

Feasibility Report for Ponderosa Woods Stream Restoration Project—**F I N A L**

Appendices

Appendix A

Stream Erosion Site Photos



Figure A- 1 *Upstream end of reach with in-channel debris and bank erosion.*



Figure A- 2*Right bank erosion.*



Figure A- 3 *Left bank erosion.*



Figure A- 4 *Bank erosion with undercutting.*



Figure A- 5 **Bank erosion and in-channel debris.**



Figure A- 6 **Upstream end of north stormwater side-channel.**



Figure A- 7 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 8 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 9 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 10 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 11 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 12 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 13 *In-channel (same location but different angle as figure above).*



Figure A- 14 *Upstream end of southwest stormwater side-channel.*



Figure A- 15 *Southwest stormwater side-channel looking downstream.*



Figure A- 16 *Upstream end of southeast stormwater side-channel.*



Figure A- 17 *Left bank undercutting with in-channel debris.*



Figure A- 18 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 19 **Right bank erosion.**



Figure A- 20 **Right bank erosion.**



Figure A- 21 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 22 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 23 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 24 *Left bank erosion with undercutting.*



Figure A- 25 *Right bank erosion with undercutting.*



Figure A- 26 *In-channel debris leading to bank erosion and sediment aggradation.*



Figure A- 27 *In-channel debris leading to bank erosion (close up of bank at same location as above figure).*



Figure A- 28 *Downstream end of reach (looking upstream)*

Appendix B

Tree Survey Results

Ponderosa Woods Stream Tree Survey - 2023

Completed by Brendan Dougherty, PLA

Feature ID Number	Tree Type	DBH (inches)	Height (Conifer Only) (feet)	Observed Health Condition	Comments	NAD_1983_UTM_Zone_15N	
						X_Cor	Y_Cor
0	Willow/Black	7		Healthy		1528729	16348741
1	Birch/River	10		Healthy		1528727	16348706
2	Birch/River	8		Healthy		1528727	16348706
3	Birch/Paper	5		Healthy	multi-stem 6 at 4in	1528744	16348685
4	Birch/River	11		Healthy		1528745	16348664
5	Ash/Green	13		Healthy		1528728	16348644
6	Box Elder	14		Healthy		1528728	16348642
7	Cottonwood	30		Healthy		1528735	16348565
8	Ash/Green	16		Healthy		1528730	16348557
9	Buckthorn	6		Healthy		1528706	16348552
10	Cottonwood	20		Dead	fallen	1528697	16348549
11	Box Elder	11		Healthy		1528670	16348547
12	Cottonwood	13		Healthy		1528669	16348544
13	Cottonwood	27		Healthy		1528671	16348547
14	Cottonwood	15		Healthy		1528656	16348546
15	Box Elder	8		Healthy		1528657	16348537
16	Cottonwood	28		Healthy		1528642	16348540
17	Box Elder	14		Dying	fallen	1528628	16348535
18	Cottonwood	25		Dead	fallen	1528622	16348527
19	Box Elder	15		Healthy		1528608	16348523
20	Box Elder	6		Healthy		1528602	16348513
21	Box Elder	11		Dying	fallen	1528593	16348520
22	Box Elder	15		Healthy		1528586	16348515
23	Box Elder	6		Healthy		1528587	16348505
24	Box Elder	10		Dying	fallen	1528573	16348506
25	Buckthorn	6		Healthy		1528573	16348494
26	Box Elder	14		Healthy		1528539	16348479
27	Cottonwood	20		Dead	fallen across creek	1528531	16348469
28	Box Elder	9		Healthy		1528548	16348466
29	Cottonwood	28		Healthy		1528538	16348459
30	Ash/Green	6		Healthy		1528536	16348455
31	Ash/Green	12		Dead		1528524	16348454
32	Cottonwood	25		Dead	fallen	1528513	16348449
33	Ash/Green	9		Healthy		1528507	16348441
34	Box Elder	6		Healthy		1528501	16348423
35	Cottonwood	31		Healthy		1528494	16348431
36	Box Elder	13		Healthy		1528491	16348437
37	Cottonwood	15		Healthy		1528485	16348445
38	Box Elder	18		Dead	fallen across creek	1528469	16348405
39	Ash/Green	11		Healthy		1528427	16348395
40	Box Elder	15		Healthy		1528425	16348374
41	Cottonwood	34		Healthy		1528409	16348367
42	Cottonwood	33		Healthy		1528404	16348367
43	Elm/American	12		Dead		1528397	16348367
44	Buckthorn	6		Healthy		1528393	16348369
45	Box Elder	8		Healthy		1528384	16348380
46	Box Elder	11		Dead	fallen	1528385	16348346
47	Box Elder	8		Dead		1528383	16348347

Ponderosa Woods Stream Tree Survey - 2023

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Feature ID Number	Tree Type	DBH (inches)	Height (Conifer Only) (feet)	Observed Health Condition	Comments	NAD_1983_UTM_Zone_15N	
						X_Cor	Y_Cor
48	Box Elder	12		Dead	fallen across creek	1528389	16348350
49	Box Elder	14		Dead		1528374	16348334
50	Cottonwood	33		Healthy		1528370	16348339
51	Box Elder	12		Dead	fallen	1528349	16348330
52	Cottonwood	14		Dead	fallen across creek	1528358	16348322
53	Cottonwood	23		Healthy		1528355	16348325
54	Box Elder	10		Dead	fallen	1528346	16348324
55	Elm/American	11		Healthy		1528337	16348314
56	Elm/American	6		Healthy		1528335	16348319
57	Cottonwood	35		Healthy		1528328	16348318
58	Cottonwood	31		Healthy		1528314	16348307
59	Buckthorn	6		Healthy		1528320	16348302
60	Elm/American	12		Dead	fallen	1528302	16348296
61	Box Elder	8		Healthy		1528296	16348301
62	Box Elder	6		Healthy		1528278	16348295
63	Elm/American	7		Healthy		1528254	16348268
64	Box Elder	26		Dead	fallen across creek	1528249	16348268
65	Box Elder	17		Dead	fallen	1528246	16348270
66	Box Elder	8		Healthy		1528253	16348262
67	Ash/Green	25		Healthy		1528246	16348261
68	Elm/American	14		Healthy		1528236	16348256
69	Maple/Sugar	8		Healthy		1528221	16348256
70	Box Elder	16		Healthy		1528203	16348253
71	Maple/Sugar	6		Healthy		1528207	16348243
72	Ash/Green	16		Dead	fallen across creek	1528215	16348237
73	Maple/Sugar	8		Healthy		1528223	16348234
74	Box Elder	15		Healthy		1528202	16348238
75	Ash/Green	17		Healthy		1528185	16348250
76	Maple/Sugar	9		Healthy		1528188	16348257
77	Basswood/American	25		Dead	fallen	1528175	16348283
78	Ash/Green	20		Dead		1528182	16348300
79	Maple/Sugar	16		Healthy		1528197	16348283
80	Ash/Green	28		Healthy		1528201	16348291
81	Elm/American	18		Healthy		1528221	16348291
82	Maple/Sugar	6		Healthy		1528234	16348281
83	Elm/American	8		Healthy		1528188	16348224
84	Elm/American	6		Healthy		1528201	16348222
85	Elm/American	7		Healthy		1528190	16348217
86	Ash/Green	10		Healthy		1528195	16348213
87	Maple/Sugar	6		Healthy		1528194	16348208
88	Elm/American	10		Dead		1528178	16348203
89	Box Elder	8		Healthy		1528167	16348199
90	Maple/Sugar	15		Dead	fallen across creek	1528165	16348198
91	Basswood/American	28		Dead	fallen across creek	1528147	16348202
92	Elm/American	18		Healthy		1528147	16348191
93	Elm/American	9		Healthy		1528142	16348173
94	Maple/Sugar	6		Healthy		1528142	16348163
95	Ash/Green	14		Dead	fallen across creek	1528138	16348161

Ponderosa Woods Stream Tree Survey - 2023

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Feature ID Number	Tree Type	DBH (inches)	Height (Conifer Only) (feet)	Observed Health Condition	Comments	NAD_1983_UTM_Zone_15N	
						X_Cor	Y_Cor
96	Ash/Green	24		Healthy		1528120	16348153
97	Ash/Green	22		Healthy		1528115	16348162
98	Basswood/American	8		Healthy		1528110	16348156
99	Basswood/American	8		Healthy		1528112	16348148
100	Basswood/American	13		Healthy		1528114	16348145
101	Elm/American	10		Healthy		1528094	16348132
102	Elm/American	15		Healthy		1528092	16348110
103	Elm/American	9		Healthy		1528089	16348115
104	Elm/American	15		Healthy		1528062	16348108
105	Box Elder	12		Healthy		1528012	16347976
106	Box Elder	11		Healthy		1528014	16347974
107	Box Elder	12		Healthy		1528010	16347978
108	Cottonwood	28		Healthy		1528018	16347996
109	Maple/Sugar	15		Healthy		1528020	16348022
110	Box Elder	15		Healthy		1528129	16348102
111	Maple/Sugar	9		Healthy		1528136	16348094
112	Maple/Sugar	12		Healthy		1528138	16348101
113	Box Elder	12		Healthy		1528135	16348120
114	Elm/American	15		Dead	stump	1528148	16348112
115	Box Elder	13		Dying	stump	1528156	16348116
116	Ash/Green	11		Dead	stump	1528163	16348118
117	Maple/Sugar	7		Healthy		1528156	16348127
118	Basswood/American	14		Healthy		1528170	16348150
119	Hackberry	21		Healthy		1528173	16348156
120	Elm/American	16		Healthy		1528183	16348153
121	Elm/American	6		Healthy		1528187	16348162
122	Box Elder	13		Healthy		1528229	16348166
123	Ash/Green	14		Healthy		1528221	16348174
124	Ash/Green	11		Healthy		1528215	16348179
125	Box Elder	13		Healthy		1528214	16348186
126	Box Elder	6		Healthy		1528218	16348186
127	Ash/Green	16		Dead		1528227	16348193
128	Box Elder	14		Healthy		1528238	16348179
129	Box Elder	18		Healthy		1528264	16348181
130	Box Elder	12		Healthy		1528276	16348182
131	Box Elder	7		Healthy		1528287	16348220
132	Ash/Green	18		Healthy		1528302	16348201
133	Elm/American	17		Healthy		1528299	16348196
134	Box Elder	8		Healthy		1528308	16348208
135	Box Elder	200		Healthy		1528320	16348214
136	Box Elder	14		Healthy		1528309	16348237
137	Box Elder	14		Healthy		1528312	16348229
138	Ash/Green	15		Healthy		1528303	16348251
139	Buckthorn	8		Healthy		1528306	16348259
140	Box Elder	16		Healthy		1528325	16348247
141	Buckthorn	6		Healthy		1528328	16348244
142	Box Elder	13		Dead	fallen	1528333	16348231
143	Box Elder	16		Dead	fallen	1528330	16348226

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Feature ID Number	Tree Type	DBH (inches)	Height (Conifer Only) (feet)	Observed Health Condition	Comments	NAD_1983_UTM_Zone_15N	
						X_Cor	Y_Cor
144	Maple/Sugar	8		Healthy		1528347	16348235
145	Box Elder	6		Healthy		1528344	16348227
146	Elm/American	8		Healthy		1528364	16348222
147	Elm/American	9		Healthy		1528364	16348220
148	Box Elder	15		Healthy		1528369	16348232
149	Ash/Green	12		Healthy		1528379	16348226
150	Ash/Green	21		Healthy		1528376	16348217
151	Ash/Green	20		Healthy		1528375	16348211
152	Elm/American	13		Healthy		1528372	16348208
153	Elm/Siberian	6		Healthy		1528380	16348206
154	Ash/Green	7		Healthy		1528388	16348215
155	Box Elder	6		Healthy		1528402	16348219
156	Ash/Green	13		Dead	stump	1528392	16348194
157	Elm/American	6		Healthy		1528396	16348190
158	Box Elder	6		Healthy		1528400	16348187
159	Box Elder	6		Healthy		1528360	16348189
160	Box Elder	7		Healthy		1528362	16348197
161	Ash/Green	21		Healthy		1528357	16348190
162	Ash/Green	23		Healthy		1528354	16348197
163	Ash/Green	21		Healthy		1528364	16348204
164	Ash/Green	20		Healthy		1528355	16348203
165	Box Elder	10		Healthy		1528374	16348175
166	Box Elder	7		Healthy		1528384	16348172
167	Maple/Sugar	20		Healthy		1528382	16348136
168	Ash/Green	23		Healthy		1528366	16348151
169	Ash/Green	22		Healthy		1528367	16348154
170	Maple/Sugar	6		Healthy		1528397	16348136
171	Maple/Sugar	20		Healthy		1528395	16348116
172	Maple/Sugar	11		Healthy		1528405	16348096
173	Ash/Green	25		Healthy		1528398	16348099
174	Maple/Sugar	6		Healthy		1528405	16348090
175	Ash/Green	15		Healthy		1528395	16348086
176	Maple/Sugar	6		Healthy		1528416	16348073
177	Ash/Green	9		Healthy		1528416	16348072
178	Ash/Green	19		Healthy		1528403	16348079
179	Maple/Sugar	10		Healthy		1528431	16348050
180	Maple/Sugar	9		Healthy		1528443	16348037
181	Maple/Sugar	27		Healthy		1528441	16348026
182	Maple/Sugar	5		Healthy		1528452	16348023
183	Maple/Sugar	23		Healthy		1528433	16348016
184	Maple/Sugar	6		Healthy		1528452	16348006
185	Maple/Sugar	18		Healthy		1528436	16347994
186	Maple/Sugar	6		Healthy		1528441	16347991
187	Maple/Sugar	18		Healthy		1528440	16347983
188	Maple/Sugar	6		Healthy		1528446	16347991
189	Maple/Sugar	8		Healthy		1528459	16348013
190	Elm/American	6		Dead		1528458	16348043
191	Elm/American	8		Healthy		1528457	16348028

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Feature ID Number	Tree Type	DBH (inches)	Height (Conifer Only) (feet)	Observed Health Condition	Comments	NAD_1983_UTM_Zone_15N	
						X_Cor	Y_Cor
192	Elm/American	10		Healthy		1528469	16348037
193	Elm/American	12		Healthy		1528449	16348055
194	Ash/Green	12		Healthy		1528425	16348152
195	Ash/Green	13		Healthy		1528417	16348176
196	Ash/Green	16		Dead	fallen	1528419	16348238
197	Ash/Green	13		Healthy		1528448	16348224
198	Box Elder	12		Dead	stump	1528446	16348231
199	Box Elder	10		Dead	fallen	1528449	16348254
200	Box Elder	13		Dead	fallen	1528453	16348260
201	Elm/American	9		Healthy		1528416	16348269
202	Elm/American	14		Healthy		1528398	16348284
203	Cottonwood	33		Healthy		1528391	16348292
204	Elm/American	6		Healthy		1528386	16348285
205	Cottonwood	29		Healthy		1528379	16348293
206	Cottonwood	32		Healthy		1528375	16348299
207	Cottonwood	28		Healthy		1528373	16348292
208	Ash/Green	12		Dead	fallen	1528365	16348287
209	Ash/Green	12		Dead	fallen	1528372	16348286
210	Box Elder	15		Dying	fallen	1528350	16348285
211	Elm/American	9		Healthy		1528340	16348282
212	Box Elder	16		Healthy		1528336	16348267
213	Elm/American	11		Healthy		1528388	16348317
214	Cottonwood	23		Dead	fallen	1528394	16348314
215	Elm/American	16		Healthy		1528394	16348325
216	Elm/American	15		Dead		1528419	16348339
217	Box Elder	8		Healthy		1528430	16348344
218	Box Elder	18		Healthy		1528436	16348338
219	Box Elder	16		Healthy		1528438	16348347
220	Box Elder	12		Healthy		1528489	16348337
221	Box Elder	18		Healthy		1528485	16348333
222	Elm/American	15		Healthy		1528497	16348356
223	Elm/American	9		Healthy		1528504	16348370
224	Box Elder	20		Healthy		1528509	16348381
225	Box Elder	15		Dead	fallen across creek	1528501	16348394
226	Box Elder	16		Healthy		1528503	16348391
227	Box Elder	12		Dead	fallen	1528527	16348378
228	Box Elder	23		Healthy		1528527	16348362
229	Box Elder	13		Dead		1528529	16348384
230	Box Elder	8		Healthy		1528535	16348412
231	Box Elder	12		Healthy		1528536	16348411
232	Box Elder	16		Healthy		1528551	16348403
233	Box Elder	8		Healthy		1528543	16348427
234	Buckthorn	8		Healthy		1528534	16348420
235	Buckthorn	7		Healthy		1528552	16348436
236	Box Elder	11		Healthy		1528556	16348440
237	Buckthorn	6		Healthy		1528548	16348445
238	Buckthorn	8		Healthy		1528562	16348446
239	Cottonwood	27		Dead	stump	1528560	16348446

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Feature ID Number	Tree Type	DBH (inches)	Height (Conifer Only) (feet)	Observed Health Condition	Comments	NAD_1983_UTM_Zone_15N	
						X_Cor	Y_Cor
240	Buckthorn	6		Healthy		1528564	16348443
241	Box Elder	10		Healthy		1528570	16348443
242	Box Elder	12		Healthy		1528562	16348420
243	Box Elder	12		Healthy		1528593	16348423
244	Box Elder	25		Healthy		1528593	16348417
245	Ash/Green	14		Dead	fallen	1528583	16348459
246	Box Elder	8		Healthy		1528582	16348462
247	Box Elder	8		Healthy		1528577	16348467
248	Box Elder	11		Healthy		1528589	16348456
249	Cottonwood	30		Healthy		1528585	16348462
250	Buckthorn	6		Healthy		1528583	16348470
251	Box Elder	13		Healthy		1528601	16348474
252	Buckthorn	7		Healthy		1528611	16348479
253	Buckthorn	6		Healthy		1528616	16348476
254	Box Elder	8		Healthy		1528632	16348471
255	Box Elder	12		Healthy		1528632	16348461
256	Box Elder	8		Healthy		1528641	16348472
257	Ash/Green	17		Dead	fallen	1528624	16348486
258	Box Elder	8		Healthy		1528622	16348485
259	Cottonwood	23		Dead	fallen	1528624	16348492
260	Buckthorn	7		Healthy		1528626	16348495
261	Buckthorn	6		Healthy		1528618	16348498
262	Buckthorn	6		Healthy		1528640	16348500
263	Box Elder	15		Healthy		1528657	16348501
264	Cottonwood	33		Healthy		1528659	16348503
265	Box Elder	8		Healthy		1528664	16348502
266	Box Elder	8		Healthy		1528679	16348476
267	Box Elder	7		Dead		1528695	16348488
268	Box Elder	23		Healthy		1528690	16348467
269	Buckthorn	9		Healthy		1528683	16348493
270	Box Elder	7		Healthy		1528673	16348516
271	Box Elder	6		Healthy		1528677	16348509
272	Cottonwood	20		Dead	fallen across creek	1528683	16348504
273	Box Elder	12		Healthy		1528687	16348511
274	Box Elder	13		Dead		1528692	16348515
275	Box Elder	14		Healthy		1528714	16348477
276	Box Elder	14		Healthy		1528732	16348495
277	Box Elder	13		Healthy		1528708	16348512
278	Willow/Black	30		Dead	fallen across creek	1528760	16348494
279	Box Elder	30		Healthy		1528767	16348510
280	Box Elder	10		Healthy		1528768	16348516
281	Box Elder	6		Healthy		1528739	16348524
282	Buckthorn	6		Healthy		1528768	16348540
283	Buckthorn	6		Healthy		1528769	16348540
284	Willow/Black	33		Healthy		1528792	16348547
285	Cedar/White	5	11-20	Healthy		1528786	16348571
286	Cedar/White	5	11-20	Healthy		1528793	16348571
287	Cedar/White	5	11-20	Healthy		1528809	16348581

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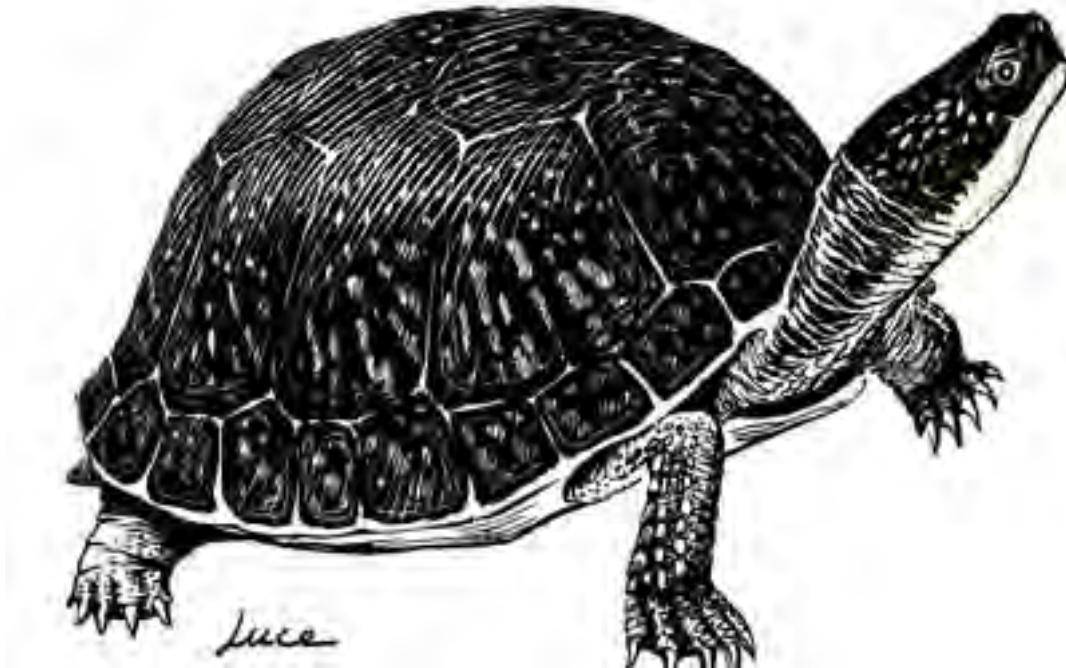
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Feature ID Number	Tree Type	DBH (inches)	Height (Conifer Only) (feet)	Observed Health Condition	Comments	NAD_1983_UTM_Zone_15N	
						X_Cor	Y_Cor
288	Cedar/White	5	11-20	Healthy		1528807	16348588
289	Birch/River	12		Healthy		1528802	16348612
290	Birch/River	10		Healthy		1528800	16348614
291	Birch/River	13		Healthy		1528804	16348615
292	Birch/River	6		Healthy		1528791	16348605
293	Birch/River	8		Healthy		1528791	16348603
294	Birch/River	10		Healthy		1528791	16348607
295	Elm/American	6		Healthy		1528781	16348617
296	Birch/River	10		Healthy		1528791	16348631
297	Box Elder	7		Healthy		1528802	16348637
298	Box Elder	6		Healthy		1528805	16348637
299	Box Elder	7		Healthy		1528804	16348632
300	Box Elder	6		Healthy		1528814	16348640
301	Box Elder	15		Healthy		1528814	16348648
302	Box Elder	7		Healthy		1528819	16348650
303	Box Elder	9		Dead		1528820	16348646
304	Birch/River	15		Healthy		1528818	16348687
305	Tamarack	10	21-40	Healthy		1528799	16348699
306	Birch/River	16		Healthy		1528788	16348720
307	Box Elder	6		Healthy		1528787	16348722
308	Amur Chokecherry	20		Healthy		1528788	16348748
309	Chokecherry	14		Healthy		1528766	16348778

Appendix C

Blanding's Turtle Flyer

CAUTION



BLANDING'S TURTLES MAY BE ENCOUNTERED IN THIS AREA

The unique and rare Blanding's turtle has been found in this area. Blanding's turtles are a State Threatened species and are protected under Minnesota Statute 84.095, Protection of Threatened and Endangered Species. Please be careful of turtles on roads and in construction sites. For additional information on turtles, or to report a Blanding's turtle sighting, contact the DNR Nongame Specialist nearest you: Bemidji (218-308-2641); Grand Rapids (218-327-4518); New Ulm (507-359-6033); Rochester (507-280-5070); or St. Paul (651-259-5764).

DESCRIPTION: The Blanding's turtle is a medium to large turtle (5 to 10 inches) with a black or dark blue, dome-shaped shell with muted yellow spots and bars. The bottom of the shell is hinged across the front third, enabling the turtle to pull the front edge of the lower shell firmly against the top shell to provide additional protection when threatened. The head, legs, and tail are dark brown or blue-gray with small dots of light brown or yellow. A distinctive field mark is the bright yellow chin and neck.

Illustration by Don Luce, from *Turtles in Minnesota*, Natural History Leaflet No. 9, June 1989, James Ford Bell Museum of Natural History

SUMMARY OF RECOMMENDATIONS FOR AVOIDING AND MINIMIZING IMPACTS TO BLANDING'S TURTLE POPULATIONS

(see Environmental Review Fact Sheet Series for full recommendations)

- A flyer with an illustration of an adult Blanding's turtle should be given to all contractors working in the area. Homeowners should also be informed of the presence of Blanding's turtles in the area.
- Turtles which are in imminent danger should be moved, by hand, out of harms way. Turtles which are not in imminent danger should be left undisturbed to continue their travel among wetlands and/or nest sites.
- If a Blanding's turtle nests in your yard, do not disturb the nest, and do not allow pets near the nest.
- Blanding's turtles do not make good pets. It is illegal to keep this threatened species in captivity.
- Silt fencing should be set up to keep turtles out of construction areas. It is critical that silt fencing be removed after the area has been revegetated.
- Small, vegetated temporary wetlands should not be dredged, deepened, or filled.
- All wetlands should be protected from pollution; use of fertilizers and pesticides should be avoided, and run-off from lawns and streets should be controlled. Erosion should be prevented to keep sediment from reaching wetlands and lakes.
- Roads should be kept to minimum standards on widths and lanes.
- Roads should be ditched, not curbed or below grade. If curbs must be used, 4" high curbs at a 3:1 slope are preferred.
- Culverts under roads crossing wetland areas, between wetland areas, or between wetland and nesting areas should be at least 36 in. diameter and flat-bottomed or elliptical.
- Culverts under roads crossing streams should be oversized (at least twice as wide as the normal width of open water) and flat-bottomed or elliptical.
- Utility access and maintenance roads should be kept to a minimum.
- Because trenches can trap turtles, trenches should be checked for turtles prior to being backfilled and the sites should be returned to original grade.
- Terrain should be left with as much natural contour as possible.
- Graded areas should be revegetated with native grasses and forbs.
- Vegetation management in infrequently mowed areas -- such as in ditches, along utility access roads, and under power lines -- should be done mechanically (chemicals should not be used). Work should occur fall through spring (after October 1st and before June 1st).

*Compiled by the Minnesota Department of Natural Resources Division of Ecological Resources, Updated March 2008
Endangered Species Environmental Review Coordinator, 500 Lafayette Rd., Box 25, St. Paul, MN 55155 / 651-259-5109*

Appendix D

Design Alternatives' Tree Removal Details

Appendix D - Design Alternatives' Tree Removal Details

Total Tree Survey (Surveyed)				
Species	Total Count	Total Fallen	Total Dead & Standing	Total Healthy
Willow/Black	3	1	0	2
Birch/River	12	0	0	12
Birch/Paper	1	0	0	1
Ash/Green	44	7	5	32
Box Elder	115	17	7	91
Cottonwood	30	8	1	21
Buckthorn	20	0	0	20
Elm/American	39	1	5	33
Maple/Sugar	31	1	0	30
Basswood/American	6	2	0	4
Hackberry	1	0	0	1
Elm/Siberian	1	0	0	1
Cedar/White	4	0	0	4
Tamarack	1	0	0	1
Amur Chokecherry	1	0	0	1
Chokecherry	1	0	0	1
Total	310	37	18	255

Alternative 1 (Removals)				
Species	Total Count	Total Fallen	Total Dead & Standing	Total Healthy
Willow/Black	0	0	0	0
Birch/River	0	0	0	0
Birch/Paper	0	0	0	0
Ash/Green	5	1	1	3
Box Elder	14	5	2	7
Cottonwood	6	1	1	4
Buckthorn	4	0	0	4
Elm/American	7	0	0	7
Maple/Sugar	1	0	0	1
Basswood/American	0	0	0	0
Hackberry	0	0	0	0
Elm/Siberian	0	0	0	0
Cedar/White	0	0	0	0
Tamarack	0	0	0	0
Amur Chokecherry	1	0	0	1
Chokecherry	0	0	0	0
Total	38	7	4	27

Appendix D - Design Alternatives' Tree Removal Details

Alternative 2 (Removals)				
Species	Total Count	Total Fallen	Total Dead & Standing	Total Healthy
Willow/Black	0	0	0	0
Birch/River	0	0	0	0
Birch/Paper	0	0	0	0
Ash/Green	8	2	1	5
Box Elder	15	5	2	8
Cottonwood	7	2	1	4
Buckthorn	4	0	0	4
Elm/American	7	0	0	7
Maple/Sugar	2	0	0	2
Basswood/American	3	0	0	3
Hackberry	0	0	0	0
Elm/Siberian	0	0	0	0
Cedar/White	0	0	0	0
Tamarack	0	0	0	0
Amur Chokecherry	1	0	0	1
Chokecherry	0	0	0	0
Total	47	9	4	34

Alternative 3 (Removals)				
Species	Total Count	Total Fallen	Total Dead & Standing	Total Healthy
Willow/Black	0	0	0	0
Birch/River	0	0	0	0
Birch/Paper	0	0	0	0
Ash/Green	12	4	2	6
Box Elder	41	10	3	28
Cottonwood	19	7	1	11
Buckthorn	12	0	0	12
Elm/American	10	0	1	9
Maple/Sugar	2	0	0	2
Basswood/American	3	0	0	3
Hackberry	0	0	0	0
Elm/Siberian	0	0	0	0
Cedar/White	0	0	0	0
Tamarack	0	0	0	0
Amur Chokecherry	1	0	0	1
Chokecherry	0	0	0	0
Total	100	21	7	72

Appendix D - Design Alternatives' Tree Removal Details

Alternative 1 (Removals)				
Parcel Address	Total Count	Total Fallen	Total Dead & Standing	Total Healthy
1935 Forestview Lane North	2	0	0	2
1829 Forestview Lane North	9	0	1	8
1825 Forestview Lane North	14	5	2	7
12105 18th Place North	0	0	0	0
12090 18th Avenue North	4	1	0	3
12125 18th Place North	0	0	0	0
12100 18th Avenue North	4	0	1	3
12110 18th Avenue North	1	0	0	1
1800 Kirkwood Lane North	0	0	0	0
12080 18th Avenue North	0	0	0	0
1825 Ives Lane North	4	1	0	3
1815 Ives Lane North	0	0	0	0
1830 Ives Lane North	0	0	0	0
Total	38	7	4	27

Alternative 2 (Removals)				
Parcel Address	Total Count	Total Fallen	Total Dead & Standing	Total Healthy
1935 Forestview Lane North	2	0	0	2
1829 Forestview Lane North	11	1	1	9
1825 Forestview Lane North	14	5	2	7
12105 18th Place North	0	0	0	0
12090 18th Avenue North	4	1	0	3
12125 18th Place North	0	0	0	0
12100 18th Avenue North	6	1	1	4
12110 18th Avenue North	6	0	0	6
1800 Kirkwood Lane North	0	0	0	0
12080 18th Avenue North	0	0	0	0
1825 Ives Lane North	4	1	0	3
1815 Ives Lane North	0	0	0	0
1830 Ives Lane North	0	0	0	0
Total	47	9	4	34

Alternative 3 (Removals)				
Parcel Address	Total Count	Total Fallen	Total Dead & Standing	Total Healthy
1935 Forestview Lane North	2	0	0	2
1829 Forestview Lane North	50	11	3	36
1825 Forestview Lane North	28	7	3	18
12105 18th Place North	0	0	0	0
12090 18th Avenue North	4	1	0	3
12125 18th Place North	0	0	0	0
12100 18th Avenue North	6	1	1	4
12110 18th Avenue North	6	0	0	6
1800 Kirkwood Lane North	0	0	0	0
12080 18th Avenue North	0	0	0	0
1825 Ives Lane North	4	1	0	3
1815 Ives Lane North	0	0	0	0
1830 Ives Lane North	0	0	0	0
Total	100	21	7	72

Appendix E

Detailed Cost Estimates

Ponderosa Woods Site - Cost Estimate for Alternative 1

Item Description	Unit	Estimated Quantity	Unit Price	Extension
Mobilization	LS	1	\$13,590	\$13,600
Control of Water	LS	1	\$5,000	\$5,000
Erosion Control	LS	1	\$6,200	\$6,200
Clearing and Grubbing	ACRE	0.3	\$20,800	\$7,100
Clear and Grub Woody Invasive Plant Removal (<=6" DBH tree)	ACRE	1.5	\$10,000	\$14,800
Herbaceous vegetation herbicide treatment	ACRE	1.5	\$1,000	\$1,500
Select Tree Removal (>6")	EACH	27	\$325	\$8,800
Debris Removal	LS	1	\$11,000	\$11,000
48-inch Manhole Structure and Installation	EACH	1	\$5,000	\$5,000
Grading	SY	5267	\$2	\$10,600
Fieldstone Riprap	TON	120	\$116	\$14,000
Rock Boulder Vane	LF	48	\$143	\$6,900
Common Excavation	CY	585	\$15	\$8,800
Plant Trees	EACH	27	\$290	\$7,900
Plant Shrubs	EACH	180	\$40	\$7,200
Seeding and Mulch	ACRE	0.3	\$9,200	\$3,200
Coir Blanket	SY	733	\$10	\$7,600
Live Stakes	EACH	333	\$6	\$2,000
Erosion Control Blanket	SY	1,650	\$4	\$5,800
One-Year Establishment Maintenance Period	LS	1	\$2,444	\$2,500
Construction Total				\$ 149,500
Construction Total w/ Contingency (20%)				\$ 179,400
Planning, Engineering & Design (30%)				\$ 53,900
Construction Management (10%)				\$ 18,000
Project Total				\$ 252,000
Total w/ Construction Lower Bound (-20%), Legal, and Engineering				\$ 202,000
Total w/ Construction Upper Bound (+30%), Legal, and Engineering				\$ 328,000
Annual Maintenance Cost (2%)				\$ 5,100

Ponderosa Woods Site - Alternative 1

30-yr and Annualized Cost analysis	Project Total
Category:	Bioengineering
Estimated life span (years)	20
Number of major maint. Events	1
Annual maintenance % of original project cost	15%
End of life span % of original project cost	25%
Expected annual maintenance	\$ 1,920
End of life span maintenance	\$ 63,000
Future Capital Cost	\$ 611,700
Future annual maintenance	\$ 91,340
Future end of life span cost	\$ 113,790
Total Future Worth	\$ 817,000
Annualized Cost	\$ 17,000
Annual Maintenance Cost	\$ 5,000

Ponderosa Woods Site - Cost Estimate for Alternative 1.5

Item Description	Unit	Estimated Quantity	Unit Price	Extension
Mobilization	LS	1	\$16,010	\$16,100
Control of Water	LS	1	\$5,000	\$5,000
Erosion Control	LS	1	\$7,300	\$7,300
Clearing and Grubbing	ACRE	0.3	\$20,800	\$7,100
Clear and Grub Woody Invasive Plant Removal (<=6" DBH tree)	ACRE	3.5	\$10,000	\$35,400
Herbaceous vegetation herbicide treatment	ACRE	3.5	\$1,000	\$3,600
Select Tree Removal (>6")	EACH	27	\$325	\$8,800
Debris Removal	LS	1	\$11,000	\$11,000
48-inch Manhole Structure and Installation	EACH	1	\$5,000	\$5,000
Grading	SY	5267	\$2	\$10,600
Fieldstone Riprap	TON	120	\$116	\$14,000
Rock Boulder Vane	LF	48	\$143	\$6,900
Common Excavation	CY	585	\$15	\$8,800
Plant Trees	EACH	27	\$290	\$7,900
Plant Shrubs	EACH	180	\$40	\$7,200
Seeding and Mulch	ACRE	0.3	\$9,200	\$3,200
Coir Blanket	SY	733	\$10	\$7,600
Live Stakes	EACH	333	\$6	\$2,000
Erosion Control Blanket	SY	1,650	\$4	\$5,800
One-Year Establishment Maintenance Period	LS	1	\$2,898	\$2,900
			Construction Total	\$ 176,200
			Construction Total w/ Contingency (20%)	\$ 211,500
			Planning, Engineering & Design (30%)	\$ 63,500
			Construction Management (10%)	\$ 21,200
			Project Total	\$ 297,000
			Total w/ Construction Lower Bound (-20%), Legal, and Engineering	\$ 238,000
			Total w/ Construction Upper Bound (+30%), Legal, and Engineering	\$ 387,000
			Annual Maintenance Cost (2%)	\$ 6,000

Ponderosa Woods Site - Alternative 1

30-yr and Annualized Cost analysis	Project Total
Category:	Bioengineering
Estimated life span (years)	20
Number of major maint. Events	1
Annual maintenance % of original project cost	15%
End of life span % of original project cost	25%
Expected annual maintenance	\$ 1,920
End of life span maintenance	\$ 74,250
Future Capital Cost	\$ 720,900
Future annual maintenance	\$ 91,340
Future end of life span cost	\$ 134,100
Total Future Worth	\$ 946,000
Annualized Cost	\$ 20,000
Annual Maintenance Cost	\$ 5,900

Ponderosa Woods Site - Cost Estimate for Alternative 2

Item Description	Unit	Estimated Quantity	Unit Price	Extension
Mobilization	LS	1	\$23,190	\$23,200
Control of Water	LS	1	\$20,000	\$20,000
Erosion Control	LS	1	\$9,900	\$9,900
Clearing and Grubbing	ACRE	0.4	\$20,800	\$7,900
Clear and Grub Woody Invasive Plant Removal (<=6" DBH tree)	ACRE	3.5	\$10,000	\$35,400
Herbaceous vegetation herbicide treatment	ACRE	3.5	\$1,000	\$3,600
Select Tree Removal (>6")	EACH	34	\$325	\$11,100
Debris Removal	LS	1	\$11,000	\$11,000
48-inch Manhole Structure and Installation	EACH	1	\$5,000	\$5,000
Grading	SY	5800	\$2	\$11,600
Fieldstone Riprap	TON	480	\$116	\$55,700
Rock Boulder Vane	LF	96	\$143	\$13,800
Common Excavation	CY	644	\$15	\$9,700
Plant Trees	EACH	34	\$290	\$9,900
Plant Shrubs	EACH	200	\$40	\$8,000
Seeding and Mulch	ACRE	0.4	\$9,200	\$3,500
Coir Blanket	SY	400	\$10	\$4,200
Live Stakes	EACH	200	\$6	\$1,200
Erosion Control Blanket	SY	1,828	\$4	\$6,400
One-Year Establishment Maintenance Period	LS	1	\$3,960	\$4,000
Construction Total				\$ 255,100
Construction Total w/ Contingency (20%)				\$ 306,200
Planning, Engineering & Design (30%)				\$ 91,900
Construction Management (10%)				\$ 30,700
Project Total				\$ 429,000
Total w/ Construction Lower Bound (-20%), Legal, and Engineering				\$ 344,000
Total w/ Construction Upper Bound (+30%), Legal, and Engineering				\$ 558,000
Annual Maintenance Cost (2%)				\$ 8,600

Ponderosa Woods Site - Alternative 2

30-yr and Annualized Cost analysis	Project Total
Category:	Bioengineering
Estimated life span (years)	20
Number of major maint. Events	1
Annual maintenance % of original project cost	15%
End of life span % of original project cost	25%
Expected annual maintenance	\$ 1,340
End of life span maintenance	\$ 107,250
Future Capital Cost	\$ 1,041,300
Future annual maintenance	\$ 63,750
Future end of life span cost	\$ 193,710
Total Future Worth	\$ 1,299,000
Annualized Cost	\$ 27,000
Annual Maintenance Cost	\$ 8,600

Ponderosa Woods Site - Cost Estimate for Alternative 3

Item Description	Unit	Estimated Quantity	Unit Price	Extension
Mobilization	LS	1	\$27,320	\$27,400
Control of Water	LS	1	\$20,000	\$20,000
Erosion Control	LS	1	\$11,825	\$11,900
Clearing and Grubbing	ACRE	0.6	\$20,800	\$13,200
Clear and Grub Woody Invasive Plant Removal (<=6" DBH tree)	ACRE	3.3	\$10,000	\$32,900
Herbaceous vegetation herbicide treatment	ACRE	3.3	\$1,000	\$3,300
Select Tree Removal (>6")	EACH	72	\$325	\$23,400
Debris Removal	LS	1	\$11,000	\$11,000
48-inch Manhole Structure and Installation	EACH	1	\$5,000	\$5,000
Grading	SY	4467	\$2	\$9,000
Fieldstone Riprap	TON	480	\$116	\$55,700
Rock Boulder Vane	LF	80	\$143	\$11,500
Common Excavation	CY	496	\$15	\$7,500
Plant Trees	EACH	72	\$290	\$20,900
Plant Shrubs	EACH	320	\$40	\$12,800
Seeding and Mulch	ACRE	0.6	\$9,200	\$5,900
Coir Blanket	SY	967	\$10	\$10,100
Live Stakes	EACH	600	\$6	\$3,500
Erosion Control Blanket	SY	3,063	\$4	\$10,800
One-Year Establishment Maintenance Period	LS	1	\$4,730	\$4,800
Construction Total				\$ 300,600
Construction Total w/ Contingency (20%)				\$ 360,800
Planning, Engineering & Design (30%)				\$ 108,300
Construction Management (10%)				\$ 36,100
Project Total				\$ 506,000
Total w/ Construction Lower Bound (-20%), Legal, and Engineering				\$ 405,000
Total w/ Construction Upper Bound (+30%), Legal, and Engineering				\$ 658,000
Annual Maintenance Cost (2%)				\$ 10,200

Ponderosa Woods Site - Alternative 3

30-yr and Annualized Cost analysis	Project Total
Category:	Bioengineering
Estimated life span (years)	20
Number of major maint. Events	1
Annual maintenance % of original project cost	15%
End of life span % of original project cost	25%
Expected annual maintenance	\$ 2,930
End of life span maintenance	\$ 126,500
Future Capital Cost	\$ 1,228,200
Future annual maintenance	\$ 139,400
Future end of life span cost	\$ 228,470
Total Future Worth	\$ 1,596,000
Annualized Cost	\$ 34,000
Annual Maintenance Cost	\$ 10,100