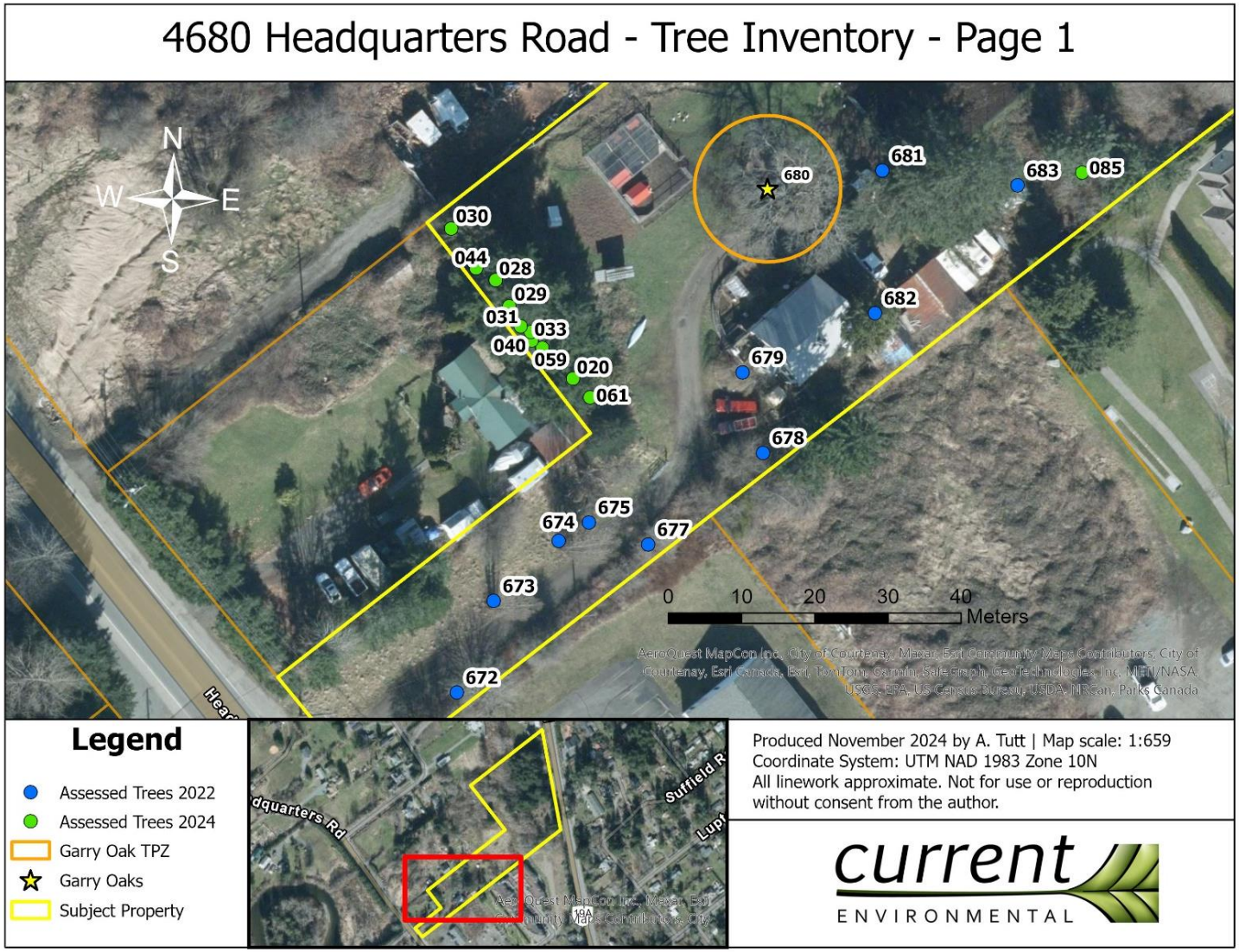


Figure 2. Tree Inventory Results - 4680 Headquarters - Page 1

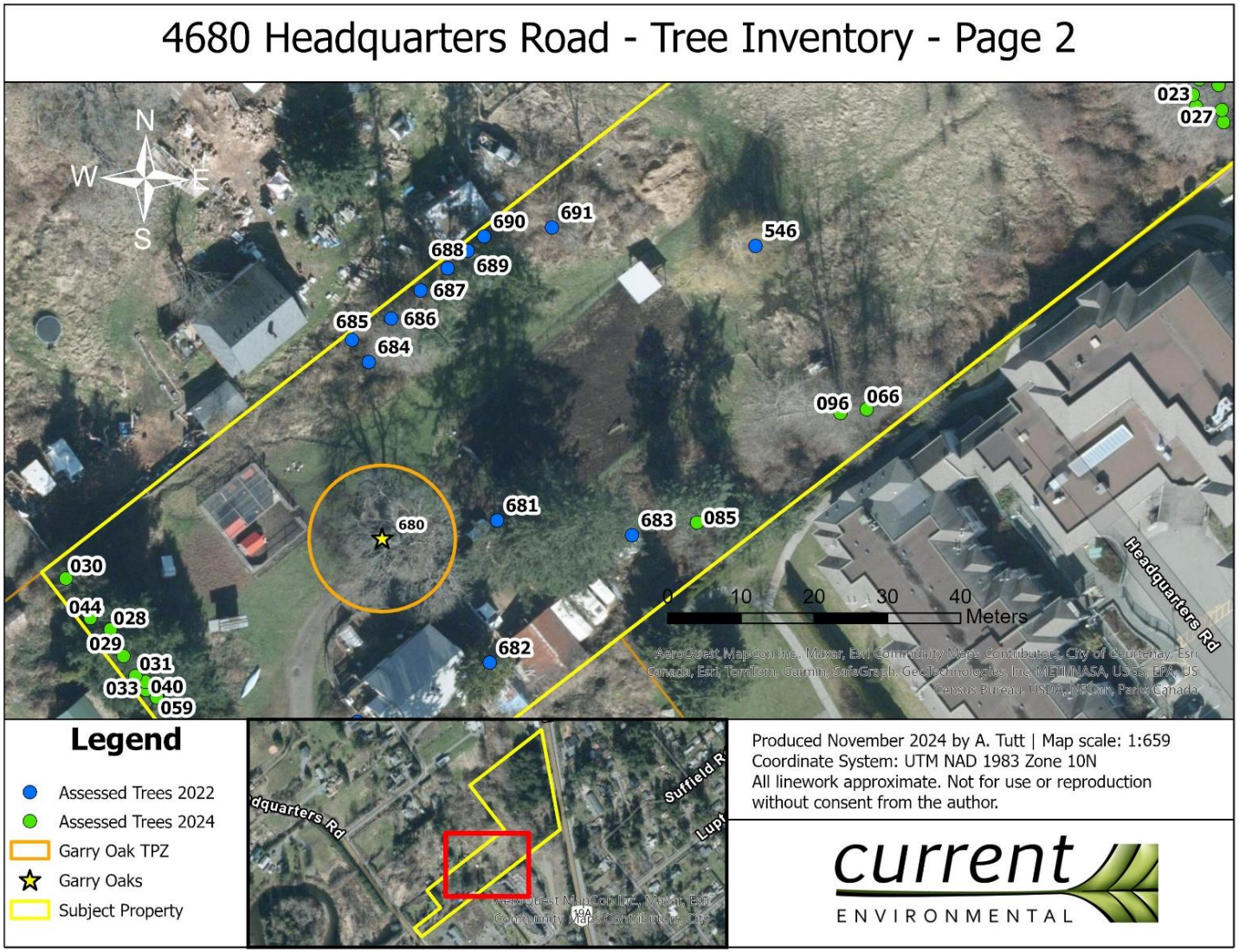


Figure 3. Tree Inventory Results - 4680 Headquarters - Page 2

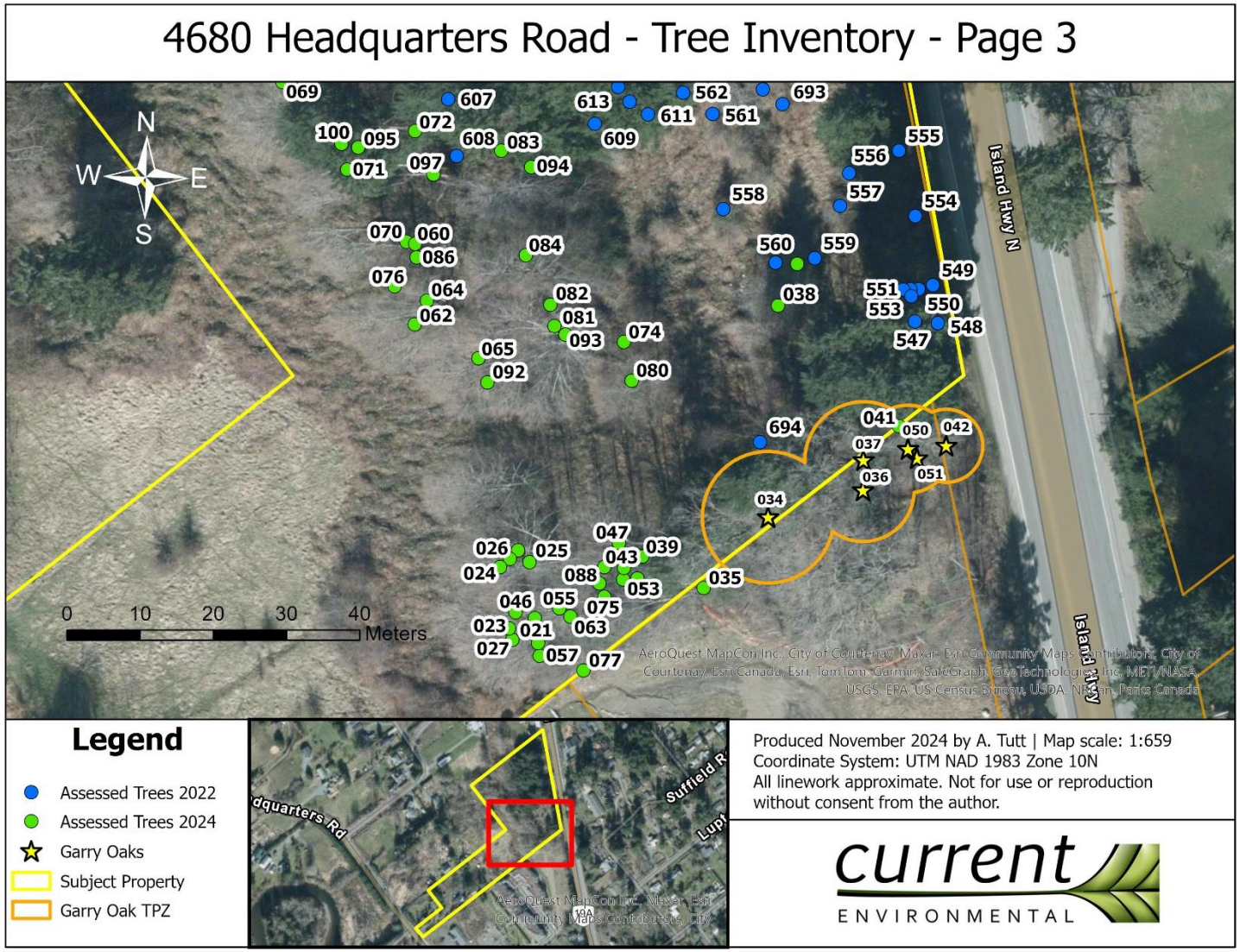


Figure 4. Tree Inventory Results - 4680 Headquarters - Page 3

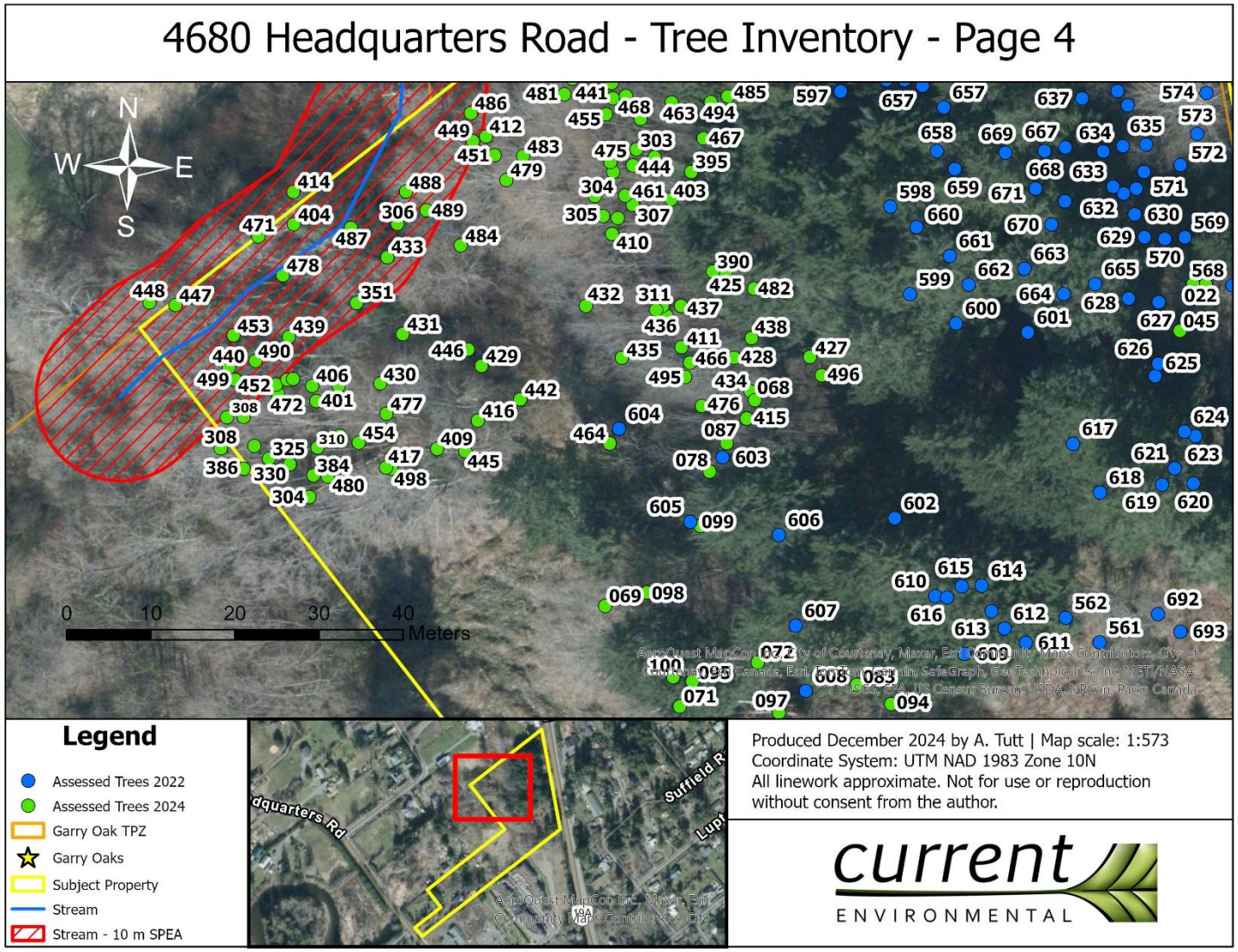


Figure 5. Tree Inventory Results - 4680 Headquarters - Page 4

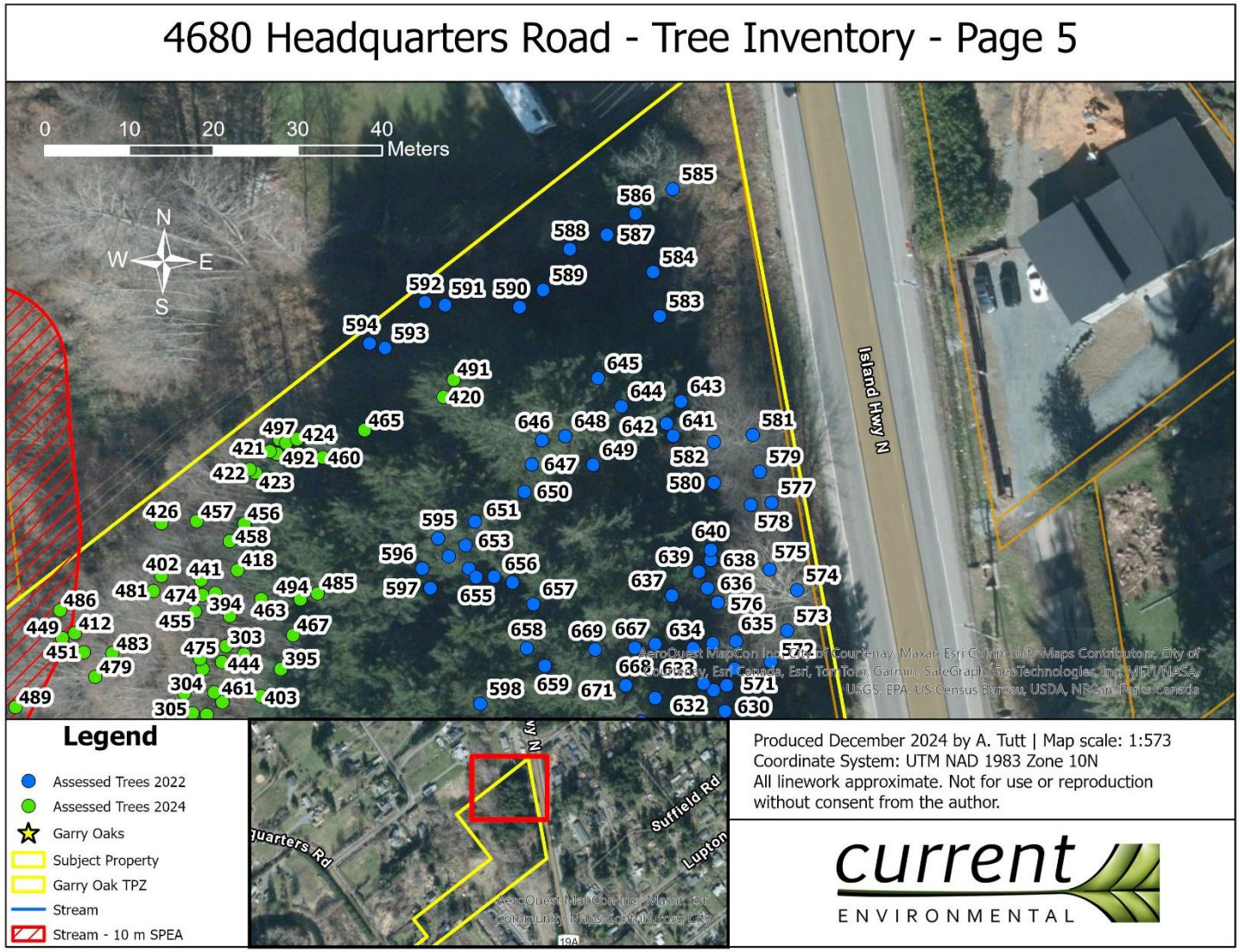


Figure 6. Tree Inventory Results - 4680 Headquarters - Page 5

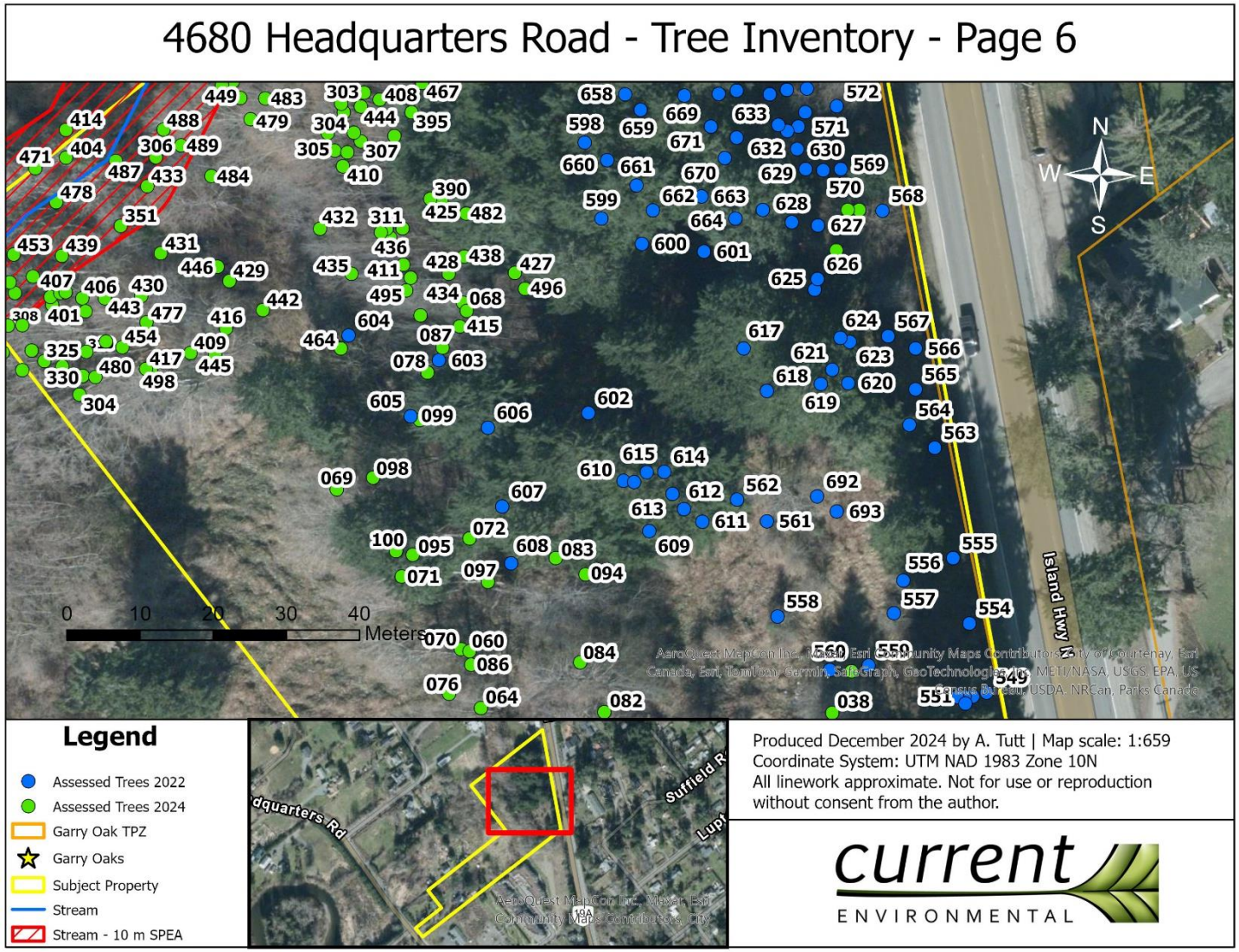


Figure 7. Tree Inventory Results - 4680 Headquarters - Page 6

4 DISCUSSION

4.1 PROTECTED TREES

An isolated stand of Garry oak trees is present in the eastern corner of the property, adjacent to the Old Island Highway and 4657 Island Highway North (Figure 4, Photo 3). There are 6 oak trees growing in a stand with bitter cherry, Douglas fir, and invasive English holly. The seventh oak introduced in Section 3.1 stands alone adjacent to the existing residence on the subject lot (Figure 3; Tree Tag #680). The isolated stand of Garry oak in the northeast corner is not part of an intact Garry oak meadow ecosystem, but the individual trees are protected; Garry oak is listed as a protected species under the *City of Courtenay Tree Protection and Management Bylaw No. 2850*[6]. These regionally uncommon trees are also highly valued by members of the Comox Valley stewardship community. Note that the City requires a $1,000 security deposit for working within 10 m of the dripline of a protected species.

4.2 UNNAMED TRIBUTARY OF THE TSOLUM RIVER

Trees within the SPEA setback in the northwestern corner of the property do not contribute to City Tree Density Target for the property, while the area of the setback (0.10 ha) does have an influence on the TDT, as discussed in Section 4.4.

Tree Protection Zone (TPZ) calculations for trees within the stream SPEA are included in Table 4. Note trees within this area may have roots extending beyond the calculated SPEA and will therefore require protection measures greater than the calculated SPEA. These tree protection measures will be established in the field under the supervision of the Project Arborist.

4.3 WINDTHROW

Where forest edge trees are proposed to be removed, it is recommended that trees that may experience an increase in wind exposure be re-examined, once tree clearing has taken place, to ensure that they are structurally stable, and suitable for retention as leading-edge trees. This assessment can be timed for when the final project layout, including clearing boundaries, has been established and accepted by the City.

4.4 TREE DENSITY TARGET

As per the City of Courtenay's Tree Density Target (TDT) interactive map[7], the TDT for this property is 132 trees. However, the "non-developable" unnamed tributary SPEA setback in the west corner of site (Figure 4) encompasses 0.10 ha, leaving a remaining 2.55 ha "net developable area" for the property. Considering the 50:1 (Trees:Hectares) TDT for the City of Courtenay, the site specific TDT is 128 trees.

The property currently supports 316 trees greater than 20 cm DBH. Red alder and cottonwood trees, which comprise 104 trees on the property, do not contribute to the TDT. In addition, there are 4 cherry trees contained within the unnamed tributary SPEA setback that also do not contribute. Therefore, 208 existing trees currently contribute to the property's 128 TDT.

[6] City of Courtenay. (2016). *Tree Protection and Management Bylaw No. 2850*. Accessed from: BYLAW NO. 2850 CONSOLIDATED VERSION (courtenay.ca)

[7] https://courtenay.maps.arcgis.com/apps/View/index.html?appid=36b80ad823ac4c90994dd2ac09a3df3f

Table 4. Inventoried trees within 3 m of the unnamed tributary of the Tsolum River and associated SPEA, including TPZ calculations.

Tree ID	Species		DBH (cm)	TPZ (m)
	Common	Scientific		
306	Bitter Cherry	Prunus emarginata	50	6.0
308	Red alder	*Alnus rubra*	44	5.3
351	Red alder	*Alnus rubra*	40	4.8
404	Red alder	*Alnus rubra*	53	6.4
407	Red alder	*Alnus rubra*	40	4.8
412	Red alder	*Alnus rubra*	25	3.0
413	Red alder	*Alnus rubra*	28	Dead
414	Red alder	*Alnus rubra*	46	5.5
433	Red alder	*Alnus rubra*	51.2	6.1
439	Red alder	*Alnus rubra*	61.2	7.3
440	Red alder	*Alnus rubra*	53.8	6.5
447	Red alder	*Alnus rubra*	47	5.6
448	Red alder	*Alnus rubra*	45	Dead
449	Bitter Cherry	Prunus emarginata	26	3.1
451	Red alder	*Alnus rubra*	40	4.8
452	Red alder	*Alnus rubra*	27	3.2
453	Red alder	*Alnus rubra*	37	4.4
471	Red alder	*Alnus rubra*	40	4.8
472	Red alder	*Alnus rubra*	34	4.1
473	Red alder	*Alnus rubra*	25	3.0
478	Red alder	*Alnus rubra*	48	N/A, Actively Failing
486	Red alder	*Alnus rubra*	36	4.3
487	Red alder	*Alnus rubra*	51	6.1
488	Bitter Cherry	Prunus emarginata	50.8	6.1
489	Bitter Cherry	Prunus emarginata	33.4	4.0
490	Red alder	*Alnus rubra*	35	4.2
499	Red alder	*Alnus rubra*	36	4.3

4.5 TREE RETENTION

The following section outlines preliminary details and concepts that are currently under consideration. Please note that these plans are subject to change as development progresses and further decisions are made. As such, the information presented here should be viewed as provisional and may be adjusted once the final development plans are confirmed.

Along with protected Garry oaks and the unnamed tributary of the Tsolum River SPEA setback, a strip of trees along the Old Island Highway has been proposed for retention (Figure 8, Table 5). The relatively steep slope in this area and the desire for screening along the busy highway make this an attractive retention

stand. There are 53 trees proposed for retention, 2 of which are red alders, resulting in 51 potential retention trees that would count towards the TDT.

In general terms, it is often more beneficial to preserve groups of trees rather than isolated ones because they share root space and have less exposed edges. Maintaining a variety of ages, species, and groundcover within a stand helps support a resilient landscape. Trees with a low live-crown ratio (<50%) are not ideal candidates for retention as they lack the capacity to withstand wind gusts as they have not grown in open conditions, and therefore often lead to failure.

Table 5. Proposed Retention Trees for 4680 Headquarters Road, including Tree Protection Zone calculations.

Tree ID	Species		DBH (cm)	TPZ (m)
	Common	Scientific		
022	Red alder	*Alnus rubra*	48.2	5.8
034	Garry oak	*Quercus garryana*	75	9.0
035	Grand fir	*Abies grandis*	63	7.6
036	Garry oak	*Quercus garryana*	62	7.4
037	Garry oak	*Quercus garryana*	65	7.8
041	Bitter cherry	Prunus emarginata	29	3.5
042	Garry oak	*Quercus garryana*	42	5.0
049	Red alder	*Alnus rubra*	48	5.8
050	Garry oak	*Quercus garryana*	47	5.6
051	Garry oak	*Quercus garryana*	28	3.4
547	Douglas fir	*Pseudotsuga menziesii*	80	9.6
548	Douglas fir	*Pseudotsuga menziesii*	98	11.8
549	Douglas fir	*Pseudotsuga menziesii*	78	9.4
550	Douglas fir	*Pseudotsuga menziesii*	55	6.6
551	Douglas fir	*Pseudotsuga menziesii*	75	9.0
552	Douglas fir	*Pseudotsuga menziesii*	50	6.0
553	Douglas fir	*Pseudotsuga menziesii*	22	2.6
554	Malus sp.	*Malus sp.*	22	2.6
555	Douglas fir	*Pseudotsuga menziesii*	70	8.4
563	Douglas fir	*Pseudotsuga menziesii*	83	10.0
564	Douglas fir	*Pseudotsuga menziesii*	140	16.8
565	Malus sp.	*Malus sp.*	35	4.2
566	Malus sp.	*Malus sp.*	24	2.9
567	Malus sp.	*Malus sp.*	44	5.3
568	Douglas fir	*Pseudotsuga menziesii*	35	4.2
569	Bitter cherry	*Prunus emarginata*	30	3.6
570	Bitter cherry	*Prunus emarginata*	20	2.4
572	Bitter cherry	*Prunus emarginata*	32	3.8

Tree ID	Species		DBH (cm)	TPZ (m)
	Common	Scientific		
573	Bitter cherry	*Prunus emarginata*	35	4.2
574	Bigleaf maple	*Acer macrophyllum*	83	10.0
575	Bitter cherry	*Prunus emarginata*	35	4.2
576	Bitter cherry	*Prunus emarginata*	30	3.6
577	Bitter cherry	*Prunus emarginata*	38	4.6
578	Bitter cherry	*Prunus emarginata*	24	2.9
579	Bitter cherry	*Prunus emarginata*	60	7.2
580	Bitter cherry	*Prunus emarginata*	30	3.6
581	Bitter cherry	*Prunus emarginata*	22	2.6
582	Bitter cherry	*Prunus emarginata*	20	2.4
583	Cascara	*Frangula purshiana*	24	2.9
584	Cascara	*Frangula purshiana*	32	3.8
585	Bitter cherry	*Prunus emarginata*	50	6.0
586	Douglas fir	*Pseudotsuga menziesii*	44	5.3
587	Malus sp.	*Malus sp.*	40	4.8
588	Malus sp.	*Malus sp.*	44	5.3
635	Douglas fir	*Pseudotsuga menziesii*	55	6.6
636	Douglas fir	*Pseudotsuga menziesii*	55	6.6
638	Douglas fir	*Pseudotsuga menziesii*	75	9.0
640	Douglas fir	*Pseudotsuga menziesii*	64	7.7
641	Douglas fir	*Pseudotsuga menziesii*	80	9.6
642	Douglas fir	*Pseudotsuga menziesii*	57	6.8
643	Douglas fir	*Pseudotsuga menziesii*	71	8.5
680	Garry oak	*Quercus garryana*	81	9.7
694	Douglas fir	*Pseudotsuga menziesii*	40	4.8

4.6 TREE CUTTING PERMIT

Given the current development plan, a Tree Cutting Permit would be required for the removal of approximately 263 trees, of which 161 are species other than red alder and cottonwood.

4.7 REPLACEMENT TREES

According to direction provided by the City of Courtenay Planning Department, the number of non-cottonwood and alder trees remaining after clearing that are below the TDT require replacement at a 3:1 ratio[8]. As the subject property has a TDT of 128 trees and 51 non-cottonwood and alder trees are proposed for retention, that results in 77 trees requiring replacement at a 3:1 ratio. As a result (77*3) 231 replacement trees are required. These trees are bonded to the City at $300/tree, which is $69,300. The final replacement and bonding calculations are subject to change and City input and will be dependent on an accepted layout and design approved by the City, contrasted against the location and condition of trees inventoried in this assessment. There may be an opportunity to retain additional existing trees in strategic location around the periphery of the development footprint that could result in reducing the number of required replacement trees.

Note that retained red alder and cottonwood trees do not contribute to Tree Density Targets but do require a Tree Cutting Permit (TCP). Also note that the City of Courtenay Tree Cutting Permit application form[9] states that for greenfield properties, the number of trees remaining on the property after clearing must not be lower than 25 trees per net developable hectare (25:1 tree:hectare). Under the current development plan, the minimum tree retention number is achieved with 58 trees that would remain that contribute to TDT (23:1 tree:hectare).

[8] Personal communication (August 22, 2024). Nancy Gothard, Manager of Community and Sustainability Planning, City of Courtenay. Personal communication (January 20, 2025). Jacob Cramer, Planner, City of Courtenay.

[9] https://www.courtenay.ca/assets/Departments/Documents/2023~-~New~Forms~and~Applications/Tree%20Permit%20Application%20Form-fillable.pdf

Figure 8. Protected Garry oaks and potential retention stands for 4680 Headquarters Road.

5 RECOMMENDATIONS

The following list summarizes recommendations made earlier in the report:

1. There were no trees observed to be moderate, high, or extreme risk within the context of existing land use. Therefore, given present conditions, no trees would require hazard abatement to eliminate present and/or future risk within a 1-year period from the time of this assessment.
2. It is recommended that retained trees be reassessed at 3-year and 5-years post construction and following any significant disturbance from the development.
3. An unnamed stream tributary to the Tsolum River in the west corner of site flows into the constructed channel and wetlands on 4694 Headquarters Road that will require an updated RAPR assessment to confirm setbacks.
4. A $1,000 security deposit is required for working within 10 m of the dripline of a protected species. Seven Garry oaks are present on the property and a security calculation will be required once proximity to project components has been determined.
5. 161 trees (see Section 4.6) multiplied by 3 results in 483 trees requiring replacement. These trees are bonded to the City at $300/tree, which is $144,900. The final replacement and bonding calculations are subject to change and City input and will be dependent on an accepted layout and design approved by the City.

5.1 MITIGATION MEASURES

The following recommendations are made to ensure retained trees survive construction and continue to provide ecosystem services to future residents and maintain conditions necessary to support a functioning ecology.

5.1.1 Tree Protection Zones (TPZ)

Tree Protection Zones (TPZ) (see Table 4 and 5) are a critical step to avoiding impacts to trees assessed to be viable for retention and involves preserving and protecting tree health by avoiding damage to tree roots, trunks, or crowns. This involves physical protective barriers and is generally required for any site disturbance that may impact retained trees. The following list describes activities that are not permitted within a Tree Protection Zone:

1. Stockpile construction materials or debris,
2. Park vehicles or equipment,
3. Pile soil and/or mulch,
4. Change soil grade by cutting or filling,
5. Damage roots by grading, tearing, or grubbing. Tree stumps within the TPZ are to be retained,
6. Compact soil with equipment, vehicles, material storage, and/or foot traffic,
7. Contaminate soil from washing out equipment (especially concrete) and vehicle maintenance,
8. Install impervious parking lots, driveways, and walkways,
9. Attach anything to trees using nails, screws, and/or spikes,
10. Wound or break tree trunks or branches through contact with vehicles and heavy equipment,
11. Wound trunks with string weed trimmers and lawn mowers,
12. Cause injury by fire or excessive heat.

The following is critical to the successful implementation and monitoring of a TPZ during and after development:

1. Show TPZs and tree protection notes on site plans/design sheets associated with site prep. and construction,
2. Educate all site workers about tree protection during pre-construction meetings
3. Establish TPZs early, during site planning, and install physical delineation/protection measures prior to construction,
4. Monitor compliance with tree protection requirements regularly during construction,
5. Have an ISA Certified arborist inspect trees annually for at least 3-5 years post development to look for changes in condition, potential issues, and to determine maintenance needs,
6. The Project Arborist must be consulted before this fencing is removed or moved for any purpose.

TPZs are provided for protected species and potential retention trees (Tables 2 and 3). Note that TPZ calculations are solely mathematical calculations that do not consider factors such as restricted root growth, limited soil volumes, age, crown spread, health, or structure.

A tree's root system is typically able to withstand up to 25% removal before irreversible consequences are incurred. Tree's ability to withstand root damage is dependent on the species, age, condition, live crown ratio (LCR), and previous modifications of a given tree. In general, younger trees are better able to recover from serious root disturbance compared to more mature trees. As such, TPZs installed in the field will be based on tree specific knowledge and the findings of the assessment. Any excavation within the TPZ is to be supervised by the Project Arborist. Specifications for tree protection fencing design and materials can be found in APPENDIX A.

5.1.2 Arborist Supervision

It is the responsibility of the client or his/her representative to contact the Project Arborist for the purpose of:

1. Installing/approving the TPZ fencing,
2. Reviewing this TMP with the Project foreman or site supervisor prior to the start of work,
3. Supervising any construction activities within the TPZ of trees to be retained,
4. Reviewing and advising of any pruning requirements for machine clearances,
5. Assessing whether mitigation measures for work around trees identified for retention have been effectively implemented.

5.2 REASSESSMENT

Construction activities will contribute additional stress and/or direct physical impacts to trees, potentially resulting in a decline in tree health. Especially trees that have root zones affected by the proposed development. It is recommended that retained trees be reassessed at 3-year and 5-years post construction.

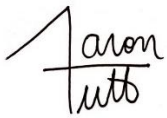
5.3 TREE RETENTION AND REPLACEMENT

Based on the final development layout, a new forest edge will require field-verification by an Arborist to ensure the exposed trees are well protected, safe, and suitable for retention. For instance, realignment of the proposed forest edge may be required to avoid trees with low live-crown ratios, suppressed or partially suppressed crowns, codominant trunks, or structural defects.

6 CONCLUSION

With protected Garry oaks located within the subject lot, implementation of tree protection measures will be of utmost importance during development. The heaviest impact will be initial clearing and the creation of a new forest edge for retained trees. If the mitigation measures prescribed herein are implemented in a diligent manner it is expected that healthy inventoried trees chosen for retention will survive.

Prepared by:



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7 DISCLAIMER

This report was prepared exclusively for Monterra Projects Ltd. by Current Environmental Ltd. The quality of information, conclusions and estimates contained herein is consistent with the level of effort expended and is based on: i) information available at the time of preparation; ii) data collected by the authors and/or supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by Monterra Projects Ltd. only, subject to the terms and conditions of its contract or understanding with Current Environmental Ltd. Other use or reliance on this report by any third party is at that party's sole risk.

7.1 LIMITATIONS AND TIME FRAME OF TREE RISK ASSESSMENT

Limitations of tree risk assessment arise from uncertainties related to trees, defects and the loads to which they are subjected. Tree risk assessment limitations include:

- Considers only known significant targets and visible or detectable tree conditions.
- Represents the condition of the tree(s) and site at the time of inspection.
- The time frame of this assessment is one year. This is the length of time for which the assessor is deciding whether a specific failure is likely to occur. The time frame should not be considered a guarantee period for the risk assessment.
- Any tree(s), whether it has visible weaknesses or not, will fail if the forces applied exceed the strength of the tree or its parts.
- Only those trees specified in the scope of work were assessed, and assessments were performed within the additional limitations specified below.

Additional limitations include:

- During the tree risk assessment, the Project footprint had not been marked on site, therefore the boundaries used for the purposes of this report are to be considered approximate,
- Tree canopies could not always be fully viewed due to the density of the forested stand and foliage which can obscure visibility of a tree's structure.

7.2 ARBORIST DISCLOSURE STATEMENT

Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine, cannot be guaranteed.

Treatment, pruning, and removal of trees may involve considerations beyond the scope of the arborist's services such as property boundaries, property ownership, site lines, disputes between neighbors, landlord-tenant matters, etc. Arborists cannot take such issues into account unless complete and accurate information is given to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees can be managed, but they cannot be controlled. To live near a tree is to accept some degree of risk. The only way to eliminate all risks is to eliminate all trees.

Retained trees should be reviewed for any evidence of soil heaving, cracking, lifting or other indicators of root plate instability following land clearing, grade changes or severe weather events. Current Environmental Ltd. should be requested to re-evaluate the conclusions of this report and to provide amendments if new information is discovered during such events or other activities.

PHOTOS

Photo 1. The subject property is relatively flat with a large slope along the eastern edge up to the Old Island Highway. Dense red alder, English holly, and salmonberry characterize the bottom of the sloped area, in particular trees found on Figures 4, 5, and 6.

Photo 2. Dense English holly and alders characterize the lower slope area.

Photo 3. A stand of Garry oaks along the Old Island Highway in the eastern corner of the subject property. These are protected trees under the City of Courtenay Tree Protection and Management Bylaw No. 2850.

Photo 4. Basal decay on a red alder in the lower slope area to the west of the subject property. Basal decay was commonly observed in this area and may indicate a disease center.

Photo 5. Tree #604. A sycamore maple previously identified as a bigleaf maple with saplings having grown from seed.

Photo 6. A historic dug well or foundation that was observed on November 15, 2024.

Photo 7. Heavy invasive pressure, in this case Himalayan blackberry, is common along the lower slope area in particular toward the south.

Photo 8. Typical mid-slope forest composition, showing a hazelnut tree and a young bitter cherry tree in the left foreground. This area can be seen on Figures 4, 6, and 7.

Photo 9. Mature second-growth Douglas fir trees line the upper slope area adjacent to the Old Island Highway, as on Figures 4, 6, and 7.

APPENDIX A – TREE PROTECTION BARRIER AND SIGNAGE SPECIFICATIONS[10]

Barrier structure and material:

Tree protection ***barriers*** should generally be a minimum of 1.2 meters high, and consist of snow fencing or an equivalent, supported by poles at sufficiently close intervals to ensure the integrity of the fence, or supported by wooden frames.

In instances where ***development*** is not expected to occur near the ***root protection area***, poles strung with multiple bands of flagging tape may be sufficient, subject to approval by an ***Arborist*** and/or the ***Director.***

Barrier distance from tree(s):

Tree protection ***barriers*** must be of a sufficient size to protect the ***root protection area*** of the tree. The ***root protection area*** refers to the area of land surrounding the trunk of the tree that contains the bulk of the critical root system of the tree, as defined on a plan prepared by an ***Arborist***, that the ***Director*** reasonably approves.

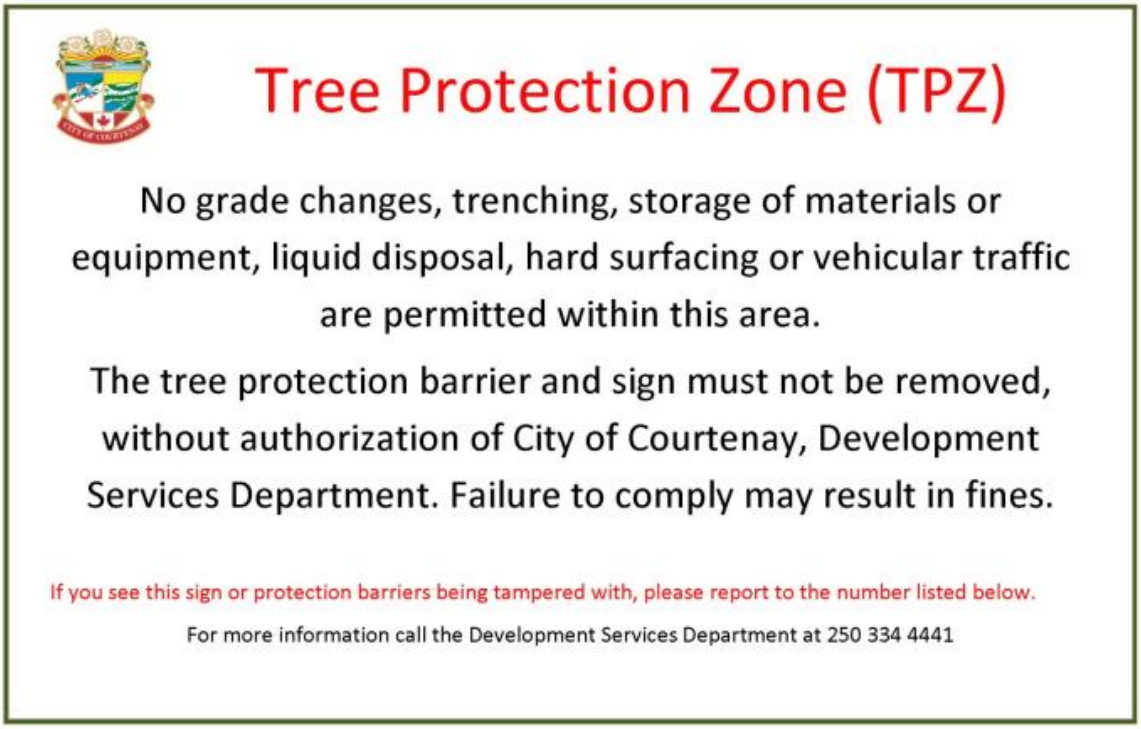
Barrier protection sign:

Where ***retained trees*** require protection barriers, a tree protection informational sign in the format provided in this Schedule, must be affixed to the ***barrier*** at intervals of every 30 metres unless waived as a requirement by the ***Director***. The sign must able to withstand weather conditions for prolonged periods of time.

Barrier duration:

The ***barrier*** must be in place throughout the entire duration of the ***development*** activities that are taking place around the ***tree*** and until written approval of its removal is obtained from the ***City.***

[10] City of Courtenay. (2016). *Tree Protection and Management Bylaw No. 2850*. Accessed from: BYLAW NO. 2850 CONSOLIDATED VERSION (courtenay.ca)


Tree Protection Zone (TPZ)
No grade changes, trenching, storage of materials or equipment, liquid disposal, hard surfacing or vehicular traffic are permitted within this area.
The tree protection barrier and sign must not be removed, without authorization of City of Courtenay, Development Services Department. Failure to comply may result in fines.
If you see this sign or protection barriers being tampered with, please report to the number listed below.
For more information call the Development Services Department at 250 334 4441