

Waterton Lakes National Park Hazard Tree Assessment and Abatement



Prepared By: TDB Consultants Inc.

Prepared For: Parks Canada

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Introduction

During late March, early April of 2019, TDB Consultants Inc. was contracted by Parks Canada to undertake the initial stages of hazard tree assessment and abatement along the Red Rock and Akamina Parkways within Waterton Lakes National Park.

The areas to be addressed included the first 8 kilometers of the Red Rock Parkway, to the Coalmine Day Use Area, and the first 11 kilometers of the Akamina Parkway, to the Rowe Trailhead. Tree falling activities were undertaken by a crew of two certified fallers and two forest technicians. Treatment activities on the Red Rock Parkway occurred from March 14 to March 17, 2019. Treatment activities on the Akamina Parkway occurred from March 30 to April 2, 2019.

Five additional areas were treated by TDB crews; the helipad location at the Parks headquarters, Linnet Lake Day Use area, Pass Creek Day Use area, Knights Lake Day Use area and the Stables. Debris removal recommendations were not provided for these locations as they were outside of the initial scope of the project. Within these four locations 155 trees were felled for a total of 93.9 cubic meters.

Treatment along the Red Rock Parkway occurred at fourteen locations with 648 trees being felled for a total of 161.5 cubic meters. Hazard tree assessments were completed using the Wildlife Tree Committee of British Columbia's Wildfire Module.

Only 4 of the 11 kilometers of the Akamina parkway were treated. Felling activities occurred at ten locations resulting in 2120 trees being felled totaling 557.9 cubic meters. Hazard tree assessments were completed using the Wildlife Tree Committee of British Columbia's Parks and Recreation Sites Module. Treatment activities were not continuous from the entrance of the road due to an overnight snowfall that increased the avalanche potential. The Parks Canada avalanche technician directed the worksite to be moved, outside of potential avalanche terrain.

Archaeological sites were present throughout the treatment areas. Tree falling occurred primarily on snow covered ground thereby minimizing any possible disruption to ground based artifacts. Avenza enabled tablets were on site with the identified archaeological sites loaded, enabling crews to know when they were working near or within an identified archaeological site. Prior to falling, trees were assessed for the presence of any potential artifacts. Two telegraph insulators were located during falling activities, one at site RR12 on the Red Rock Parkway and one within the Linnet Lake Day Use area. These findings were reported to Parks Canada staff.

Hazard trees within riparian areas were felled on an as needed basis with extra effort taken to maintain as much non-target vegetation as possible. Debris within the riparian areas, resulting from the falling activities is recommended to be bucked to lay flat and retained on site to provide mitigation measures as per the BMPs for Watershed-Scale Danger Tree Removal.

Clean-up recommendations

Since these treatments are in the early stages of hazard tree abatement, tree debris clean up recommendations are solely for those sites referenced in this document. Recommendations are based on projects of similar scale and incorporates practical recommendations provided in the *DRAFT Waterton Lakes National Park Management Plan for Trees Affected by Wildfire, 2018* and the *Waterton Lakes National Park Best Management Practices for Watershed-Scale Danger Tree Removal, 2019* documents.

The following is a list of the potential disposal methods for use along the Red Rock and Akamina Parkways:

- 1) The primary recommended method of debris removal is using a rubber tracked mini excavator equipped with a processing head. A rubber tracked machine will minimize damage to the paved road surface as well as reducing the soil disturbance along the roadsides. Further reductions to soil disturbance and damage to vegetation regrowth can be attained through limiting the travel and maneuvering of the excavator to a single in/out path when leaving the road surface.
- 2) An alternative to complete removal, as per method 1 above, would be to collect the conifers for use as firewood, chipping the remaining limbs and tops, as well as the deciduous, and removing the resulting debris from Waterton National Park for disposal.
- 3) Leave on site well anchored stems oriented parallel to the road on the uphill side to provide erosion control, site diversity, moisture retention and microsites for regeneration.
- 4) Buck to lay flat, all stems, and leave on site as per the BMPs for Watershed-Scale Danger Tree Removal.
- 5) No debris disposal is recommended. Leave tree as is on site, no ladder fuel risk exists.

The stumps remaining from the falling activities will require further cutting to reduce their overall height to 75mm above ground, as per the BMPs of Watershed-Scale Danger Tree Removal. All stumps being used to retain logs felled parallel to the road should remain in their current state.

Red Rock Parkway (Sites RR1 – RR14)

Site RR1 is comprised entirely of cottonwood with a stand of large diameter stems on the low side of the road and smaller diameter, shorter stems on the upper side of the road. The treatment area extends approximately 20 meters, from the road centerline, below the road and 12 meters above the road. 53 trees were felled, totaling 53.10 cubic meters.

Tree debris disposal recommendations are to leave, all stems located below the road and limb and buck to lay flat all smaller diameter stems on uphill side, disperse pieces in adjacent stand if required.



Site RR2 is primarily comprised of Douglas fir with a few scattered aspen. Tree felling occurred on a strip approximately 15 meters wide on both sides of the road. 87 trees were felled totaling 22.99 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site RR3 is comprised entirely of Douglas fir located on both sides of the road, approximately 15 meters from the road centerline. 19 trees were felled, totaling 6.06 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site RR4 is comprised of mixed Douglas fir and aspen approximately 15 meters wide on the uphill side of the road. 58 trees were felled, totaling 12.57 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site RR5 is primarily comprised of aspen with a few scattered Douglas fir located within 15 meters of the road centerline on both sides of the road. 42 trees were felled, totaling 17.70 cubic meters.

Tree debris disposal recommendations include collecting the Douglas fir for use as firewood or buck to lay flat all stems and leave on site as per the BMPs for Watershed-Scale Danger Tree Removal.



Site RR6 is comprised entirely of aspen located on both sides of the road approximately 12m from the road centerline. 93 trees were felled, totaling 8.37 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site RR7 is comprised entirely of aspen located on both sides of the road, approximately 15 meters from the centerline. 10 trees were felled, totaling 3.53 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.

Alternatively, buck to lay flat and leave on site as per the BMPs for Watershed-Scale Danger Tree Removal.



Site RR8 is comprised entirely of aspen located in a strip approximately 12 meters wide on one side of the road. 195 trees were felled, totaling 13.46 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site RR9 is comprised of a single Douglas fir tree totaling 0.29 cubic meters.

No debris disposal is recommended. Leave tree as is on site, no ladder fuel risk exists.



Site RR10 is comprised entirely of scattered cottonwood located on the downhill side of the road. 5 trees were felled, totaling 1.45 cubic meters.

No debris disposal is recommended. Leave trees as is on site, no ladder fuel risk exists.



Site RR11 is comprised entirely of aspen located on one side of the road, approximately 12 meters from the road centerline. 26 trees were felled, totaling 2.08 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal. Alternatively, buck to lay flat and leave on site.



Site RR12 is comprised entirely of cottonwood located on both sides of the road at the entrance to the Coppermine day use area. The treatment area extends approximately 20 meters to the uphill side of the road and 15 meters below the road. 28 trees were felled, totaling 13.38 cubic meters. One telegraph insulator was found on a cottonwood tree located across the creek from the day use area. The tree was retained, GPS'd and photographed with the resulting data provided to Parks Canada.

Tree debris disposal recommendations include leaving, all large diameter cottonwood stems located adjacent to the creek. Remove the remaining felled trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site RR13 is comprised of scattered cottonwood located at either end of a pullout area. 4 trees were felled, totaling 0.62 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site RR14 is primarily comprised of aspen with a few scattered Douglas fir located within the Coppermine day use area. 32 trees were felled, totaling 5.89 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Akamina Parkway (Sites AK1 – AK10)

Site AK1 is comprised entirely of Douglas fir located on uphill side of the road, approximately 25 meters from the road centerline. 13 trees were felled, totaling 15.21 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site AK2 is comprised entirely of cottonwood located approximately 12 meters from the centerline on the downhill side of the road. 5 trees were felled, totaling 5.22 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.

Alternatively, buck to lay flat, leave on site, dispersing in the adjacent stand as required.



Site AK3 is comprised of a mix of species, Douglas fir, pine, spruce, aspen and birch located 15 meters from the road centerline on both sides of the road. 84 trees were felled, totaling 29.07 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site AK4 is primarily comprised of Douglas fir with a few scattered aspen and birch located on the uphill side of the road, approximately 15 meters from the road centerline. 37 trees were felled, totaling 5.14 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site AK5 is primarily comprised of Douglas fir with a few scattered pine located within 15 meters of the road centerline on the uphill side of the road. 79 trees were felled, totaling 17.85 cubic meters.

The recommended debris disposal method is to remove the trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site AK6 is comprised primarily of Douglas fir with scattered spruce, pine and aspen. The treatment area extended approximately 20 meters from the road centerline along both sides of the road. 213 trees were felled, totaling 77.96 cubic meters.

Tree debris disposal recommendations include leaving well anchored stems oriented parallel to the road on the uphill side as well as all stems located below the road on the downhill side. Remove the remaining trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site AK7 is comprised entirely of aspen located below the road. 4 trees were felled, totaling 2.61 cubic meters.

No debris disposal is recommended. Leave trees on site, no ladder fuel risk exists.



Site AK8 is comprised entirely of Douglas fir located approximately 20 meters from the road centerline above the road. 164 trees were felled, totaling 56.49 cubic meters.

Tree debris disposal recommendations include leaving well anchored stems oriented parallel to the road on the uphill side. Remove the remaining trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site AK9 is comprised primarily of Douglas fir with scattered aspen located within 15 meters of the road centerline along both sides of the road. 136 trees were felled, totaling 39.59 cubic meters.

Tree debris disposal recommendations include leaving well anchored stems oriented parallel to the road on the uphill side as well as all stems located below the road on the downhill side. Remove the remaining trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



Site AK10 is an extensive site comprised primarily of pine with spruce, Douglas fir, balsam, cottonwood and aspen located along both sides of the road and the area surrounding McNeilly's Camp Site day use area. The treatment area extends approximately 15 meters from the road centerline above the road and 20 meters below the road. 1385 trees were felled, totaling 308.77 cubic meters. Three aspen wildlife trees were identified and retained on site.

Tree debris disposal recommendations include leaving on site, all cottonwood and aspen stems located adjacent to Cameron Creek, ensuring they are bucked to lay flat. Limb and buck to lay flat conifer stems located at the start of the Crandell Mountain Trail and leave on site to deter the development of further social trail leading to the parking area. Remove the remaining trees with a rubber tracked mini excavator capable of processing the stems. Processed logs and limbs will be piled at the roadside to facilitate later removal through chipping and hauling offsite or loading debris into bins for removal.



A small portion of the start of the Akamina Parkway was left untreated due to hazardous falling conditions. This area was a cliff face with fire killed Douglas fir above, located between site AK6 and AK7.



Signature of Preparing Forester:

RPF Printed Name: Roy Dresen, RPF

Date Signed: June 5, 2019



"I certify that the work described herein fulfills standards expected of a member of the Association of British Columbia Forest Professionals, and that I did personally supervise the work."

Appendix 1 Red Rock Parkway Volume Summary

Site	Species	Number	Height (m)	Radius	Volume (m3)
RR1	Ac	4	13	17	2.36
	Ac	9	10	11	1.71
	Ac	10	19	20	11.93
	Ac	10	20	25	19.64
	Ac	5	23	30	16.26
	Ac	15	8	8	1.20
		53			53.10
RR2	Fd	84	12	12	22.76
	At	3	10	7	0.23
		87			22.99
RR3	Fd	19	12	13	6.06
RR4	Fd	6	13	18	3.97
	Fd	4	17	22	5.17
	Fd	2	10	10	0.31
	At	30	9	8	2.40
	At	16	8	6	0.72
		58			12.57
RR5	Fd	1	15	25	2.41
	Fd	3	13	18	1.98
	At	19	10	9	4.94
	At	19	10	12	8.37
		42			17.70
RR6	At	93	9	8	8.37
RR7	At	10	10	15	3.53
RR8	At	195	9	7	13.46
RR9	Fd	1	11	13	0.29

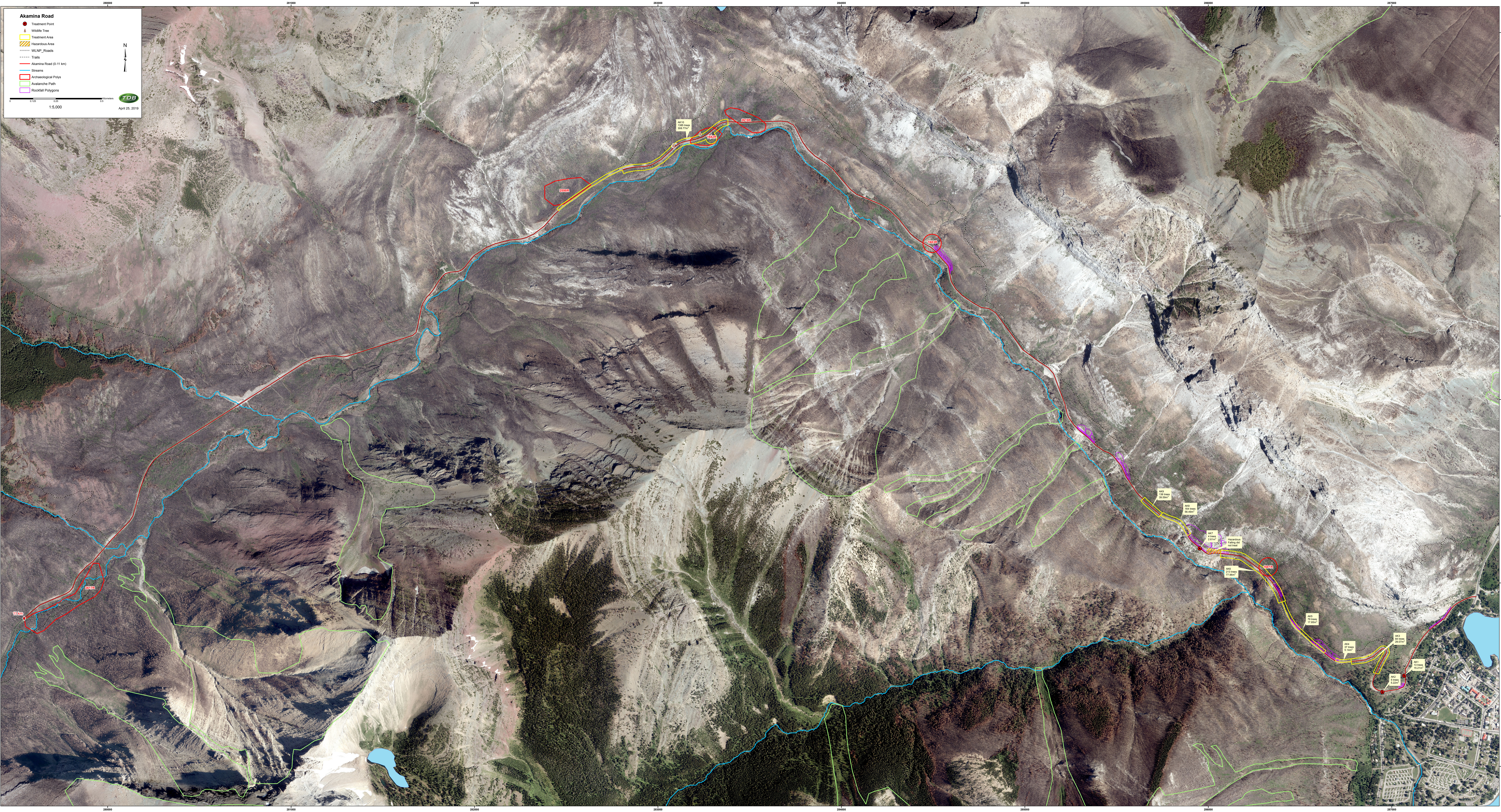
Site	Species	Number	Height (m)	Radius	Volume (m3)
RR10	Ac	2	9	17	0.82
	Ac	3	9	12	0.63
		5			1.45
RR11	At	26	8	8	2.08
RR12	Ac	2	19	23	3.16
	Ac	25	14	13	9.30
	Ac	1	18	17	0.92
		28			13.38
RR13	Ac	3	8	12	0.54
	Ac	1	8	8	0.08
		4			0.62
RR14	Fd	1	9	20	0.56
	Fd	4	10	14	1.23
	At	21	9	7	1.45
	At	6	11	16	2.65
		32			5.89
		Tree Count			Volume (m3)
Total		648			161.49
Species code	Species name				
Ac	cottonwood				
At	trembling aspen				
Ba	balsam				
Ep	paper birch				
Fd	Douglas fir				
Pl	lodgepole pine				
Sx	spruce				

Appendix 2 Akamina Parkway Volume Summary

Site	Species	Number	Height (m)	Radius	Volume (m3)
AK1	Fd	3	23	28	8.50
	Fd	8	20	22	6.08
	Fd	2	14	12	0.63
		13			15.21
AK2	Ac	1	17	30	2.40
	Ac	2	15	22	2.28
	Ac	1	12	14	0.37
	Ac	1	11	10	0.17
		5			5.22
AK3	Sx	1	16	20	1.00
	Sx	7	13	10	1.43
	Fd	3	16	20	3.00
	Fd	14	13	10	2.65
	Fd	5	8	7	0.31
	Pl	1	16	18	0.81
	Pl	10	14	12	3.16
	Pl	8	14	15	3.97
	At	10	12	10	1.88
	At	10	14	15	4.96
	At	4	20	20	5.02
	At	8	8	6	0.36
	Ep	3	11	10	0.52
		84			29.07
AK4	Fd	23	7	7	1.24
	Fd	2	14	16	1.12
	Fd	9	13	11	2.22
	At	2	12	10	0.38
	Ep	1	8	12	0.18
		37			5.14
AK5	Fd	42	10	8	4.24
	Fd	35	14	13	13.02
	Pl	2	13	12	0.59
		79			17.85

Site	Species	Number	Height (m)	Radius	Volume (m3)
AK6	Fd	44	14	13	16.37
	Fd	88	10	8	8.89
	Fd	44	18	18	40.30
	Pl	3	10	8	0.30
	Pl	9	13	12	3.55
	Sx	1	13	14	0.40
	At	15	8	12	2.72
	At	9	14	16	5.43
		213			77.96
AK7	At	2	19	18	1.93
	At	2	15	12	0.68
		4			2.61
AK8	Fd	55	8	8	4.40
	Fd	96	14	14	41.47
	Fd	13	18	20	10.62
		164			56.49
AK9	Fd	44	8	8	3.52
	Fd	74	14	14	31.97
	At	18	12	11	4.10
		136			39.59
AK10	Pl	687	12	8	82.44
	Pl	247	16	15	115.10
	Pl	300	4	3	3.60
	Sx	8	15	14	3.70
	Sx	2	17	20	2.14
	Sx	29	24	22	52.90
	Ac	10	19	20	11.94
	Ac	31	18	15	18.17
	At	40	15	13	15.92
	At	25	9	8	2.25
	Ba	6	10	8	0.61
		1385			308.77
		Tree Count			Volume (m3)
Total		2120			557.91

Species code	Species name
Ac	cottonwood
At	trembling aspen
Ba	balsam
Ep	paper birch
Fd	Douglas fir
Pl	lodgepole pine
Sx	spruce





Appendix 3. An Example of a filled out Affected Tree Prescription Checklist

Fire Affected Tree Prescription Checklist		
Project/Site: Wolf Creek Viewpoint		Date: June 21 2019
Project Manager: John Doe		Site Supervisor: John Henry
Level of Disturbance:		Contractor: Tree Works Inc.
<input type="checkbox"/> VLR <input type="checkbox"/> LOD1 <input checked="" type="checkbox"/> LOD2 <input type="checkbox"/> LOD3 <input type="checkbox"/> LOD4		Coordinates: 54 125 999 124 233 4186
Project Review		
Applicable Functional Group Involvement		Comments:
Environmental Assessment	<input type="checkbox"/> N/A <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	Steep slopes, marsh wetlands, Nesting season, invasives
Cultural Resource Management (including Terrestrial Archaeology)	<input type="checkbox"/> N/A <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (required if ground disturbance)	Historic train wreck on site – fence of area as no work zone
Fire Management Officer	<input type="checkbox"/> N/A <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	Fire Ban currently in affect
Assets Management	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	No concerns
Mitigation		
Environment		Comments:
Steep slopes/Erosion issues		
Hand fell tree	<input type="checkbox"/>	
High stumps and fall tree across slope and leave tree debris on site.	<input checked="" type="checkbox"/>	Only on designated slopes- flagged in pink.
Clear/leave debris in culverts or creek.	<input checked="" type="checkbox"/>	Leave woody debris around marshland
Wildlife Trees		
Wildlife Stub trees	<input checked="" type="checkbox"/>	5 trees flagged in green. Cut at 10m
Bat roosts	<input type="checkbox"/>	
Create nesting cavity	<input type="checkbox"/>	
Other:		
Visitor Experience		
Cut stumps at ground level	<input checked="" type="checkbox"/>	
Cover stumps/Dust cuts	<input checked="" type="checkbox"/>	
Turn cuts away from visitor facility	<input type="checkbox"/>	
Leave debris to prevent trail braiding	<input type="checkbox"/>	

Sensitive Habitat Considerations (i.e. Observed nest or bat roost)		
Leave allocated area (indicate how safety has been addressed- close area, flag off, monitor, move target, etc.) or bring in the appropriate specialist (e.g. aquatic biologist) to develop a site-specific plan.		Currently in nesting window, will require a nesting survey.
Tree Debris		
Burn Piles	<input type="checkbox"/>	
Remove from site	<input type="checkbox"/>	
Chip	<input type="checkbox"/>	
Leave on site	<input type="checkbox"/>	
Leave small piles for habitat	<input type="checkbox"/>	
Combination	<input type="checkbox"/>	
Site Requirements		
Signage/flagging	<input type="checkbox"/>	Flagger and roads signs required as road and viewpoint will have to be closed when tree work being done.
Other		
Site Rehabilitation		
Seeding	<input type="checkbox"/>	
Replanting	<input checked="" type="checkbox"/>	Replant on steep slope- see prescription from Environmental Assessment Office
Follow-up weed monitoring required.	<input type="checkbox"/>	
Weed management actions required.	<input checked="" type="checkbox"/>	Hand pull bugloss before work begins. No work zone in knapweed area.
Target		
Remove target if possible	<input type="checkbox"/>	Not possible