APPENDIX B

SOILS DATA TABLES AND MAPS

TABLES

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TABLE B1: SOIL DESCRIPTIONS, MORROW COUNTY

Soil Map Unit	NSCS Map Unit	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
2 D	61308	Bakeoven very cobbly loam	Well drained	Moderate	Bakeoven	2	20	plateaus, plateaus	1.5	6.1	7.8	10	25	loess mixed with residuum weathered from basalt
3 D	61325	Bakeoven-Morrow complex	Well drained	Moderate	Bakeoven	2	20	plateaus, plateaus	1.5	6.1	7.8	10	25	loess mixed with residuum weathered from basalt
4 D	61345	Bakeoven-Valby complex	Well drained	Moderate	Bakeoven	2	20	plateaus, plateaus	1.5	6.1	7.8	10	25	loess mixed with residuum weathered from basalt
8 B	61400	Burbank loamy fine sand	Excessively drained	Slight	Burbank	2	5	terraces	1.5	6.6	7.8	0	0	
9	61402	Dune land	Well drained	Not rated	Dune land	5	40	dunes	1.5	0.0	0.0	0	0	
9	61402	Dune land	Well drained	Not rated	Dune land	5	40	dunes	1.5	0.0	0.0	0	0	
10 C	61280	Ellum fine sandy loam	Well drained	Severe	Ellum	5	12	strath terraces, valleys	1.5	7.4	7.8	51	102	gravelly mixed alluvium
11	61281	Endersby fine sandy loam	Somewhat excessively drained	Slight	Endersby	0	3	flood plains	1.5	6.6	7.8	0	0	
13 E	61284	Gravden very gravelly loam	Well drained	Severe	Gravden	20	40	hills, hillslopes	1.5	7.9	8.4	25	51	gravelly alluvium and colluvium
20 C	61294	Hezel loamy fine sand	Somewhat excessively drained	Severe	Hezel	5	12	strath terraces, valleys	1.5	6.6	8.4	0	0	
26 B	61303	Koehler loamy fine sand	Somewhat excessively drained	Moderate	Koehler	2	5	strath terraces, valleys	1.5	7.4	8.4	51	102	eolian sands over cemented alluvium
28 E	61306	Lickskillet very stony loam	Well drained	Severe	Lickskillet	7	40	hills, hillslopes	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
29 F	61307	Lickskillet-Rock outcrop complex	Well drained	Severe	Lickskillet	40	70	hills, hillslopes	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
30 B	61309	Mikkalo silt loam	Well drained	Moderate	Mikkalo	2	7	plateaus, plateaus	1.5	6.6	7.8	51	102	loess
30 C	61310	Mikkalo silt loam	Well drained	Severe	Mikkalo	7	12	plateaus, plateaus	1.5	6.6	7.8	51	102	loess
31 B	61312	Morrow silt loam	Well drained	Moderate	Morrow	1	7	plateaus, plateaus	1.5	6.6	7.3	51	102	loess
31 C	61313	Morrow silt loam	Well drained	Severe	Morrow	7	12	plateaus, plateaus	1.5	6.6	7.3	51	102	loess
32 D	61314	Morrow silt loam	Well drained	Severe	Morrow	12	20	hills, hillslopes	1.5	6.6	7.3	51	102	loess
32 E	61315	Morrow silt loam	Well drained	Severe	Morrow	20	35	hills, hillslopes	1.5	6.6	7.3	51	102	loess
33 E	61317	Morrow silt loam	Well drained	Severe	Morrow	20	30	hills, hillslopes	1.5	6.6	7.3	51	102	loess
34 F	61318	Nansene silt loam	Well drained	Severe	Nansene	35	70	hills, hillslopes	1.5	6.1	7.3	102	152	loess
35	61319	Onyx silt loam	Well drained	Slight	Onyx	0	3	flood plains	1.5	6.6	7.8	0	0	
35	61319	Onyx silt loam	Well drained	Slight	Onyx	0	3	flood plains	1.5	6.6	7.8	0	0	
36	61320	Pedigo silt loam	Somewhat poorly drained	Slight	Pedigo	0	3	flood plains	1.5	8.4	9.6	0	0	
40 C	61326	Quincy loamy fine sand	Excessively drained	Moderate	Quincy	2	12	strath terraces, valleys	1.5	6.1	8.4	0	0	
41 B	61327	Quinton loamy fine sand	Excessively drained	Moderate	Quinton	2	5	strath terraces, valleys	1.5	6.6	8.4	51	102	eolian sands over basalt
43 C	61330	Rhea silt loam	Well drained	Severe	Rhea	7	12	plateaus, plateaus	1.5	6.6	7.3	0	0	
43 D	61331	Rhea silt loam	Well drained	Severe	Rhea	12	20	plateaus, plateaus	1.5	6.6	7.3	0	0	
43 E	61332	Rhea silt loam	Well drained	Severe	Rhea	20	35	plateaus, plateaus	1.5	6.6	7.3	0	0	
43 F	61333	Rhea silt loam	Well drained	Severe	Rhea	35	50	plateaus, plateaus	1.5	6.6	7.3	0	0	
45 A	61337	Ritzville silt loam	Well drained	Slight	Ritzville	0	2	plateaus, plateaus	1.5	6.6	8.4	0	0	
45 B	61338	Ritzville silt loam	Well drained	Moderate	Ritzville	2	7	plateaus, plateaus	1.5	6.6	8.4	0	0	
45 C	61339	Ritzville silt loam	Well drained	Severe	Ritzville	7	12	plateaus, plateaus	1.5	6.6	8.4	0	0	
45 D	61340	Ritzville silt loam	Well drained	Severe	Ritzville	12	20	plateaus, plateaus	1.5	6.6	8.4	0	0	
51 B	61347	Royal loamy fine sand	Well drained	Moderate	Royal	2	5	strath terraces, valleys	1.5	6.6	7.8	0	0	
53 A	61352	Royal silt loam	Well drained	Slight	Royal	0	3	flood plains, river valleys	1.5	6.6	7.8	0	0	
54 B	61353	Sagehill fine sandy loam	Well drained	Moderate	Sagehill	2	5	strath terraces, valleys	1.5	6.6	8.4	0	0	

TABLE B1: SOIL DESCRIPTIONS, MORROW COUNTY

Soil Map Unit	NSCS Map Unit	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
54 C	61354	Sagehill fine sandy loam	Well drained	Severe	Sagehill	5	12	strath terraces, valleys	1.5	6.6	8.4	0	0	
54 D	61355	Sagehill fine sandy loam	Well drained	Severe	Sagehill	12	20	strath terraces, valleys	1.5	6.6	8.4	0	0	
55 B	61356	Sagehill fine sandy loam	Well drained	Moderate	Sagehill	2	5	strath terraces, valleys	1.5	6.6	8.4	0	0	
55 C	61357	Sagehill fine sandy loam	Well drained	Severe	Sagehill	5	12	strath terraces, valleys	1.5	6.6	8.4	0	0	
56 B	64520	Morrow silt loam	Well drained	Moderate	Morrow	1	7	hills, hills on plateaus	1.5	7.9	8.4	51	102	loess
56 C	64521	Morrow silt loam	Well drained	Severe	Morrow	7	12	hills, hills on plateaus	1.5	7.9	8.4	51	102	loess
56 E	64522	Morrow silt loam	Well drained	Severe	Morrow	20	40	hillslopes, hills on plateaus	1.5	7.9	8.4	51	102	loess
58 B	61361	Taunton fine sandy loam	Well drained	Moderate	Taunton	2	5	strath terraces, valleys	1.5	6.6	7.3	51	102	eolian sands over strongly cemented alluvium
59 D	64525	Morrow-Bakeoven complex	Well drained	Severe	Morrow	2	20	patterned ground on hills, hills	1.5	7.9	8.4	51	102	loess
63 B	61370	Valby silt loam	Well drained	Moderate	Valby	1	7	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over basalt
63 C	61371	Valby silt loam	Well drained	Severe	Valby	7	12	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over basalt
64 D	61372	Valby silt loam	Well drained	Severe	Valby	12	20	hills, hillslopes	1.5	6.6	7.8	51	102	loess over basalt
65 D	61373	Valby silt loam	Well drained	Severe	Valby	12	20	hills, hillslopes	1.5	6.6	7.8	51	102	loess over basalt
65 E	61374	Valby silt loam	Well drained	Severe	Valby	20	30	hills, hillslopes	1.5	6.6	7.8	51	102	loess over basalt
70 B	61381	Warden very fine sandy loam	Well drained	Moderate	Warden	2	5	strath terraces, valleys	1.5	6.6	7.8	0	0	
70 C	61382	Warden very fine sandy loam	Well drained	Severe	Warden	5	12	strath terraces, valleys	1.5	6.6	7.8	0	0	
70 D	61383	Warden very fine sandy loam	Well drained	Severe	Warden	12	20	strath terraces, valleys	1.5	6.6	7.8	0	0	
71 A	61384	Warden silt loam	Well drained	Slight	Warden	0	2	strath terraces, valleys	1.5	6.6	7.8	0	0	
71 B	61385	Warden silt loam	Well drained	Moderate	Warden	2	5	strath terraces, valleys	1.5	6.6	7.8	0	0	
71 C	61386	Warden silt loam	Well drained	Severe	Warden	5	12	strath terraces, valleys	1.5	6.6	7.8	0	0	
71 D	61387	Warden silt loam	Well drained	Severe	Warden	12	20	strath terraces, valleys	1.5	6.6	7.8	0	0	
71 E	61388	Warden silt loam	Well drained	Severe	Warden	20	40	strath terraces, valleys	1.5	6.6	7.8	0	0	
75 B	61393	Willis silt loam	Well drained	Moderate	Willis	2	5	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over cemented alluvium
75 C	61394	Willis silt loam	Well drained	Severe	Willis	5	12	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over cemented alluvium
75 D	61395	Willis silt loam	Well drained	Severe	Willis	12	20	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over cemented alluvium
77 F	61397	Wrentham-Rock outcrop complex	Well drained	Severe	Wrentham	35	70	hills, hillslopes	1.5	6.1	7.3	51	102	loess mixed with colluvium derived from basalt
78	61398	Xeric Torriorthents	Somewhat excessively drained	Slight	Xeric Torriorthents	0	2	flood plains, river valleys	1.5	6.6	7.3	0	0	
78	61398	Xeric Torriorthents	Somewhat excessively drained	Slight	Xeric Torriorthents	0	2	flood plains, river valleys	1.5	6.6	7.3	0	0	

TABLE B2: SOIL DESCRIPTIONS, UMATILLA COUNTY

Soil Map Unit Symbol	NSCS Map Unit Key	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
5 C	64526	Albee-Bocker-Anatone complex	Well drained	Moderate	Albee	2	15	plateaus, patterned ground on plateaus	1.5	5.6	7.3	51	102	loess and volcanic ash mixed with colluvium derived from basalt
13 F	64452	Buckcreek-Gwin association	Well drained	Severe	Buckcreek	45	70	hillslopes, mountains	1.5	6.1	7.3	51	102	small amount of volcanic ash mixed with loess and colluvium from basalt
31 D	64484	Gurdane silty clay loam	Well drained	Severe	Gurdane	7	25	hills, mountains	4.5	6.1	7.3	51	102	loess mixed with a small amount of volcanic ash over residuum weathered from basalt
31 B	64483	Morrow silt loam	Well drained	Moderate	Gurdane	0	7	hills, mountains	4.5	6.1	7.3	51	102	loess mixed with a small amount of volcanic ash over residuum weathered from basalt
31 E	64485	Gurdane silty clay loam	Well drained	Severe	Gurdane	25	45	hillslopes, mountains	7.5	6.1	7.3	51	102	loess mixed with a small amount of volcanic ash over residuum weathered from basalt
32 E	64486	Morrow silt loam	Well drained	Severe	Gurdane	20	40	hillslopes, mountains	4.5	6.1	7.3	51	102	loess mixed with a small amount of volcanic ash over residuum weathered from basalt
33 D	64487	Gurdane-Rockly complex	Well drained	Moderate	Gurdane	2	20	mountains, patterned ground on plateaus	4.5	6.1	7.3	51	102	loess mixed with a small amount of volcanic ash over residuum weathered from basalt
35 F	64489	Gwin-Rock outcrop complex	Well drained	Severe	Gwin	40	70	hillslopes, mountains	0	0.0	0.0	25	51	loess mixed with residuum and colluvium from basalt
36 E	64490	Gwinly very cobbly silt loam	Well drained	Severe	Gwinly	7	40	hillslopes, mountains	4.5	6.6	7.3	25	51	loess mixed with residuum and colluvium from basalt
39 A	64495	Hermiston silt loam	Well drained	Slight	Hermiston	0	3	flood plains, valleys	1.5	6.6	8.4	0	0	
44 D	64503	Klicker silt loam	Well drained	Moderate	Klicker	2	20	mountains, plateaus	0	4.5	5.5	51	102	loess and volcanic ash mixed with colluvium from basalt
46 C	64505	Klicker-Anatone-Bocker complex	Well drained	Moderate	Klicker	2	15	mountains, plateaus	1.5	6.1	7.3	51	102	loess and volcanic ash mixed with colluvium from basalt
46 E	64506	Klicker-Anatone-Bocker complex	Well drained	Severe	Klicker	15	35	hillslopes, mountains	4.5	6.1	6.5	51	102	loess and volcanic ash mixed with colluvium from basalt
48 E	64508	Lickskillet very stony loam	Well drained	Severe	Lickskillet	7	40	hillslopes, hills on plateaus	1.5	6.6	8.4	30	51	loess mixed with colluvium from basalt
50 F	64511	Lickskillet-Rock outcrop complex	Well drained	Severe	Lickskillet	40	70	hillslopes, hills on plateaus	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
52 D	64513	McKay silt loam	Well drained	Severe	McKay	7	25	hills, hillslopes	4.5	7.9	9.0	0	0	
53 D	64514	McKay silt loam	Well drained	Severe	McKay	7	25	hills, hillslopes	1.5	5.6	7.8	0	0	
55 A	64519	Mondovi silt loam	Well drained	Slight	Mondovi	0	3	flood plains, valleys	1.5	6.6	7.8	0	0	
56 C	64521	Morrow silt loam	Well drained	Severe	Morrow	7	12	hills, hills on plateaus	1.5	7.9	8.4	51	102	loess
56 E	64522	Morrow silt loam	Well drained	Severe	Morrow	20	40	hillslopes, hills on plateaus	1.5	7.9	8.4	51	102	loess
56 B	64520	Morrow silt loam	Well drained	Moderate	Morrow	1	7	hills, hills on plateaus	1.5	7.9	8.4	51	102	loess
57 D	64523	Morrow silt loam	Well drained	Severe	Morrow	12	20	hillslopes, hills on plateaus	1.5	6.6	7.3	51	102	loess
59 D	64525	Morrow-Bakeoven complex	Well drained	Severe	Morrow	2	20	patterned ground on hills, hills	1.5	7.9	8.4	51	102	loess
63 A	64531	Onyx silt loam	Well drained	Slight	Onyx	0	3	flood plains, valleys	1.5	6.6	7.8	0	0	
86 D	64572	Rockly very cobbly loam	Well drained	Moderate	Rockly	2	20	ridges on hillslopes, foothills, mountains	1.5	6.1	7.3	13	30	loess and volcanic ash mixed with residuum and colluvium from basalt
97 C	64592	Tolo silt loam	Well drained	Severe	Tolo	3	15	mountains, plateaus	4.5	5.6	7.3	0	0	
97 E	64593	Tolo silt loam	Well drained	Severe	Tolo	15	35	hillslopes, mountains	1.5	5.6	7.3	0	0	
100 A	64411	Tolo-Klicker association	Well drained	Severe	Tolo	15	35	hillslopes, mountains	4.5	5.6	7.3	0	0	
100 C	64410	Tolo-Klicker association	Well drained	Severe	Tolo	3	15	mountains, plateaus	0	4.5	5.5	0	0	
107 F	64419	Umatilla-Kahler association	Well drained	Severe	Umatilla	35	70	hillslopes, mountains	4.5	6.1	7.3	0	0	
108 F	64420	Umatilla-Kahler-Gwin association	Well drained	Severe	Umatilla	35	70	hillslopes, mountains	0	4.5	5.5	0	0	
109 A	64421	Veazie silt loam	Well drained	Slight	Veazie	0	3	flood plains, valleys	1.5	6.1	7.3	0	0	
110 A	64423	Veazie cobbly loam	Well drained	Slight	Veazie	0	3	flood plains, valleys	1.5	6.1	7.3	0	0	

TABLE B2: SOIL DESCRIPTIONS, UMATILLA COUNTY

Soil Map Unit Symbol	NSCS Map Unit Key	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
112 B	64425	Waha silty clay loam	Well drained	Moderate	Waha	1	12	hills, mountains	4.5	6.1	6.5	51	102	loess over colluvium and residuum derived from basalt
113 D	64428	Waha-Rockly complex	Well drained	Moderate	Waha	2	20	patterned ground on plateaus, mountains	4.5	6.6	7.3	51	102	loess over colluvium and residuum derived from basalt
126 A	64446	Xerofluvents	Somewhat poorly drained	Slight	Xerofluvents	0	3	flood plains, valleys	1.5	6.6	7.3	0	0	
3000	2998632	Patit Creek-Psuni-Psuni	Well drained	Slight	Olallie	0	2	seeps on flood plains, foothills	0.1	6.6	7.3	0	0	
5791 BO	2593961	Syrupcreek-Tamara complex	Well drained	Severe	Syrupcreek	15	30	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	volcanic ash mixed with loess over colluvium and residuum derived from andesite or basalt

TABLE B3: SOIL DESCRIPTIONS, UNION COUNTY

Soil Map Unit	NSCS Map Unit	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
4 E	63988	Anatone extremely stony loam	Well drained	Severe	Anatone	2	35	hillslopes	1.5	6.1	7.3	25	51	colluvium and residuum from basalt with loess and volcanic ash in the surface layer
5 E	64004	Anatone-Bocker complex	Well drained	Severe	Anatone	2	35	hillslopes	1.5	6.1	7.3	25	51	colluvium and residuum from basalt with loess and volcanic ash in the surface layer
6 F	64015	Anatone-Klicker complex	Well drained	Severe	Anatone	40	65	mountain slopes	1.5	6.1	7.3	25	51	colluvium and residuum from basalt with loess and volcanic ash in the surface layer
7	64016	Catherine silt loam	Somewhat poorly drained	Slight	Catherine	0	3	flood plains, stream terraces	1.5	6.1	7.3	0	0	
8	64020	Catherine silty clay loam	Somewhat poorly drained	Slight	Catherine	0	3	flood plains, stream terraces	1.5	7.4	7.8	0	0	
8	64020	Catherine silty clay loam	Somewhat poorly drained	Slight	Catherine	0	3	flood plains, stream terraces	1.5	7.4	7.8	0	0	
9 A	64021	Conley silty clay loam	Somewhat poorly drained	Slight	Conley	0	2	alluvial fans, lake plains	4.5	6.6	7.3	25	76	mixed alluvium and lacustrine deposits
10 C	63932	Coughanour silt loam	Well drained	Severe	Coughanour	7	12	fans, terraces	1.5	6.6	7.8	51	102	mixed alluvium derived mainly from loess and volcanic ash
10 B	63931	Coughanour silt loam	Well drained	Moderate	Coughanour	2	7	fans, terraces	1.5	6.6	7.8	51	102	mixed alluvium derived mainly from loess and volcanic ash
11 D	63934	Cowsly silt loam	Moderately well drained	Severe	Cowsly	12	20	mountain slopes	1.5	6.1	7.3	30	102	colluvium and residuum derived from basalt and tuff with a mantle of loess and volcanic ash
11 C	63933	Cowsly silt loam	Moderately well drained	Moderate	Cowsly	2	12	mountain slopes	1.5	6.1	7.3	30	102	colluvium and residuum derived from basalt and tuff with a mantle of loess and volcanic ash
12 D	63935	Cowsly very stony silt loam	Moderately well drained	Moderate	Cowsly	2	20	mountain slopes	1.5	6.1	7.3	30	102	colluvium and residuum derived from basalt and tuff with a mantle of loess and volcanic ash
14 C	63937	Emily cobbly silt loam	Well drained	Slight	Emily	2	12	mountain slopes	0	4.5	5.5	0	0	
15 C	63938	Encina silt loam	Well drained	Moderate	Encina	2	12	terraces	1.5	6.6	7.3	0	0	
16 E	63940	Encina silt loam	Well drained	Severe	Encina	12	45	terraces	1.5	6.6	7.3	0	0	
17 E	63942	Gwinly very cobbly silt loam	Well drained	Severe	Gwinly	20	40	hillslopes	1.5	6.6	7.8	25	51	loess and colluvium derived from basalt and tuff
17 D	63941	Gwinly very cobbly silt loam	Well drained	Severe	Gwinly	12	20	hillslopes	1.5	6.6	7.8	25	51	loess and colluvium derived from basalt and tuff
18 E	63943	Gwinly-Rockly complex	Well drained	Severe	Gwinly	5	40	hillslopes	1.5	6.6	7.8	25	51	loess and colluvium derived from basalt and tuff
18 F	63944	Gwinly-Rockly complex	Well drained	Severe	Gwinly	40	70	hillslopes	7.5	6.6	7.3	25	51	loess and colluvium derived from basalt and tuff
22	63951	Hooly silt loam	Somewhat poorly drained	Slight	Hooly	0	2	lake plains, terraces	1.5	7.4	8.4	0	0	
25	63954	Hot Lake silt loam	Somewhat poorly drained	Slight	Hot Lake	0	2	lake plains, terraces	1.5	7.4	8.4	0	0	
26 C	63956	Hutchinson silt loam	Well drained	Moderate	Hutchinson	7	12	terraces	1.5	6.6	7.8	51	102	loess, volcanic ash, colluvium, and mixed alluvium
27 D	63957	Hutchinson gravelly silt loam	Well drained	Moderate	Hutchinson	1	20	terraces	1.5	6.6	7.8	51	102	loess, volcanic ash, colluvium, and mixed alluvium
28 C	63958	Hutchinson variant silt loam	Well drained	Moderate	Hutchinson variant	2	12	alluvial fans, terraces	1.5	6.6	7.3	51	102	mixed alluvium with loess and volcanic ash in the surface layer
31	63963	Jett silt loam	Well drained	Slight	Jett	0	2	flood plains	1.5	7.4	8.4	0	0	
32 E	63964	Kamela very stony silt loam	Well drained	Severe	Kamela	2	35	mountain slopes	0	4.5	5.5	51	102	colluvium and residuum derived from basalt with loess and volcanic ash
33 E	63965	Klicker stony silt loam	Well drained	Moderate	Klicker	2	40	mountain slopes	0	4.5	5.5	51	102	colluvium and residuum from basalt with loess and volcanic ash in the surface layer
33 F	63966	Klicker stony silt loam	Well drained	Severe	Klicker	40	65	mountain slopes	0	4.5	5.5	51	102	colluvium and residuum from basalt with loess and volcanic ash in the surface layer
34 F	63967	Klicker stony silt loam	Well drained	Severe	Klicker	40	65	mountain slopes	0	4.5	5.5	51	102	colluvium and residuum from basalt with loess and volcanic ash in the surface layer
35 E	63968	Klicker-Anatone complex	Well drained	Moderate	Klicker	5	40	mountain slopes	4.5	6.1	6.5	51	102	colluvium and residuum from basalt with loess and volcanic ash in the surface layer
36	63969	La Grande silt loam	Moderately well drained	Slight	La Grande	0	2	alluvial fans, stream terraces	1.5	7.9	8.4	0	0	
38 E	63971	Loneridge stony silt loam	Well drained	Severe	Loneridge	12	40	mountain slopes	0	4.5	5.5	0	0	

TABLE B3: SOIL DESCRIPTIONS, UNION COUNTY

Soil Map Unit	NSCS Map Unit	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
39 C	63972	Lookingglass silt loam	Moderately well drained	Moderate	Lookingglass	2	12	hillslopes	1.5	6.1	7.3	30	76	colluvium and residuum from basalt and tuff with a mantle of loess and volcanic ash
40 C	63974	Lookingglass very stony silt loam	Moderately well drained	Moderate	Lookingglass	2	20	hillslopes	1.5	6.1	7.3	30	76	colluvium and residuum from basalt and tuff with a mantle of loess and volcanic ash
41 D	63975	Lookout very stony silt loam	Well drained	Moderate	Lookout	2	20	hillslopes	1.5	6.6	7.3	102	152	colluvium from basalt and tuff with loess and volcanic ash in the surface layer
42 D	63977	McMurdie silt loam	Well drained	Severe	McMurdie	15	25	hillslopes	1.5	6.1	6.5	102	152	colluvium and residuum from basalt and tuff with loess in the surface layer
43 C	63978	North Powder loam	Well drained	Moderate	North Powder	2	15	hillslopes	1.5	6.1	7.3	51	102	colluvium derived from granite with loess and volcanic ash in the surface layer
44 C	63979	Olot silt loam	Well drained	Moderate	Olot	2	12	mountain slopes	0	4.5	5.5	51	102	colluvium and residuum derived from basalt with a mantle of volcanic ash
45 E	63980	Olot stony silt loam	Well drained	Severe	Olot	12	35	mountain slopes	0	4.5	5.5	51	102	colluvium and residuum derived from basalt with a mantle of volcanic ash
45 F	63981	Olot stony silt loam	Well drained	Severe	Olot	35	65	mountain slopes	0	4.5	5.5	51	102	colluvium and residuum derived from basalt with a mantle of volcanic ash
46 D	63983	Durkee gravelly silt loam	Well drained	Severe	Palouse	5	20	hillslopes	1.5	6.6	7.3	0	0	
48 B	63986	Phys gravelly silt loam	Well drained	Slight	Phys	1	5	alluvial fans	4.5	6.6	7.3	0	0	
49	63987	Pits		Not rated	Pits	0	90		0	0.0	0.0	0	0	
50 C	63989	Ramo silty clay loam	Well drained	Severe	Ramo	2	15	hillslopes	4.5	6.1	7.3	0	0	
50 D	63990	Ramo silty clay loam	Well drained	Severe	Ramo	15	35	hillslopes	4.5	6.1	7.3	0	0	
51 D	63991	Ramo very stony silty clay loam	Well drained	Moderate	Ramo	2	20	hillslopes	7.5	6.1	7.3	0	0	
52 AO	2484542	Peaviner-Tolo complex	Well drained	Moderate	Tolo	0	15	mountain slopes, mountains, plateaus, plateaus	4.5	5.6	7.3	0	0	
55 D	63995	Rockly extremely stony loam	Well drained	Moderate	Rockly	2	20	hillslopes	1.5	6.1	7.3	13	30	colluvium and residuum from basalt with loess and volcanic ash in the surface layer
56 E	63996	Royst very stony silt loam	Well drained	Severe	Royst	7	35	hillslopes	1.5	6.1	7.3	51	102	colluvium and residuum from basalt and tuff with loess and volcanic ash in the surface layer
56 F	63997	Royst very stony silt loam	Well drained	Severe	Royst	35	70	hillslopes	1.5	6.1	7.3	51	102	colluvium and residuum from basalt and tuff with loess and volcanic ash in the surface layer
57 E	63999	Ruckles very stony clay loam	Well drained	Severe	Ruckles	12	45	hillslopes	4.5	6.6	7.8	25	51	colluvium and residuum from basalt and tuff with loess and volcanic ash in the surface layer
57 C	63998	Ruckles very stony clay loam	Well drained	Moderate	Ruckles	1	12	hillslopes	4.5	6.6	7.8	25	51	colluvium and residuum from basalt and tuff with loess and volcanic ash in the surface layer
57	64000	Ruckles very stony clay loam	Well drained	Severe	Ruckles	45	65	hillslopes	4.5	6.6	7.8	25	51	colluvium and residuum from basalt and tuff with loess and volcanic ash in the surface layer
57 CO	2437300	Syrupcreek-Limberjim complex	Well drained	Severe	Limberjim	30	60	mountain slopes, mountains, plateaus, plateaus	4.5	5.6	7.3	102	152	volcanic ash over colluvium and/or residuum weathered from basalt and/or andesite
58 E	64001	Starkey very stony silt loam	Well drained	Severe	Starkey	2	35	hillslopes	1.5	6.6	7.3	25	51	colluvium and residuum from basalt and tuff with loess in the surface layer
59 F	64003	Tolo silt loam	Well drained	Severe	Tolo	35	65	mountain slopes	0	4.5	5.5	0	0	
59 E	64002	Tolo silt loam	Well drained	Severe	Tolo	12	35	mountain slopes	0	4.5	5.5	0	0	
60 D	64005	Ukiah silty clay loam	Well drained	Severe	Ukiah	2	20	hillslopes	4.5	6.1	7.3	51	102	colluvium and residuum from tuff with loess in the surface layer
61 E	64006	Ukiah-Starkey complex	Well drained	Severe	Ukiah	5	40	hillslopes	7.5	6.1	7.3	51	102	colluvium and residuum from tuff with loess in the surface layer
62	64007	Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	stream terraces	1.5	8.4	9.6	0	0	
64	64009	Urban land-Ramo complex		Not rated	Urban land	2	15		0	0.0	0.0	0	0	
66	64011	Veazie-Voats complex	Well drained	Slight	Veazie	0	3	stream terraces	1.5	6.1	7.3	51	102	mixed alluvium

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						Low	High			Low	High	Low	High	
68 C	64013	Watama silt loam	Well drained	Moderate	Watama	2	12	hillslopes	1.5	6.6	7.3	51	102	colluvium and residuum from basalt mixed with loess and volcanic ash
69 C	64014	Watama-Gwinly complex	Well drained	Moderate	Watama	2	12	hillslopes	1.5	6.6	7.3	51	102	colluvium and residuum from basalt mixed with loess and volcanic ash
70 B	64017	Wilkins silt loam	Somewhat poorly drained	Moderate	Wilkins	1	5	terraces	1.5	5.6	7.3	38	76	alluvium with a mantle of loess and volcanic ash
71	64018	Wingville silt loam	Somewhat poorly drained	Slight	Wingville	0	2	alluvial fans, flood plains	1.5	7.4	8.4	0	0	
72 C	64019	Wolot silt loam	Well drained	Moderate	Wolot	2	12	hillslopes	0	4.5	5.5	0	0	
72 C	64019	Wolot silt loam	Well drained	Moderate	Wolot	2	12	hillslopes	0	4.5	5.5	0	0	
97 E	64593	Tolo silt loam	Well drained	Severe	Tolo	15	35	hillslopes, mountains	1.5	5.6	7.3	0	0	
589 AO	2437333	Anatone-Bocker-Fivebeaver complex	Well drained	Moderate	Anatone	0	15	mountain slopes, mountains, plateaus, plateaus	1.5	6.1	7.3	25	51	loess and colluvium derived from basalt
589 CO	2437335	Anatone-Bocker-Fivebeaver complex	Well drained	Severe	Anatone	30	60	mountain slopes, mountains, plateaus, plateaus	1.5	6.1	7.3	25	51	loess and colluvium derived from basalt
5775 AO	2437298	Syrupcreek-Limberjim complex	Well drained	Moderate	Limberjim	0	15	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	102	152	volcanic ash over colluvium and/or residuum weathered from basalt and/or andesite
5775 BO	2437299	Syrupcreek-Limberjim complex	Well drained	Severe	Limberjim	15	30	mountain slopes, mountains, plateaus, plateaus	4.5	5.6	7.3	102	152	volcanic ash over colluvium and/or residuum weathered from basalt and/or andesite
5775 AO	2437298	Syrupcreek-Limberjim complex	Well drained	Moderate	Syrupcreek	0	15	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	volcanic ash and loess over colluvium and/or residuum weathered from basalt and/or andesite
5776 BN	2437302	Limberjim-Syrupcreek complex	Well drained	Severe	Limberjim	15	30	mountain slopes, mountains, plateaus, plateaus	4.5	5.6	7.3	102	152	volcanic ash over colluvium and residuum derived from basalt or andesitic tuff breccia
5776 CN	2437303	Limberjim-Syrupcreek complex	Well drained	Severe	Limberjim	30	60	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	102	152	volcanic ash over colluvium and residuum derived from basalt or andesitic tuff breccia
5776 AO	2437301	Limberjim-Syrupcreek complex	Well drained	Moderate	Limberjim	0	15	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	102	152	volcanic ash over colluvium and residuum derived from basalt or andesitic tuff breccia
5778 AO	2437305	Syrupcreek-Klicker-Anatone complex	Well drained	Moderate	Klicker	0	15	mountain slopes, mountains, plateaus, plateaus	0	0.0	0.0	51	102	volcanic ash mixed with loess and colluvium in surface horizons over colluvium derived from basalt
5778 BO	2437306	Syrupcreek-Klicker-Anatone complex	Well drained	Severe	Syrupcreek	15	30	mountain slopes, mountains, plateaus, plateaus	4.5	5.6	7.3	51	102	volcanic ash and loess over colluvium and/or residuum weathered from basalt and/or andesite
5778 CO	2437307	Syrupcreek-Klicker-Anatone complex	Well drained	Severe	Syrupcreek	30	60	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	volcanic ash and loess over colluvium and/or residuum weathered from basalt and/or andesite
5782 BO	2437312	Klicker-Syrupcreek complex	Well drained	Moderate	Syrupcreek	15	30	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	volcanic ash and loess over colluvium and/or residuum weathered from basalt and/or andesite
5782 AO	2437311	Klicker-Syrupcreek complex	Well drained	Slight	Klicker	0	15	mountain slopes, mountains, plateaus, plateaus	0	0.0	0.0	51	102	volcanic ash mixed with loess and colluvium in surface horizons over colluvium derived from basalt
5782 CO	2437313	Klicker-Syrupcreek complex	Well drained	Severe	Klicker	30	60	mountain slopes, mountains, plateaus, plateaus	0	0.0	0.0	51	102	volcanic ash mixed with loess and colluvium in surface horizons over colluvium derived from basalt
5783 BO	2486842	Klicker-Limberjim complex	Well drained	Moderate	Klicker	15	30	mountain slopes, mountains, plateaus, plateaus	0	0.0	0.0	51	102	volcanic ash mixed with loess and colluvium in surface horizons over colluvium derived from basalt
5791 BO	2437320	Syrupcreek-Tamara complex	Well drained	Severe	Syrupcreek	15	30	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	volcanic ash and loess over colluvium and residuum derived from basalt and andesitic tuff breccia
5791 AO	2437319	Syrupcreek-Tamara complex	Well drained	Moderate	Syrupcreek	0	15	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	volcanic ash and loess over colluvium and/or residuum weathered from basalt and/or andesite
5791 BO	2593961	Syrupcreek-Tamara complex	Well drained	Severe	Syrupcreek	15	30	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	volcanic ash mixed with loess over colluvium and residuum derived from andesite or basalt
5814 AO	2437338	Albee-Bocker complex	Well drained	Severe	Albee	2	15	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	mixed volcanic ash, loess and colluvium derived from basalt
5816 AO	2437339	Bocker-Anatone-Kamela complex	Well drained	Moderate	Bocker	0	15	mountain slopes, mountains, plateaus, plateaus	1.5	6.1	7.3	10	25	An influence of volcanic ash or loess mixed with colluvium or residuum from basalt or andesite

TABLE B3: SOIL DESCRIPTIONS, UNION COUNTY

Soil Map Unit	NSCS Map Unit	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
5830 BO	2437344	Klicker-Fivebeaver-Anatone complex	Well drained	Severe	Klicker	15	30	mountain slopes, mountains, plateaus, plateaus	0	0.0	0.0	51	102	loess and colluvium derived from basalt
5830 AO	2437343	Klicker-Fivebeaver-Anatone complex	Well drained	Moderate	Klicker	0	15	mountain slopes, mountains, plateaus, plateaus	1.5	6.1	7.3	51	102	loess and colluvium derived from basalt
5830 CO	2437345	Klicker-Fivebeaver-Anatone complex	Well drained	Severe	Klicker	30	60	mountain slopes, mountains, plateaus, plateaus	0	0.0	0.0	51	102	loess and colluvium derived from basalt
5834 AO	2437348	Klicker-Fivebeaver-Kamela complex	Well drained	Slight	Kamela	0	15	mountain slopes, mountains, plateaus, plateaus	1.5	5.6	7.3	51	102	colluvium and/or residuum weathered from basalt with and influence of volcanic ash
5836 AO	2437352	Bocker-Anatone-Rock outcrop complex	Well drained	Moderate	Rock outcrop	2	15		0	0.0	0.0	0	0	basalt
5836 BO	2437353	Bocker-Anatone-Rock outcrop complex	Well drained	Severe	Rock outcrop	15	30		0	0.0	0.0	0	0	basalt
5856 BO	2437371	Klicker-Anatone-Bocker complex	Well drained	Severe	Klicker	15	35	mountain slopes, mountains, plateaus, plateaus	4.5	6.1	6.5	51	102	volcanic ash mixed with loess and colluvium in surface horizons over colluvium derived from basalt
5856 CO	2437372	Klicker-Anatone-Bocker complex	Well drained	Severe	Klicker	35	60	mountain slopes, mountains, plateaus, plateaus	1.5	6.1	7.3	51	102	volcanic ash mixed with loess and colluvium in surface horizons over colluvium derived from basalt
5857 BO	2437374	Tolo ashy silt loam	Well drained	Severe	Tolo	15	30	mountain slopes, mountains, plateaus, plateaus	4.5	5.6	7.3	0	0	
5857 AO	2437373	Tolo ashy silt loam	Well drained	Severe	Tolo	2	15	mountain slopes, mountains, plateaus, plateaus	4.5	5.6	7.3	0	0	

TABLE B4: SOIL DESCRIPTIONS, BAKER COUNTY

Soil Map Unit Symbol	NSCS Map Unit Key	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
0 D	62058	Lostbasin very channery loam	Well drained	Severe	Lostbasin	12	35	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from graywacke and schist
5 C	62238	Aridic Haploxerolls	Well drained	Moderate	Aridic Haploxerolls	2	12	fans	1.5	6.6	7.3	0	0	
6 C	62251	Ateron very stony loam	Well drained	Slight	Ateron	2	12	hillslopes	1.5	6.6	7.3	25	51	colluvium derived from basalt
6 C	62251	Ateron very stony loam	Well drained	Slight	Ateron	2	12	hillslopes	0	0.0	0.0	25	51	colluvium derived from basalt
7 D	62265	Ateron very stony loam	Well drained	Moderate	Ateron	12	35	hillslopes	1.5	6.6	7.3	25	51	colluvium derived from basalt
7 E	62266	Ateron very stony loam	Well drained	Severe	Ateron	35	60	hillslopes	1.5	6.6	7.3	25	51	colluvium derived from basalt
7 D	62265	Ateron very stony loam	Well drained	Moderate	Ateron	12	35	hillslopes	0	0.0	0.0	25	51	colluvium derived from basalt
8 C	62282	Ateron-Roostercomb extremely gravelly clay loams	Well drained	Slight	Ateron	2	12	hillslopes	4.5	6.6	7.3	25	51	colluvium derived from greenstone
9 E	62296	Ateron-Roostercomb extremely gravelly clay loams	Well drained	Severe	Ateron	35	60	hillslopes	7.5	6.6	7.3	25	51	colluvium derived from greenstone
9 D	62295	Ateron-Roostercomb extremely gravelly clay loams	Well drained	Moderate	Ateron	12	35	hillslopes	4.5	6.6	7.3	25	51	colluvium derived from greenstone
11 A	62083	Baker silt loam	Well drained	Slight	Baker	0	2	terraces	1.5	6.6	7.8	51	102	old alluvium mixed with volcanic ash and loess
11 B	62084	Baker silt loam	Well drained	Moderate	Baker	2	7	terraces	1.5	6.6	7.8	51	102	old alluvium mixed with volcanic ash and loess
13 A	62109	Baldock silt loam	Poorly drained	Slight	Baldock	0	2	flood plains	1.5	7.9	8.4	0	0	
15 A	62146	Balm loam	Somewhat poorly drained	Slight	Baldock	0	2	flood plains	1.5	7.4	8.4	0	0	
20 D	62181	Bouldrock loam	Well drained	Severe	Bouldrock	12	35	hillslopes	1.5	6.6	7.3	51	102	colluvium and residuum derived from quartz diorite and related rocks
32 A	62198	Burntriver silt loam	Well drained	Slight	Burntriver	0	2	fans, terraces	1.5	6.6	7.8	0	0	
33 C	62199	Burntriver gravelly silt loam	Well drained	Moderate	Burntriver	2	12	fans, terraces	1.5	6.6	7.8	0	0	
34 E	62201	Campcreek-Skullgulch association	Well drained	Severe	Campcreek	35	60	terraces	1.5	6.6	7.3	25	51	mixed alluvium
34 D	62200	Campcreek-Skullgulch association	Well drained	Severe	Campcreek	12	35	terraces	1.5	6.6	7.3	25	51	mixed alluvium
36 C	62203	Clovercreek-Keating complex	Well drained	Moderate	Clovercreek	2	12	hillslopes	1.5	6.6	7.3	36	51	colluvium derived from greenstone
37 D	62204	Clovercreek-Keating complex	Well drained	Severe	Clovercreek	12	35	hillslopes	4.5	6.6	7.3	36	51	colluvium derived from greenstone
39 E	62208	Crackler-Rouen gravelly silt loams	Well drained	Severe	Crackler	30	50	mountain slopes	0	4.5	5.5	102	152	colluvium derived from argillite with a mantle of volcanic ash
40 A	62210	Cumulic Haploxerolls	Moderately well drained	Slight	Cumulic Haploxerolls	0	2	flood plains	1.5	6.6	7.8	0	0	
45 C	62215	Durkee gravelly silt loam	Well drained	Moderate	Durkee	2	12	hillslopes	7.5	6.6	8.4	51	102	colluvium derived from argillite with loess and volcanic ash in the upper part
46 E	62217	Durkee gravelly silt loam	Well drained	Severe	Durkee	35	60	hillslopes	4.5	7.4	9.0	51	102	colluvium derived from argillite with loess and volcanic ash in the upper part
46 D	62216	Durkee gravelly silt loam	Well drained	Severe	Durkee	12	35	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from argillite with loess and volcanic ash in the upper part
47 D	62218	Durkee gravelly silt loam	Well drained	Severe	Durkee	12	35	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from argillite with loess and volcanic ash in the upper part
47 E	62219	Durkee gravelly silt loam	Well drained	Severe	Durkee	35	60	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from argillite with loess and volcanic ash in the upper part
49 A	62145	Stanflow-Umapine silt loams	0	2		Slight		terraces	1.5	9.1	11.0	0	0	
50 C	62225	Encina gravelly silt loam	Well drained	Moderate	Encina	2	12	terraces	7.5	6.6	7.8	102	152	mixed lacustrine deposits influenced by volcanic ash
51 D	62226	Encina gravelly silt loam	Well drained	Severe	Encina	12	35	terraces	1.5	6.6	7.3	102	152	mixed lacustrine deposits influenced by volcanic ash
51 E	62227	Encina gravelly silt loam	Well drained	Severe	Encina	35	50	terraces	1.5	6.6	7.3	102	152	mixed lacustrine deposits influenced by volcanic ash

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						Low	High			Low	High	Low	High	
54 B	62230	Goodrich gravelly loam	Well drained	Slight	Goodrich	0	3	fans	1.5	6.6	7.8	0	0	
56 C	62232	Greenscombe loam	Well drained	Moderate	Greenscombe	2	12	hillslopes	1.5	6.6	7.8	51	102	colluvium derived from quartz diorite and related granitic rocks
57 D	62233	Greenscombe loam	Well drained	Severe	Greenscombe	12	35	hillslopes	1.5	6.6	7.8	51	102	colluvium derived from quartz diorite and related granitic rocks
58 D	62234	Greenscombe loam	Well drained	Severe	Greenscombe	12	35	hillslopes	0	0.0	0.0	51	102	colluvium derived from quartz diorite and related granitic rocks
75 A	64026	Cumulic Haploxerolls	Moderately well drained	Slight	Cumulic Haploxerolls	0	2	flood plains	1.5	6.6	7.8	0	0	
83 F	62272	Inkler very gravelly loam	Well drained	Severe	Inkler	50	70	mountain slopes	1.5	6.6	7.3	0	0	
83 E	62271	Inkler very gravelly loam	Well drained	Severe	Inkler	35	50	mountain slopes	1.5	6.6	7.3	0	0	
84 D	62273	Jett silt loam	Well drained	Slight	Jett	0	3	flood plains	1.5	7.4	8.4	0	0	
85 D	62274	Keating silt loam	Well drained	Severe	Keating	12	35	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from greenstone with loess and volcanic ash in the surface layer
94 C	62288	Legler silt loam	Well drained	Moderate	Legler	2	8	fans, flood plains	1.5	6.6	7.3	0	0	
96 F	62291	Lickskillet very gravelly sandy loam	Well drained	Severe	Lickskillet	50	70	hillslopes	1.5	6.6	8.4	25	51	colluvium derived from basalt and metavolcanics
96 E	62290	Lickskillet very gravelly sandy loam	Well drained	Severe	Lickskillet	30	50	hillslopes	1.5	6.6	8.4	25	51	colluvium derived from basalt and metavolcanics
98 C	62293	Lookout silt loam	Well drained	Moderate	Lookout	2	12	hillslopes	1.5	6.6	7.3	76	127	colluvium derived from basalt with loess and volcanic ash in the surface layer
99 C	62294	Lookout very cobbly silt loam	Well drained	Moderate	Lookout	2	12	hillslopes	1.5	6.6	7.3	76	127	colluvium derived from basalt with loess and volcanic ash in the surface layer
101 E	62059	Lostbasin-Xerorthents-Rock outcrop complex	Well drained	Severe	Lostbasin	35	50	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from graywacke and schist
103 F	62063	Lovline channery loam	Well drained	Severe	Lovline	50	70	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from schist
103 E	62062	Lovline channery loam	Well drained	Severe	Lovline	30	50	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from schist
104 D	62064	Marack silt loam	Well drained	Severe	Marack	12	35	terraces	1.5	6.6	7.3	102	152	lacustrine deposits
105 C	62065	Marack gravelly silty clay loam	Well drained	Moderate	Marack	2	12	terraces	7.5	6.6	7.8	102	152	lacustrine deposits
106 D	62066	Marack very gravelly silty clay loam	Well drained	Severe	Marack	12	35	terraces	4.5	6.6	7.3	102	152	lacustrine deposits
108 D	62068	Marack-Badland complex	Well drained	Moderate	Marack	8	20	terraces	4.5	6.6	7.3	102	152	lacustrine deposits
113 E	62076	Nagle silt loam	Well drained	Severe	Nagle	35	50	terraces	1.5	6.6	7.8	0	0	
113 D	62075	Nagle silt loam	Well drained	Severe	Nagle	12	35	terraces	1.5	6.6	7.8	0	0	
114 C	62077	North Powder loam	Well drained	Moderate	North Powder	2	12	hillslopes	1.5	6.1	7.3	51	102	colluvium derived from quartz diorite and related rocks
117 D	62080	North Powder-Rock outcrop complex	Well drained	Severe	North Powder	12	35	hillslopes	1.5	6.1	7.3	51	102	colluvium derived from quartz diorite and related rocks
121 E	62086	Piersonte very channery loam	Well drained	Severe	Piersonte	35	50	mountain slopes	0	4.5	5.5	0	0	
122 C	62088	Poall very fine sandy loam	Well drained	Moderate	Poall	2	12	hillslopes	7.5	7.9	8.4	23	38	lacustrine deposits
123 D	62089	Poall very fine sandy loam	Well drained	Severe	Poall	12	40	hillslopes	1.5	7.4	8.4	23	38	lacustrine deposits
124 D	62090	Poall very fine sandy loam	Well drained	Severe	Poall	12	40	hillslopes	1.5	7.4	8.4	23	38	lacustrine deposits
126 A	62092	Powval silt loam	Well drained	Slight	Powval	0	3	terraces	1.5	7.4	8.4	0	0	
127 A	62093	Powval silt loam	Well drained	Slight	Powval	0	3	terraces	1.5	7.4	8.4	0	0	
129 B	62095	Rastus very gravelly loam	Well drained	Slight	Rastus	1	7	terraces	1.5	6.6	7.3	51	76	mixed alluvium
130 F	62099	Redcliff gravelly loam	Well drained	Severe	Redcliff	50	75	hillslopes	1.5	7.4	7.8	51	102	colluvium derived from metavolcanics
131 C	62100	Ridley-Keating silt loams	Well drained	Moderate	Ridley	2	12	hillslopes	4.5	7.9	8.4	0	0	

TABLE B4: SOIL DESCRIPTIONS, BAKER COUNTY

Soil Map Unit Symbol	NSCS Map Unit Key	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
134 F	62103	Rock outcrop-Lostbasin-Xerorthents complex	Well drained	Severe	Rock outcrop	50	80		0	0.0	0.0	0	0	
136 F	62105	Rock outcrop-Ruclick complex		Not rated	Rock outcrop	50	70		0	0.0	0.0	0	0	
139 F	62108	Rock outcrop-Xeric Torriorthents-Darkcanyon complex	Well drained	Severe	Rock outcrop	50	80		0	0.0	0.0	0	0	
141 E	62112	Roostercomb-Longbranch complex	Well drained	Severe	Roostercomb	35	50	hillslopes	4.5	6.6	7.3	51	102	colluvium derived from greenstone
141 D	62111	Roostercomb-Longbranch complex	Well drained	Severe	Roostercomb	12	35	hillslopes	4.5	6.6	7.3	51	102	colluvium derived from greenstone
142 C	62113	Ruckles-Ruclick complex	Well drained	Moderate	Ruckles	2	12	hillslopes	4.5	6.6	7.8	25	51	colluvium derived from basalt with loess and volcanic ash in the surface layer
143 D	62114	Ruckles-Ruclick complex	Well drained	Severe	Ruckles	12	35	hillslopes	0	0.0	0.0	25	51	colluvium derived from basalt with loess and volcanic ash in the surface layer
143 E	62115	Ruckles-Ruclick complex	Well drained	Severe	Ruckles	35	50	hillslopes	4.5	6.6	7.8	25	51	colluvium derived from basalt with loess and volcanic ash in the surface layer
144 E	62117	Ruckles-Ruclick-Snellby complex	Well drained	Severe	Ruckles	35	50	hillslopes	4.5	6.6	7.8	25	51	colluvium derived from basalt with loess and volcanic ash in the surface layer
145 D	62119	Ruclick very cobbly silt loam	Well drained	Moderate	Ruclick	12	35	hillslopes	7.5	6.6	8.4	51	102	colluvium derived from basalt with loess and volcanic ash in the surface layer
145 E	62120	Ruclick very cobbly silt loam	Well drained	Severe	Ruclick	35	50	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from basalt with loess and volcanic ash in the surface layer
146 E	62122	Sag-Snell complex	Well drained	Severe	Sag	35	50	hillslopes	1.5	6.1	7.3	102	152	colluvium derived from basalt with loess and volcanic ash in the surface layer
148 F	62126	Sinker very channery loam	Well drained	Severe	Sinker	50	80	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from schist and graywacke
149 E	62128	Sinker and Chambeam soils	Well drained	Severe	Sinker	35	50	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from schist and graywacke
149 D	62127	Sinker and Chambeam soils	Well drained	Severe	Sinker	12	35	hillslopes	1.5	6.6	7.3	51	102	colluvium derived from schist and graywacke
152 F	62136	Snaker channery loam	Well drained	Severe	Snaker	50	80	hillslopes	1.5	6.6	7.3	25	51	colluvium derived from schist
153 E	62137	Snaker-Darkcanyon complex	Well drained	Severe	Snaker	30	50	hillslopes	1.5	6.6	7.3	25	51	colluvium derived from schist
154 E	62138	Snaker-Darkcanyon-Xeric Torriorthents complex	Well drained	Severe	Snaker	30	50	hillslopes	1.5	6.6	7.3	25	51	colluvium derived from schist
155 E	62140	Snell-Ateron complex	Well drained	Severe	Snell	35	60	hillslopes	1.5	5.6	7.3	51	102	colluvium derived from basalt and loess
155 D	62139	Snell-Ateron complex	Well drained	Severe	Snell	12	35	hillslopes	1.5	5.6	7.3	51	102	colluvium derived from basalt and loess
158 D	62143	Snellby stony silt loam	Well drained	Moderate	Snellby	12	35	hillslopes	1.5	6.6	7.8	51	102	colluvium derived from basalt with loess and volcanic ash in the surface layer
159 A	62145	Stanflow-Umapine silt loams	Moderately well drained	Slight	Stanflow	0	2	terraces	1.5	9.1	11.0	0	0	
163 D	62151	Taterpa loam	Well drained	Severe	Taterpa	12	35	hillslopes, mountain slopes	1.5	6.6	7.3	102	152	colluvium and residuum weathered from quartz diorite and related rocks
163 E	62152	Taterpa loam	Well drained	Severe	Taterpa	35	60	hillslopes, mountain slopes	1.5	6.6	7.3	102	152	colluvium and residuum weathered from quartz diorite and related rocks
167 E	62158	Top-McGarr complex	Well drained	Severe	Top	35	65	mountain slopes	0	4.5	5.5	102	152	colluvium derived from basalt and loess
171 B	62166	Virtue silt loam	Well drained	Moderate	Virtue	2	7	fans, terraces	4.5	6.6	8.4	51	102	alluvium and lacustrine deposits with loess and volcanic ash in the surface layer
171 C	62167	Virtue silt loam	Well drained	Severe	Virtue	7	12	fans, terraces	1.5	6.6	7.3	51	102	alluvium and lacustrine deposits with loess and volcanic ash in the surface layer
172 C	62169	Virtue very gravelly silt loam	Well drained	Moderate	Virtue	7	12	fans, terraces	4.5	6.6	8.4	51	102	alluvium and lacustrine deposits with loess and volcanic ash in the surface layer
172 B	62168	Virtue very gravelly silt loam	Well drained	Moderate	Virtue	2	7	fans, terraces	0	0.0	0.0	51	102	alluvium and lacustrine deposits with loess and volcanic ash in the surface layer

TABLE B4: SOIL DESCRIPTIONS, BAKER COUNTY

Soil Map Unit Symbol	NSCS Map Unit Key	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
173 C	62170	Wahstal very cobbly loam	Well drained	Slight	Wahstal	2	12	fans, terraces	1.5	6.1	7.3	25	51	mixed alluvium
177 E	62174	Xeric Torriorthents	Well drained	Severe	Xeric Torriorthents	35	60	terraces	0	0.0	0.0	8	51	colluvium and residuum derived from volcanic rocks and lacustrine deposits
178 F	62175	Xeric Torriorthents-Rock outcrop complex	Excessively drained	Severe	Xeric Torriorthents	50	80	canyons	0	0.0	0.0	25	152	colluvium and residuum derived from volcanic rocks and lacustrine deposits
7E E	62266	Ateron very stony loam	Well drained	Severe	Ateron	35	60	hillslopes	7.5	6.6	7.3	25	51	colluvium derived from basalt
W	62297	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	

TABLE B5: SOIL DESCRIPTIONS, MALHEUR COUNTY

Soil Map Unit	NSCS Map Unit	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
7	62857	Falk variant fine sandy loam	Moderately well drained	Slight	Falk variant	0	2	terraces	1.5	7.9	8.4	51	102	alluvium
11 C	62789	Frohman silt loam	Well drained	Moderate	Frohman	5	8	terraces	1.5	7.4	8.4	25	51	alluvium and lacustrine deposits
11 A	62787	Baker silt loam	Well drained	Slight	Frohman	0	2	terraces	1.5	7.4	8.4	25	51	alluvium and lacustrine deposits
11 B	62788	Baker silt loam	Well drained	Moderate	Frohman	2	5	terraces	1.5	7.4	8.4	25	51	alluvium and lacustrine deposits
11 E	62791	Frohman silt loam	Well drained	Severe	Frohman	12	20	terraces	1.5	7.4	8.4	25	51	alluvium and lacustrine deposits
11 D	62790	Frohman silt loam	Well drained	Severe	Frohman	8	12	terraces	1.5	7.4	8.4	25	51	alluvium and lacustrine deposits
12 B	62793	Garbutt silt loam	Well drained	Moderate	Garbutt	2	5	fans, terraces	1.5	7.9	9.0	0	0	
12 A	62792	Garbutt silt loam	Well drained	Slight	Garbutt	0	2	fans, terraces	1.5	7.9	9.0	0	0	
16	62798	Harana silty clay loam	Somewhat poorly drained	Slight	Harana	0	2	terraces	4.5	8.5	9.0	0	0	
18	62800	Kimberly fine sandy loam	Well drained	Slight	Kimberly	0	2	fans, terraces	1.5	6.6	8.4	0	0	
19 B	62802	McLoughlin silt loam	Well drained	Moderate	McLoughlin	2	5	fans	1.5	7.9	9.0	0	0	
19 C	62803	McLoughlin silt loam	Well drained	Moderate	McLoughlin	5	8	fans	1.5	7.9	9.0	0	0	
19 A	62801	McLoughlin silt loam	Well drained	Slight	McLoughlin	0	2	fans	1.5	7.9	9.0	0	0	
20	62805	Notus-Falk variant complex	Somewhat poorly drained	Slight	Notus	0	2	terraces	1.5	6.1	8.4	25	51	alluvium
21 A	62806	Nyssa silt loam	Well drained	Slight	Nyssa	0	2	terraces	1.5	7.4	8.4	51	102	lacustrine deposits
21 C	62808	Nyssa silt loam	Well drained	Moderate	Nyssa	5	8	terraces	0	0.0	0.0	51	102	lacustrine deposits
21 B	62807	Nyssa silt loam	Well drained	Moderate	Nyssa	2	5	terraces	1.5	7.4	8.4	51	102	lacustrine deposits
27	62826	Powder silt loam	Well drained	Slight	Powder	0	2	fans, terraces	1.5	6.6	8.4	0	0	
27	62826	Powder silt loam	Well drained	Slight	Powder	0	2	fans, terraces	1.5	6.6	8.4	0	0	
29	62829	Riverwash	Poorly drained	Not rated	Riverwash	0	4	flood plains	0	0.0	0.0	0	0	
31	62835	Stanfield silt loam	Moderately well drained	Slight	Stanfield	0	2	terraces	1.5	7.9	9.6	51	102	alluvium
31	62835	Stanfield silt loam	Moderately well drained	Slight	Stanfield	0	2	terraces	1.5	7.9	9.6	51	102	alluvium
33 A	62840	Turbyfill fine sandy loam	Well drained	Slight	Turbyfill	0	2	fans, terraces	1.5	6.6	8.4	0	0	
34	62842	Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	terraces	1.5	8.5	9.0	0	0	
35 D	62846	Virtue silt loam	Well drained	Severe	Virtue	8	12	terraces	1.5	6.6	7.3	51	102	alluvium
35 B	62844	Virtue silt loam	Well drained	Moderate	Virtue	2	5	terraces	1.5	6.6	7.3	51	102	alluvium
35 C	62845	Virtue silt loam	Well drained	Moderate	Virtue	5	8	terraces	1.5	6.6	7.3	51	102	alluvium
35 A	62843	Virtue silt loam	Well drained	Slight	Virtue	0	2	terraces	1.5	6.6	7.3	51	102	alluvium
35 B	62844	Virtue silt loam	Well drained	Moderate	Virtue	2	5	terraces	1.5	6.6	7.3	51	102	alluvium
35 D	62846	Virtue silt loam	Well drained	Severe	Virtue	8	12	terraces	1.5	6.6	7.3	51	102	alluvium
36 F	62849	Xeric Torriorthents	Well drained	Not rated	Xeric Torriorthents	20	60	terraces	0	0.0	0.0	0	0	
36 F	62849	Xeric Torriorthents	Well drained	Not rated	Xeric Torriorthents	20	60	terraces	0	0.0	0.0	0	0	
36 E	62848	Xeric Torriorthents	Well drained	Not rated	Xeric Torriorthents	5	20	terraces	0	0.0	0.0	0	0	
204	81212	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	
	2479921	No Digital Data Available				0	0		0	0.0	0.0	0	0	
W	62864	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	

TABLE B6: SOIL DESCRIPTIONS, OWYHEE COUNTY

Soil Map Unit Symbol	NSCS Map Unit Key	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
13	485950	Badland-Typic Torriorthents-Xeric Torriorthents complex	Somewhat excessively drained	Severe	Badland	15	90		0	0.0	0.0	76	102	mixed alluvium over consolidated lacustrine deposits over residuum weathered from tuff
55	486220	Escalante-Tindahay-Ornea complex	Well drained	Moderate	Escalante	1	12	fan remnants, valleys	0	0.0	0.0	51	102	alluvium and/or loess and/or colluvium over residuum weathered from siltstone and/or mudstone and/or tuff
64	81260	Dune land		Not rated	Dune land	0	0		0	0.0	0.0	51	102	alluvium and/or loess and/or colluvium over residuum weathered from siltstone and/or mudstone and/or tuff
65	486242	Graveya-Ratsnest-Rock outcrop association	Well drained	Severe	Graveya	8	35	foothills, hillslopes	0	0.0	0.0	53	102	alluvium and/or slope alluvium over bedrock derived from welded tuff and/or rhyolite
69	486250	Hardtrigger-Briabbit-Tindahay complex	Well drained	Moderate	Hardtrigger	2	15	fan remnants, pillow lava flows, valleys	0	0.0	0.0	102	152	colluvium and slope alluvium over bedrock derived from welded tuff
73	486259	Hardtrigger-Goose Creek loams	Well drained	Moderate	Hardtrigger	1	5	basins, stream terraces, valleys	1.5	7.4	9.0	51	102	alluvium and/or loess and/or colluvium over residuum weathered from siltstone and/or mudstone and/or tuff
95	81294	Haw silt loam	Well drained	Severe	Haw	12	30	terraces, valleys	0	0.0	0.0	0	0	
100	485889	McKeeth-Veta gravelly loams	Well drained	Slight	McKeeth	2	8	fan remnants, valleys	0	0.0	0.0	0	0	
134	485960	Plush-Rubble land-Rock outcrop association		Not rated	Plush	25	50	hills, hillslopes	1.5	6.6	8.4	0	0	
141	485975	Ratsnest-Ornea complex	Well drained	Moderate	Ratsnest	3	12	fan remnants, piedmont slopes	1.5	7.9	8.4	0	0	
143	485979	Rock outcrop-Xerollic Haplargids complex		Not rated	Rock outcrop	15	60		1.5	7.9	8.4	0	0	
178	486057	Tindahay-Royal-Badland complex	Somewhat excessively drained	Moderate	Tindahay	1	12	fan remnants, valleys	1.5	8.5	9.6	0	0	
179	81183	Riverwash		Not rated	Riverwash	0	0	flood plains	1.5	7.9	8.4	0	0	
185	486072	Typic Torripsamments-Typic Torrifluvents complex	Excessively drained	Moderate	Typic Torripsamments	1	8	stream terraces, valleys	1.5	7.4	8.4	0	0	
210	486129	Willhill-Cottle association	Well drained	Moderate	Willhill	3	25	lava plateaus, pyroclastic flows	1.5	7.9	8.4	0	0	
211	486131	Willhill-Cottle-Longcreek complex	Well drained	Moderate	Willhill	3	25	foothills, hillslopes	1.5	7.9	8.4	0	0	
BrA	80728	Bram silt loam	Somewhat poorly drained	Slight	Bram	0	1	fan remnants, flood plains, lakebeds, river valleys, valleys	1.5	7.4	9.0	0	0	
BrB	80729	Bram silt loam	Somewhat poorly drained	Slight	Bram	1	3	drainageways, terraces, valleys	1.5	7.9	8.4	0	0	
CcB	80734	Cencove fine sandy loam	Well drained	Slight	Cencove	1	3	fan remnants, terraces, valleys	1.5	7.9	9.0	0	0	
CcD	80736	Cencove fine sandy loam	Well drained	Severe	Cencove	7	12	fan remnants, terraces, valleys	1.5	7.9	9.0	0	0	
FeC	80755	Feltham loamy fine sand	Somewhat excessively drained	Moderate	Feltham	3	7	drainageways, terraces, valleys	1.5	7.4	8.4	0	0	
GaB	80760	Garbutt silt loam	Well drained	Slight	Garbutt	1	3	fan remnants, terraces, valleys	1.5	7.9	8.4	0	0	
Ha	80775	Harpt loam	Well drained	Slight	Harpt	0	1	fan remnants, terraces, valleys	1.5	6.6	8.4	0	0	
MgA	80798	Marsing loam	Well drained	Slight	Marsing	0	1	terraces, valleys	1.5	7.9	9.0	0	0	
MgB	80799	Marsing loam	Well drained	Slight	Marsing	1	3	fans, terraces, valleys	1.5	7.4	9.0	0	0	
MgE	80802	Marsing loam	Well drained	Severe	Marsing	12	20	fan remnants, terraces, valleys	1.5	7.9	8.4	0	0	
NaB	80813	Nannyton fine gravelly sandy loam	Well drained	Slight	Nannyton	1	3	fan remnants, terraces, valleys	1.5	6.1	8.4	0	0	
NaC	80814	Nannyton fine gravelly sandy loam	Well drained	Moderate	Nannyton	3	7	fan remnants, terraces, valleys	1.5	0.0	0.0	0	0	
No	80815	Notus soils	Somewhat poorly drained	Slight	Notus	0	3	fan remnants, terraces, valleys	1.5	6.1	7.8	0	0	

TABLE B6: SOIL DESCRIPTIONS, OWYHEE COUNTY

Soil Map Unit Symbol	NSCS Map Unit Key	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name/Parent Source
						Low	High			Low	High	Low	High	
OgB	80822	Oliaga loam	Somewhat poorly drained	Slight	Oliaga	1	3	drainageways, terraces, valleys	0	0.0	0.0	0	0	
QcD	80849	Quincy fine sand	Excessively drained	Moderate	Quincy	3	12	dunes, sand plains, terraces, valleys	1.5	7.9	8.4	0	0	
QcE	80850	Quincy fine sand	Excessively drained	Severe	Quincy	12	30	dunes, sand plains, terraces, valleys	1.5	7.9	8.4	0	0	
Tc	80863	Terrace escarpments	Well drained	Not rated	Terrace escarpments	30	70		1.5	7.9	8.4	0	0	
TuB	80876	Turbyfill fine sandy loam	Well drained	Slight	Turbyfill	1	3	terraces, valleys	1.5	6.1	7.3	0	0	
TuC	80877	Turbyfill fine sandy loam	Well drained	Moderate	Turbyfill	3	7	fan remnants, terraces, valleys	1.5	7.9	8.4	0	0	
VaB	80883	Vanderhoff loam	Well drained	Slight	Vanderhoff	1	3	terraces, valleys	0	0.0	0.0	51	102	alluvium and/or loess and/or colluvium over residuum weathered from siltstone and/or mudstone and/or tuff
VaC	80884	Vanderhoff loam	Well drained	Moderate	Vanderhoff	3	7	terraces, valleys	1.5	7.4	9.0	0	0	
VaD	80885	Vanderhoff loam	Well drained	Severe	Vanderhoff	7	12	drainageways, terraces, valleys	1.5	6.6	8.4	0	0	
VaE	80886	Vanderhoff loam	Well drained	Severe	Vanderhoff	12	30	terraces, valleys	0	0.0	0.0	53	102	alluvium and/or slope alluvium over bedrock derived from welded tuff and/or rhyolite

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
13A	62109	MU BA-01	4968030	439060	Baldock silt loam, 0 to 2 percent slopes	Poorly drained	Slight	Baldock	0	2	flood plains	1.5	7.9	8.4	0	0	mixed alluvium
159A	62145	MU BA-01	4968030	439060	Stanflow-Umapine silt loams, 0 to 2 percent slopes	Moderately well drained	Slight	Stanflow	0	2	terraces	1.5	9.1	11.0	0	0	mixed alluvium with volcanic ash in the surface layer
170A	62165	MU BA-01	4968030	439060	Umapine silt loam, 0 to 2 percent slopes	Somewhat poorly drained	Slight	Umapine	0	2	terraces	1.5	9.1	11.0	0	0	mixed alluvium and loess
175A	62172	MU BA-01	4968030	439060	Wingdale silt loam, 0 to 2 percent slopes	Poorly drained	Slight	Wingdale	0	2	flood plains	1.5	7.9	9.0	0	0	mixed alluvium with volcanic ash in the surface layer
31A	62197	MU BA-01	4968030	439060	Burkemont silty clay loam, 0 to 2 percent slopes	Poorly drained	Slight	Burkemont	0	2	terraces	4.5	9.1	11.0	0	0	mixed alluvium
62A	62243	MU BA-01	4968030	439060	Haines silt loam, 0 to 2 percent slopes	Poorly drained	Slight	Haines	0	2	flood plains	1.5	9.1	11.0	0	0	mixed alluvium with loess and volcanic ash in the surface layer
98C	62293	MU BA-01	4968030	439060	Lookout silt loam, 2 to 12 percent slopes	Well drained	Moderate	Lookout	2	12	hillslopes	1.5	6.6	7.3	76	127	colluvium derived from basalt with loess and volcanic ash in the surface layer
99C	62294	MU BA-01	4968030	439060	Lookout very cobbly silt loam, 2 to 12 percent slopes	Well drained	Moderate	Lookout	2	12	hillslopes	1.5	6.6	7.3	76	127	colluvium derived from basalt with loess and volcanic ash in the surface layer
W	62297	MU BA-01	4968030	439060	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	
11B	62084	MU BA-02	4958846	436511	Baker silt loam, 2 to 7 percent slopes	Well drained	Moderate	Baker	2	7	terraces	1.5	6.6	7.8	51	102	old alluvium mixed with volcanic ash and loess
126A	62092	MU BA-02	4958846	436511	Powval silt loam, 0 to 3 percent slopes	Well drained	Slight	Powval	0	3	terraces	1.5	7.4	8.4	0	0	mixed alluvium
158E	62144	MU BA-02	4958846	436511	Snellby stony silt loam, 35 to 50 percent north slopes	Well drained	Severe	Snellby	35	50	hillslopes	4.5	6.6	7.8	51	102	colluvium derived from basalt with loess and volcanic ash in the surface layer
171B	62166	MU BA-02	4958846	436511	Virtue silt loam, 2 to 7 percent slopes	Well drained	Moderate	Virtue	2	7	fans, terraces	4.5	6.6	8.4	51	102	alluvium and lacustrine deposits with loess and volcanic ash in the surface layer
171C	62167	MU BA-02	4958846	436511	Virtue silt loam, 7 to 12 percent slopes	Well drained	Severe	Virtue	7	12	fans, terraces	1.5	6.6	7.3	51	102	alluvium and lacustrine deposits with loess and volcanic ash in the surface layer
172C	62169	MU BA-02	4958846	436511	Virtue very gravelly silt loam, 7 to 12 percent slopes	Well drained	Moderate	Virtue	7	12	fans, terraces	4.5	6.6	8.4	51	102	alluvium and lacustrine deposits with loess and volcanic ash in the surface layer
176A	62173	MU BA-02	4958846	436511	Wingville silt loam, 0 to 2 percent slopes	Somewhat poorly drained	Slight	Wingville	0	2	fans, terraces	1.5	7.4	8.4	0	0	mixed alluvium with volcanic ash in the surface layer

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
177E	62174	MU BA-02	4958846	436511	Xeric Torriorthents, 35 to 60 percent south slopes	Well drained	Severe	Xeric Torriorthents	35	60	terraces	0	0.0	0.0	8	51	colluvium and residuum derived from volcanic rocks and lacustrine deposits
94C	62288	MU BA-02	4958846	436511	Legler silt loam, 2 to 8 percent slopes	Well drained	Moderate	Legler	2	8	fans, flood plains	1.5	6.6	7.3	0	0	alluvium with loess and volcanic ash in the surface layer
95C	62289	MU BA-02	4958846	436511	Legler gravelly loam, 8 to 20 percent slopes	Well drained	Moderate	Legler	8	20	fans, terraces	1.5	6.6	7.3	0	0	alluvium with loess and volcanic ash in the surface layer
W	62297	MU BA-02	4958846	436511	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	
113E	62076	MU BA-04	4936252	461150	Nagle silt loam, 35 to 50 percent north slopes	Well drained	Severe	Nagle	35	50	terraces	1.5	6.6	7.8	0	0	mixed alluvium with loess and volcanic ash in the surface layer
126A	62092	MU BA-04	4936252	461150	Powval silt loam, 0 to 3 percent slopes	Well drained	Slight	Powval	0	3	terraces	1.5	7.4	8.4	0	0	mixed alluvium
132A	62101	MU BA-04	4936252	461150	Riverwash, 0 to 2 percent slopes	Poorly drained	Not rated	Riverwash	0	2	flood plains	0	0.0	0.0	0	0	
13A	62109	MU BA-04	4936252	461150	Baldock silt loam, 0 to 2 percent slopes	Poorly drained	Slight	Baldock	0	2	flood plains	1.5	7.9	8.4	0	0	mixed alluvium
171B	62166	MU BA-04	4936252	461150	Virtue silt loam, 2 to 7 percent slopes	Well drained	Moderate	Virtue	2	7	fans, terraces	4.5	6.6	8.4	51	102	alluvium and lacustrine deposits with loess and volcanic ash in the surface layer
177E	62174	MU BA-04	4936252	461150	Xeric Torriorthents, 35 to 60 percent south slopes	Well drained	Severe	Xeric Torriorthents	35	60	terraces	0	0.0	0.0	8	51	colluvium and residuum derived from volcanic rocks and lacustrine deposits
50C	62225	MU BA-04	4936252	461150	Encina gravelly silt loam, 2 to 12 percent slopes	Well drained	Moderate	Encina	2	12	terraces	7.5	6.6	7.8	102	152	mixed lacustrine deposits influenced by volcanic ash
51D	62226	MU BA-04	4936252	461150	Encina gravelly silt loam, 12 to 35 percent south slopes	Well drained	Severe	Encina	12	35	terraces	1.5	6.6	7.3	102	152	mixed lacustrine deposits influenced by volcanic ash
94C	62288	MU BA-04	4936252	461150	Legler silt loam, 2 to 8 percent slopes	Well drained	Moderate	Legler	2	8	fans, flood plains	1.5	6.6	7.3	0	0	alluvium with loess and volcanic ash in the surface layer
122C	62088	MU BA-06	4911097	478177	Poall very fine sandy loam, 2 to 12 percent slopes	Well drained	Moderate	Poall	2	12	hillslopes	7.5	7.9	8.4	23	38	lacustrine deposits
123D	62089	MU BA-06	4911097	478177	Poall very fine sandy loam, 12 to 40 percent north slopes	Well drained	Severe	Poall	12	40	hillslopes	1.5	7.4	8.4	23	38	lacustrine deposits
124D	62090	MU BA-06	4911097	478177	Poall very fine sandy loam, 12 to 40 percent south slopes	Well drained	Severe	Poall	12	40	hillslopes	1.5	7.4	8.4	23	38	lacustrine deposits
143D	62114	MU BA-06	4911097	478177	Ruckles-Ruclick complex, 12 to 35 percent south slopes	Well drained	Severe	Ruckles	12	35	hillslopes	0	0.0	0.0	25	51	colluvium derived from basalt with loess and volcanic ash in the surface layer

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
143E	62115	MU BA-06	4911097	478177	Ruckles-Ruclick complex, 35 to 50 percent south slopes	Well drained	Severe	Ruckles	35	50	hillslopes	4.5	6.6	7.8	25	51	colluvium derived from basalt with loess and volcanic ash in the surface layer
40A	62210	MU BA-06	4911097	478177	Cumulic Haploxerolls, 0 to 2 percent slopes	Moderately well drained	Slight	Cumulic Haploxerolls	0	2	flood plains	1.5	6.6	7.8	0	0	mixed alluvium
5C	62238	MU BA-06	4911097	478177	Aridic Haploxerolls, 2 to 12 percent slopes	Well drained	Moderate	Aridic Haploxerolls	2	12	fans	4	6.8	7.4	0	0	mixed alluvium and colluvium
84D	62273	MU BA-06	4911097	478177	Jett silt loam, 0 to 3 percent slopes	Well drained	Slight	Jett	0	3	flood plains	1.5	7.4	8.4	0	0	mixed alluvium with an influence of volcanic ash
96E	62290	MU BA-06	4911097	478177	Lickskillet very gravelly sandy loam, 30 to 50 percent south slopes	Well drained	Severe	Lickskillet	30	50	hillslopes	1.5	6.6	8.4	25	51	colluvium derived from basalt and metavolcanics
96F	62291	MU BA-06	4911097	478177	Lickskillet very gravelly sandy loam, 50 to 70 percent south slopes	Well drained	Severe	Lickskillet	50	70	hillslopes	1.5	6.6	8.4	25	51	colluvium derived from basalt and metavolcanics
19A	62801	MU MA-02	4879441	478560	McLoughlin silt loam, 0 to 2 percent slopes	Well drained	Slight	McLoughlin	0	2	fans	1.5	7.9	9.0	0	0	alluvium
16	62798	MU MA-02	4879441	478560	Harana silty clay loam, alkali	Somewhat poorly drained	Slight	Harana	0	2	terraces	4.5	8.5	9.0	0	0	alluvium
34	62842	MU MA-02	4879441	478560	Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	terraces	1.5	8.5	9.0	0	0	alluvium
27	62826	MU MA-02	4879441	478560	Powder silt loam	Well drained	Slight	Powder	0	2	fans, terraces	1.5	6.6	8.4	0	0	alluvium
NOTCOM	2479921	MU MA-02	4879441	478560	No Digital Data Available			NOTCOM	0	0		0	0.0	0.0	0	0	
7	62857	MU MA-03	4866475	469461	Falk variant fine sandy loam	Moderately well drained	Slight	Falk variant	0	2	terraces	1.5	7.9	8.4	51	102	alluvium
20	62805	MU MA-03	4866475	469461	Notus-Falk variant complex	Somewhat poorly drained	Slight	Notus	0	2	terraces	1.5	6.1	8.4	25	51	alluvium
24	62819	MU MA-03	4866475	469461	Otoole silt loam	Somewhat poorly drained	Slight	Otoole	0	2	terraces	1.5	9.1	11.0	25	51	alluvium
27	62826	MU MA-03	4866475	469461	Powder silt loam	Well drained	Slight	Powder	0	2	fans, terraces	1.5	6.6	8.4	0	0	alluvium
29	62829	MU MA-03	4866475	469461	Riverwash	Poorly drained	Not rated	Riverwash	0	4	flood plains	0	0.0	0.0	0	0	
31	62835	MU MA-03	4866475	469461	Stanfield silt loam	Moderately well drained	Slight	Stanfield	0	2	terraces	1.5	7.9	9.6	51	102	alluvium
34	62842	MU MA-03	4866475	469461	Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	terraces	1.5	8.5	9.0	0	0	alluvium
11A	62787	MU MA-03	4866475	469461	Frohman silt loam, 0 to 2 percent slopes	Well drained	Slight	Frohman	0	2	terraces	1.5	7.4	8.4	51	102	alluvium and lacustrine deposits
11B	62788	MU MA-03	4866475	469461	Baker silt loam, 2 to 7 percent slopes	Well drained	Moderate	Frohman	2	5	terraces	1.5	7.4	8.4	51	102	alluvium and lacustrine deposits
11C	62789	MU MA-03	4866475	469461	Frohman silt loam, 5 to 8 percent slopes	Well drained	Moderate	Frohman	5	8	terraces	1.5	7.4	8.4	51	102	alluvium and lacustrine deposits
19A	62801	MU MA-03	4866475	469461	McLoughlin silt loam, 0 to 2 percent slopes	Well drained	Slight	McLoughlin	0	2	fans	1.5	7.9	9.0	0	0	alluvium
36F	62849	MU MA-03	4866475	469461	Xeric Torriorthents, very steep	Well drained	Not rated	Xeric Torriorthents	20	60	terraces	0	0.0	0.0	0	0	lacustrine deposits

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
W	62864	MU MA-03	4866475	469461	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	
20	62805	MU MA-07	4839634	492740	Notus-Falk variant complex	Somewhat poorly drained	Slight	Notus	0	2	terraces	1.5	6.1	8.4	25	51	alluvium
31	62835	MU MA-07	4839634	492740	Stanfield silt loam	Moderately well drained	Slight	Stanfield	0	2	terraces	1.5	7.9	9.6	51	102	alluvium
34	62842	MU MA-07	4839634	492740	Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	terraces	1.5	8.5	9.0	0	0	alluvium
12A	62792	MU MA-07	4839634	492740	Garbutt silt loam, 0 to 2 percent slopes	Well drained	Slight	Garbutt	0	2	fans, terraces	1.5	7.9	9.0	0	0	alluvium and loess
19B	62802	MU MA-07	4839634	492740	McLoughlin silt loam, 2 to 5 percent slopes	Well drained	Moderate	McLoughlin	2	5	fans	1.5	7.9	9.0	0	0	alluvium
33A	62840	MU MA-07	4839634	492740	Turbyfill fine sandy loam, 0 to 2 percent slopes	Well drained	Slight	Turbyfill	0	2	fans, terraces	1.5	6.6	8.4	0	0	alluvium
33B	62841	MU MA-07	4839634	492740	Turbyfill fine sandy loam, 2 to 5 percent slopes	Well drained	Moderate	Turbyfill	2	5	fans, terraces	1.5	6.6	8.4	0	0	alluvium
8A	62858	MU MA-07	4839634	492740	Feltham loamy fine sand, 0 to 2 percent slopes	Somewhat excessively drained	Slight	Feltham	0	2	fans, terraces	1.5	6.6	8.4	0	0	alluvium
GP	62863	MU MA-07	4839634	492740	Gravel pits		Not rated	Pits	0	3		0	0.0	0.0	0	0	
NOTCOM	2479921	MU MA-07	4839634	492740	No Digital Data Available			NOTCOM	0	0		0	0.0	0.0	0	0	
W	62864	MU MA-07	4839634	492740	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	
36F	62849	MU MA-08	4835510	492443	Xeric Torriorthents, very steep	Well drained	Not rated	Xeric Torriorthents	20	60	terraces	0	0.0	0.0	0	0	lacustrine deposits
34	62842	MU MA-08	4835510	492443	Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	terraces	1.5	8.5	9.0	0	0	alluvium
25D	62823	MU MA-08	4835510	492443	Owyhee silt loam, 8 to 12 percent slopes	Well drained	Severe	Owyhee	8	12	terraces	1.5	6.6	8.4	0	0	lacustrine deposits
12A	62792	MU MA-08	4835510	492443	Garbutt silt loam, 0 to 2 percent slopes	Well drained	Slight	Garbutt	0	2	fans, terraces	1.5	7.9	9.0	0	0	alluvium and loess
33B	62841	MU MA-08	4835510	492443	Turbyfill fine sandy loam, 2 to 5 percent slopes	Well drained	Moderate	Turbyfill	2	5	fans, terraces	1.5	6.6	8.4	0	0	alluvium
W	62864	MU MA-08	4835510	492443	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	
NOTCOM	2479921	MU MA-08	4835510	492443	No Digital Data Available			NOTCOM	0	0		0	0.0	0.0	0	0	
78	61398	MU MO-02	5051813	301969	Xeric Torriorthents, nearly level	Somewhat excessively drained	Slight	Xeric Torriorthents	0	2	flood plains, river valleys	1.5	6.6	7.3	0	0	eolian sands and alluvium
13E	61284	MU MO-02	5051813	301969	Gravden very gravelly loam, 20 to 40 percent slopes	Well drained	Severe	Gravden	20	40	hills, hillslopes	1.5	7.9	8.4	25	51	gravelly alluvium and colluvium
28E	61306	MU MO-02	5051813	301969	Lickskillet very stony loam, 7 to 40 percent slopes	Well drained	Severe	Lickskillet	7	40	hills, hillslopes	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
45B	61338	MU MO-02	5051813	301969	Ritzville silt loam, 2 to 7 percent slopes	Well drained	Moderate	Ritzville	2	7	plateaus, plateaus	1.5	6.6	8.4	0	0	loess mixed with small amounts of volcanic ash
71B	61385	MU MO-02	5051813	301969	Warden silt loam, 2 to 5 percent slopes	Well drained	Moderate	Warden	2	5	strath terraces, valleys	1.5	6.6	7.8	0	0	loess over calcareous lacustrine deposits
75B	61393	MU MO-02	5051813	301969	Willis silt loam, 2 to 5 percent slopes	Well drained	Moderate	Willis	2	5	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over cemented alluvium

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
75C	61394	MU MO-02	5051813	301969	Willis silt loam, 5 to 12 percent slopes	Well drained	Severe	Willis	5	12	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over cemented alluvium
11	61281	MU MO-03	5050423	311412	Endersby fine sandy loam	Somewhat excessively drained	Slight	Endersby	0	3	flood plains	1.5	6.6	7.8	0	0	alluvium from loess and volcanic ash
22	61297	MU MO-03	5050423	311412	Kimberly fine sandy loam	Well drained	Slight	Kimberly	0	3	flood plains, river valleys	1.5	6.6	7.8	0	0	mixed alluvium
35	61319	MU MO-03	5050423	311412	Onyx silt loam	Well drained	Slight	Onyx	0	3	flood plains	1.5	6.6	7.8	0	0	silty alluvium
36	61320	MU MO-03	5050423	311412	Pedigo silt loam	Somewhat poorly drained	Slight	Pedigo	0	3	flood plains	1.5	8.4	9.6	0	0	silty alluvium mixed with volcanic ash
28E	61306	MU MO-03	5050423	311412	Lickskillet very stony loam, 7 to 40 percent slopes	Well drained	Severe	Lickskillet	7	40	hills, hillslopes	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
29F	61307	MU MO-03	5050423	311412	Lickskillet-Rock outcrop complex, 40 to 70 percent slopes	Well drained	Severe	Lickskillet	40	70	hills, hillslopes	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
43D	61331	MU MO-03	5050423	311412	Rhea silt loam, 12 to 20 percent slopes	Well drained	Severe	Rhea	12	20	plateaus, plateaus	1.5	6.6	7.3	0	0	loess mixed with small amounts of volcanic ash
45C	61339	MU MO-03	5050423	311412	Ritzville silt loam, 7 to 12 percent slopes	Well drained	Severe	Ritzville	7	12	plateaus, plateaus	1.5	6.6	8.4	0	0	loess mixed with small amounts of volcanic ash
4D	61345	MU MO-03	5050423	311412	Bakeoven-Valby complex, 2 to 20 percent slopes	Well drained	Moderate	Bakeoven	2	20	plateaus, plateaus	1.5	6.1	7.8	10	25	loess mixed with residuum weathered from basalt
63C	61371	MU MO-03	5050423	311412	Valby silt loam, 7 to 12 percent slopes	Well drained	Severe	Valby	7	12	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over basalt
64D	61372	MU MO-03	5050423	311412	Valby silt loam, 12 to 20 percent north slopes	Well drained	Severe	Valby	12	20	hills, hillslopes	1.5	6.6	7.8	51	102	loess over basalt
75B	61393	MU MO-03	5050423	311412	Willis silt loam, 2 to 5 percent slopes	Well drained	Moderate	Willis	2	5	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over cemented alluvium
75C	61394	MU MO-03	5050423	311412	Willis silt loam, 5 to 12 percent slopes	Well drained	Severe	Willis	5	12	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over cemented alluvium
77F	61397	MU MO-03	5050423	311412	Wrentham-Rock outcrop complex, 35 to 70 percent slopes	Well drained	Severe	Wrentham	35	70	hills, hillslopes	1.5	6.1	7.3	51	102	loess mixed with colluvium derived from basalt
28E	61306	MU MO-05	5028732	329294	Lickskillet very stony loam, 7 to 40 percent slopes	Well drained	Severe	Lickskillet	7	40	hills, hillslopes	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
31B	61312	MU MO-05	5028732	329294	Morrow silt loam, 1 to 7 percent slopes	Well drained	Moderate	Morrow	1	7	plateaus, plateaus	1.5	6.6	7.3	51	102	loess
32D	61314	MU MO-05	5028732	329294	Morrow silt loam, 12 to 20 percent north slopes	Well drained	Severe	Morrow	12	20	hills, hillslopes	1.5	6.6	7.3	51	102	loess
32E	61315	MU MO-05	5028732	329294	Morrow silt loam, 20 to 35 percent north slopes	Well drained	Severe	Morrow	20	35	hills, hillslopes	1.5	6.6	7.3	51	102	loess
3D	61325	MU MO-05	5028732	329294	Bakeoven-Morrow complex, 2 to 20 percent slopes	Well drained	Moderate	Bakeoven	2	20	plateaus, plateaus	1.5	6.1	7.8	10	25	loess mixed with residuum weathered from basalt
56F	61358	MU MO-05	5028732	329294	Snell very stony loam, 35 to 70 percent north slopes	Well drained	Severe	Snell	35	70	hills, hillslopes	1.5	5.6	7.3	51	102	loess and colluvium derived from basalt

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
67E	61377	MU MO-05	5028732	329294	Waha silt loam, 25 to 40 percent north slopes	Well drained	Severe	Waha	25	40	hills, hillslopes	1.5	6.1	6.5	51	102	loess over colluvium and residuum derived from basalt
69D	61379	MU MO-05	5028732	329294	Waha-Rockly complex, 2 to 20 percent slopes	Well drained	Moderate	Waha	2	20	plateaus, plateaus	1.5	6.1	6.5	51	102	loess over colluvium and residuum derived from basalt
74F	61392	MU MO-05	5028732	329294	Waterbury-Rock outcrop complex, 40 to 70 percent slopes	Well drained	Severe	Waterbury	40	70	hills, hillslopes	2	6.6	7.3	30	51	colluvium derived from basalt
13	485950	MU OW-01	4822912	498766	Badland-Typic Torriorthents-Xeric Torriorthents complex, very steep	Somewhat excessively drained	Severe	Badland	15	90		0	0.0	0.0	0	0	
55	486220	MU OW-01	4822912	498766	Escalante-Tindahay-Ornea complex, 1 to 12 percent slopes	Well drained	Moderate	Escalante	1	12	fan remnants, valleys	1.5	7.9	8.4	0	0	mixed alluvium and/or lacustrine deposits and/or eolian sands
65	486242	MU OW-01	4822912	498766	Graveya-Ratsnest-Rock outcrop association, 3 to 35 percent slopes	Well drained	Severe	Graveya	8	35	foothills, hillslopes	1.5	7.9	9.0	0	0	volcanic ash and/or loamy colluvium derived from welded tuff over lacustrine deposits
141	485975	MU OW-01	4822912	498766	Ratsnest-Ornea complex, 1 to 12 percent slopes	Well drained	Moderate	Ratsnest	3	12	fan remnants, piedmont slopes	0	0.0	0.0	76	102	mixed alluvium over consolidated lacustrine deposits over residuum weathered from tuff
178	486057	MU OW-01	4822912	498766	Tindahay-Royal-Badland complex, 1 to 90 percent slopes	Somewhat excessively drained	Moderate	Tindahay	1	12	fan remnants, valleys	1.5	6.6	8.4	0	0	mixed alluvium and/or eolian deposits
211	486131	MU OW-01	4822912	498766	Willhill-Cottle-Longcreek complex, 3 to 35 percent slopes	Well drained	Moderate	Willhill	3	25	foothills, hillslopes	0	0.0	0.0	53	102	alluvium and/or slope alluvium over bedrock derived from welded tuff and/or rhyolite
BdA	80725	MU OW-01	4822912	498766	Baldock loam, 0 to 1 percent slopes	Somewhat poorly drained	Slight	Baldock	0	1	flood plains, stream terraces, valleys	1.5	7.4	9.0	0	0	mixed alluvium
GaB	80760	MU OW-01	4822912	498766	Garbutt silt loam, 1 to 3 percent slopes	Well drained	Slight	Garbutt	1	3	fan remnants, terraces, valleys	1.5	7.4	9.0	0	0	silty alluvium and/or lacustrine deposits and/or loess
GaC	80761	MU OW-01	4822912	498766	Garbutt silt loam, 3 to 7 percent slopes	Well drained	Moderate	Garbutt	3	7	fan remnants, valleys	1.5	7.4	9.0	0	0	silty alluvium and/or lacustrine deposits and/or loess
GaD	80762	MU OW-01	4822912	498766	Garbutt silt loam, 7 to 12 percent slopes	Well drained	Severe	Garbutt	7	12	fan remnants, valleys	1.5	7.4	9.0	0	0	silty alluvium and/or lacustrine deposits and/or loess
MgC	80800	MU OW-01	4822912	498766	Marsing loam, 3 to 7 percent slopes	Well drained	Moderate	Marsing	3	7	fan remnants, terraces, valleys	1.5	7.9	8.4	0	0	mixed alluvium
NOTCOM	2479921	MU OW-01	4822912	498766	No Digital Data Available			NOTCOM	0	0		0	0.0	0.0	0	0	

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
VaD	80885	MU OW-01	4822912	498766	Vanderhoff loam, 7 to 12 percent slopes	Well drained	Severe	Vanderhoff	7	12	drainageways, terraces, valleys	0	0.0	0.0	51	102	alluvium and/or loess and/or colluvium over residuum weathered from siltstone and/or mudstone and/or tuff
VaE	80886	MU OW-01	4822912	498766	Vanderhoff loam, 12 to 30 percent slopes	Well drained	Severe	Vanderhoff	12	30	terraces, valleys	0	0.0	0.0	51	102	alluvium and/or loess and/or colluvium over residuum weathered from siltstone and/or mudstone and/or tuff
76B	64556	MU UM-01	5075048	315092	Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes	Excessively drained	Moderate	Quincy	0	5	strath terraces, valleys	1.5	6.6	7.8	0	0	eolian sands over gravelly alluvium
74B	64553	MU UM-01	5075048	315092	Quincy fine sand, 0 to 5 percent slopes	Excessively drained	Slight	Quincy	0	5	strath terraces, valleys	1.5	6.6	8.4	0	0	eolian sands
22	61297	MU UM-02	5043374	327250	Kimberly fine sandy loam	Well drained	Slight	Kimberly	0	3	flood plains, river valleys	1.5	6.6	7.8	0	0	mixed alluvium
125F	64445	MU UM-02	5043374	327250	Wrentham-Rock outcrop complex, 35 to 70 percent slopes	Well drained	Severe	Wrentham	35	70	hills, hillslopes	1.5	6.1	7.3	51	102	loess mixed with colluvium derived from basalt
28E	61306	MU UM-02	5043374	327250	Lickskillet very stony loam, 7 to 40 percent slopes	Well drained	Severe	Lickskillet	7	40	hills, hillslopes	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
29F	61307	MU UM-02	5043374	327250	Lickskillet-Rock outcrop complex, 40 to 70 percent slopes	Well drained	Severe	Lickskillet	40	70	hills, hillslopes	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
42A	64501	MU UM-02	5043374	327250	Kimberly fine sandy loam, 0 to 3 percent slopes	Well drained	Slight	Kimberly	0	3	flood plains, valleys	1.5	6.6	7.8	0	0	mixed alluvium
43A	64502	MU UM-02	5043374	327250	Kimberly silt loam, 0 to 3 percent slopes	Well drained	Slight	Kimberly	0	3	flood plains, valleys	1.5	7.9	9.0	0	0	mixed alluvium
43F	61333	MU UM-02	5043374	327250	Rhea silt loam, 35 to 50 percent slopes	Well drained	Severe	Rhea	35	50	plateaus, plateaus	1.5	6.6	7.3	0	0	loess mixed with small amounts of volcanic ash
49F	64509	MU UM-02	5043374	327250	Lickskillet-Nansene association, 35 to 70 percent slopes	Well drained	Severe	Lickskillet	35	70	hillslopes, hills on plateaus	0	0.0	0.0	30	51	loess mixed with colluvium from basalt
50F	64511	MU UM-02	5043374	327250	Lickskillet-Rock outcrop complex, 40 to 70 percent slopes	Well drained	Severe	Lickskillet	40	70	hillslopes, hills on plateaus	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
53D	64514	MU UM-02	5043374	327250	McKay silt loam, 7 to 25 percent south slopes	Well drained	Severe	McKay	7	25	hills, hillslopes	1.5	5.6	7.8	0	0	loess over calcareous, old silty alluvium
59D	64525	MU UM-02	5043374	327250	Morrow-Bakeoven complex, 2 to 20 percent slopes	Well drained	Severe	Morrow	2	20	patterned ground on hills, hills	1.5	7.9	8.4	51	102	loess
60F	64527	MU UM-02	5043374	327250	Nansene silt loam, 35 to 70 percent slopes	Well drained	Severe	Nansene	35	70	hills, hillslopes	1.5	6.1	7.8	0	0	loess
63B	61370	MU UM-02	5043374	327250	Valby silt loam, 1 to 7 percent slopes	Well drained	Moderate	Valby	1	7	plateaus, plateaus	1.5	6.6	7.8	51	102	loess over basalt
79D	61418	MU UM-02	5043374	327250	McKay silt loam, 7 to 25 percent south slopes	Well drained	Severe	McKay	7	25	hills, hillslopes	1.5	5.6	7.8	0	0	loess over calcareous, old silty alluvium

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

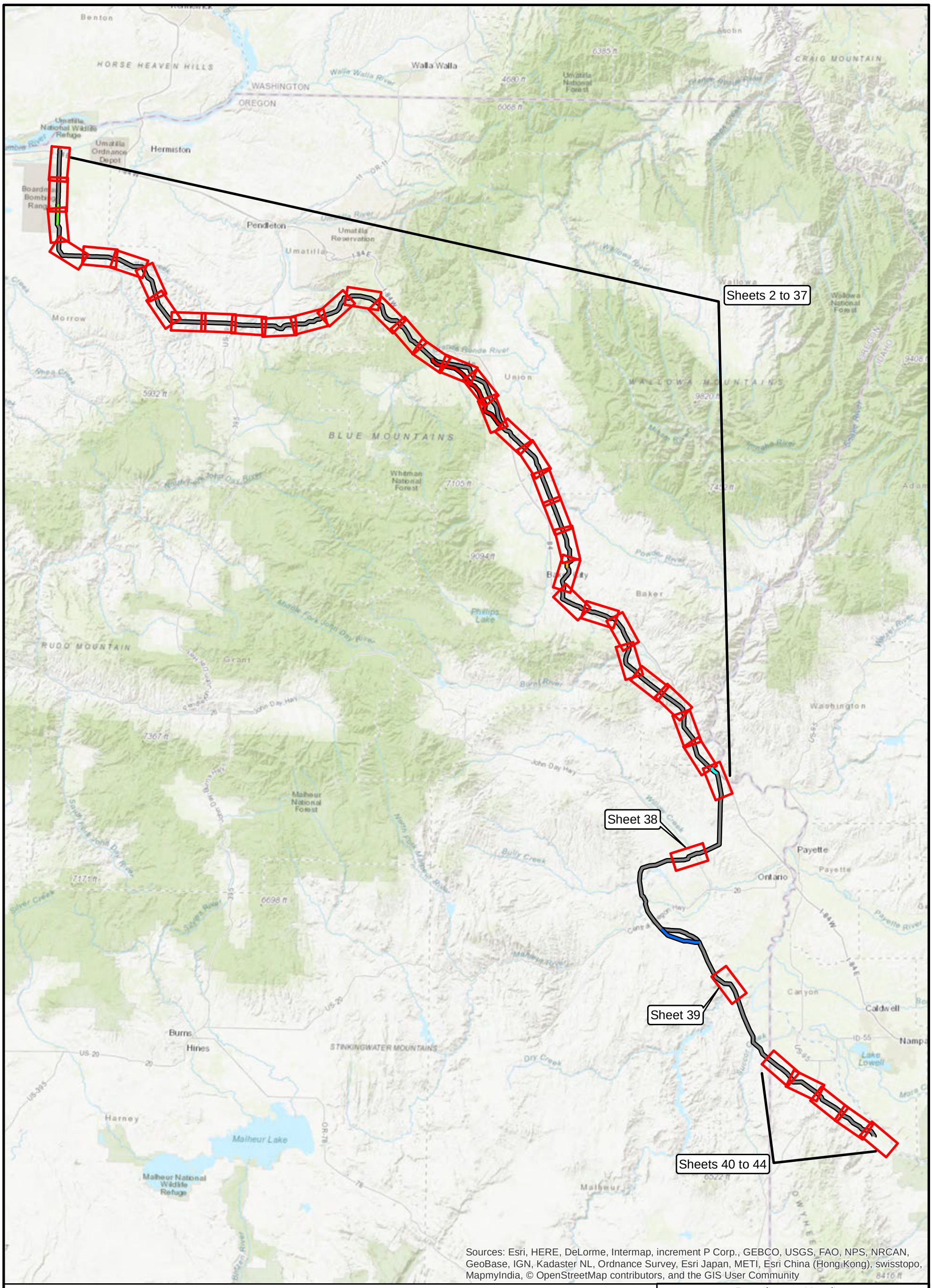
Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
80F	61417	MU UM-02	5043374	327250	Lickskillet-Nansene association, 35 to 70 percent slopes	Well drained	Severe	Lickskillet	35	70	hillslopes, hills on plateaus	1.5	6.1	7.3	30	51	loess mixed with colluvium from basalt
109A	64421	MU UM-04	5033588	356470	Veazie silt loam, 0 to 3 percent slopes	Well drained	Slight	Veazie	0	3	flood plains, valleys	1.5	6.1	7.3	0	0	mixed alluvium
126A	64446	MU UM-04	5033588	356470	Powval silt loam, 0 to 3 percent slopes	Well drained	Slight	Xerofluvents	0	3	flood plains, valleys	1.5	6.6	7.3	0	0	mixed alluvium
128A	64448	MU UM-04	5033588	356470	Yakima silt loam, 0 to 3 percent slopes	Well drained	Slight	Yakima	0	3	flood plains, valleys	1.5	6.1	7.8	0	0	mixed alluvium
33D	64487	MU UM-04	5033588	356470	Gurdane-Rockly complex, 2 to 20 percent slopes	Well drained	Moderate	Gurdane	2	20	mountains, patterned ground on plateaus	4.5	6.1	7.3	51	102	loess mixed with a small amount of volcanic ash over residuum weathered from basalt
48E	64508	MU UM-04	5033588	356470	Lickskillet very stony loam, 7 to 40 percent slopes	Well drained	Severe	Lickskillet	7	40	hillslopes, hills on plateaus	1.5	6.6	8.4	30	51	loess mixed with colluvium from basalt
52D	64513	MU UM-04	5033588	356470	McKay silt loam, 7 to 25 percent north slopes	Well drained	Severe	McKay	7	25	hills, hillslopes	4.5	7.9	9.0	0	0	loess over calcareous, old silty alluvium
56B	64520	MU UM-04	5033588	356470	Morrow silt loam, 1 to 7 percent slopes	Well drained	Moderate	Morrow	1	7	hills, hills on plateaus	1.5	7.9	8.4	51	102	loess
56C	64521	MU UM-04	5033588	356470	Morrow silt loam, 7 to 12 percent slopes	Well drained	Severe	Morrow	7	12	hills, hills on plateaus	1.5	7.9	8.4	51	102	loess
59D	64525	MU UM-04	5033588	356470	Morrow-Bakeoven complex, 2 to 20 percent slopes	Well drained	Severe	Morrow	2	20	patterned ground on hills, hills	1.5	7.9	8.4	51	102	loess
67B	64538	MU UM-04	5033588	356470	Pilot Rock silt loam, 1 to 7 percent slopes	Well drained	Moderate	Pilot Rock	1	7	terraces, valleys	1.5	7.4	9.0	51	102	loess over cemented alluvium
110A	64423	MU UM-05	5028834	363663	Veazie cobbly loam, 0 to 3 percent slopes	Well drained	Slight	Veazie	0	3	flood plains, valleys	1.5	6.1	7.3	0	0	mixed alluvium
13F	64452	MU UM-05	5028834	363663	Buckcreek-Gwin association, 45 to 70 percent slopes	Well drained	Severe	Buckcreek	45	70	hillslopes, mountains	1.5	6.1	7.3	51	102	small amount of volcanic ash mixed with loess and colluvium from basalt
31E	64485	MU UM-05	5028834	363663	Gurdane silty clay loam, 25 to 45 percent slopes	Well drained	Severe	Gurdane	25	45	hillslopes, mountains	7.5	6.1	7.3	51	102	loess mixed with a small amount of volcanic ash over residuum weathered from basalt
32E	64486	MU UM-05	5028834	363663	Morrow silt loam, 20 to 35 percent north slopes	Well drained	Severe	Gurdane	20	40	hillslopes, mountains	4.5	6.1	7.3	51	102	loess mixed with a small amount of volcanic ash over residuum weathered from basalt
35F	64489	MU UM-05	5028834	363663	Gwin-Rock outcrop complex, 40 to 70 percent slopes	Well drained	Severe	Gwin	40	70	hillslopes, mountains	0	0.0	0.0	25	51	loess mixed with residuum and colluvium from basalt
36E	64490	MU UM-05	5028834	363663	Gwinly very cobbly silt loam, 7 to 40 percent slopes	Well drained	Severe	Gwinly	7	40	hillslopes, mountains	4.5	6.6	7.3	25	51	loess mixed with residuum and colluvium from basalt
53D	64514	MU UM-05	5028834	363663	McKay silt loam, 7 to 25 percent south slopes	Well drained	Severe	McKay	7	25	hills, hillslopes	1.5	5.6	7.8	0	0	loess over calcareous, old silty alluvium

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

Soil Map Unit Symbol	NSCS Map Unit Key	Multi-Use Area ID	Northing (meters)	Easting (meters)	Soil Name	Drainage Class	Erosion Hazard	Component	Percent Slope		Geomorph	Shrink Swell	Water pH		Rock Depth		Group Name / Parent Source
									Low	High			Low	High	Low	High	
86D	64572	MU UM-05	5028834	363663	Rockly very cobbly loam, 2 to 20 percent slopes	Well drained	Moderate	Rockly	2	20	ridges on hillslopes, foothills, mountains	1.5	6.1	7.3	13	30	loess and volcanic ash mixed with residuum and colluvium from basalt
23	63952	MU UN-01	5015809	420060	Hoopal fine sandy loam	Somewhat poorly drained	Slight	Hoopal	0	2	lake plains, terraces	1.5	7.8	9.6	51	102	mixed alluvium with loess and volcanic ash
24	63953	MU UN-01	5015809	420060	Otoole silt loam	Somewhat poorly drained	Slight	Hoopal Variant	0	2	lake plains, terraces	1.5	7.8	9.6	25	51	mixed alluvium with loess and volcanic ash
25	63954	MU UN-01	5015809	420060	Hot Lake silt loam	Somewhat poorly drained	Slight	Hot Lake	0	2	lake plains, terraces	1.5	7.4	8.4	0	0	loess and volcanic ash over diatomaceous sediment
31	63963	MU UN-01	5015809	420060	Stanfield silt loam	Moderately well drained	Slight	Jett	0	2	flood plains	1.5	7.4	8.4	0	0	mixed alluvium with an influence of volcanic ash
8	64020	MU UN-01	5015809	420060	Catherine silty clay loam	Somewhat poorly drained	Slight	Catherine	0	3	flood plains, stream terraces	4.5	6.1	7.3	0	0	mixed alluvium
62	64007	MU UN-01	5015809	420060	Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	stream terraces	1.5	8.4	9.6	0	0	mixed alluvium
W	64023	MU UN-01	5015809	420060	Water		Not rated	Water	0	0		0	0.0	0.0	0	0	
30B	63962	MU UN-01	5015809	420060	Imbler fine sandy loam, 1 to 5 percent slopes	Well drained	Moderate	Imbler	1	5	terraces	1.5	6.6	7.3	0	0	mixed eolian deposits derived from basalt and andesite
17D	63941	MU UN-02	5009806	419832	Gwinly very cobbly silt loam, 12 to 20 percent slopes	Well drained	Severe	Gwinly	12	20	hillslopes	1.5	6.6	7.8	25	51	loess and colluvium derived from basalt and tuff
18F	63944	MU UN-02	5009806	419832	Gwinly-Rockly complex, 40 to 70 percent slopes	Well drained	Severe	Gwinly	40	70	hillslopes	7.5	6.6	7.3	25	51	loess and colluvium derived from basalt and tuff
47B	63985	MU UN-02	5009806	419832	Phys silt loam, 1 to 5 percent slopes	Well drained	Slight	Phys	1	5	alluvial fans	1.5	6.1	6.5	0	0	mixed alluvium
48B	63986	MU UN-02	5009806	419832	Phys gravelly silt loam, 1 to 5 percent slopes	Well drained	Slight	Phys	1	5	alluvial fans	4.5	6.6	7.3	0	0	mixed alluvium
50C	63989	MU UN-02			Encina gravelly silt loam, 2 to 12 percent slopes	Well drained	Moderate	Ramo	2	15	hillslopes	4.5	6.1	7.3	0	0	mixed alluvium and colluvium from basalt
51D	63991	MU UN-02	5009806	419832	Encina gravelly silt loam, 12 to 35 percent south slopes	Well drained	Severe	Ramo	2	20	hillslopes	7.5	6.1	7.3	0	0	mixed alluvium and colluvium from basalt
56E	63996	MU UN-02	5009806	419832	Royst very stony silt loam, 7 to 35 percent slopes	Well drained	Severe	Royst	7	35	hillslopes	1.5	6.1	7.3	51	102	colluvium and residuum from basalt and tuff with loess and volcanic ash in the surface layer
15C	63938	MU UN-03			Encina silt loam, 2 to 12 percent slopes	Well drained	Moderate	Encina	2	12	terraces	1.5	6.6	7.3	0	0	loess and lacustrine deposits
10B	63931	MU UN-03			Coughanour silt loam, 2 to 7 percent slopes	Well drained	Moderate	Coughanour	2	7	fans, terraces	1.5	6.6	7.8	51	102	mixed alluvium derived mainly from loess and volcanic ash
7	64016	MU UN-03			Falk variant fine sandy loam	Moderately well drained	Slight	Catherine	0	3	flood plains, stream terraces	1.5	6.1	7.3	0	0	mixed alluvium

TABLE B7: SOILS DATA FOR MULTI-USE AREAS AWAY FROM THE PROPOSED ALIGNMENT

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									Low	High			Low	High	Low	High	
62	64007	MU UN-03			Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	stream terraces	1.5	8.4	9.6	0	0	mixed alluvium
15C	63938	MU UN-03			Encina silt loam, 2 to 12 percent slopes	Well drained	Moderate	Encina	2	12	terraces	1.5	6.6	7.3	0	0	loess and lacustrine deposits
7	64016	MU UN-04			Falk variant fine sandy loam	Moderately well drained	Slight	Catherine	0	3	flood plains, stream terraces	1.5	6.1	7.3	0	0	mixed alluvium
62	64007	MU UN-04			Umapine silt loam	Somewhat poorly drained	Slight	Umapine	0	2	stream terraces	1.5	8.4	9.6	0	0	mixed alluvium
71	64018	MU UN-04			Wingville silt loam	Somewhat poorly drained	Slight	Wingville	0	2	alluvial fans, flood plains	1.5	7.4	8.4	0	0	alluvium
10B	63931	MU UN-04			Coughanour silt loam, 2 to 7 percent slopes	Well drained	Moderate	Coughanour	2	7	fans, terraces	1.5	6.6	7.8	51	102	mixed alluvium derived mainly from loess and volcanic ash
126A	62092	MU UN-04			Powval silt loam, 0 to 3 percent slopes	Well drained	Slight	Powval	0	3	terraces	1.5	7.4	8.4	0	0	mixed alluvium
13A	62109	MU UN-04			Baldock silt loam, 0 to 2 percent slopes	Poorly drained	Slight	Baldock	0	2	flood plains	1.5	7.9	8.4	0	0	mixed alluvium
15C	63938	MU UN-04			Encina silt loam, 2 to 12 percent slopes	Well drained	Moderate	Encina	2	12	terraces	1.5	6.6	7.3	0	0	loess and lacustrine deposits
27D	63957	MU UN-04			Hutchinson gravelly silt loam, 1 to 20 percent slopes	Well drained	Moderate	Hutchinson	1	20	terraces	1.5	6.6	7.8	51	102	loess, volcanic ash, colluvium, and mixed alluvium
40A	62210	MU UN-04			Cumulic Haploxerolls, 0 to 2 percent slopes	Moderately well drained	Slight	Cumulic Haploxerolls	0	2	flood plains	1.5	6.6	7.8	0	0	mixed alluvium
62A	62243	MU UN-04			Haines silt loam, 0 to 2 percent slopes	Poorly drained	Slight	Haines	0	2	flood plains	1.5	9.1	11.0	0	0	mixed alluvium with loess and volcanic ash in the surface layer
75A	64026	MU UN-04			Cumulic Haploxerolls, 0 to 2 percent slopes	Moderately well drained	Slight	Cumulic Haploxerolls	0	2	flood plains	1.5	6.6	7.8	0	0	mixed alluvium



LEGEND

- IPC Proposed Route
- West Bombing Range Road Alternative 1
- West Bombing Range Road Alternative 2
- Morgan Lake Alternative
- Proposed 230-kV Rebuild
- Proposed 138-kV Rebuild
- Double Mountain Alternative
- Map Sheets

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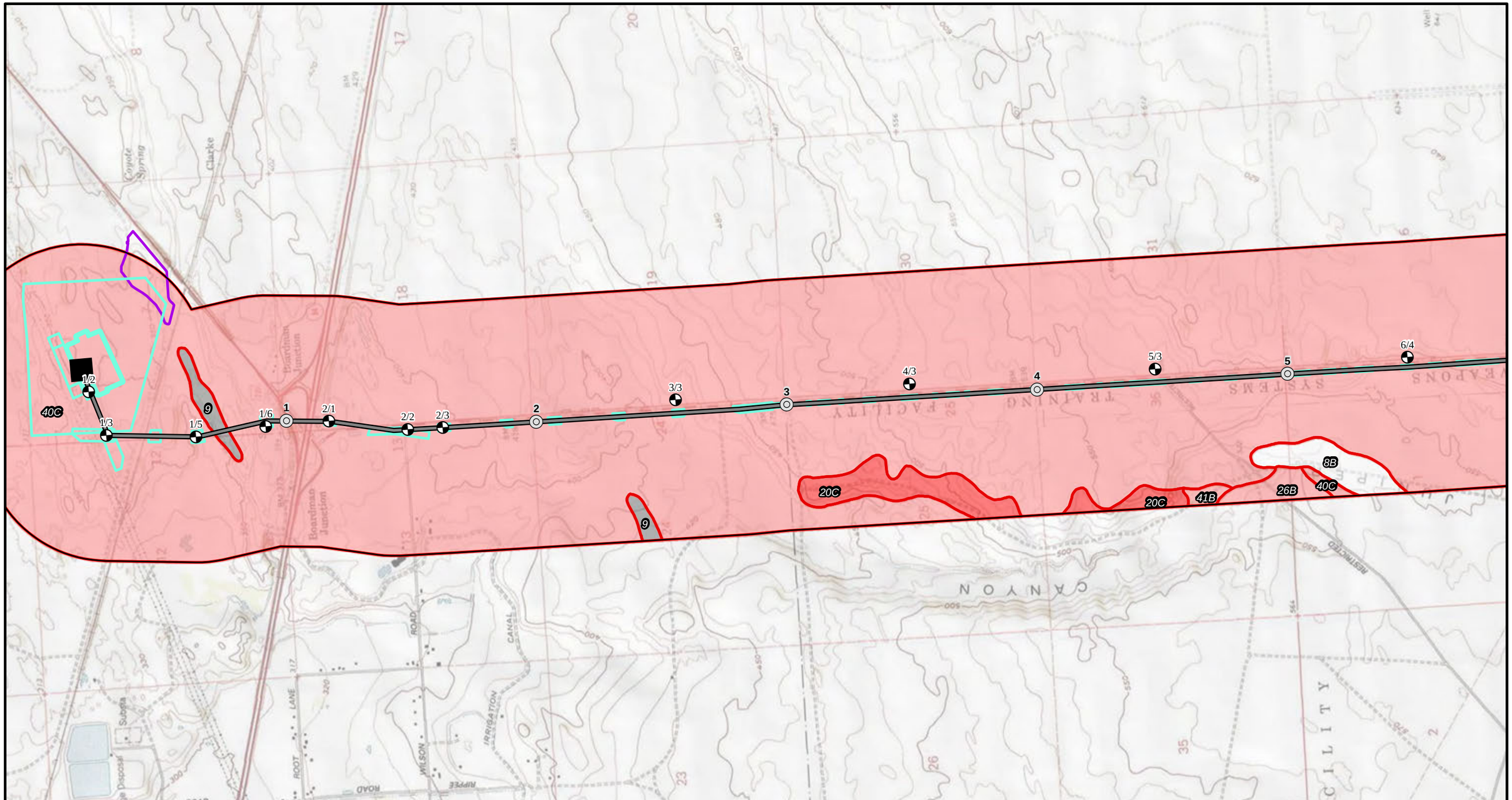
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

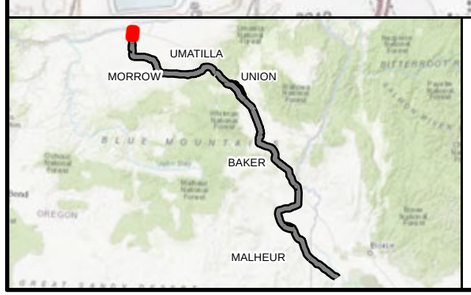
SOILS INDEX MAP

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LEGEND

TRANSMISSION FEATURES

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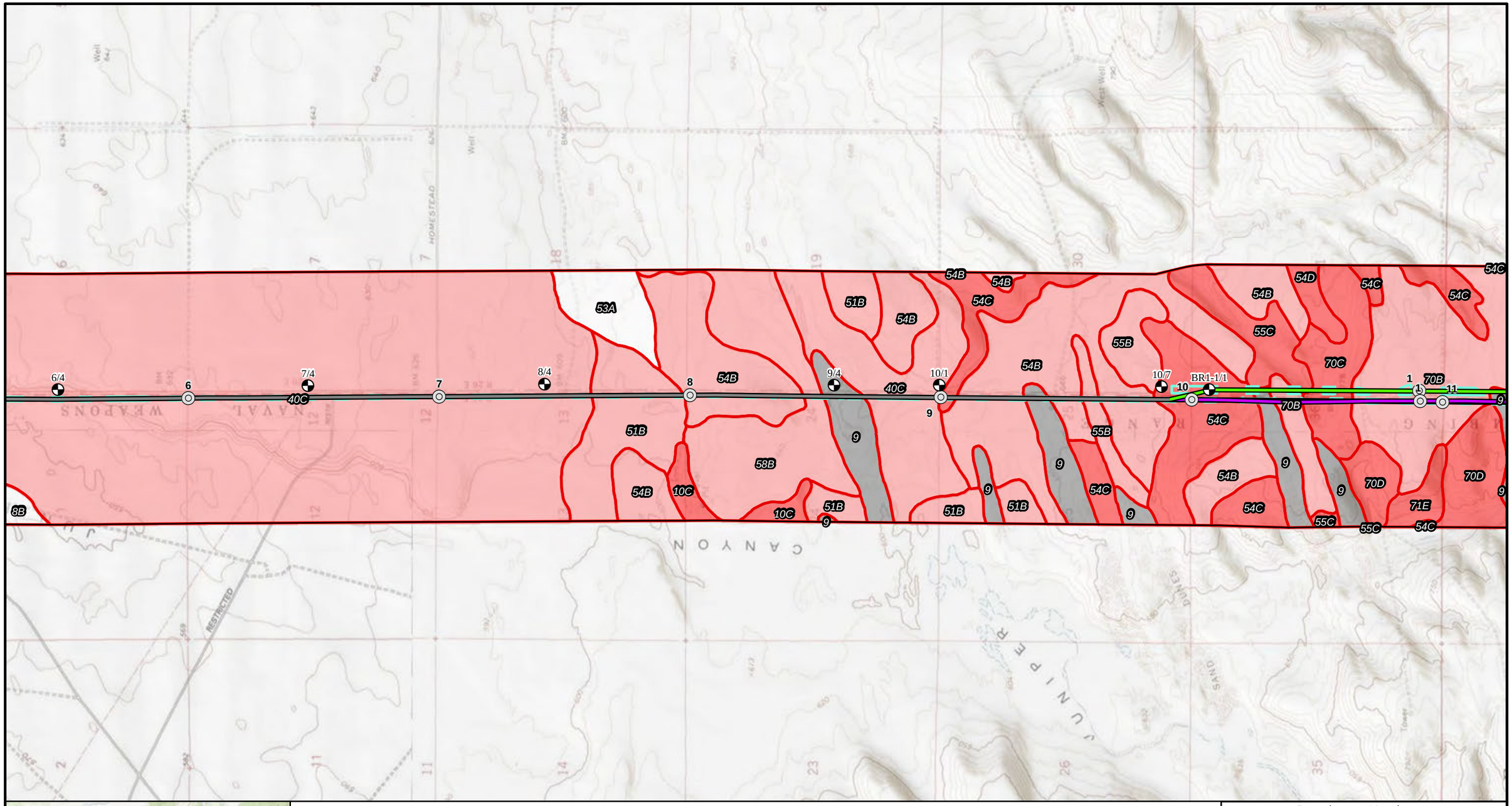
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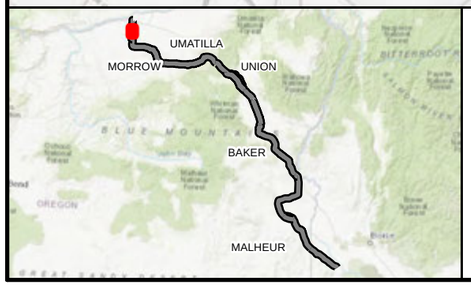
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

SOILS

April 2018 24-1-03820-006

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LEGEND

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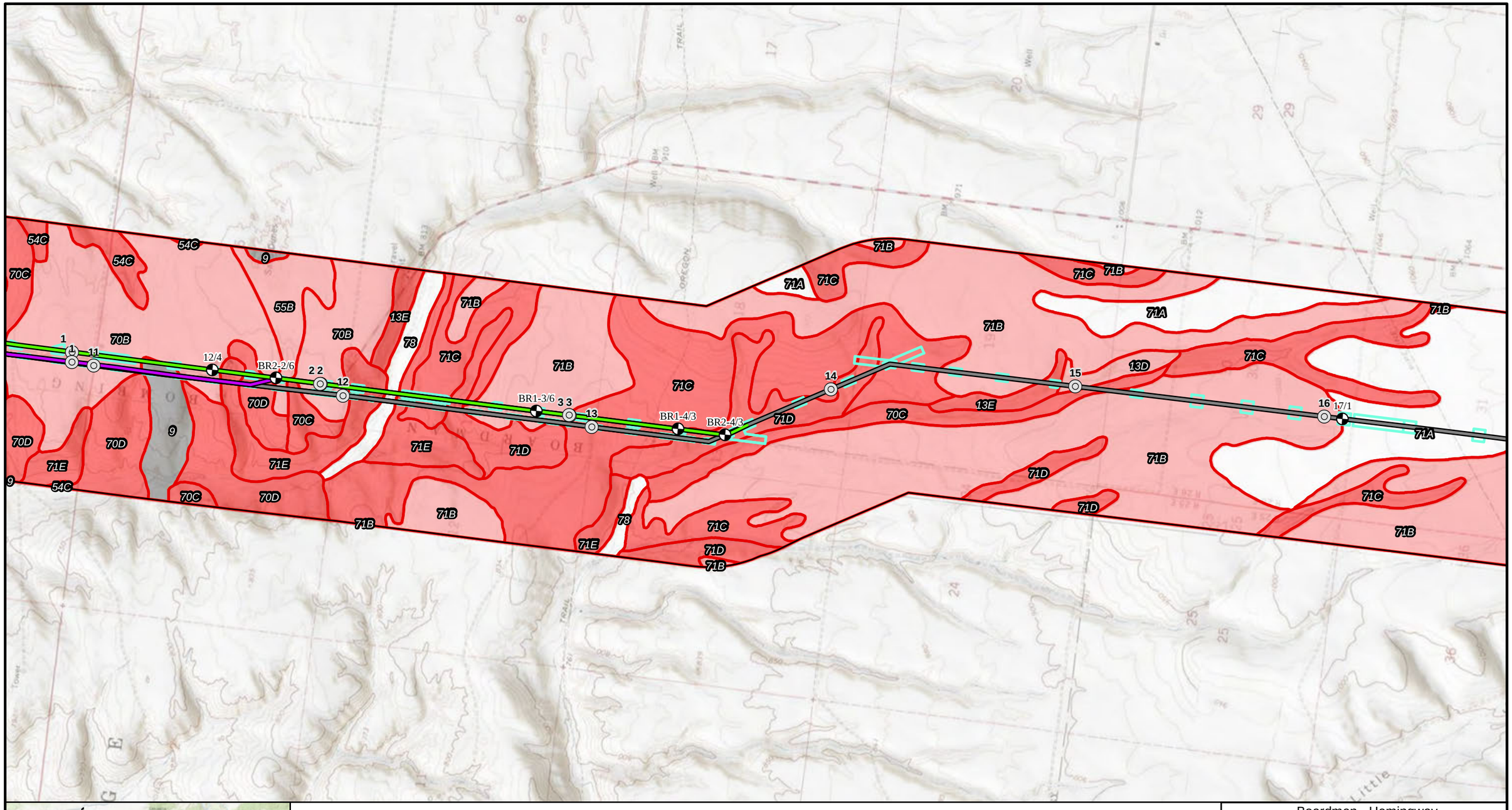
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500kV Transmission Line
Oregon - Idaho

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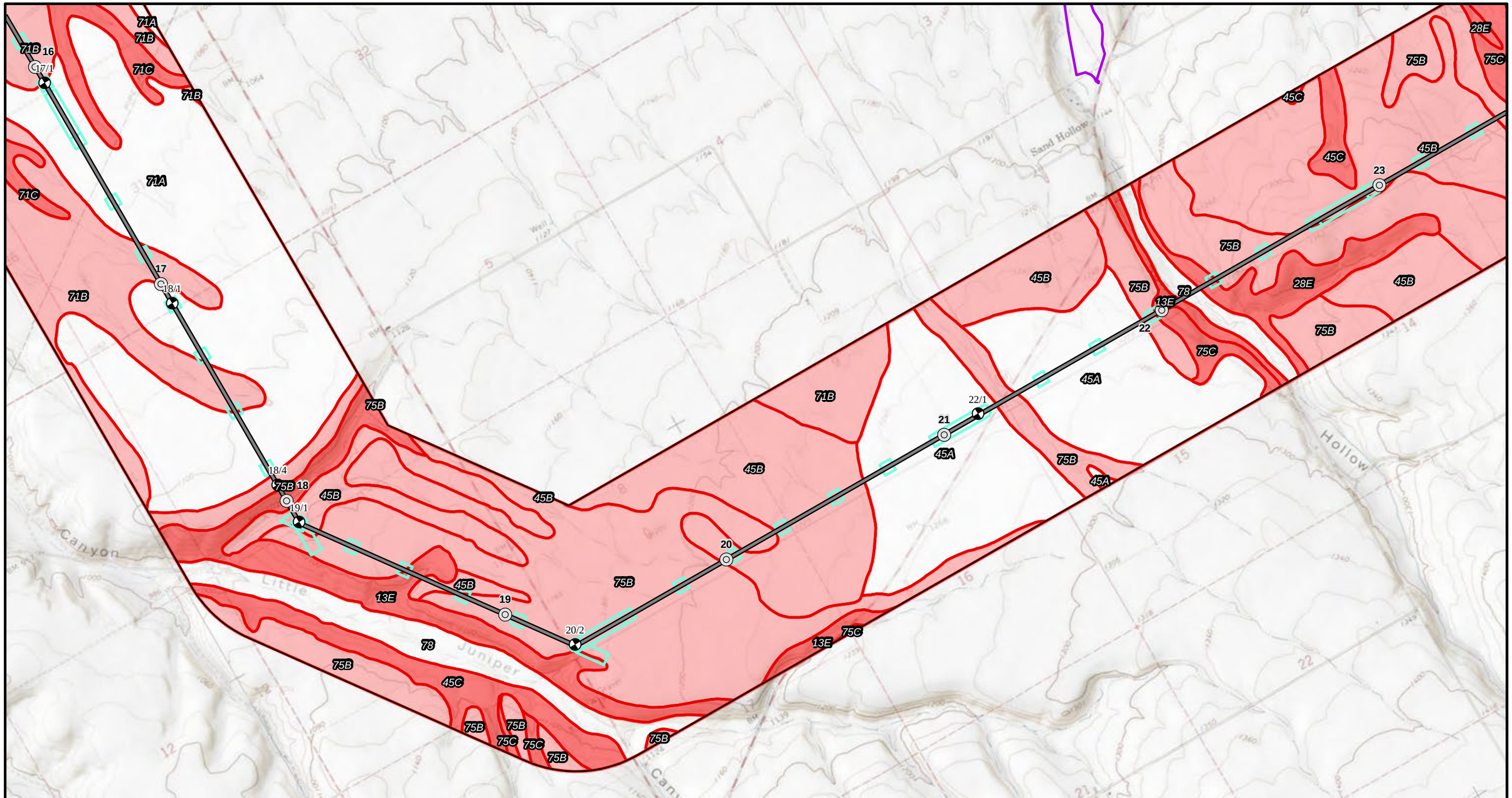
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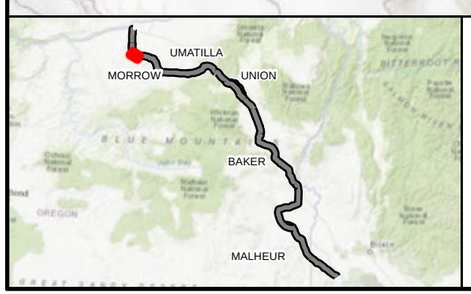
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Oregon - Idaho

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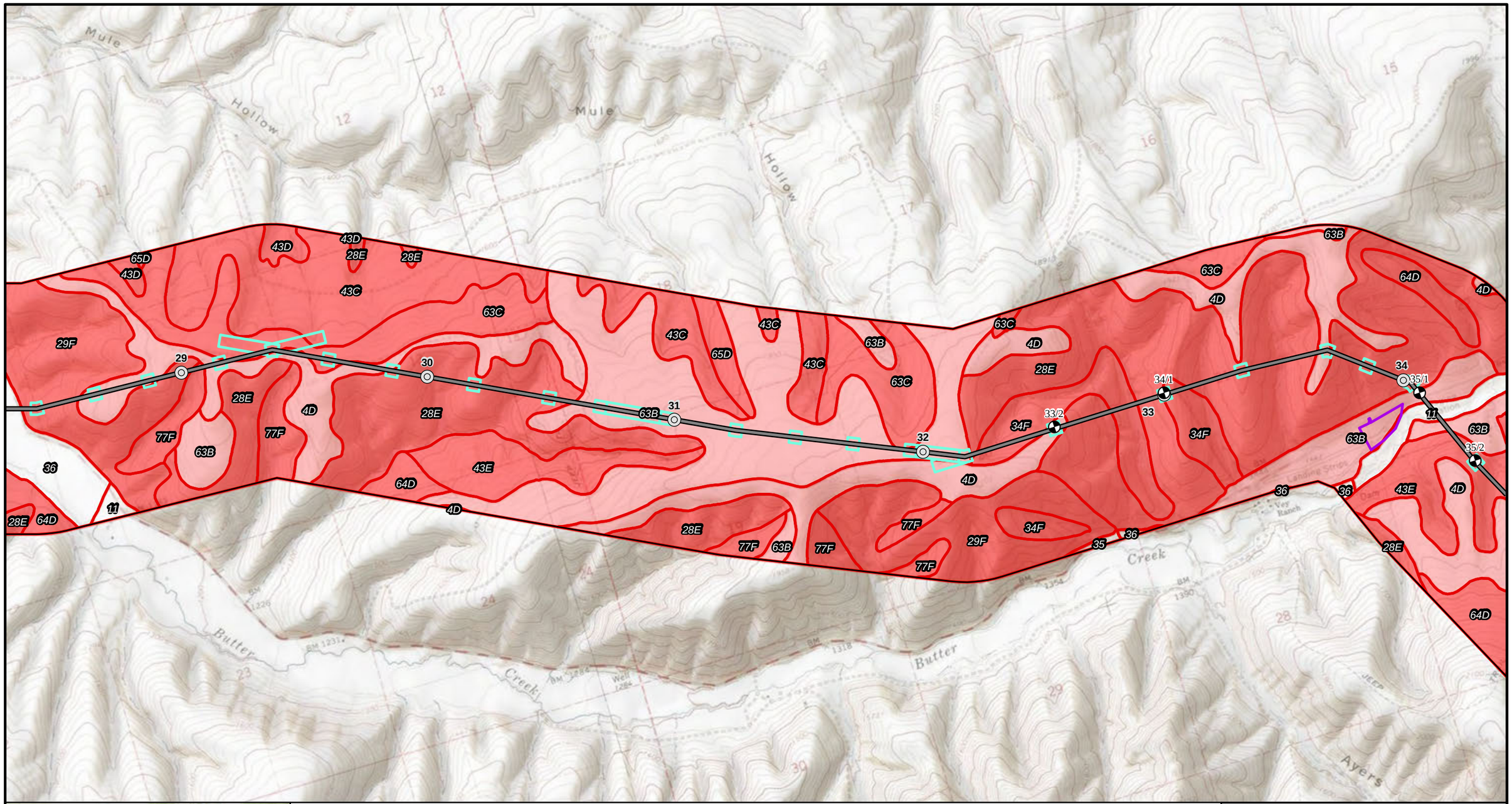
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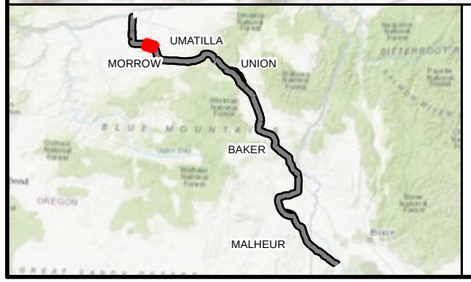
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Oregon - Idaho

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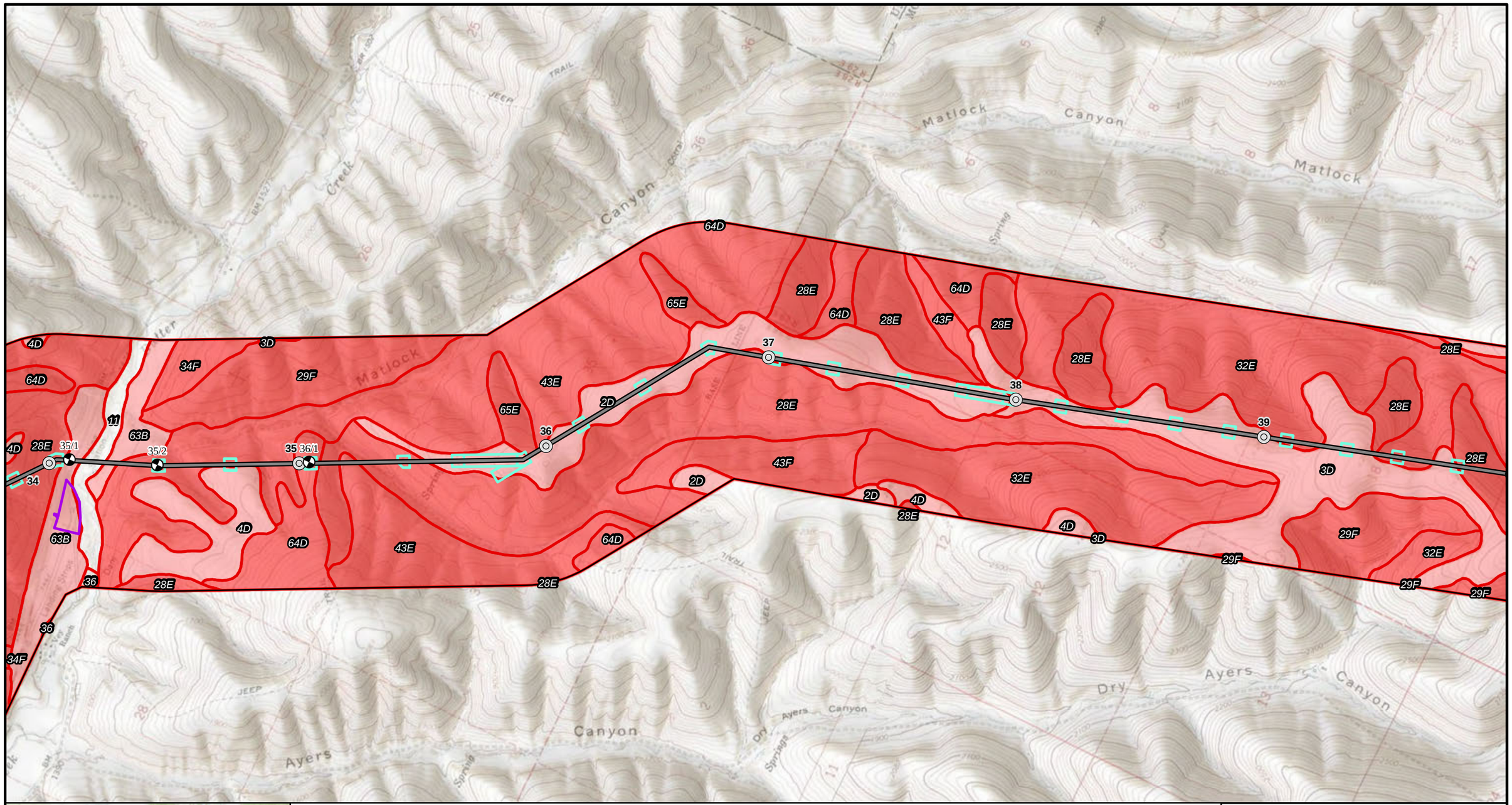
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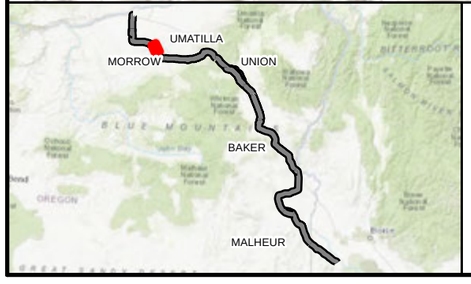
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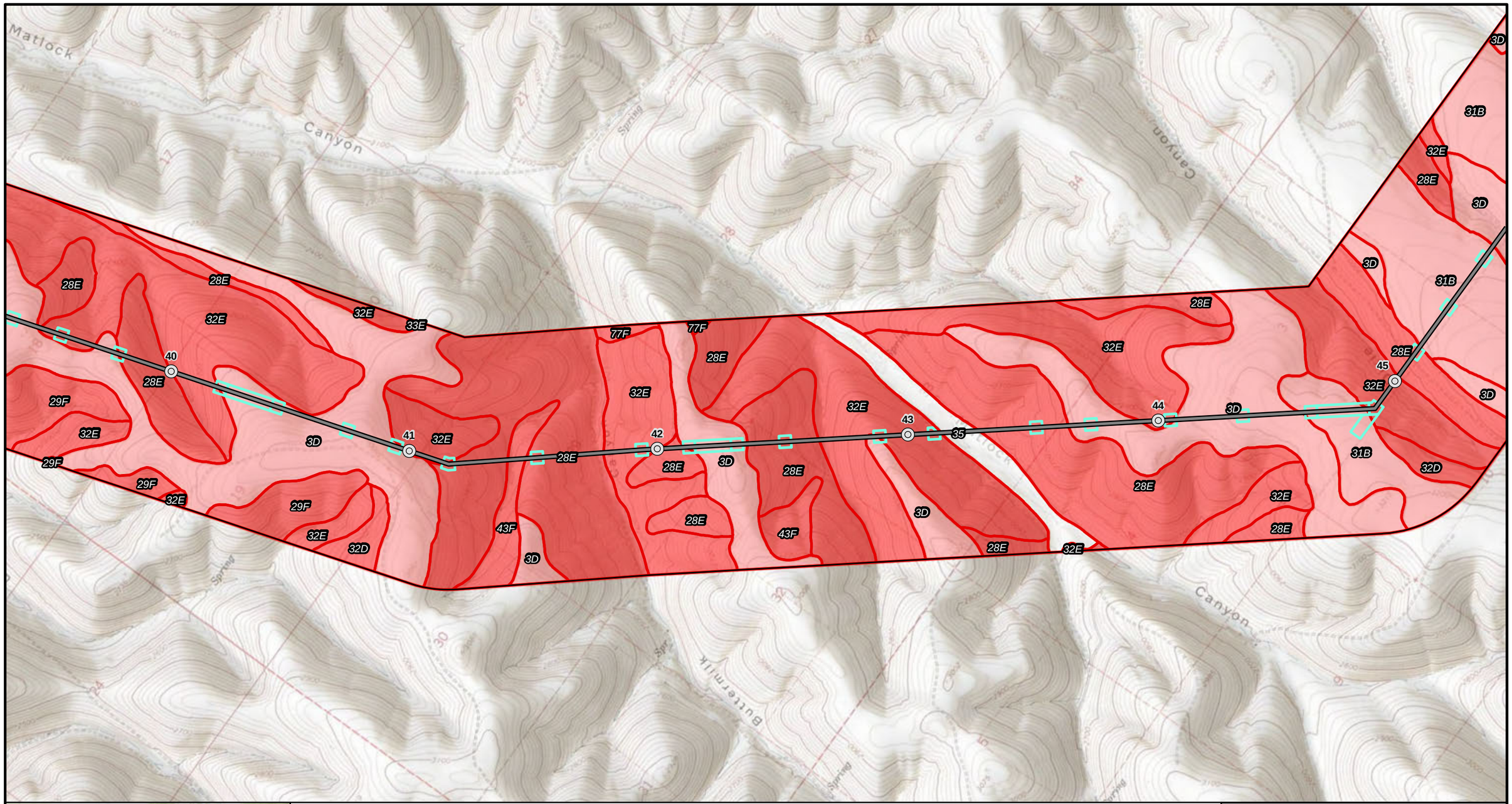
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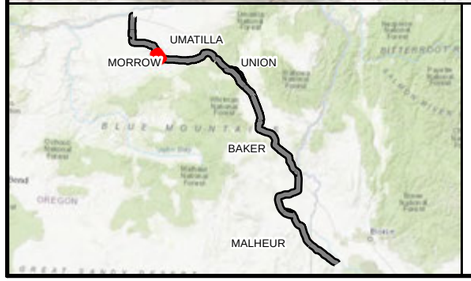
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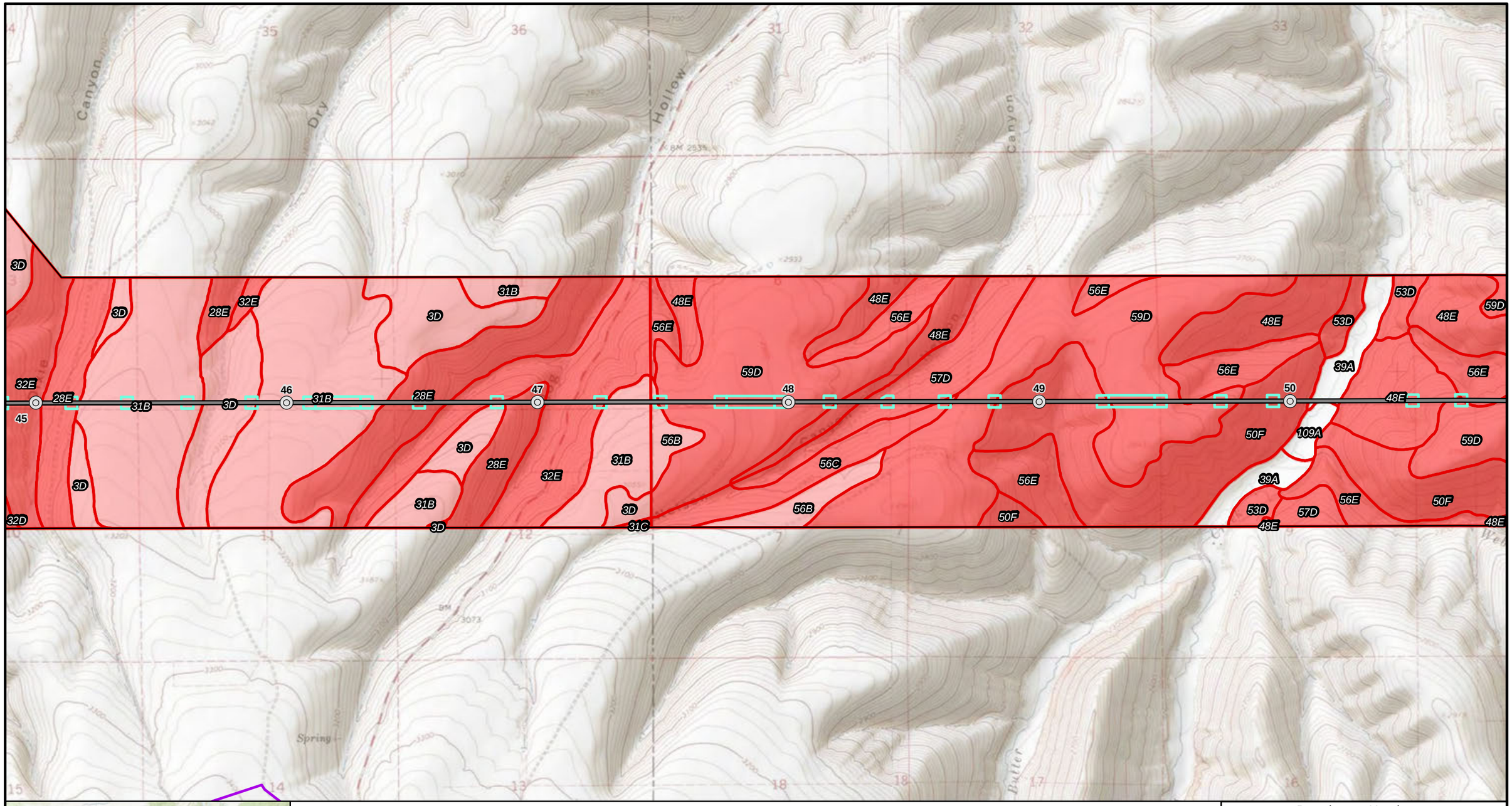
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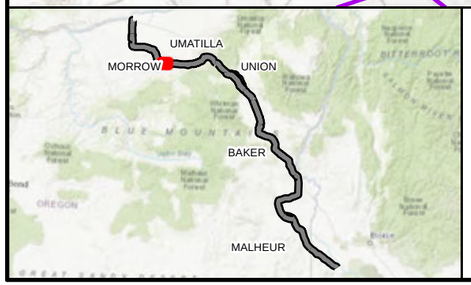
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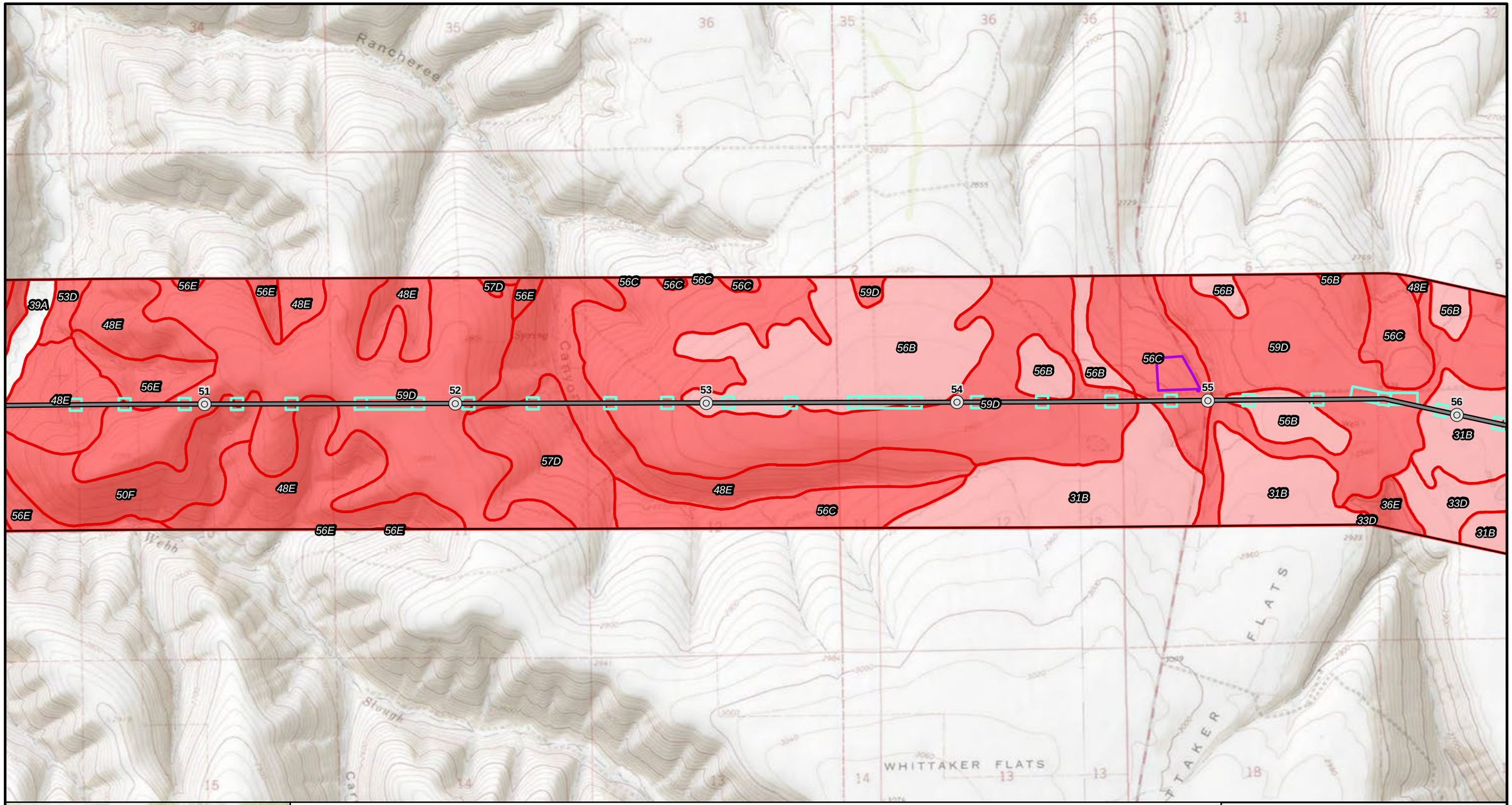
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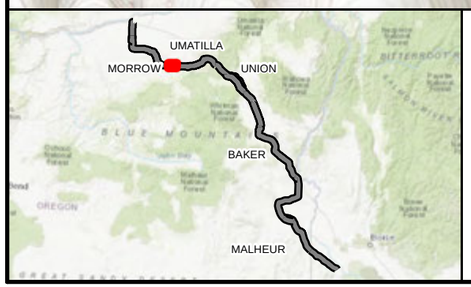
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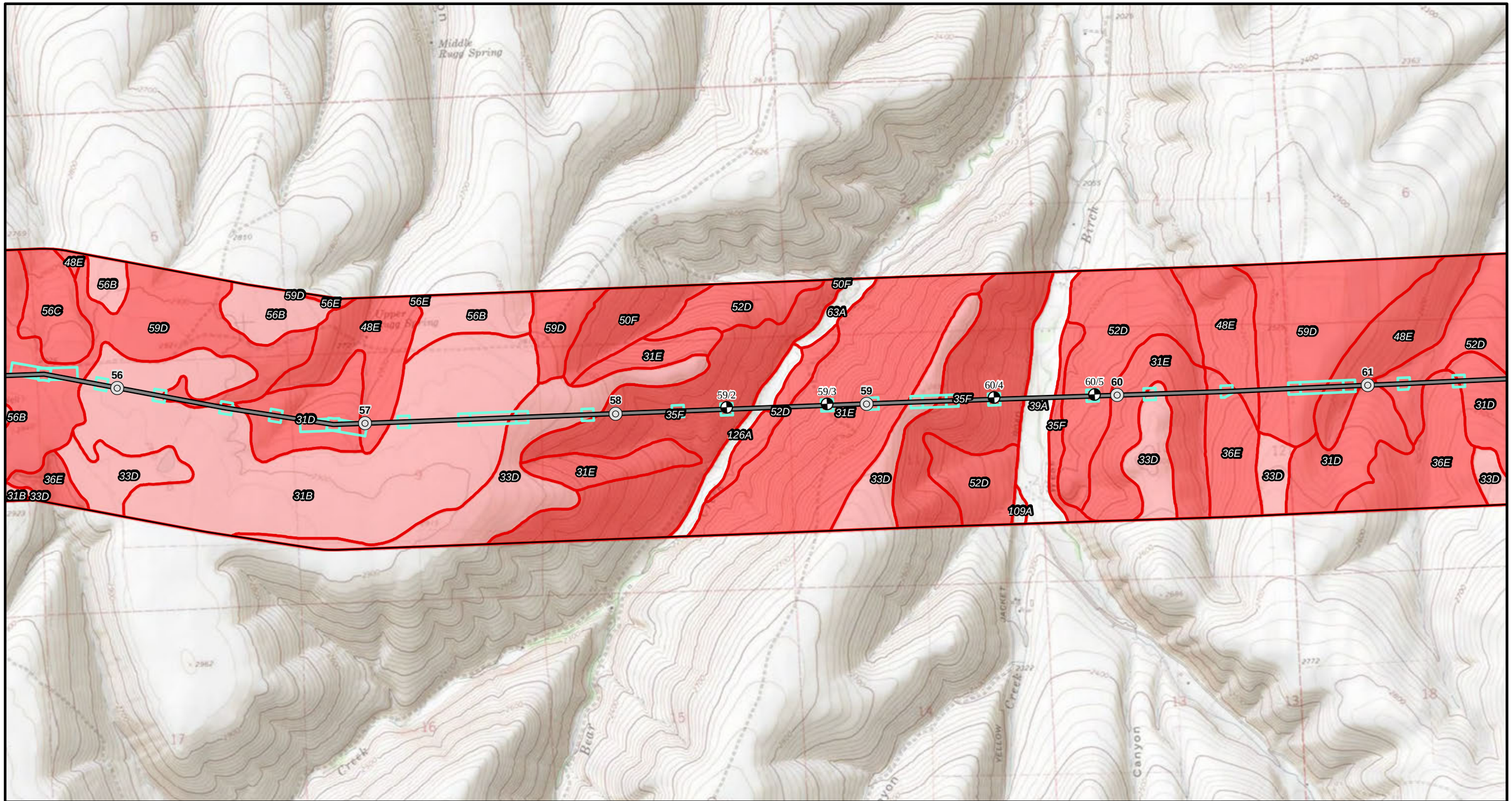
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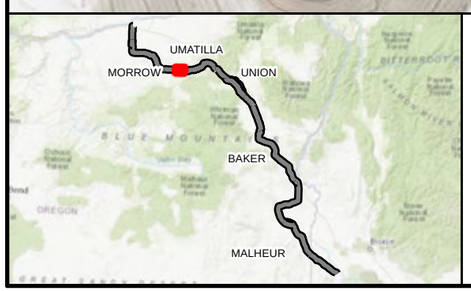
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Oregon - Idaho

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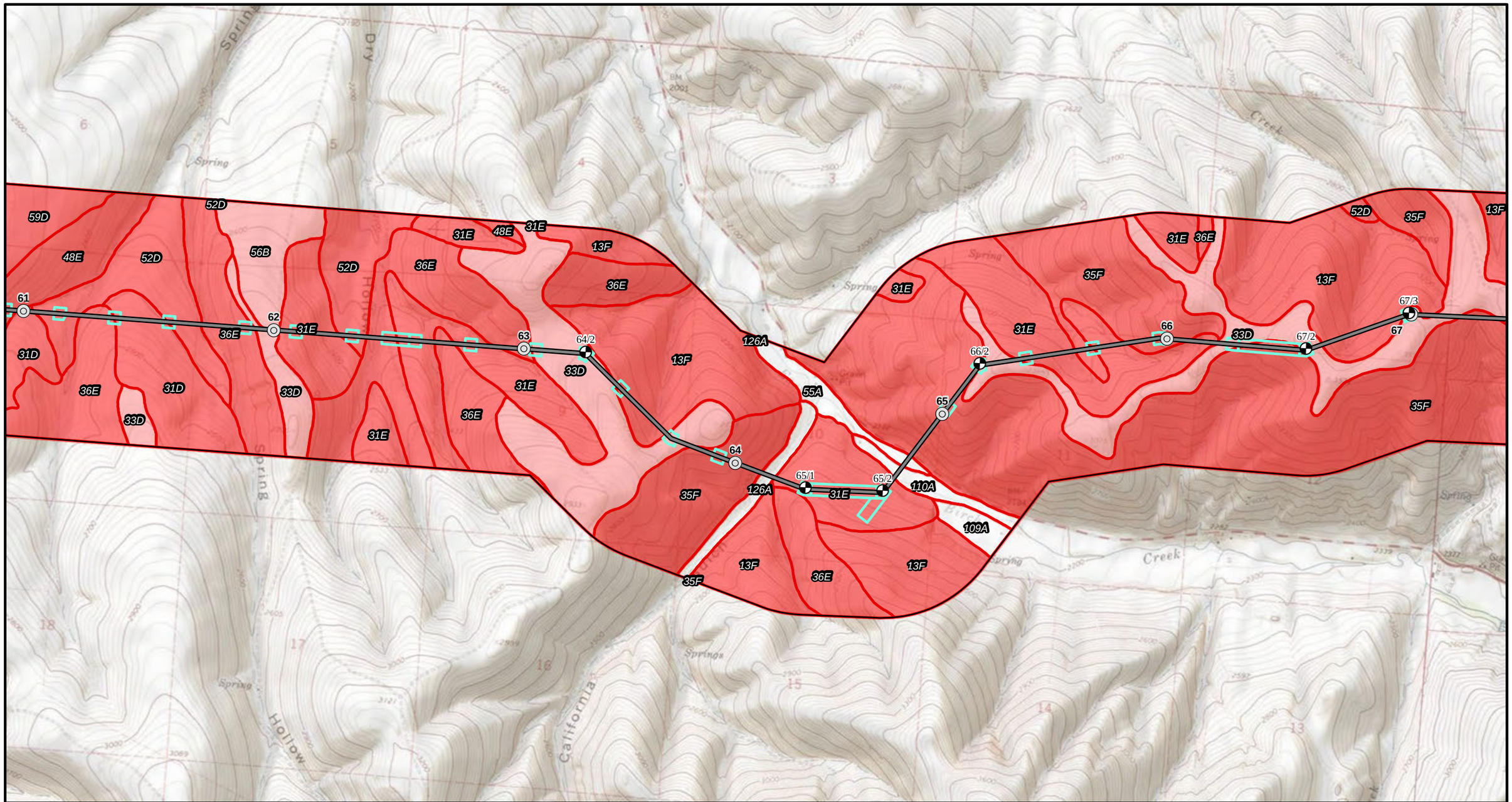
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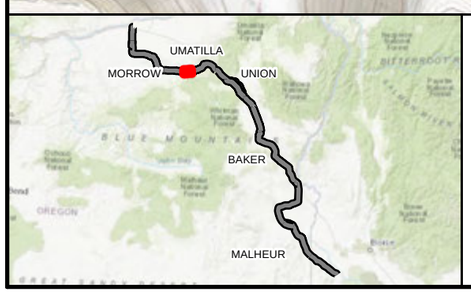
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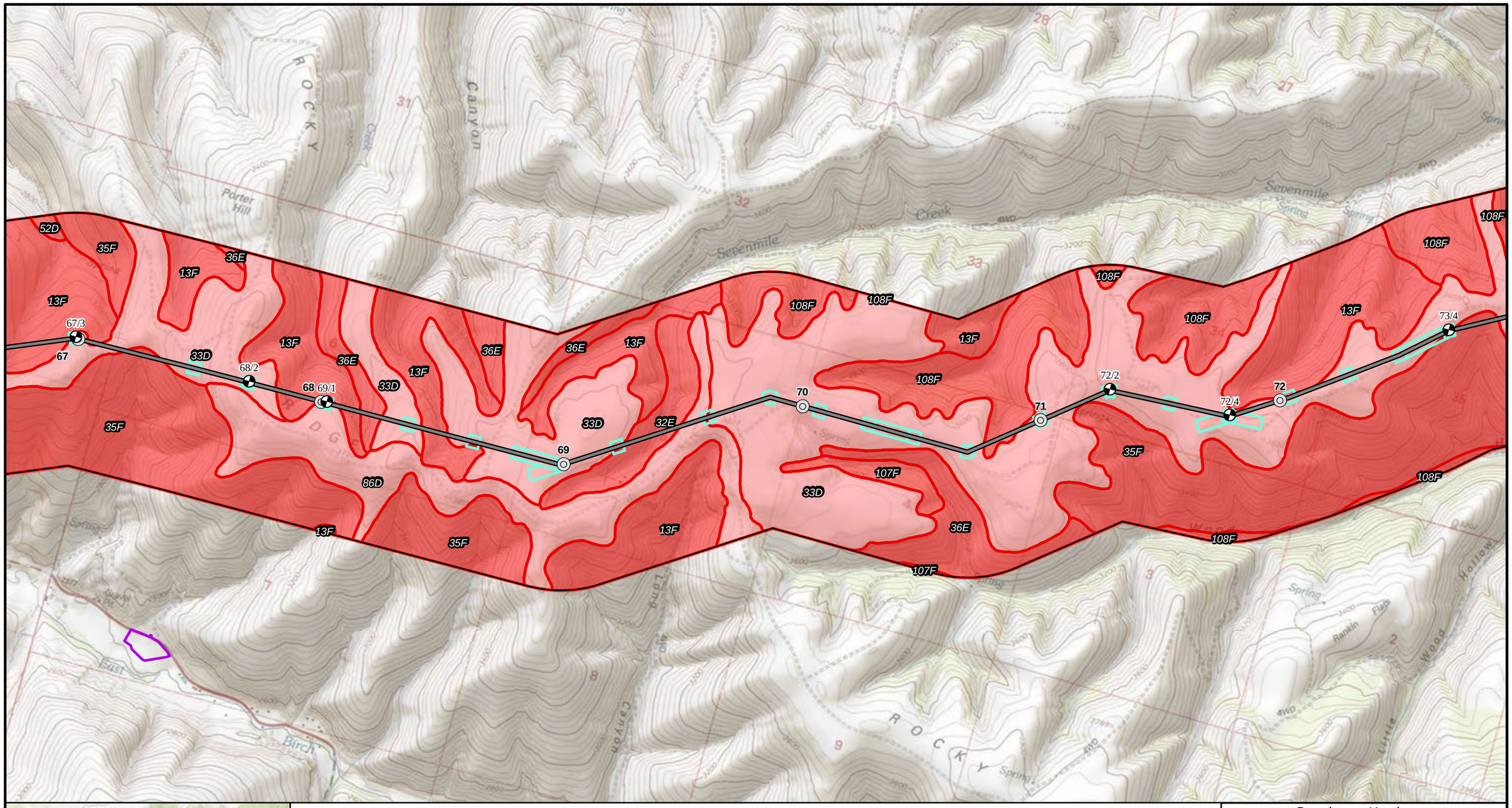
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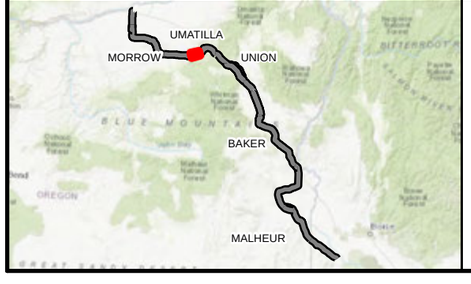
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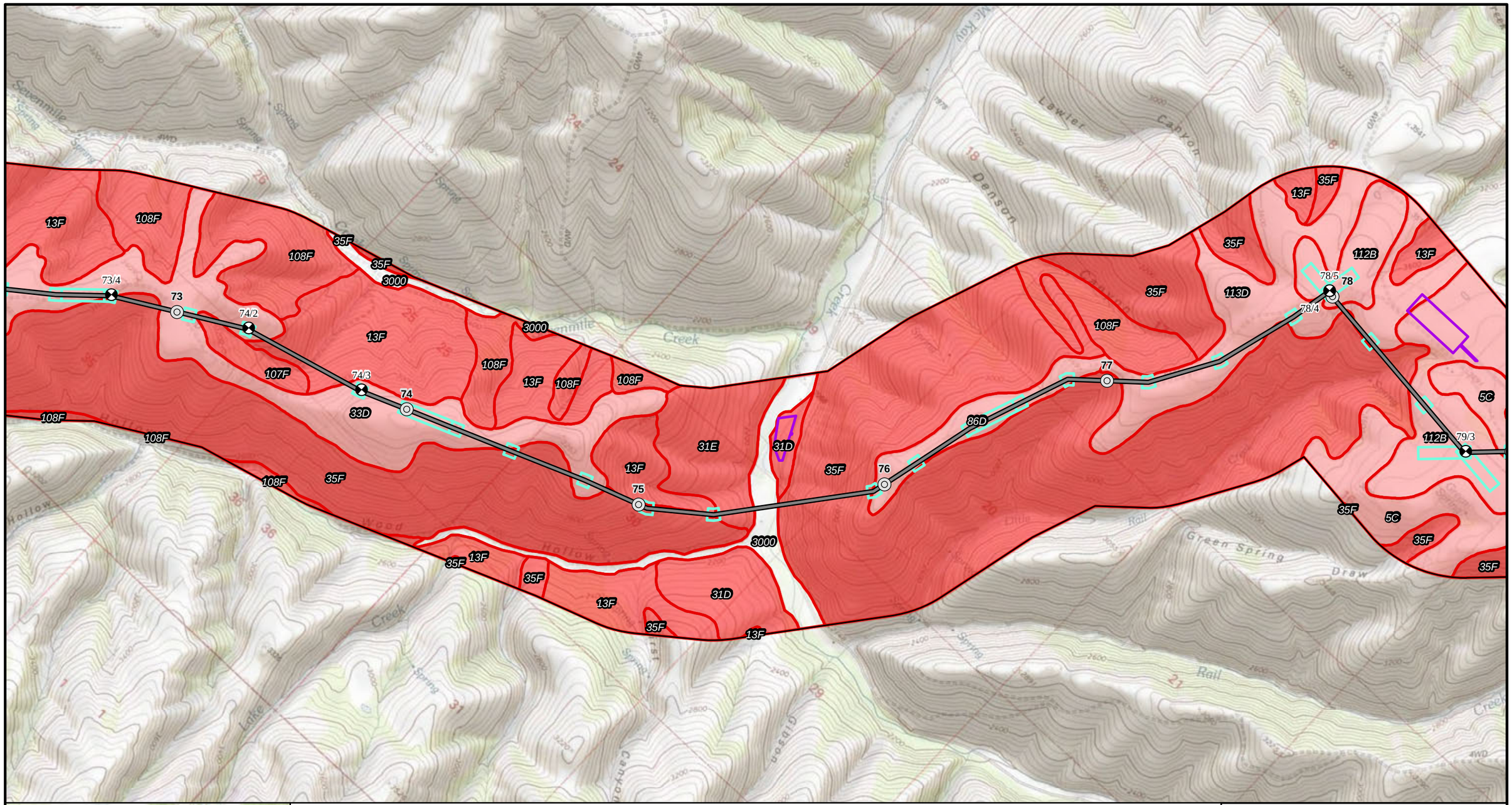
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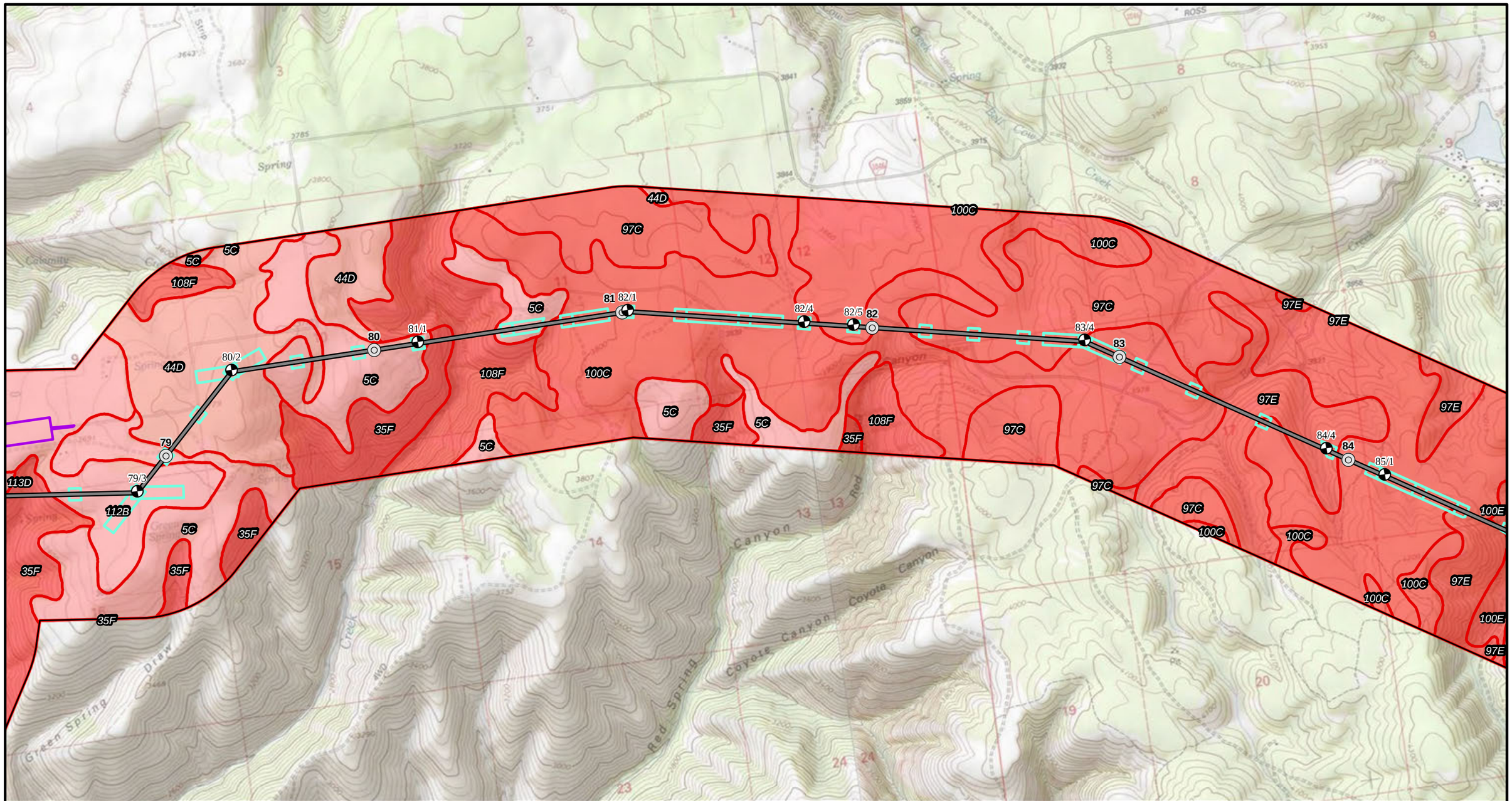
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13F
108F
35F
108F
35F
3000
73/4
73
74/2
13F
107F
74/3
74
33D
108F
108F
108F
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108F
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108F
31E
31D
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Denson
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Draw
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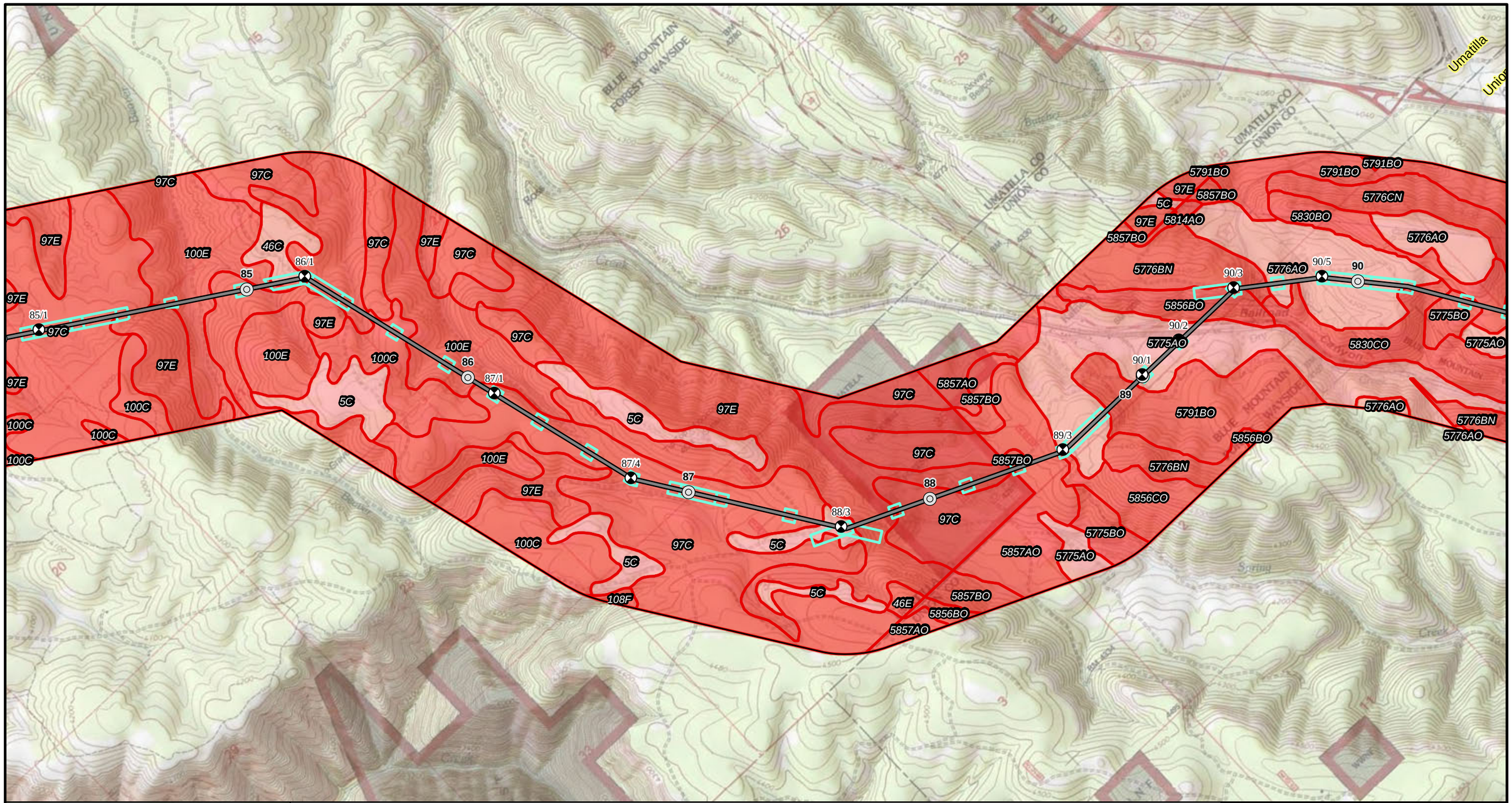
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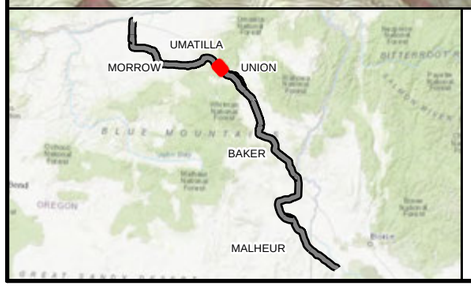
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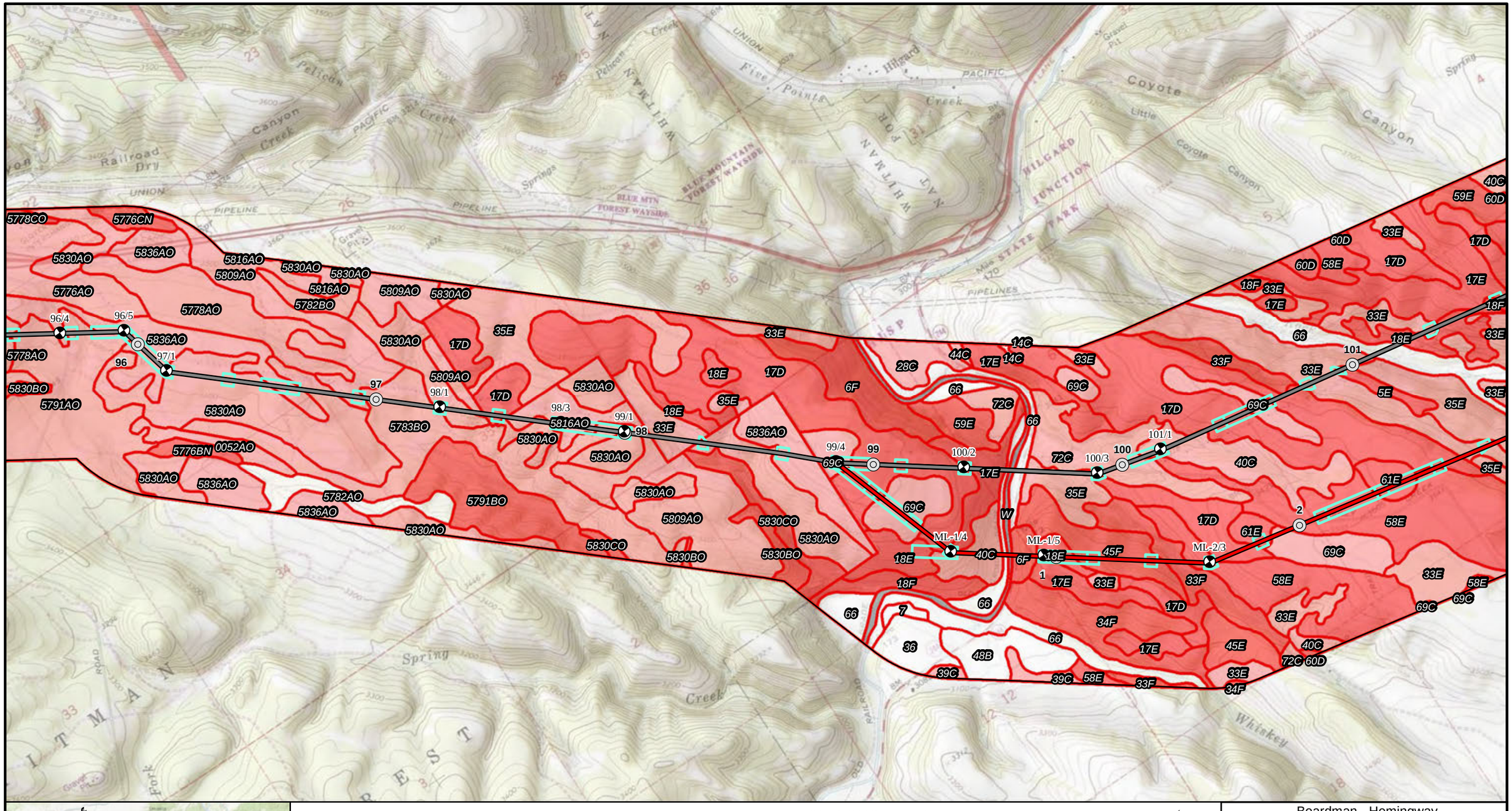
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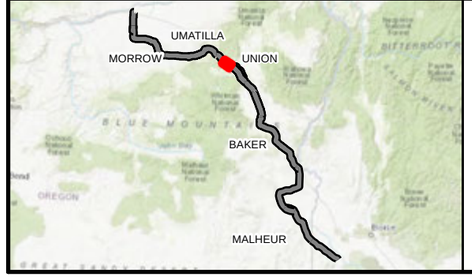
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

SOILS

April 2018 24-1-03820-006

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS





LEGEND

TRANSMISSION FEATURES

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- Proposed 138-kV Rebuild
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- Severe
- Moderate
- Slight
- Not rated
- 0.5 Mile Buffer

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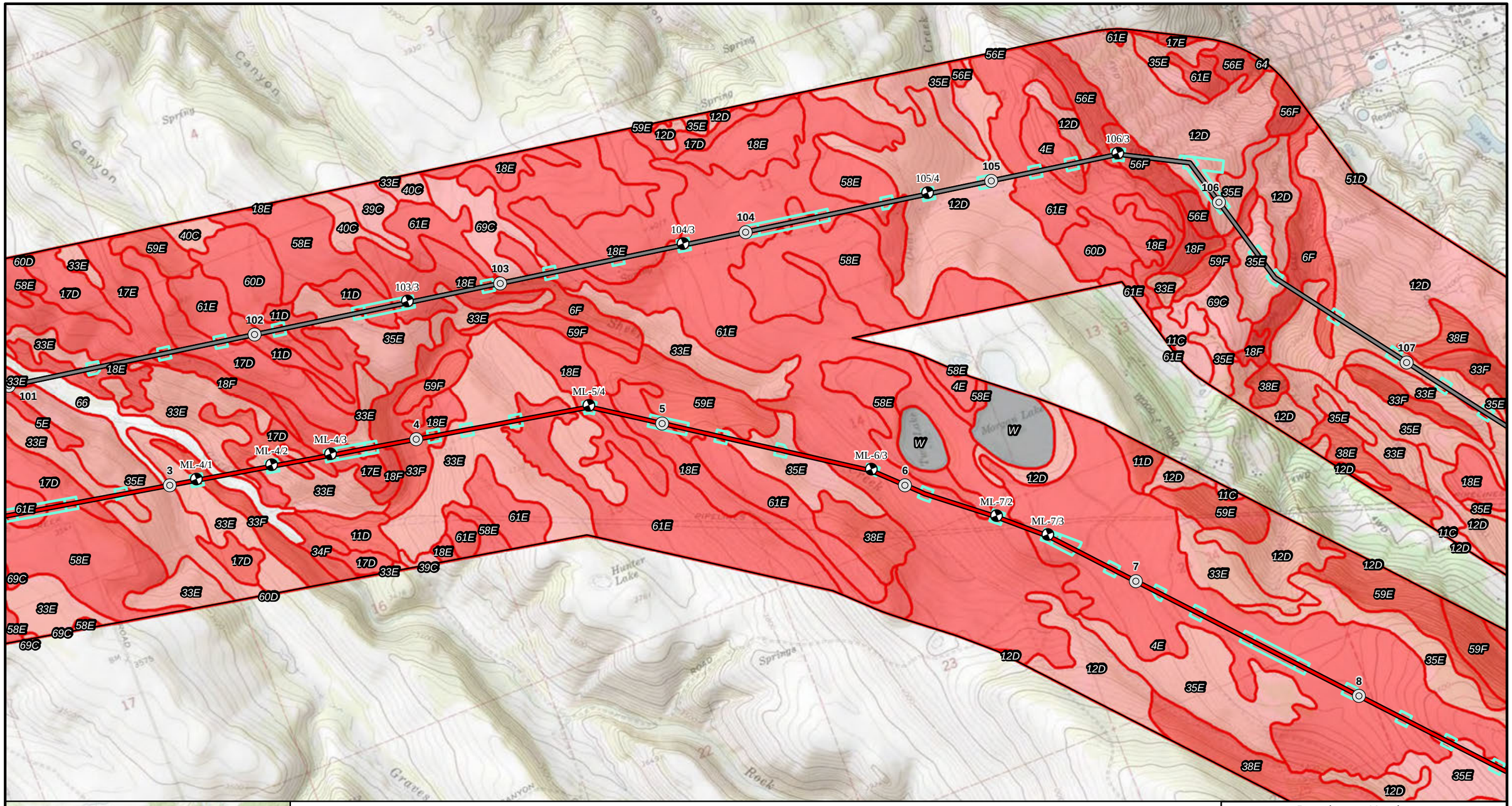
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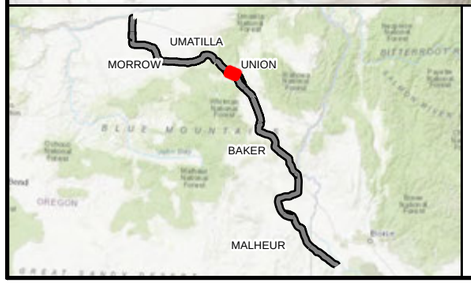
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Oregon - Idaho

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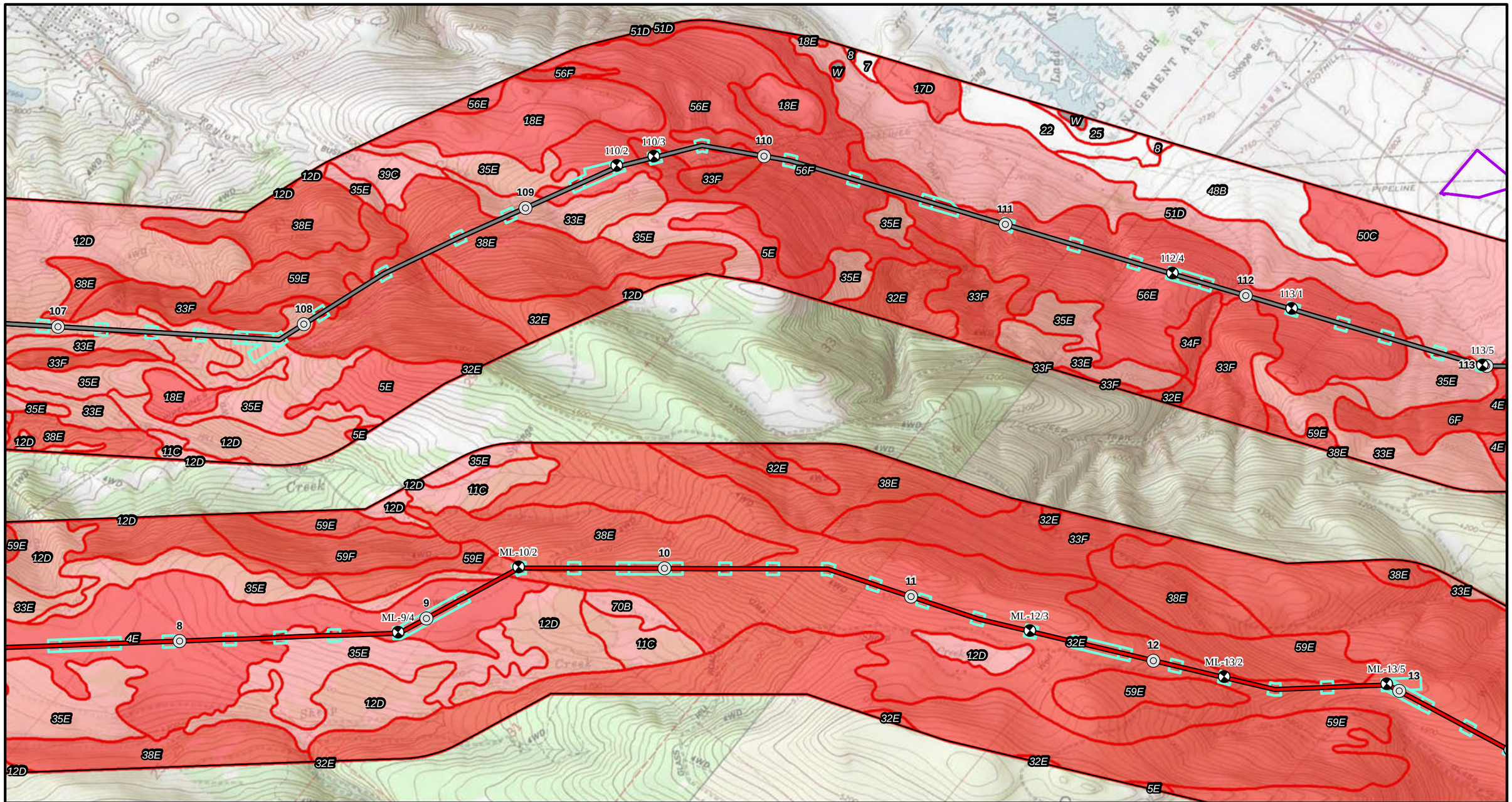
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Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

SOILS

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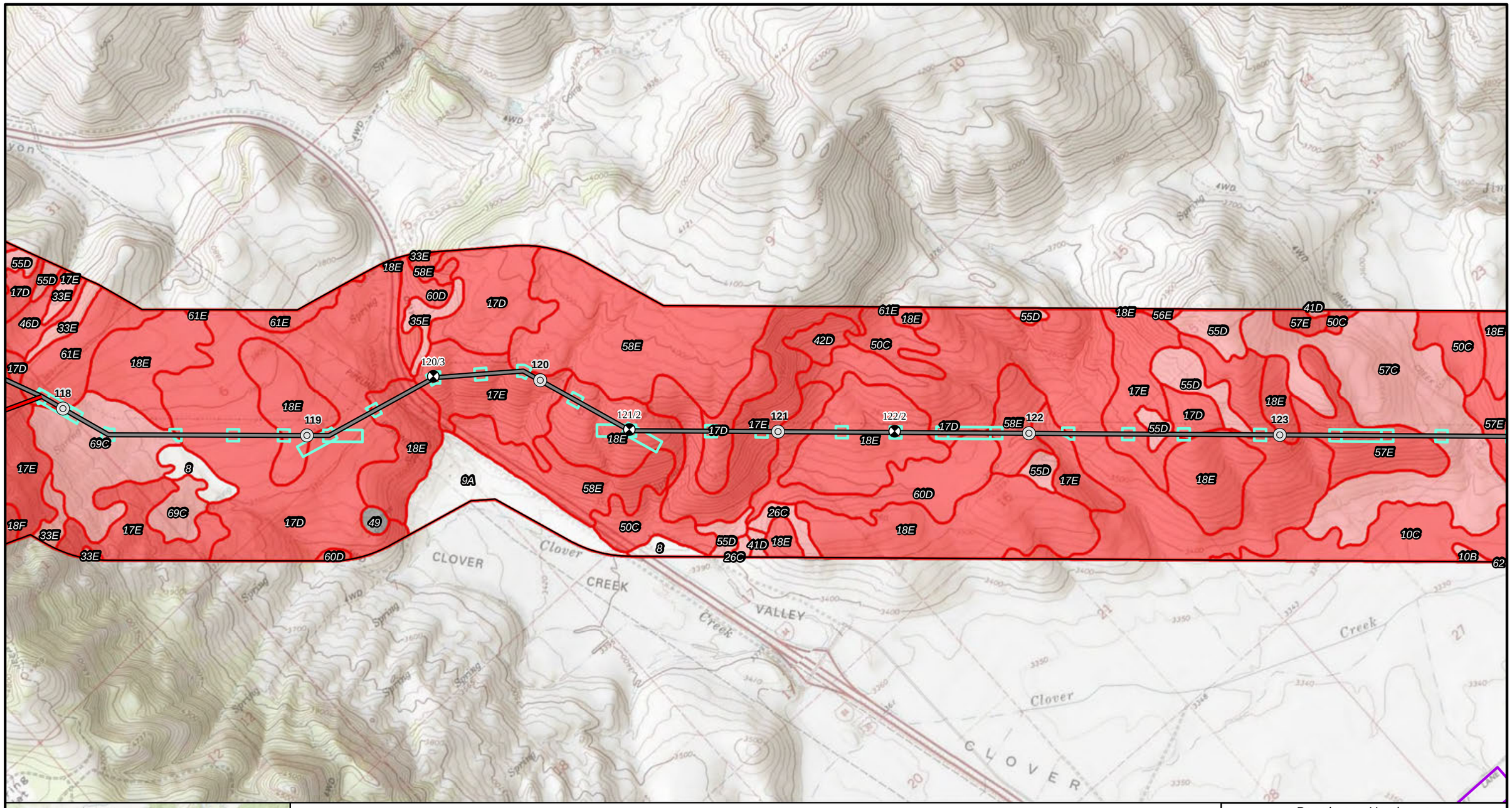
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

SOILS

April 2018 24-1-03820-006

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS


48B
33E
35E
18E
33E
58E
61E
60D
55D
58E
33F
4E
6F
50C
51D
48B
56E
17D
114
115/1
115
17D
33F
18F
6F
49
116/3
18E
116/4
69C
18E
117/2
9A
116
50C
68C
113/5
113
56E
35E
4E
18E
6F
58E
33F
59E
59F
4E
61E
5E
59E
38E
33E
5E
61E
56E
35E
17D
17E
ML-19/1
18
17E
17E
5E
33E
17
33E
4E
18F
33E
17E
ML-17/2
16
5E
ML-16/4
6F
33E
35E
33E
4E
35E
4E
35E
38E
33E
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17E
33F
18F
59F
18E
4E
35E
18F
38E
ML-13/5
13
59E
32E
ML-14/3
ML-13/2
59E
4E
56F
17E
17D
18F
6F
ML-16/1
45E
18F
15
6F
33F
35E
ML-15/4
18E
14
33E
4E
18F
34F
18F
ML-15/2
59E
59E
35E
6F
33F
6F
18F
6F
6F
6F
4E
33F
33F
33F
UMATILLA
MORROW
UNION
BAKER
MALHEUR
OREGON
LEGEND
TRANSMISSION FEATURES
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Structure Work Areas
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Moderate
Slight
Not rated
0.5 Mile Buffer
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0
2,000
4,000
Feet
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho
SOILS
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SHANNON & WILSON, INC.
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LEGEND

TRANSMISSION FEATURES

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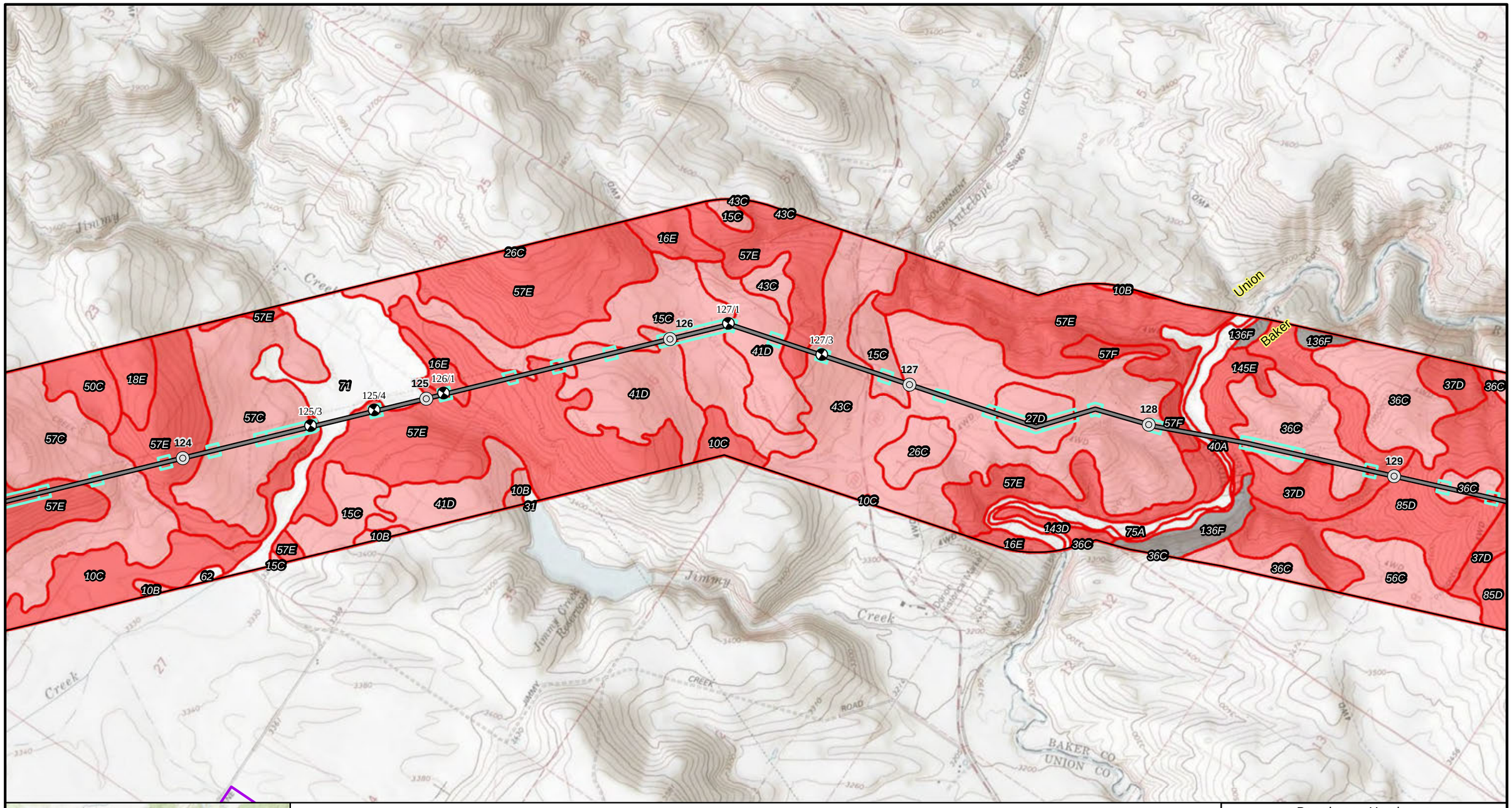
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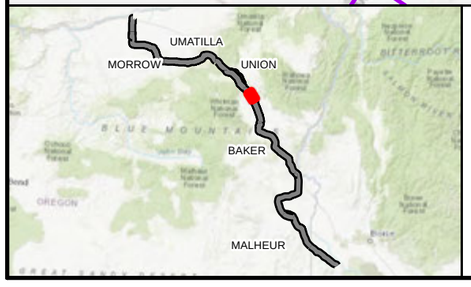
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

SOILS

April 2018 24-1-03820-006

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS





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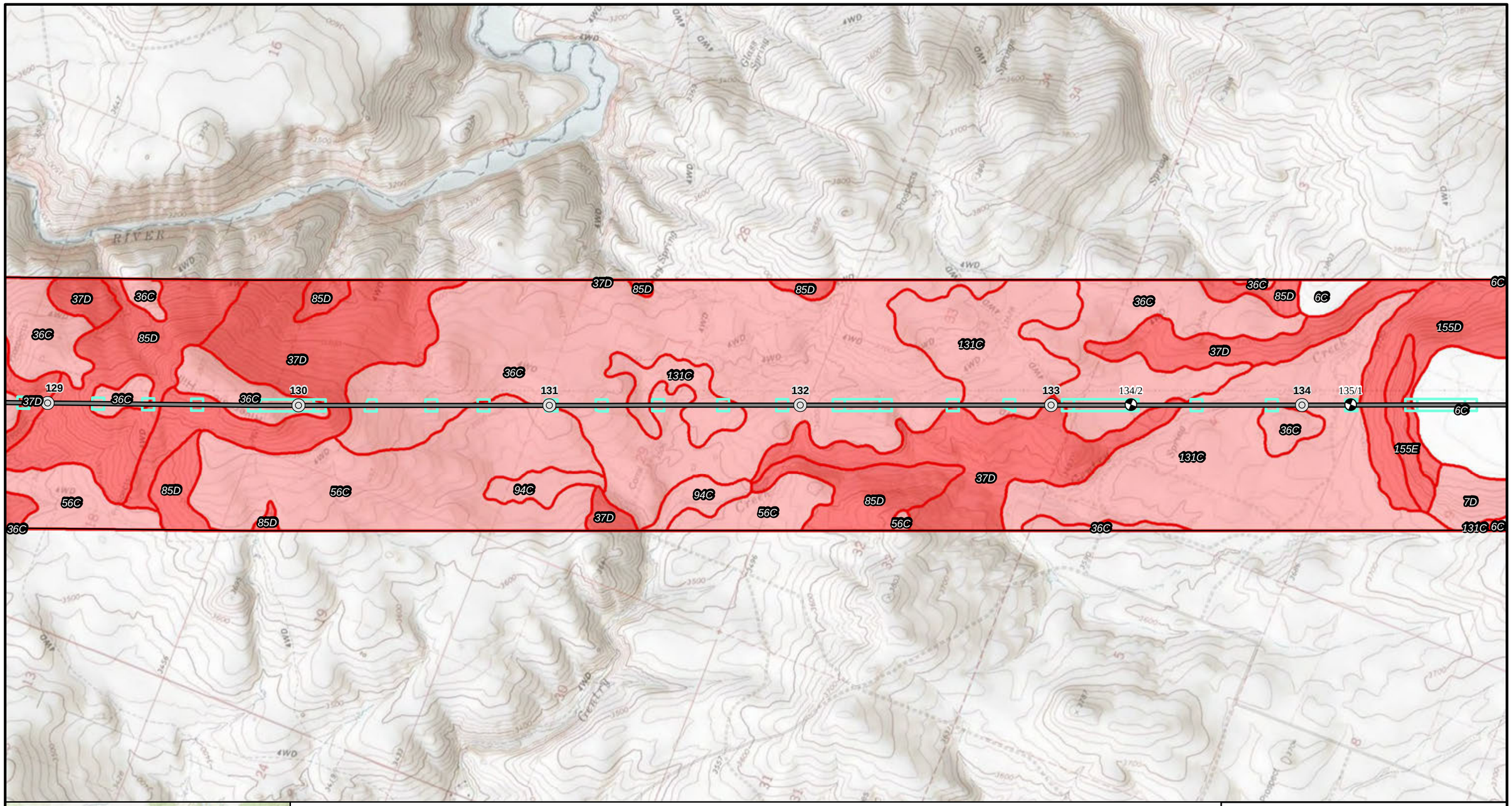
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Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

SOILS

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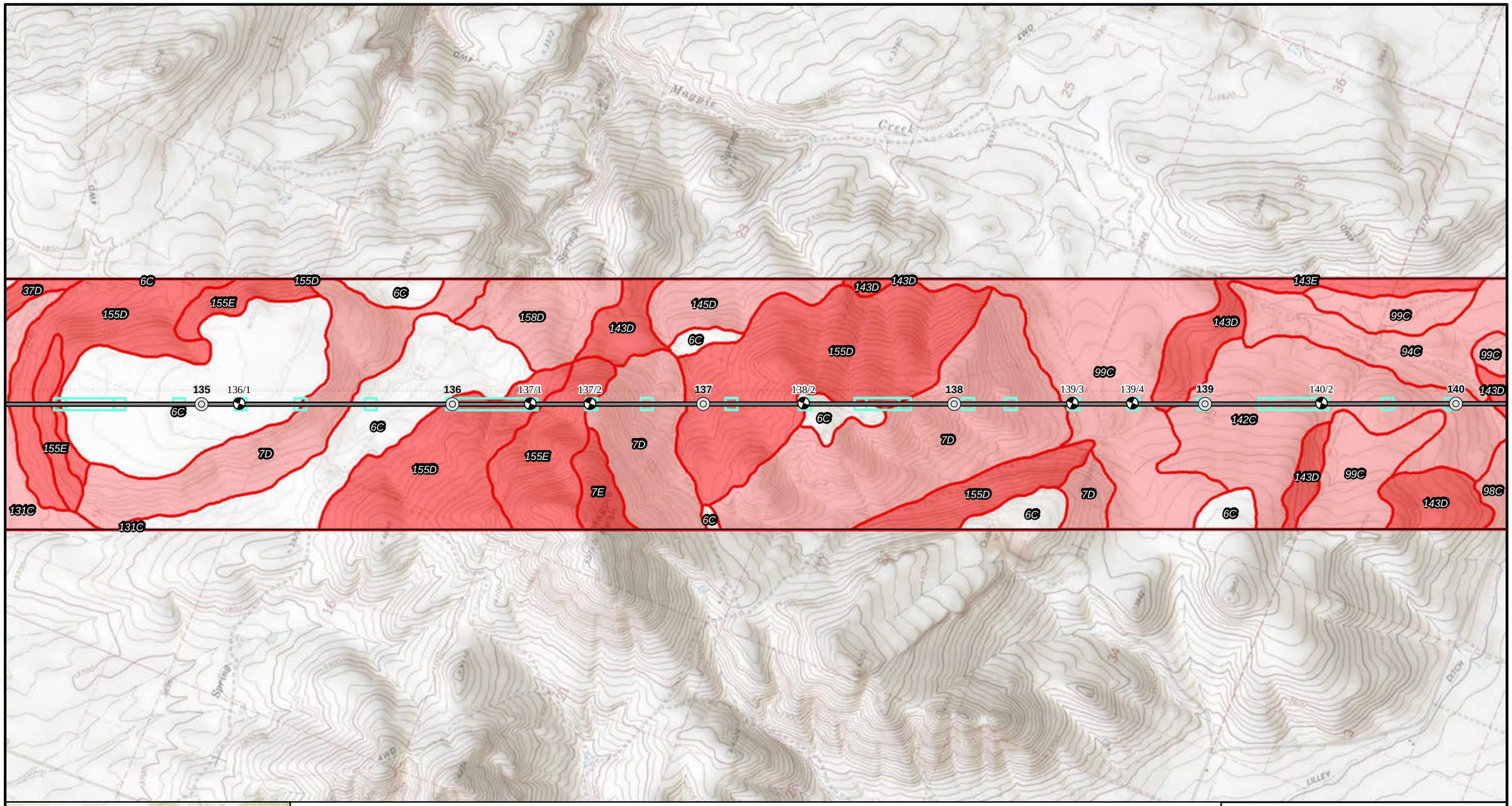
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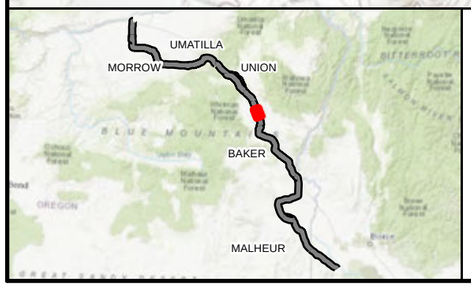
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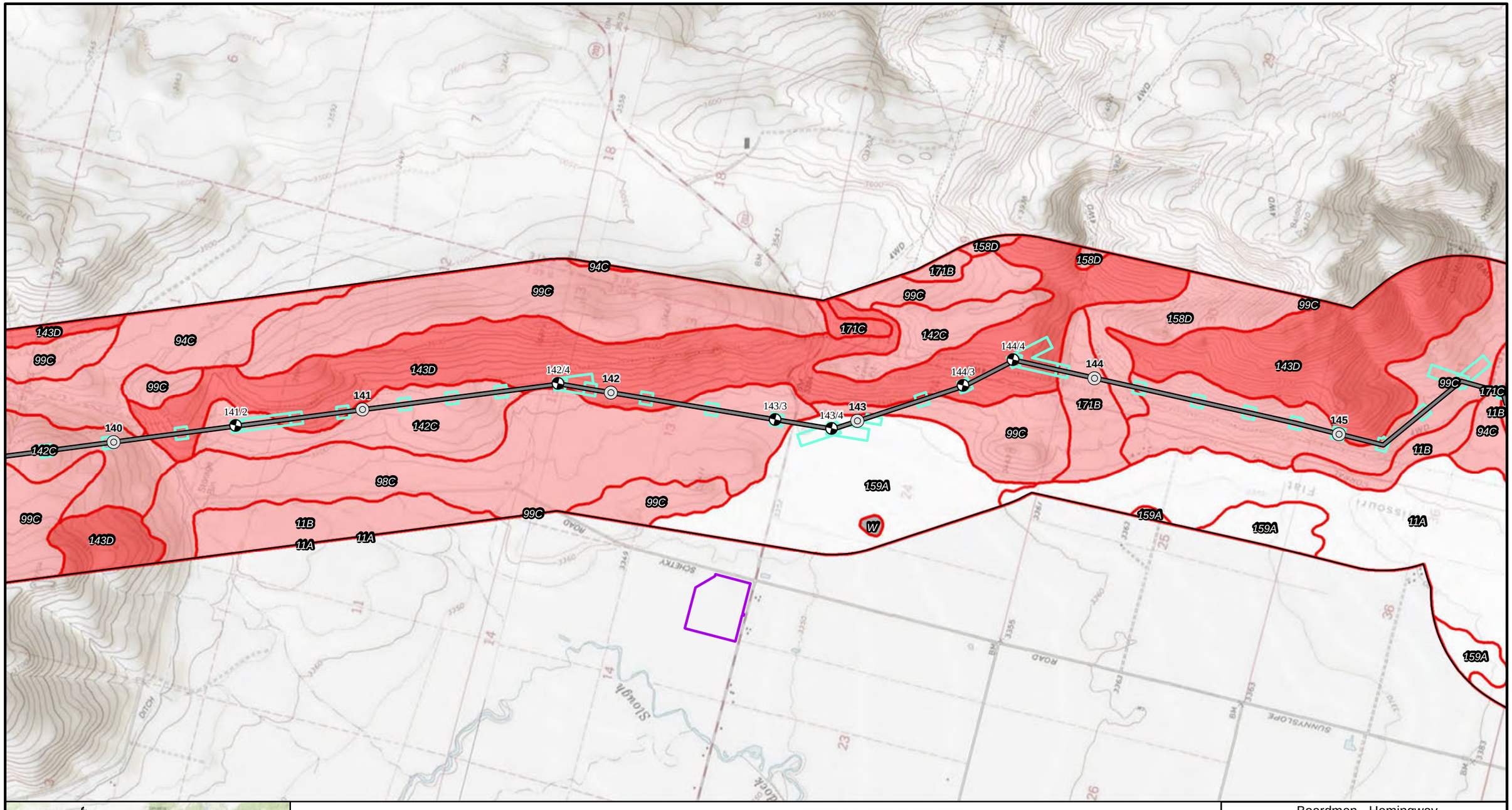
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Oregon - Idaho

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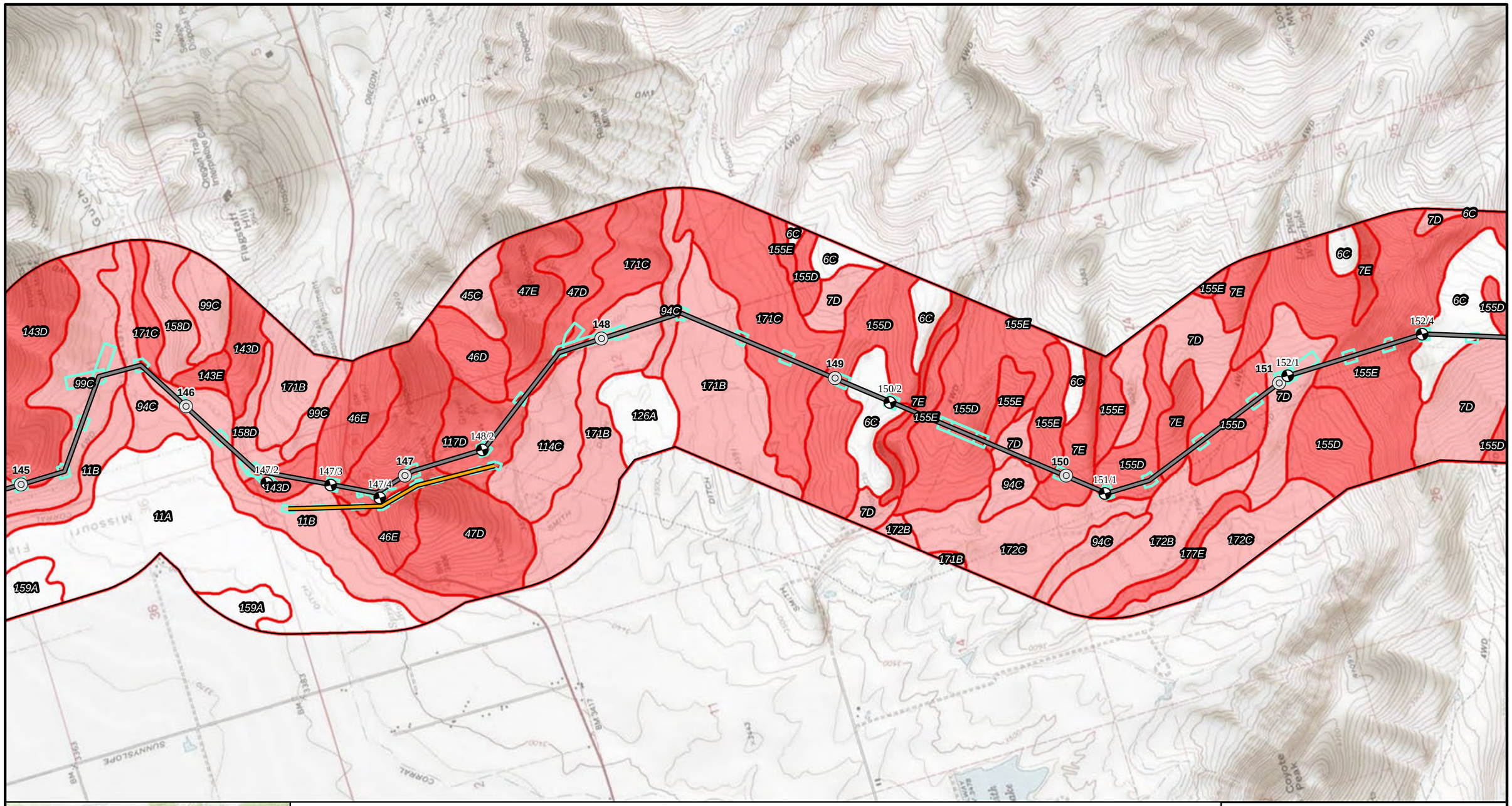
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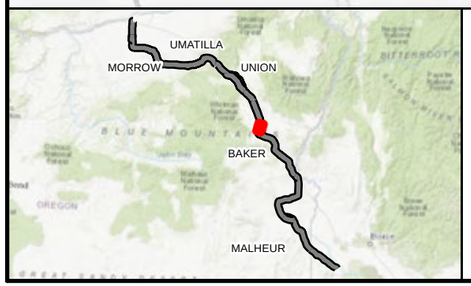
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

SOILS

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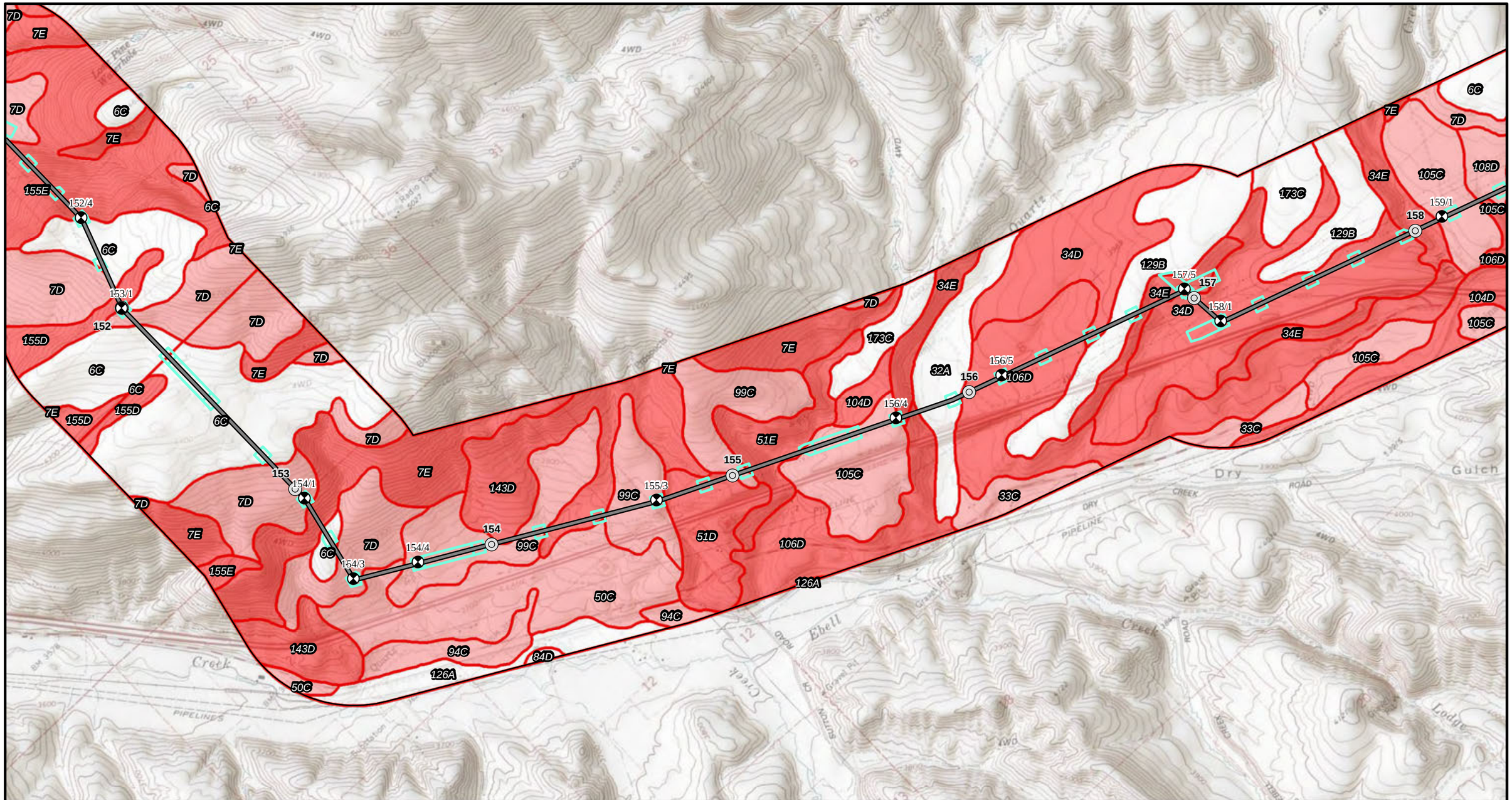
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500kV Transmission Line
Oregon - Idaho

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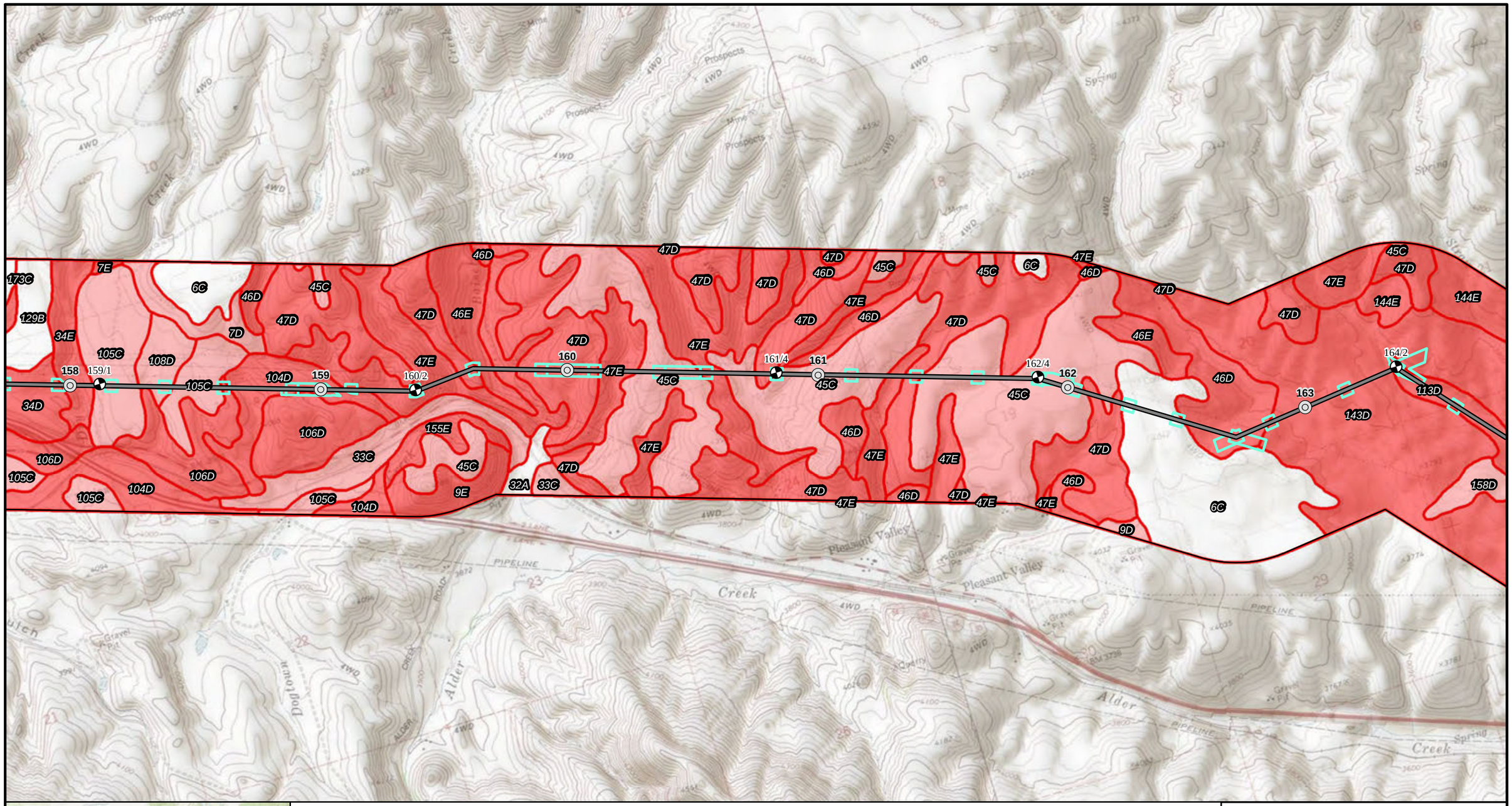
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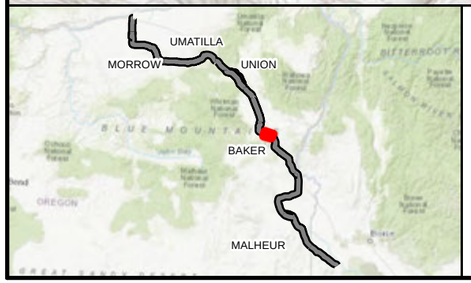
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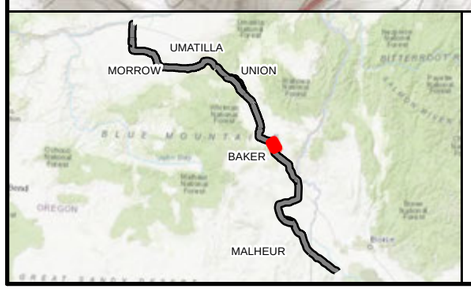
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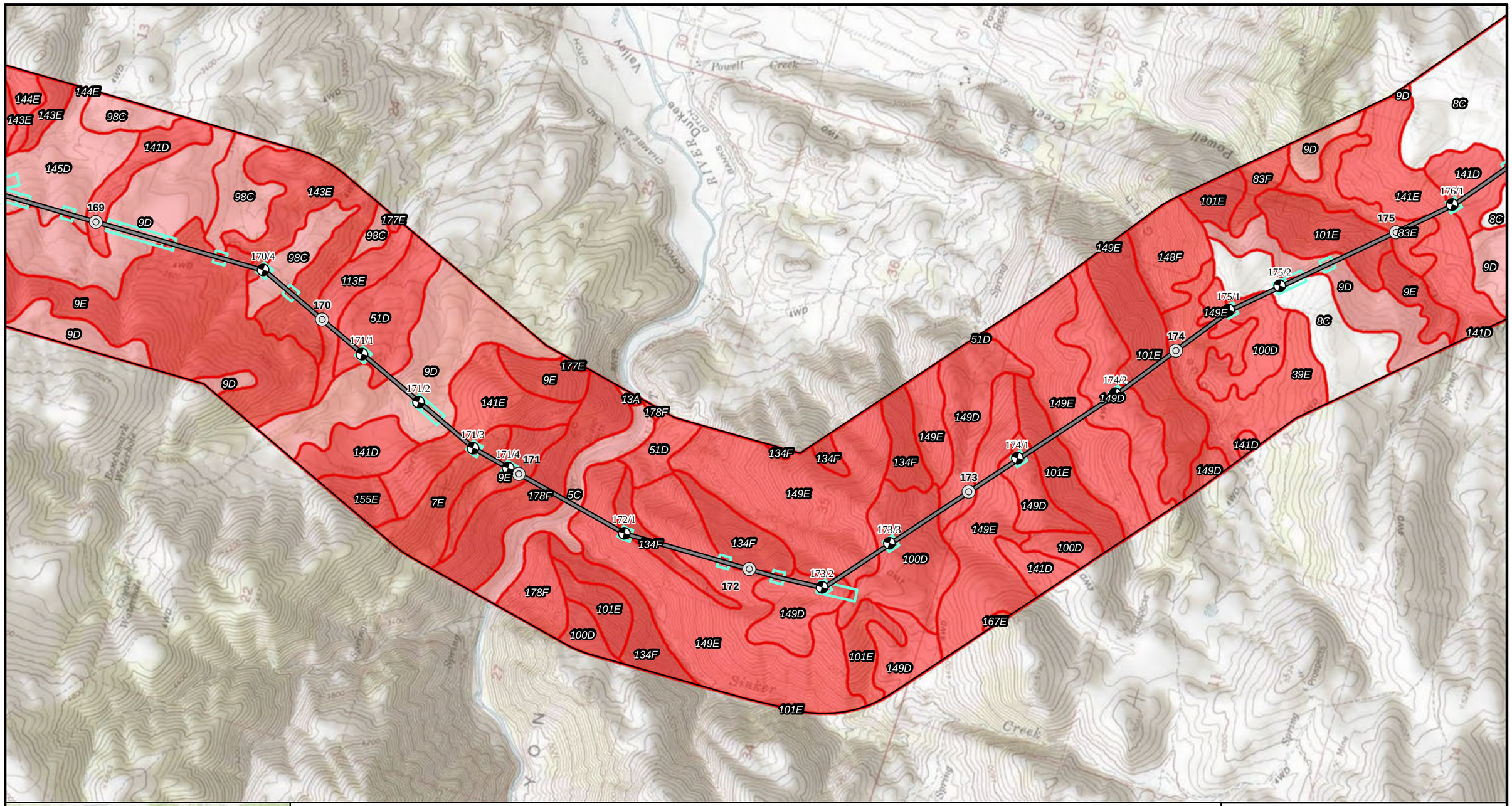
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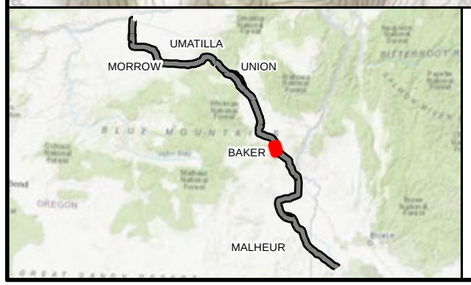
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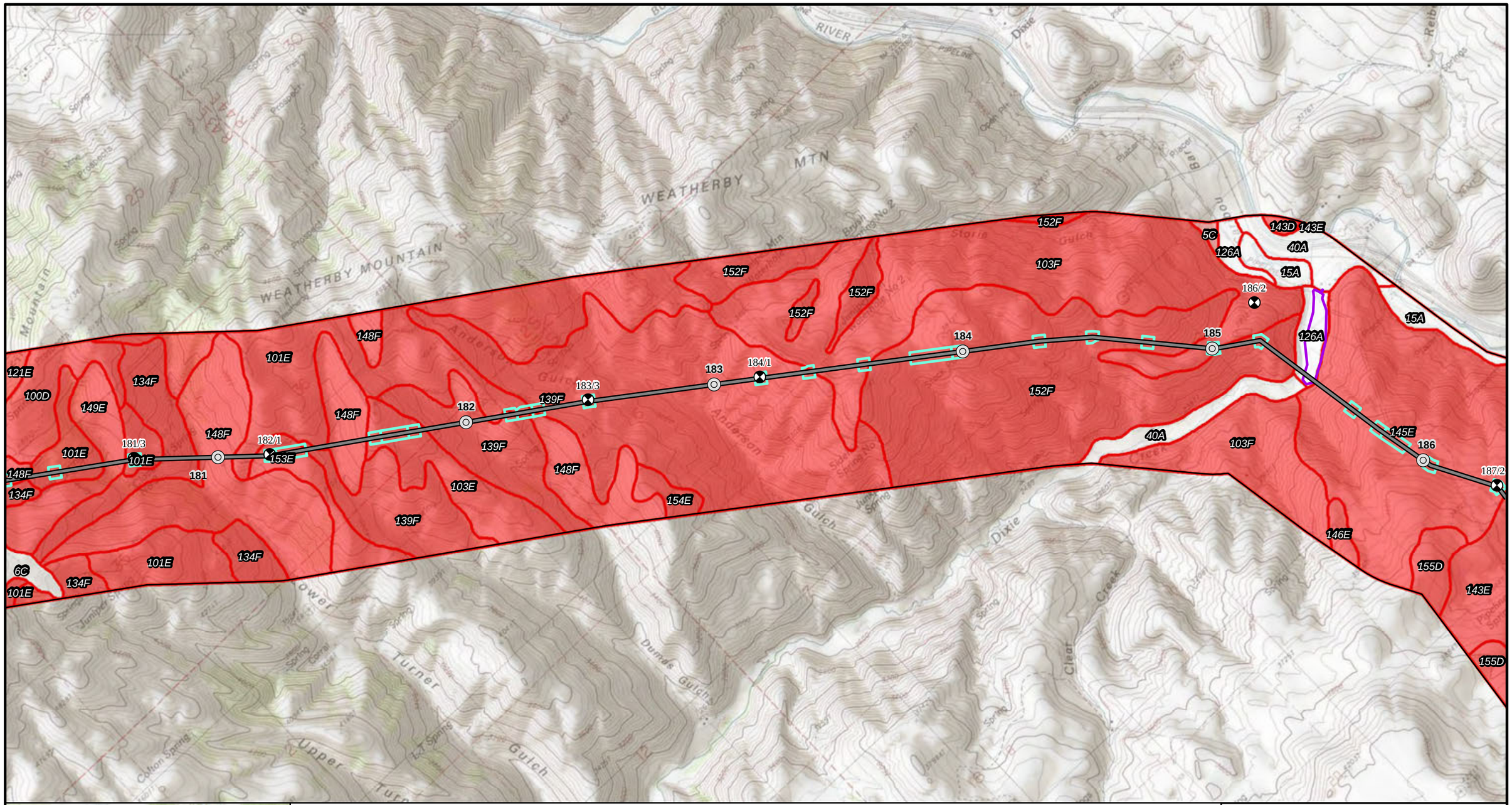
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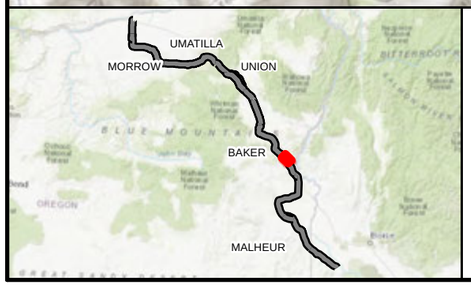
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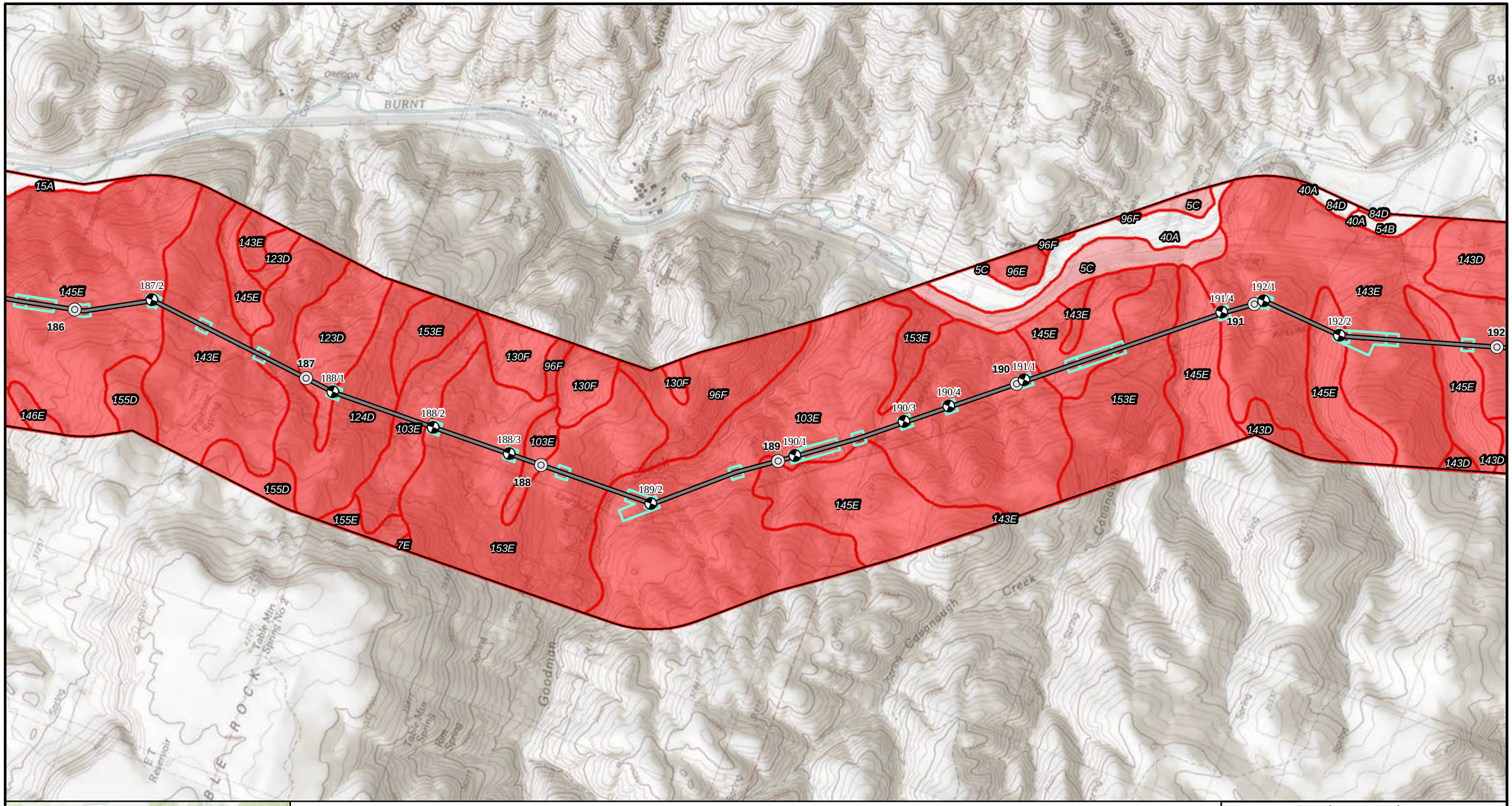
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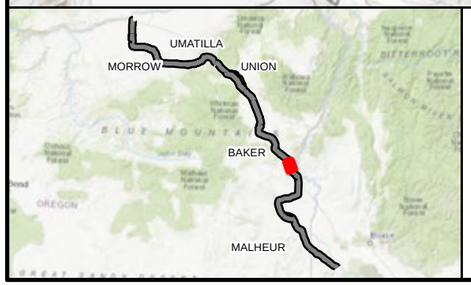
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

SOILS

April 2018 24-1-03820-006

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS





LEGEND

TRANSMISSION FEATURES

- IPC Proposed Route
- Proposed 230-kV Rebuild
- Proposed 138-kV Rebuild
- Double Mountain Alternative
- Morgan Lake Alternative
- West Bombing Range Road Alternative 1
- West Bombing Range Road Alternative 2

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- Substation
- Mileposts
- Multi-Use Areas
- Structure Work Areas

SSURGO SOIL MAP UNIT EROSION HAZARD

- Severe
- Moderate
- Slight
- Not rated
- 0.5 Mile Buffer

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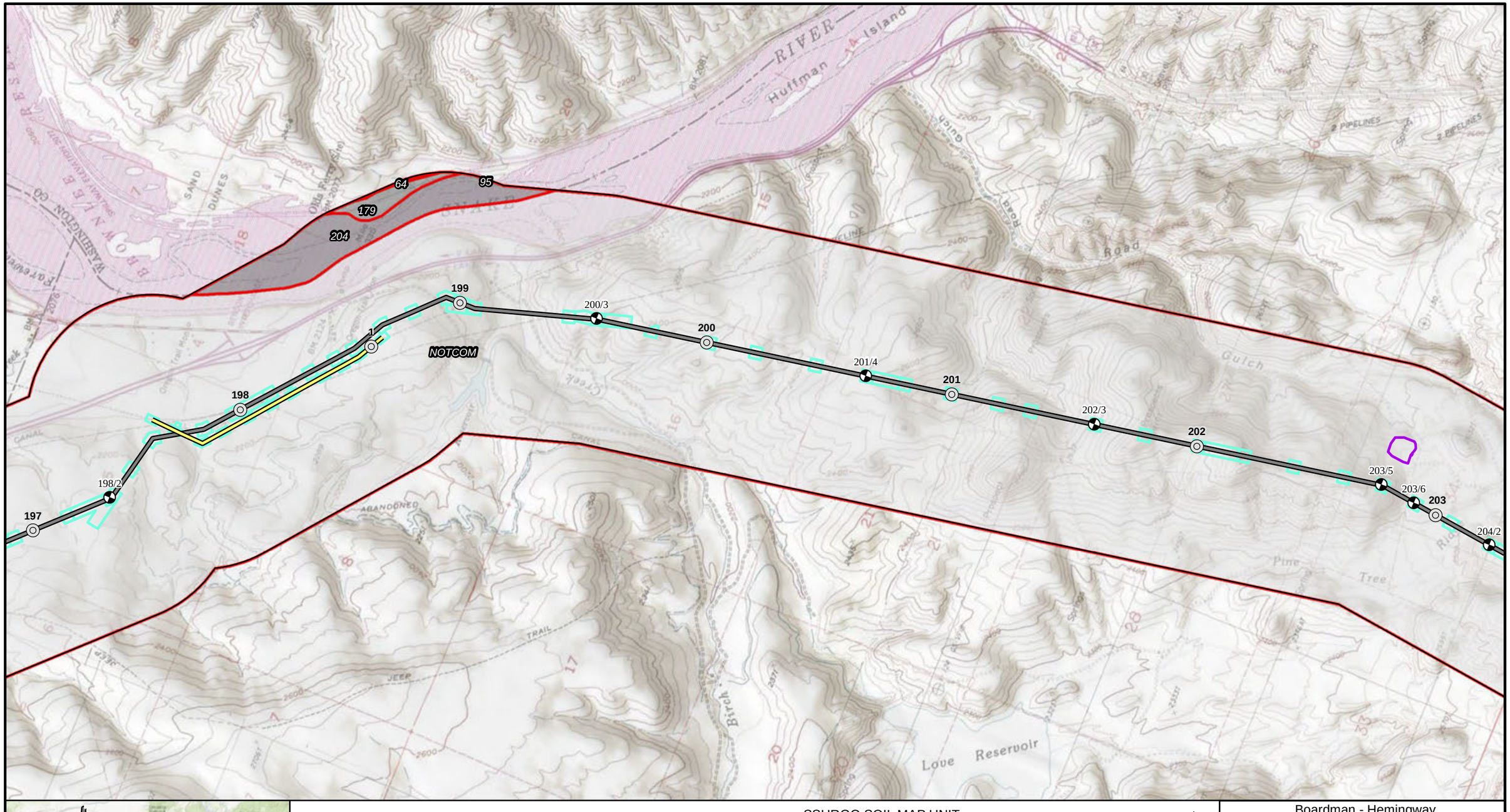
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Oregon - Idaho

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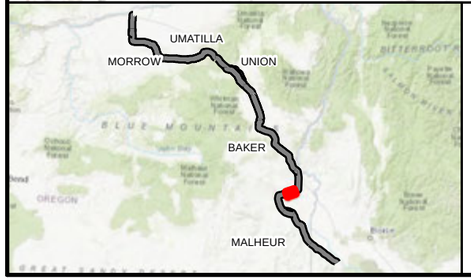
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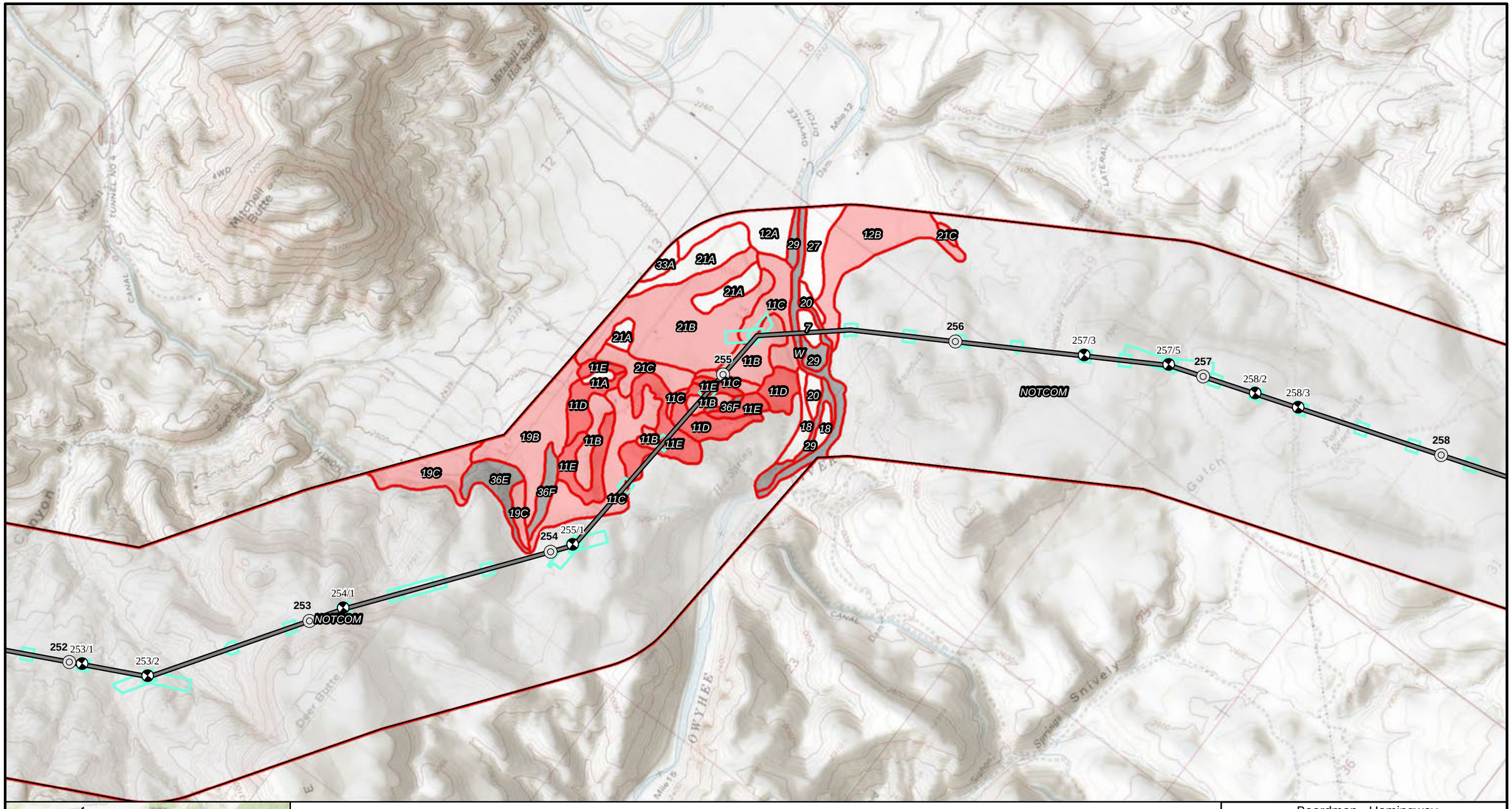
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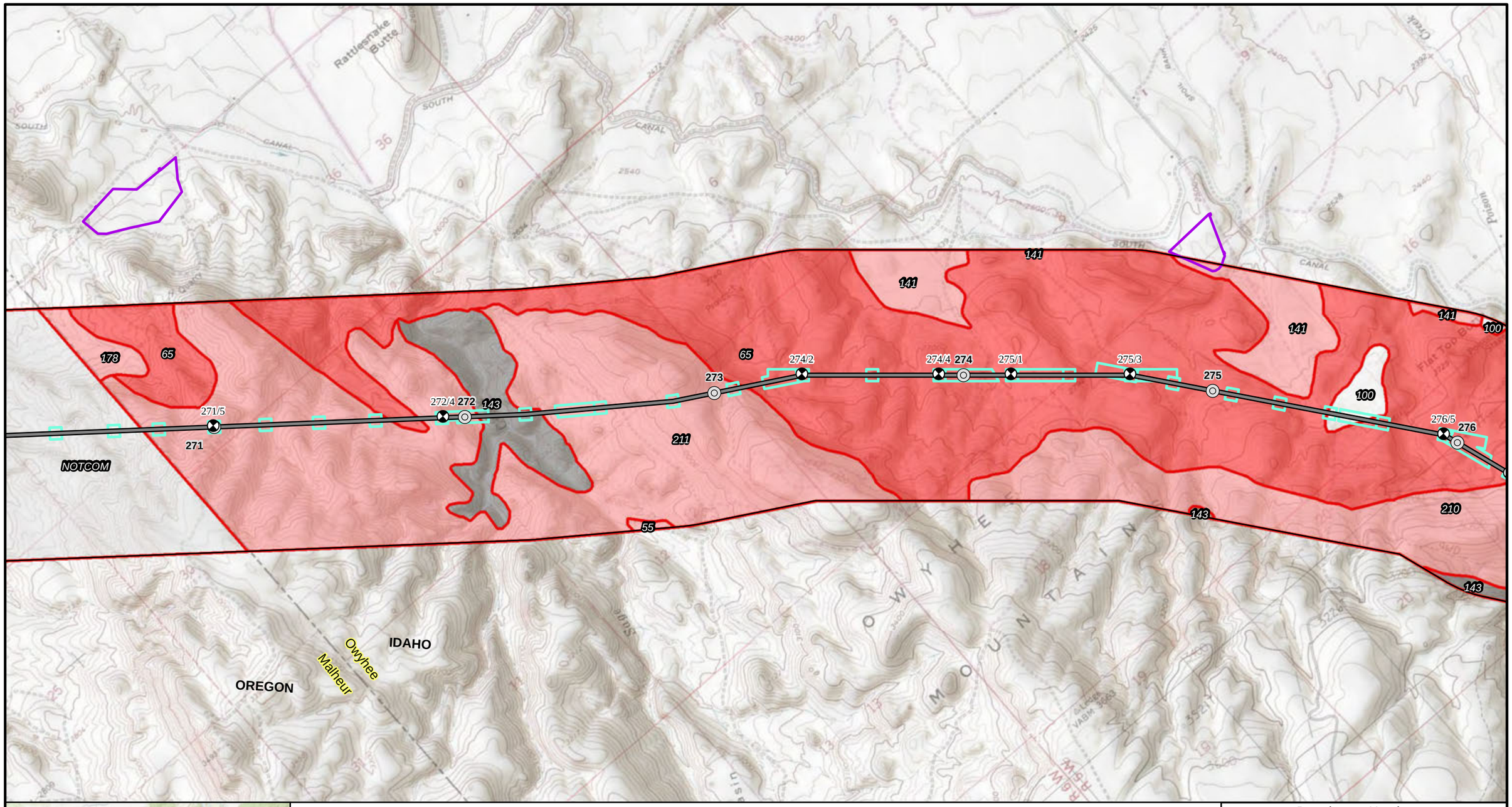
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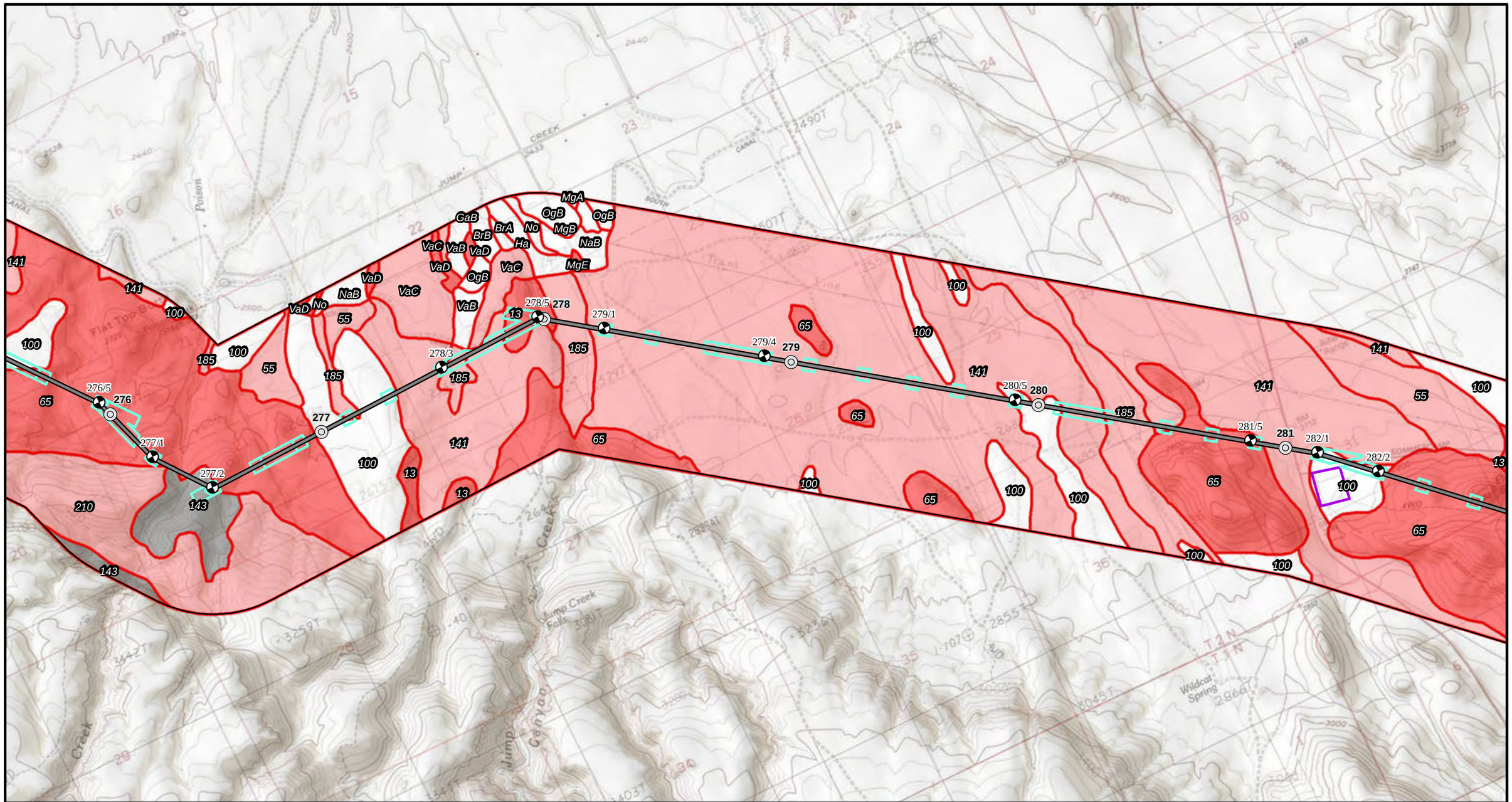
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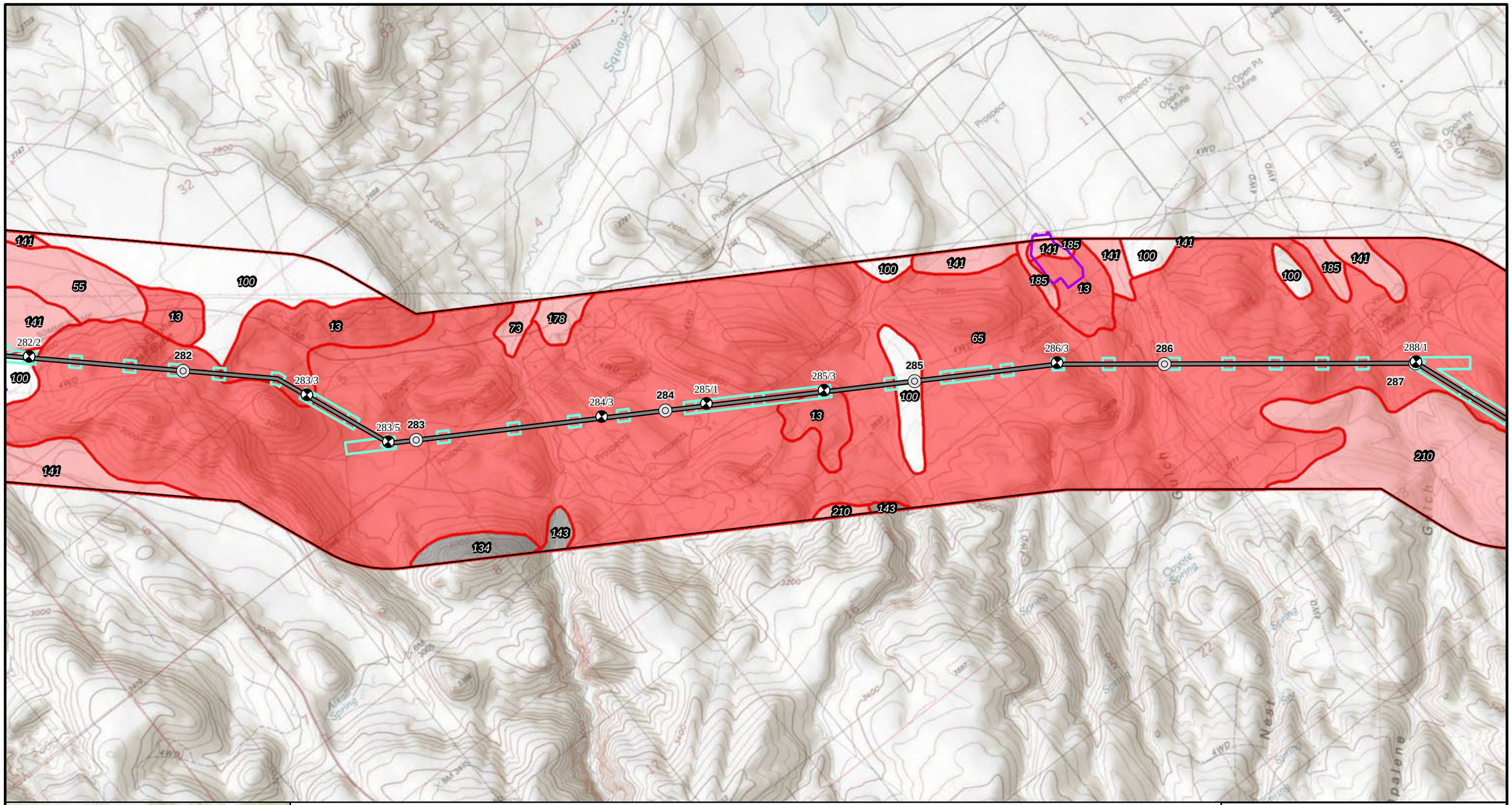
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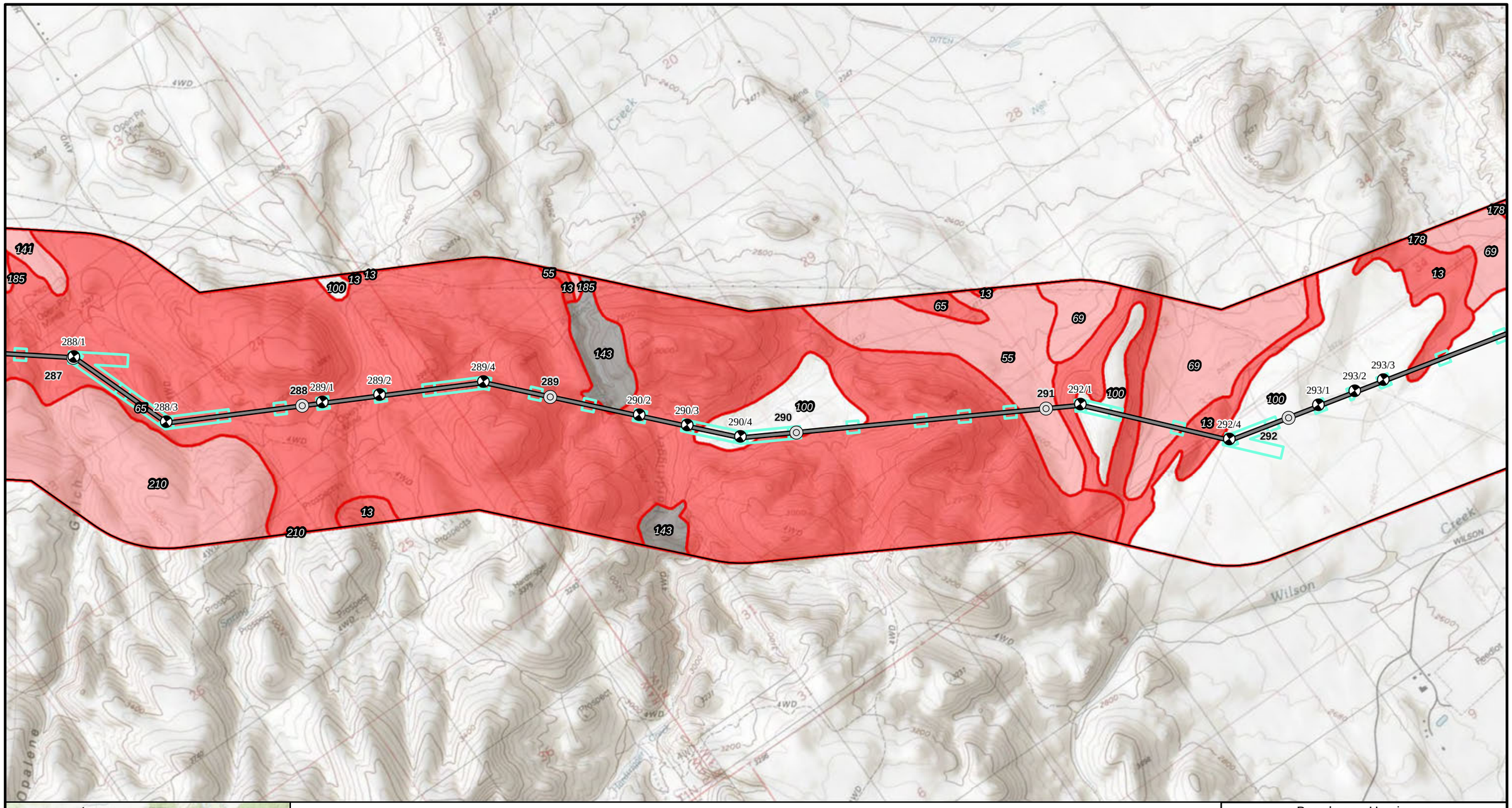
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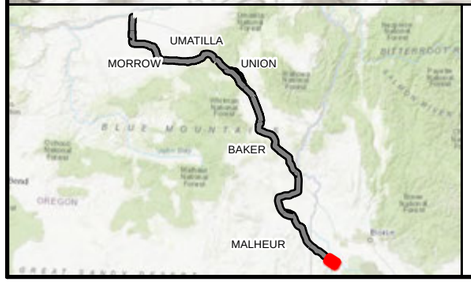
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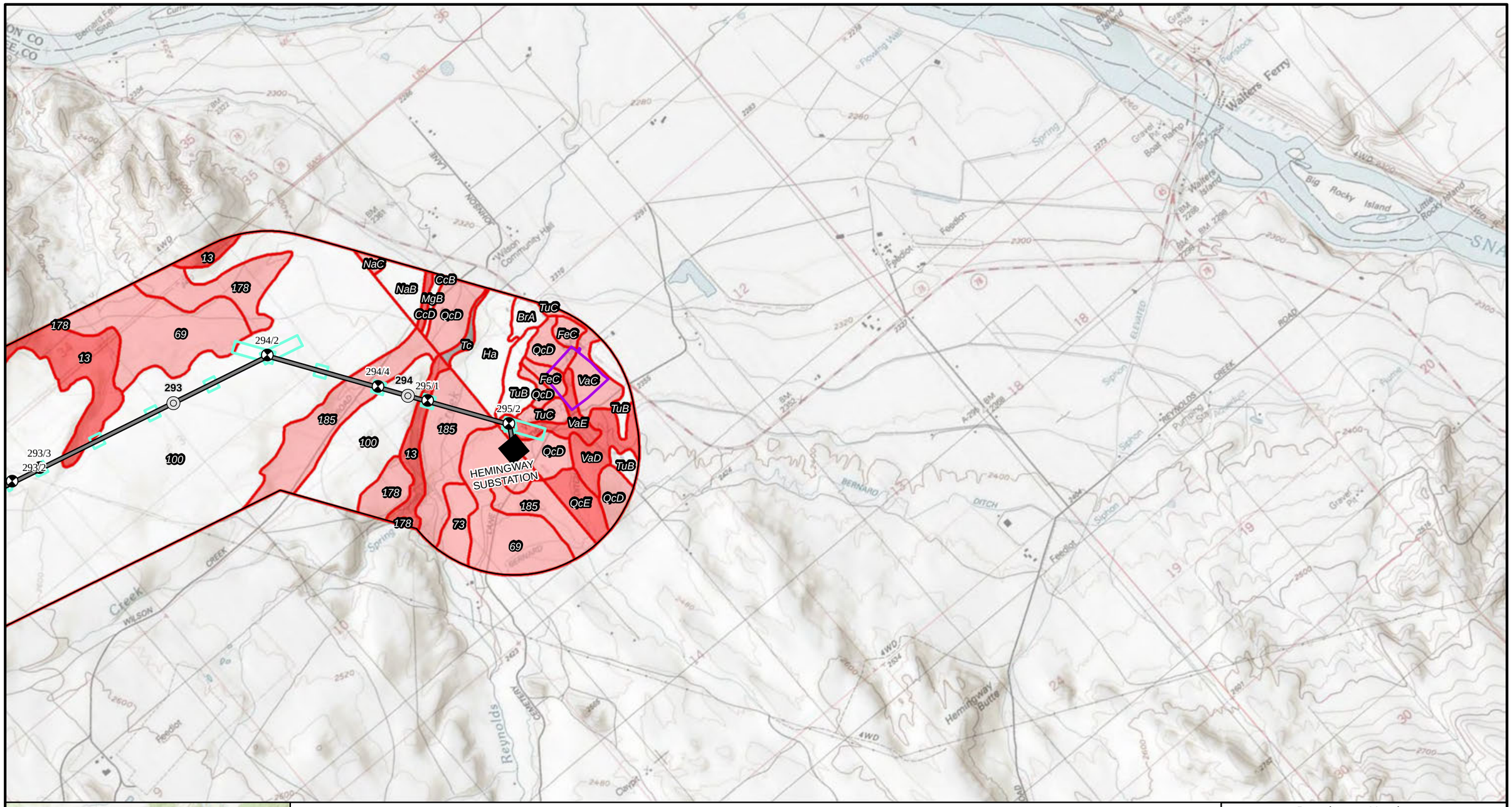
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APPENDIX C

SUMMARY OF PROPOSED BORING LOCATIONS

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C.1 GENERAL C-1

TABLE

C1 Summary of Proposed Borings

APPENDIX C

SUMMARY OF PROPOSED BORING LOCATIONS

C.1 GENERAL

Shannon & Wilson, Inc., reviewed the proposed project alignments with respect to aerial photographs, topographic maps, existing geologic mapping, soils mapping, landslide mapping, and limited reconnaissance data (compiled by Shannon & Wilson and Shaw) to select preliminary proposed boring locations. Some proposed boring locations were adjusted slightly away from proposed tower locations, based on access or permitting considerations communicated to us by Tetra Tech, via HDR. Preliminary locations of the proposed borings are summarized in Table C1 in this appendix. These locations are also shown on the geologic map sheets in Appendix A and the Landslide Inventory maps in Appendix E. In general, criteria for boring placement included borings at the following:

- A maximum spacing of approximately 1 mile along the alignments in areas anticipated to have variable ground conditions, and a maximum spacing of approximately 2 miles along the alignments in areas anticipated to have uniform ground conditions;
- Dead end structures;
- Corners or significant changes in alignment heading (angle points);
- Crossings of highways, major roads, rivers, railroads, and utilities such as power transmission lines, natural gas pipelines, and canals;
- Locations necessary to verify anticipated lithologic changes and/or geologic hazards, such as landslides, steep slopes, or soft soil areas;
- Locations of towers nearest to where Quaternary faults cross the alignment; and
- Locations for potential geo-seismic hazards such as liquefaction, lateral spreading, and seismic slope instability.

The desired boring locations were compared with areas that have already been surveyed for cultural, biological, or environmental sensitivity; and where the necessary right of entry permits have already been granted by land owners. Where complete access clearance at a borehole location was not expected by the year 2019, the desired borehole location was removed from this preliminary exploration list.

The preliminary summary table provided in this appendix presents 342 proposed boring locations, as well as information regarding the anticipated subsurface geology, anticipated drilling rig type, and justification for each boring. This information will need to be verified during a detailed field reconnaissance of the entire alignment, to be performed prior to drilling.

The current list of proposed borings is preliminary and will change as the project progresses. Borings may be added, repositioned, or removed from the list based on future site reconnaissance, conditions encountered as the exploration program is performed, and site access

constraints. Current borehole designations, based on the designation of the nearest tower, are also preliminary and subject to future revision.

The depth of each boring will generally be no more than 50 feet below the designed finish grade of the transmission line centerline. Borings may be terminated at shallower depths if the blow counts (the number of blows required to advance a split-spoon sampler 12 inches) in soil materials exceed 50 blows per foot for each consecutive sample taken in a minimum 15-foot interval. Borings may also be terminated at less than 50 feet when they have been advanced 10 feet into unweathered, competent rock, as determined by a field representative from examination of the recovered rock core. Depths for drilling into hard soil or competent rock will vary, depending on the information needed for design.

Potential methods for geotechnical drilling and sampling are discussed in the main Attachment H-1 text.

TABLE C1: SUMMARY OF PROPOSED BORINGS

Boring Designation / Tower	Northing (meters)	Easting (meters)	Map Sheet Number (Appendix A)	Mapped Geologic Unit*	Assumed Rig Type (pending future reconnaissance)	Purpose												
						General	End	Angle Change Along Alignment	Slope Stability / Landslide	Geo-Seismic Hazard (i.e., liquefaction, lateral spreading, seismic slope instability)	Fault Crossing	Highway Crossing	Road Crossing	River Crossing	Railroad Crossing	Utility Crossing (Electric)	Utility Crossing (Natural Gas)	Canal Crossing
1/2	5080304	296625	2	Qe	truck	x												
1/3	5080216	296337	2	Qe	truck			x							x			
1/5	5079645	296276	2	Qe	truck			x							x			
1/6	5079193	296303	2	Qe	truck			x				x						
2/1	5078787	296297	2	Qe	truck			x				x						
2/2	5078288	296200	2	Qe	truck			x					x					
2/3	5078064	296192	2	Qe	truck								x					
3/3	5076559	296232	2	Qe	truck	x												
4/3	5075056	296199	3	Qe	truck	x												
5/3	5073478	296151	3	Qe	truck	x												
6/4	5071859	296079	3	Qe	truck	x												
7/4	5070257	296053	4	Qe	truck	x												
8/4	5068739	296017	4	Qe	truck	x												
9/4	5066882	295951	5	Qmf	truck	x												
10/1	5066207	295930	5	Qmf	truck	x												
10/7	5064783	295875	5	Qmf	truck			x										
12/4	5062224	295762	6	Qmf	truck or track	x												
BR1-1/1	5064478	295847	5	Qmf	truck or track			x										
BR1-3/6	5060130	295688	6	Qmf	truck or track	x												
BR1-4/3	5059215	295656	6	Qmf	truck or track	x												
BR2-2/6	5061811	295747	6	Qe	truck or track			x										
BR2-4/3	5058911	295645	6	Qmf	truck or track			x										
17/1	5054975	296108	7	Qmf	truck or track	x												
18/1	5053342	296057	8	Qf	track	x			x	x								
18/4	5051995	296014	8	Qf	track				x	x			x					
19/1	5051719	296005	8	Qf	track			x	x	x			x					
20/2	5050117	297093	9	Qf	truck or track			x	x	x								
22/1	5050008	300070	9	Qf	truck or track				x	x		x						
33/2	5046935	317796	13	Tgn2	track					x								
34/1	5046921	318534	14	Tgn2	track	x												
35/1	5046404	320090	14	Tgn2	track			x		x			x	x				
35/2	5045877	320291	14	Tgn2	track or platform			x		x			x	x				
36/1	5044996	320706	14	Tgn2	track	x												
59/2	5030315	349741	23	Tgn2	track or platform					x			x	x				
59/3	5030296	350386	23	Tgn2	track or platform					x			x	x				
60/4	5030263	351457	23	Tgn2	track or platform					x			x	x				
60/5	5030240	352102	23	Tgn2	track					x			x	x				
64/2	5030106	357468	25	Tgn2	track			x										
65/1	5029310	358923	25	Tgr2	track or platform			x		x								
65/2	5029315	359419	25	Tgr2	track or platform			x		x			x	x				
66/2	5030163	359997	25	Tgn2	track or platform			x										
67/2	5030369	362081	26	Tgn2	track			x										
67/3	5030633	362728	26	Tgn2	track			x										
68/2	5030637	363874	26	Tgn2	track					x								

TABLE C1: SUMMARY OF PROPOSED BORINGS

Boring Designation / Tower	Northing (meters)	Easting (meters)	Map Sheet Number (Appendix A)	Mapped Geologic Unit*	Assumed Rig Type (pending future reconnaissance)	Purpose												
						General	End	Angle Change Along Alignment	Slope Stability / Landslide	Geo-Seismic Hazard (i.e., liquefaction, lateral spreading, seismic slope instability)	Fault Crossing	Highway Crossing	Road Crossing	River Crossing	Railroad Crossing	Utility Crossing (Electric)	Utility Crossing (Natural Gas)	Canal Crossing
69/1	5030636	364390	26	Tgn2	track													
72/2	5031981	369232	27	Tgn2	track			x										
72/4	5032013	370017	28	Tgn2	track			x										
73/4	5032898	371239	28	Tgn2	track			x										
74/2	5033326	372037	28	Tgn2	track or platform			x										
74/3	5033514	372840	28	Tgn2	track or platform			x										
78/4	5038134	377039	30	Tf	track			x										
78/5	5038135	377038	30	Tf	track			x										
79/3	5037952	378376	30	Tf	track			x										
80/2	5038624	379097	30	Tf	track			x										
81/1	5038614	380306	30	Tf	track or platform	x												
82/1	5038603	381668	31	Tf	track or platform			x										
82/4	5038350	382773	31	Tf	track	x												
82/5	5038280	383083	31	Tf	track	x												
83/4	5037949	384531	31	Tf	track			x										
84/4	5037018	385953	32	Tgn2	track					x								
85/1	5036793	386296	32	Tgn2	truck or track	x												
86/1	5035840	387751	32	Tgn2	track			x										
87/1	5034452	388090	33	Tgn2	track	x				x								
87/4	5033449	388333	33	Tgn2	track			x		x								
88/3	5032279	389073	33	Tcgn2	truck or track			x										
89/3	5031632	390432	33	Tcgn2	truck or track			x										
90/1	5031618	391132	34	Tcgn2	truck or track				x	x								
90/2	5031612	391457	34	Tcgn2	truck or track				x	x			x		x		x	
90/3	5031603	391943	34	Tcgn2	track			x					x		x		x	
90/5	5031257	392398	34	Tcgn2	track			x										
91/5	5029981	393252	34	Tcgn2	track			x										
92/1	5029923	393684	34	Tcgr2	track or platform			x		x								
92/2	5029699	393780	34	Tcgr2	track			x		x								
92/4	5029267	394214	34	Tcgr2	track			x		x								
93/3	5028042	395028	35	Tcgn2	track			x										
94/4	5026094	395992	35	Tcgn2	track			x	x	x								
95/3	5025547	396962	36	Tcgn2	track			x	x	x			x		x			
95/4	5025203	397274	36	Tcgf	truck or track			x					x		x			
96/4	5024493	398360	36	Tcgf	truck	x												
96/5	5024274	398707	36	Tcgn2	truck or track			x										
97/1	5023907	398787	36	Tcgn2	truck or track			x										
98/1	5022721	400096	37	Tms	track	x												
98/3	5022196	400680	37	Tms	truck or track	x												
99/1	5021918	400982	37	Tms	track	x				x								
99/4	5020988	401989	37	Tcgn2	track			x										
100/2	5020492	402645	37	Tcgn2	track or platform							x		x				
ML-1/4	5020095	402268	37	Tcgn2	track or platform			x				x		x				
ML-1/5	5019736	402747	37	Tcgn2	track							x		x				

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100/3	5019977	403329	38	Tcgn2	track			x				x		x		x		
101/1	5019872	403749	38	Tcgn2	truck or track			x								x		
ML-2/3	5019097	403597	38	Tcgf	track or platform			x		x								
ML-4/1	5018608	405956	38	Tcgf	track									x			x	
ML-4/2	5018508	406437	38	Qls	track				x	x				x			x	
ML-4/3	5018431	406813	38	Tcgf	track or platform					x							x	
103/3	5019150	407641	39	Tpb	track				x	x								
104/3	5018820	409418	39	Tpa	track	x												
105/4	5018528	410993	39	Tcgf	track	x				x								
ML-5/4	5018088	408464	39	Tcgf	track or platform			x										
ML-6/3	5017021	409984	39	Tpb	track			x										
106/3	5018301	412218	40	Tcgn2	track or platform			x	x	x						x		
110/2	5014185	416461	41	Tpa	track			x	x	x	x							
110/3	5014036	416655	41	Qdf	track				x	x								
112/4	5010964	418134	42	Tpa	track				x	x								
113/1	5010223	418432	42	Tpa	track or platform				x	x								
113/5	5009039	418908	42	Qdf	track or platform			x	x	x	x							
115/1	5007154	420261	43	Tpd	track			x				x						
116/3	5005442	420597	43	Tcgf	truck					x		x						
116/4	5004844	420711	43	Tcgf	track							x						
117/2	5004118	420876	44	Tcgf	track			x										
ML-17/2	5004119	419549	44	Tpd	track				x	x								
ML-19/1	5002097	421158	44	Tcgf	track			x										
ML-7/2	5016442	410615	45	Tpa	track			x									x	
ML-7/3	5016203	410873	45	Tpa	track			x									x	
ML-9/4	5013425	413244	46	Tpa	track			x										
ML-10/2	5013080	414052	46	Tpa	track			x										
ML-12/3	5010256	415769	47	Tpa	track	x												
ML-13/2	5009095	416312	47	Tpa	track	x												
ML-13/5	5008250	416923	47	Tpa	track			x										
ML-14/3	5007368	417082	47	Tpa	track			x										
ML-15/2	5006078	416914	48	Tcgn2	track			x										
ML-15/4	5005601	417579	48	Tcgr2	track or platform			x					x	x				
ML-16/1	5005359	418082	48	Tcgn2	track or platform								x	x				
ML-16/4	5004947	418938	48	Tpd	track			x										
120/3	5000198	423759	49	Tpgd	track			x				x					x	
121/2	4999095	424450	49	Tpgd	track			x										
122/2	4997929	425692	49	Tpgd	track	x												
125/3	4994561	429283	51	Qal	track					x				x				
125/4	4994272	429590	51	Qal	track					x				x				
126/1	4993959	429924	51	Tbf	track					x				x				
127/1	4992672	431295	51	TRPwc	track			x										
127/3	4992062	431455	51	Tpb	track							x						
134/2	4982071	435301	54	Qal	track	x				x								

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						General	End	Angle Change Along Alignment	Slope Stability / Landslide	Geo-Seismic Hazard (i.e., liquefaction, lateral spreading, seismic slope instability)	Fault Crossing	Highway Crossing	Road Crossing	River Crossing	Railroad Crossing	Utility Crossing (Electric)	Utility Crossing (Natural Gas)	Canal Crossing
135/1	4980757	435809	54	Ta	track	x				x								
136/1	4979322	436363	54	Ta	track	x												
137/1	4977581	437036	55	TRPv	track or platform					x								
137/2	4977222	437174	55	TRPv	track or platform	x				x								
138/2	4975944	437668	55	Tan	track	x												
139/3	4974337	438289	56	Tob	truck or track					x			x					
139/4	4973977	438427	56	Tob	truck or track					x			x					
140/2	4972845	438865	56	Tob	truck or track	x												
141/2	4971304	439460	56	Tob	truck or track	x				x	x							
142/4	4969358	440212	57	Tob	track			x		x	x							
143/3	4967951	440317	57	Qal	truck or track					x	x	x						
143/4	4967585	440345	57	Qal	truck or track			x		x	x	x						
144/3	4966831	440816	58	Tob	track or platform			x		x						x		
144/4	4966558	441051	58	Tob	track			x		x						x		
147/2	4962906	440626	58	Tgo	track			x		x								
147/3	4962517	440494	59	Tgo	track or platform					x		x						
147/4	4962239	440322	59	Tgo	track or platform			x		x		x						
148/2	4961521	440424	59	KJi	truck			x		x								
150/2	4958931	439946	59	Tob	track	x				x	x							
151/1	4957785	438982	60	Tob	track			x		x								
152/1	4956443	439359	60	Tob	track			x			x							
152/4	4955540	439361	60	Tob	track			x										
153/1	4954941	439148	60	Tb	track or platform			x			x							
154/1	4953250	439154	61	Tb	track or platform			x		x								
154/3	4952659	439023	61	Tst	track			x										
154/4	4952450	439397	61	Tst	track					x								
155/3	4951680	440778	61	Tst	track			x		x								
156/4	4951000	442253	62	Tst	track											x		
156/5	4950730	442932	62	Tst	track			x								x		
157/5	4950320	444162	62	Tst	track			x								x	x	
158/1	4950010	444189	62	Tst	track			x								x	x	
159/1	4949515	445677	62	Tst	truck or track	x												
160/2	4948874	447599	63	TRPbe	track			x								x		
161/4	4948287	449841	63	TRPbe	track	x												
162/4	4947757	451432	64	TRPbi	track			x										
164/2	4947136	453646	64	TRPbi	track or platform			x		x								
165/3	4945652	454897	65	TRPbi	track			x								x		
165/4	4945395	455094	65	TRPbi	track											x		
166/4	4944226	455987	65	TRPbi	track											x		
166/5	4944042	456127	65	TRPbi	track or platform			x				x		x	x	x	x	
168/1	4942331	456754	66	Tst	track			x										
168/5	4941203	457374	66	TRgb	track or platform	x												
169/3	4940199	457924	66	TRgb	track or platform			x										
170/4	4938289	457937	67	TRgb	track			x										

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						General	End	Angle Change Along Alignment	Slope Stability / Landslide	Geo-Seismic Hazard (i.e., liquefaction, lateral spreading, seismic slope instability)	Fault Crossing	Highway Crossing	Road Crossing	River Crossing	Railroad Crossing	Utility Crossing (Electric)	Utility Crossing (Natural Gas)	Canal Crossing
171/1	4937527	457601	67	Tfls	track					x								
171/2	4937092	457409	67	Tfls	track or platform				x	x								
171/3	4936674	457224	67	mg/md	track			x	x	x								
171/4	4936420	457166	67	mg/md	track or platform								x	x				
172/1	4935587	456975	67	p	platform			x	x	x			x	x				
173/2	4934272	457005	68	p	platform			x										
173/3	4933940	457399	68	p	track								x					
174/1	4933306	458154	68	p	track or platform	x							x					
174/2	4932822	458731	68	p	track			x										
175/1	4932277	459452	68	g	track or platform			x										
175/2	4932007	459692	68	Tfs	track				x	x								
176/1	4931094	460506	69	g	track or platform			x										
177/2	4930190	461641	69	gb	track	x												
177/3	4929749	462194	69	gb	track or platform	x												
178/3	4928726	463478	70	kgd	track	x												
179/2	4927727	464751	70	kgd	track or platform	x												
180/5	4926462	466418	70	Jw	track or platform			x										
181/3	4925782	467411	71	Jw	track or platform			x										
182/1	4925201	468060	71	Jw	track or platform			x										
183/3	4924049	469781	71	Jw	track or platform			x										
184/1	4923397	470682	72	Jw	platform	x			x	x								
186/2	4921560	473311	72	Jw	track			x					x	x				
187/2	4919638	473634	73	Tob	track or platform			x	x	x						x	x	
188/1	4918343	473484	73	Tst	track			x										
188/2	4917662	473497	73	Qls	track				x	x								
188/3	4917146	473507	73	Jw	track				x	x								
189/2	4916184	473525	74	Qls	track			x	x	x								
190/1	4915423	474135	74	Jw	track or platform			x										
190/3	4914844	474583	74	Tg	track				x	x								
190/4	4914609	474776	74	Qls	track				x	x								
191/1	4914213	475101	74	Qls	track or platform				x	x								
191/4	4913177	475951	74	Tg	track or platform			x										
192/1	4912952	476115	74	Tg	track			x								x	x	
192/2	4912418	476075	75	Tg	track or platform			x								x	x	
194/2	4909345	476975	75	Tst	track	x				x								
195/1	4908155	477324	76	Tst	track or platform			x		x								
195/5	4907325	478171	76	Tst	truck or track					x								
196/1	4907061	478441	76	Qal	track	x				x								
197/1	4905770	479760	76	Tst	track			x										
198/2	4904526	480980	77	Tst	track			x										
200/3	4902056	483216	78	Tst	track			x										
201/4	4900316	483524	78	Tst	track	x												
202/3	4898839	483786	78	Tst	track or platform	x												
203/5	4896983	484114	79	Tst	track or platform			x					x					

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						General	End	Angle Change Along Alignment	Slope Stability / Landslide	Geo-Seismic Hazard (i.e., liquefaction, lateral spreading, seismic slope instability)	Fault Crossing	Highway Crossing	Road Crossing	River Crossing	Railroad Crossing	Utility Crossing (Electric)	Utility Crossing (Natural Gas)	Canal Crossing
203/6	4896745	484085	79	Tst	track					x			x					
204/2	4896194	484016	79	Tst	track				x	x								
204/4	4895537	483933	79	Tst	track				x	x								
205/1	4894803	483841	79	Qls	track			x	x	x								
205/3	4894093	483823	79	Tst	track				x	x								
206/4	4892140	483772	80	Tst	truck or track					x			x					
207/1	4891767	483763	80	Tst	track								x					
208/1	4889872	483713	80	Tst	track	x												
209/5	4887037	483640	81	Qal	truck or track	x				x								
210/1	4886758	483633	81	Qal	truck or track					x								
211/1	4885254	483593	82	Qal	track	x												
211/5	4883890	483558	82	Tst	track	x												
212/3	4882930	483533	82	Tst	track or platform			x										
214/2	4881697	480987	83	Tst	track	x												
214/3	4881511	480575	83	Tst	track	x												
215/1	4881067	479600	83	Tst	track			x										
216/2	4880378	477933	83	Qal	truck or track			x		x			x					
216/4	4880387	477211	83	Qal	truck			x		x			x					x
217/3	4879913	476020	84	Qal	track					x		x				x		
218/2	4879438	474871	84	Qal	truck or track			x		x			x					
218/4	4878859	474692	84	Qal	truck			x		x								
219/2	4878559	473603	84	Tst	track			x										
220/2	4878503	472123	85	Tst	truck or track	x												
222/1	4878399	469352	85	Tst	track	x												
222/3	4878374	468695	86	Tst	track			x										
223/3	4877685	467048	86	Tst	track	x												
224/1	4877320	466174	86	Tst	track	x												
224/3	4877054	465539	86	Tst	track			x			x							
225/4	4876846	463719	87	Tst	track or platform			x										
227/1	4876227	461652	87	Tst	track			x										
227/3	4875607	461360	87	Tst	track	x												
232/4	4867486	462375	89	Qls	track or platform				x	x				x	x			
233/1	4867012	462498	89	Qls	track				x	x				x	x			
233/2	4866742	462655	89	Qls	track or platform			x	x	x								
233/4	4866003	462562	90	Tbcu	track			x										
235/1	4863941	463188	90	Tbcu	track			x										
236/3	4862017	464434	91	Tic	track	x												
237/2	4861090	465171	91	Qas1	track			x				x						
237/3	4860865	465373	91	Qas1	truck or track							x						
238/2	4859901	466237	91	Tic	track	x												
239/1	4858972	467070	92	Tic	track			x										
239/3	4858740	467760	92	Qas1	track			x		x								
240/3	4858541	469602	92	Qas1	track					x				x				
240/4	4858496	470021	92	Tic	track					x				x				

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						General	End	Angle Change Along Alignment	Slope Stability / Landslide	Geo-Seismic Hazard (i.e., liquefaction, lateral spreading, seismic slope instability)	Fault Crossing	Highway Crossing	Road Crossing	River Crossing	Railroad Crossing	Utility Crossing (Electric)	Utility Crossing (Natural Gas)	Canal Crossing
241/4	4858434	471433	93	Tic	track	x												
242/2	4858418	472260	93	Qas1	track			x										
243/3	4857710	474120	93	Qal	track			x		x								
243/5	4857304	474665	93	Tic	track			x										
244/4	4856769	475935	94	Qas1	track			x		x								
245/4	4856066	477029	94	Qas1	track			x		x								
246/1	4855350	477681	94	Qas1	track					x								
246/2	4855121	477889	94	Qal	track			x		x								
247/2	4853897	478402	97	Qas1	track			x										
248/1	4852661	479025	97	Qas1	track			x		x								
248/3	4852081	479267	97	Qas1	truck or track	x												
250/1	4849830	480205	98	Qas1	truck or track			x		x								
250/4	4848782	480726	98	Qas1	truck or track	x				x								
252/3	4846168	482024	99	Tbou	track	x				x								
253/1	4845493	482359	99	Tbou	track	x												
253/2	4845111	482549	99	Tig	track			x		x								
254/1	4844370	483650	99	Tig	platform			x										
255/1	4843437	484860	99	Tbcl	track			x										
257/3	4841542	487801	100	Tic	track or platform				x	x								
257/5	4841072	488078	100	Qas	track			x										
258/2	4840518	488265	101	Tbcm	track											x		
258/3	4840243	488357	101	Tbcm	truck or track											x		
259/4	4837950	489130	101	Qas	track	x				x								
260/3	4836715	489546	101	Qas	track	x				x								
261/2	4835718	489882	102	Tbcm	track	x												
261/4	4835170	490067	102	Tbcm	track					x								
262/2	4834137	490415	102	Tic	track			x										
263/2	4832608	491081	102	Tic	track	x												
264/1	4831475	491575	103	Qas	track	x												
265/1	4830236	492114	103	Tic	track			x										
266/1	4828670	492836	103	Tic	truck or track	x												
266/5	4827461	493125	104	Tic	track					x						x		
267/1	4827084	493131	104	Tic	track											x		
267/2	4826752	493136	104	Tstl	track			x										
267/5	4826110	493879	104	Tstl	track									x				
268/1	4825866	494161	104	Qas1	track									x				
270/1	4823501	495774	105	Tstl	track			x		x								
271/1	4822391	497089	105	Tbtv	track or platform	x												
271/5	4821505	498200	106	Tpd	truck or track	x												
272/4	4820584	499353	106	Tpd	truck or track									x				
274/2	4819282	501273	106	Tmf	track			x		x								
274/4	4818708	501935	107	Tpd	track					x								
275/1	4818405	502286	107	Tmf	track	x				x								
275/3	4817905	502863	107	Tmf	track or platform			x		x								

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276/5	4816297	504132	107	Tpd	truck or track			x		x	x							
277/1	4815832	504287	108	Tmf	track			x			x			x				
277/2	4815487	504547	108	Tmf	track or platform			x			x			x				
278/3	4815537	506205	108	Tpd	track					x								x
278/5	4815558	506903	108	Qa	track			x					x	x				
279/1	4815303	507254	108	Tpd	truck or track					x			x	x				
279/4	4814693	508098	108	Tpd	truck or track	x				x								
280/5	4813736	509422	109	Tpd	truck or track	x												
281/5	4812838	510664	109	Tpd	track					x	x	x						
282/1	4812583	511017	109	Tpd	truck or track			x				x	x					
282/2	4812303	511316	109	Tpd	track								x					
283/3	4811006	512563	110	Tpd	track				x	x								
283/5	4810445	512786	110	Tpd	track			x										
284/3	4809724	513961	110	Tpd	truck or track									x				
285/1	4809374	514539	110	Tpd	truck or track	x												
285/3	4808973	515184	111	Tpd	track or platform	x												
286/3	4808185	516468	111	Tmf	track			x										
288/1	4806763	518277	111	Tmf	truck or track			x										
288/3	4806081	518525	112	Tmf	truck or track			x										
289/1	4805614	519420	112	Tmf	track					x			x					
289/2	4805442	519749	112	Tmf	track								x					
289/4	4805131	520344	112	Tmf	track or platform			x										
290/2	4804385	521042	112	Tpd	track					x				x				
290/3	4804155	521258	112	Tpd	track								x	x				
290/4	4803901	521496	112	Tpd	truck or track			x		x			x					
292/1	4802827	523406	113	Tpd	track			x					x					
292/4	4802096	524063	113	Tpd	truck or track			x										
293/1	4801951	524658	113	Tpd	truck or track								x					
293/2	4801892	524900	113	Tpd	truck or track						x					x		
293/3	4801846	525090	113	Tpd	track									x		x		
294/2	4801460	526674	114	Qa	track			x		x								
294/4	4800850	527089	114	Qa	truck or track	x												
295/1	4800576	527275	114	Qa	truck or track					x			x	x				
295/2	4800128	527580	114	Qa	truck or track			x		x			x	x				

* See Appendix A, Table A2 and Table A3 for defenitions of geologic unit abbreviations.

APPENDIX D

SEISMIC TABLES AND MAPS

TABLES

D1 Summary of Quaternary Faults within 5 Miles of the Proposed Alignments
D2 Earthquakes Reported To Cause Greater Than MMI III
D3 Earthquakes Estimated To Cause MMI III or Greater

FIGURES

D1 Peak Ground Acceleration - 500 Year Return Period - 2002 USGS PSHA
D2 Peak Ground Acceleration - 2,500 Year Return Period - 2002 USGS PSHA
D3 0.2 sec Period Spectral Acceleration - 2,500 Year Return Period - 2002 USGS PSHA
D4 1.0 sec Period Spectral Acceleration - 2,500 Year Return Period - 2002 USGS PSHA
D5 Peak Ground Acceleration - 5,000 Year Return Period - 2002 USGS PSHA
D6 Peak Ground Acceleration - 500 Year Return Period - 2014 USGS PSHA
D7 Peak Ground Acceleration - 2,500 Year Return Period - 2014 USGS PSHA
D8 0.2 sec Period Spectral Acceleration - 2,500 Year Return Period - 2014 USGS PSHA
D9 1.0 sec Period Spectral Acceleration - 2,500 Year Return Period - 2014 USGS PSHA
D10 Peak Ground Acceleration - 5,000 Year Return Period - 2014 USGS PSHA
D11 Quaternary Faults
D12 Historical Earthquakes

TABLE D1: SUMMARY OF QUATERNARY FAULTS WITHIN 5 MILES OF THE PROPOSED ALIGNMENTS

Fault Name	Fault ID	Primary County, State	Time of Most Recent Deformation[1]	Slip Rate (mm/yr)	Slip Sense[2]	Dip Direction	Length (km)
Owyhee Mountains fault system	636	Owyhee County, ID	<1.6 Ma	<0.2	Normal	NE	206
South Grande Ronde Valley faults	709	Union County, OR	<750 ka	<0.2	Normal	SW / NE	23
Unnamed East Baker Valley faults	712	Baker County, OR	<750 ka	<0.2	Normal	SW	27
West Baker Valley faults	804	Baker County, OR	<130 ka	<0.2	Normal	NE	33
Cottonwood Mountain fault	806	Malheur County, OR	<15 ka	<0.2	Normal, Sinistral	NE	42
Faults near Owyhee Dam (Class B)	808	Malheur County, OR	<1.6 Ma	<0.2	Normal	E / W	37
West Grande Ronde Valley fault zone, Mount Emily section	802a	Union County, OR	<15 ka	<0.2	Normal, Dextral	E	29
West Grande Ronde Valley fault zone, La Grande section	802b	Union County, OR	<15 ka	<0.2	Normal, Dextral	NE	15
West Grande Ronde Valley fault zone, Craig Mountain section	802c	Union County, OR	<15 ka	<0.2	Normal, Dextral	NE / SW	10
Hite fault system, Thorn Hollow section	845c	Umatilla County, OR	<130 ka	<0.2	Sinistral, Normal	NW	44
Hite fault system, Agency section	845d	Umatilla County, OR	<1.6 Ma	<0.2	Sinistral, Normal	NW	28

1. Ma = million years ago; ka = thousand years ago
2. Sense of movement on a fault is based on the angle of the dip of the fault plane and the relative direction of movement across the fault. Terms used to describe the sense of movement include dip-slip, normal, reverse, thrust, strike-slip, dextral (right-lateral), sinistral (left-lateral), and oblique.

TABLE D2: EARTHQUAKES REPORTED TO CAUSE GREATER THAN MMI III

Year	Month	Day	Hour	Minute	Second	Lattitude	Longitude	Depth (kilometers)	Magnitude	MMI	City Where Felt	State	City Lat.	City Lon.	Distance to Epicenter (kilometers)
1893	3	7	1	3	0	46.000	-119.000			7	UMATILLA	OR	45.92	-119.34	27
1916	5	13	2	30	0	43.700	-116.200			4	IDAHO CITY	ID	43.83	-115.83	33
1916	5	25	13	36	0	43.567	-115.967			5					
1916	5	26	6	36	0	43.800	-116.000			4	PAYETTE	ID	43.97	-116.72	60
1921	9	14	11	0	0	46.067	-118.333			6					
1924	1	6	13	9	0	46.067	-118.333			4					
1924	1	6	23	10	0	45.833	-118.333			5					
1924	5	27	0	19	0	46.067	-118.333			4					
1926	4	23	13	56	0	46.067	-118.333			4					
1927	4	9	5	0	0	44.800	-117.200			5	HALFWAY	OR	44.88	-117.11	11
1927	4	9	7	0	0	44.833	-117.317			4					
1927	4	9	9	30	0	44.817	-117.083			4					
1927	4	9	14	0	0	44.750	-117.233			4					
1936	7	16	7	7	48	46.000	-118.500		5.8	4	BOVILL	ID	46.86	-116.4	187
1936	7	18	16	30	0	46.000	-118.300			5					
1936	7	30	11	20	0	45.933	-118.317			4					
1936	8	4	9	19	0	45.917	-118.783			5					
1936	8	28	4	39	0	45.950	-118.317			5					
1937	2	9	22	20	0	46.067	-118.333			4					
1937	6	4	14	43	0	46.067	-118.333			4					
1938	8	11	18	52	0	45.950	-118.300			4					
1938	10	27	23	10	0	45.950	-118.283			4					
1939	1	26	7	59	0	45.667	-118.667			4					
1941	12	23	17	48	0	44.750	-117.000			4					
1941	12	23	22	20	0	44.667	-117.100			4					
1942	6	12	9	30	0	44.900	-117.100			5	EAGLE VALLEY	OR	44.75	-117.3	22
1944	9	2	2	25	14	46.067	-118.333			4					
1944	9	20	3	0	0	43.200	-117.083			4					
1945	9	23	3	40	0	46.067	-118.333			4					
1948	12	20	16	18	0	45.050	-120.167			4					
1951	1	7	22	45	0	45.917	-119.233			5					
1959	1	21	7	15	0	46.067	-118.333			4					
1959	11	9	21	10	0	45.333	-119.533			4					
1971	7	13	23	29	25	44.800	-117.900	33.0	3.9	4	HAINES	OR	44.91	-117.94	12

TABLE D2: EARTHQUAKES REPORTED TO CAUSE GREATER THAN MMI III

Year	Month	Day	Hour	Minute	Second	Lattitude	Longitude	Depth (kilometers)	Magnitude	MMI	City Where Felt	State	City Lat.	City Lon.	Distance to Epicenter (kilometers)
1978	4	3	10	10	8	44.050	-116.360	5.0	3.6	4	SWEET	ID	43.97	-116.32	9
1979	4	8	7	29	38	46.000	-118.450	5.0	4.1	4	MILTON FREEWATER	OR	45.93	-118.39	9
1981	9	29	5	39	48	44.690	-116.990	5.0	3.3	4	CAMBRIDGE	ID	44.57	-116.68	27
1983	3	22	12	47	3	46.000	-118.440	4.0	3.9	4	HELIX	OR	45.85	-118.66	23
1984	8	10	7	26	38	44.990	-116.950	5.0	4.0	4	HALFWAY	OR	44.88	-117.11	17
1985	2	10	20	29	32	45.700	-119.630	18.0	3.9	4	HERMISTON	OR	45.84	-119.28	31

Data Sources: National Geophysical Data Center (NGDC), 1985, Earthquake Intensity Database Search, 1638 – 1985, NOAA Satellite and Information Service: http://www.ngdc.noaa.gov/hazard/earthqk.shtml; Johnson, A.G., Scofield. D.H., 1993, Earthquake Database for Oregon, 1833 through October 25, 1993: Oregon Department of Geology and Mineral Industries Open-File Report 94-04; and Advanced National Seismic System (ANSS), 2016, Composite Catalog: http://earthquake.usgs.gov/earthquakes/search/.

TABLE D3: EARTHQUAKES ESTIMATED TO CAUSE MMI III OR GREATER

Year	Month	Day	Hour	Minute	Second	Epicenter		EQ Depth (kilometers)	Magnitude	Estimated MMI
						Lattitude	Longitude			
1986	2	4	1	59	7	46.044	-118.810	7.80	3.2	III
1987	9	8	5	2	16	45.184	-120.085	1.00	3.1	III
1988	9	29	8	9	20	45.850	-120.260	13.89	3.5	III
1989	3	27	20	17	22	45.816	-120.262	12.25	3.1	III
1989	5	30	22	7	37	43.762	-116.930	11.00	3.1	III
1989	7	20	13	50	50	44.173	-117.184	5.00	3.7	III
1989	12	20	8	52	46	44.620	-117.073	5.00	3.2	III
1990	1	4	18	1	5	44.701	-117.887	20.40	3.2	III
1991	11	28	1	8	59	45.990	-118.317	9.47	4.3	IV
1991	12	15	22	14	53	45.995	-118.329	7.98	3.3	III
1992	1	26	5	35	48	45.019	-116.808	5.00	3.2	III
1992	6	16	12	31	17	44.827	-117.022	6.80	3.9	III - IV
1992	7	14	20	1	51	45.993	-118.309	11.62	4.1	IV
1992	8	7	17	23	18	45.860	-119.590	0.57	3.9	III - IV
1992	10	1	11	7	38	45.561	-117.311	3.40	3.3	III
1993	3	10	14	39	42	44.383	-116.255	11.10	3.2	III
1993	12	16	12	21	34	45.196	-120.090	6.69	3	III
1993	12	24	11	21	3	44.934	-117.303	5.00	3	III
1994	4	19	23	8	6	44.806	-116.890	6.80	3.1	III
1994	8	12	19	3	48	44.571	-116.670	10.00	3.5	III
1994	10	25	17	55	48	44.835	-117.009	10.00	3.1	III
1994	10	27	3	35	54	44.814	-117.001	10.00	4	IV
1995	3	16	16	44	55	44.802	-116.905	8.20	3.3	III
1995	6	12	1	48	24	46.404	-119.263	0.95	3.3	III
1995	8	29	13	2	49	46.208	-119.906	15.34	3.1	III
1995	11	2	14	30	14	46.150	-119.564	21.30	3.1	III
1997	1	27	19	10	44	44.821	-117.020	6.50	3.3	III

TABLE D3: EARTHQUAKES ESTIMATED TO CAUSE MMI III OR GREATER

Year	Month	Day	Hour	Minute	Second	Epicenter		EQ Depth (kilometers)	Magnitude	Estimated MMI
						Lattitude	Longitude			
1997	3	22	6	5	35	45.197	-120.067	0.83	3.9	III - IV
1997	3	23	4	39	51	45.195	-120.051	0.02	3.1	III
1997	3	23	4	40	13	45.246	-120.049	17.96	3.1	III
1997	4	17	17	30	37	45.188	-120.082	3.19	3.2	III
1997	10	13	15	45	34	46.114	-120.376	17.86	3.1	III
1997	11	18	1	53	6	46.143	-120.471	15.63	3.9	III - IV
1997	11	18	9	55	11	46.137	-120.461	15.83	3.3	III
1998	2	3	23	45	14	45.814	-120.192	16.29	3.1	III
1998	3	18	0	52	20	44.980	-116.924	7.90	3.4	III
1998	7	19	18	34	45	44.847	-117.015	11.50	3.5	III
1998	7	20	1	48	46	44.849	-117.015	12.20	3.7	III
1998	7	20	3	38	35	44.850	-117.016	11.50	3.3	III
1998	7	20	21	1	21	44.842	-117.021	10.60	3.6	III
1998	7	21	23	13	31	44.841	-117.017	11.40	3.5	III
1999	3	3	8	15	38	45.285	-117.076	10.00	3.5	III
1999	3	3	8	25	3	45.230	-117.100	5.00	3.5	III
1999	5	23	3	57	49	44.945	-116.976	10.00	3.1	III
1999	6	11	15	44	8	44.506	-116.333	18.30	3.3	III
1999	8	31	23	3	7	45.186	-120.091	3.55	3.5	III
1999	9	19	4	21	44	46.441	-119.626	19.88	3.1	III
1999	9	19	11	11	53	46.392	-120.106	12.38	3.2	III
2000	1	30	19	10	23	45.197	-120.125	0.03	4.1	IV
2000	1	30	20	46	6	45.183	-120.103	0.03	3.4	III
2000	2	1	0	11	8	45.190	-120.113	0.02	3.6	III
2000	2	27	22	26	24	44.310	-116.250	10.00	3.1	III
2000	7	13	22	29	59	44.451	-118.246	67.50	3.1	III
2000	8	17	1	58	24	45.312	-120.042	15.07	3.2	III

TABLE D3: EARTHQUAKES ESTIMATED TO CAUSE MMI III OR GREATER

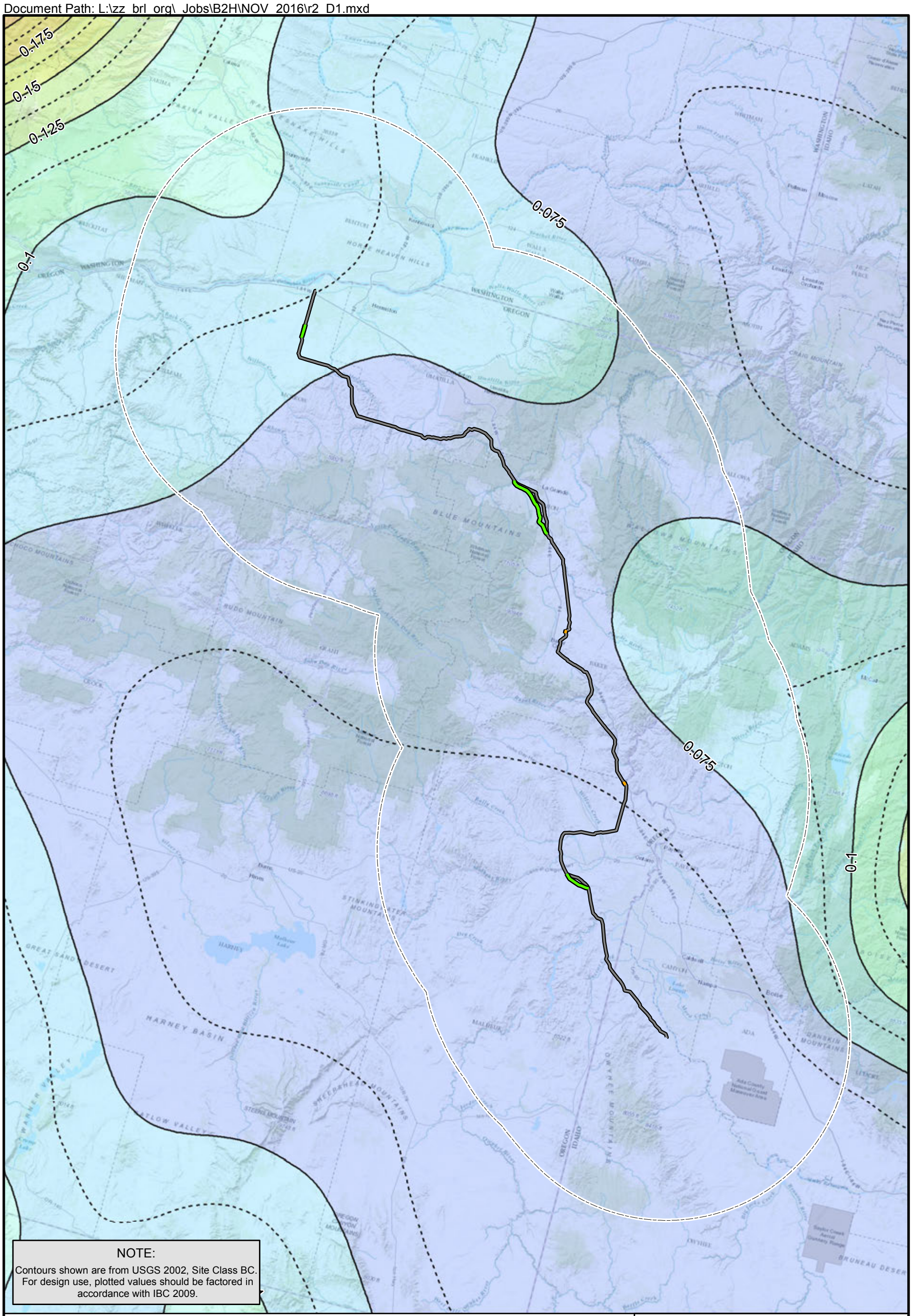
Year	Month	Day	Hour	Minute	Second	Epicenter		EQ Depth (kilometers)	Magnitude	Estimated MMI
						Lattitude	Longitude			
2000	8	27	21	20	26	44.667	-117.511	23.50	3.5	III
2000	9	6	6	54	17	46.075	-118.365	0.05	3	III
2002	10	4	0	56	6	44.434	-116.268	10.00	4	IV
2002	11	6	16	4	41	45.193	-117.078	10.00	3.1	III
2002	11	16	0	46	59	45.034	-116.942	15.20	3.5	III
2002	11	16	9	24	58	45.018	-116.942	8.90	3.1	III
2002	11	16	9	37	38	45.024	-116.952	16.20	3.2	III
2003	10	1	13	27	35	44.656	-117.730	10.00	3.6	III
2004	2	28	2	1	48	46.036	-119.021	1.00	3.3	III
2004	12	14	15	49	9	44.524	-116.312	3.50	3.6	III
2004	12	15	0	17	15	44.539	-116.300	7.00	3.8	III
2005	2	4	13	10	23	44.523	-116.282	14.30	3	III
2005	3	27	6	16	18	44.507	-116.287	3.00	3.1	III
2006	12	20	9	43	27	46.095	-118.513	13.57	3.4	III
2006	12	22	16	43	0	44.777	-116.647	9.50	3	III
2008	5	18	22	19	55	46.168	-119.550	20.10	3.7	III
2008	11	4	22	39	30	44.816	-117.053	14.60	3.5	III
2009	5	4	10	47	43	46.413	-119.273	0.40	3	III
2009	7	25	8	57	23	44.289	-117.655	7.60	3.8	III
2010	7	30	13	51	9	44.809	-117.072	16.70	3.3	III
2011	5	1	4	13	55	46.404	-119.255	1.91	3.3	III
2011	9	4	4	13	40	46.411	-119.260	1.77	3.7	III
2011	10	15	6	11	29	46.408	-119.262	1.43	3.4	III
2012	4	10	4	43	35	46.045	-118.712	14.36	3.2	III
2013	11	17	14	47	6	46.411	-119.271	0.00	3.2	III
2013	12	23	2	55	46	45.360	-118.206	8.70	3	III
2014	11	3	16	43	58	45.351	-117.189	3.90	3.4	III

TABLE D3: EARTHQUAKES ESTIMATED TO CAUSE MMI III OR GREATER

Year	Month	Day	Hour	Minute	Second	Epicenter		EQ Depth (kilometers)	Magnitude	Estimated MMI
						Lattitude	Longitude			
2015	1	23	13	47	52	45.711	-118.550	20.62	3.6	III
2015	4	24	3	49	14	44.943	-116.740	4.70	3.2	III

Data Source: Advanced National Seismic System (ANSS), 2016, Composite Catalog: http://earthquake.usgs.gov/earthquakes/search/.

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LEGEND

ALIGNMENTS

Alternative Route

IPC Proposed Route

Proposed Rebuild

PEAK GROUND ACCELERATION (g)

- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.125
- 0.125 - 0.150
- 0.150 - 0.175
- 0.175 - 0.200
- 0.200 - 0.225
- 0.225 - 0.250

BOUNDS

50 Mile Project Buffer

Source: USGS 2002

N W E S

0 12.5 25

Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

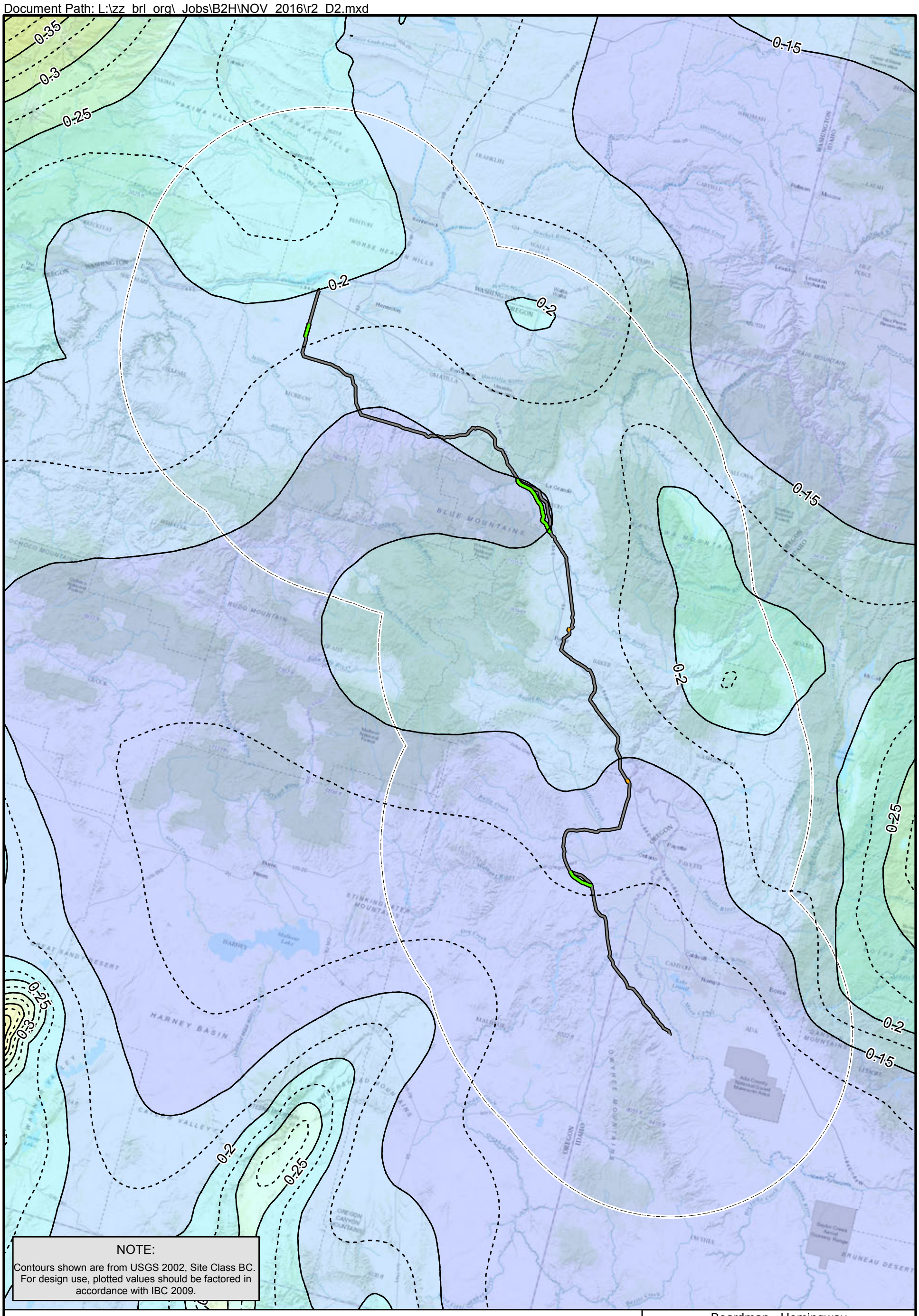
PEAK GROUND ACCELERATION
500 YEAR RETURN PERIOD
2002 USGS PSHA

January 2018 24-1-03820-006

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FIG. D1

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LEGEND

ALIGNMENTS

Alternative Route

IPC Proposed Route

Proposed Rebuild

PEAK GROUND ACCELERATION (g)

0.05 - 0.10
0.10 - 0.15
0.15 - 0.20
0.20 - 0.25
0.25 - 0.30
0.30 - 0.35
0.35 - 0.40
0.40 - 0.45
0.45 - 0.50
0.50 - 0.55
0.55 - 0.60

BOUNDS

50 Mile Project Buffer

Source: USGS 2002

N W E S

0 12.5 25

Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

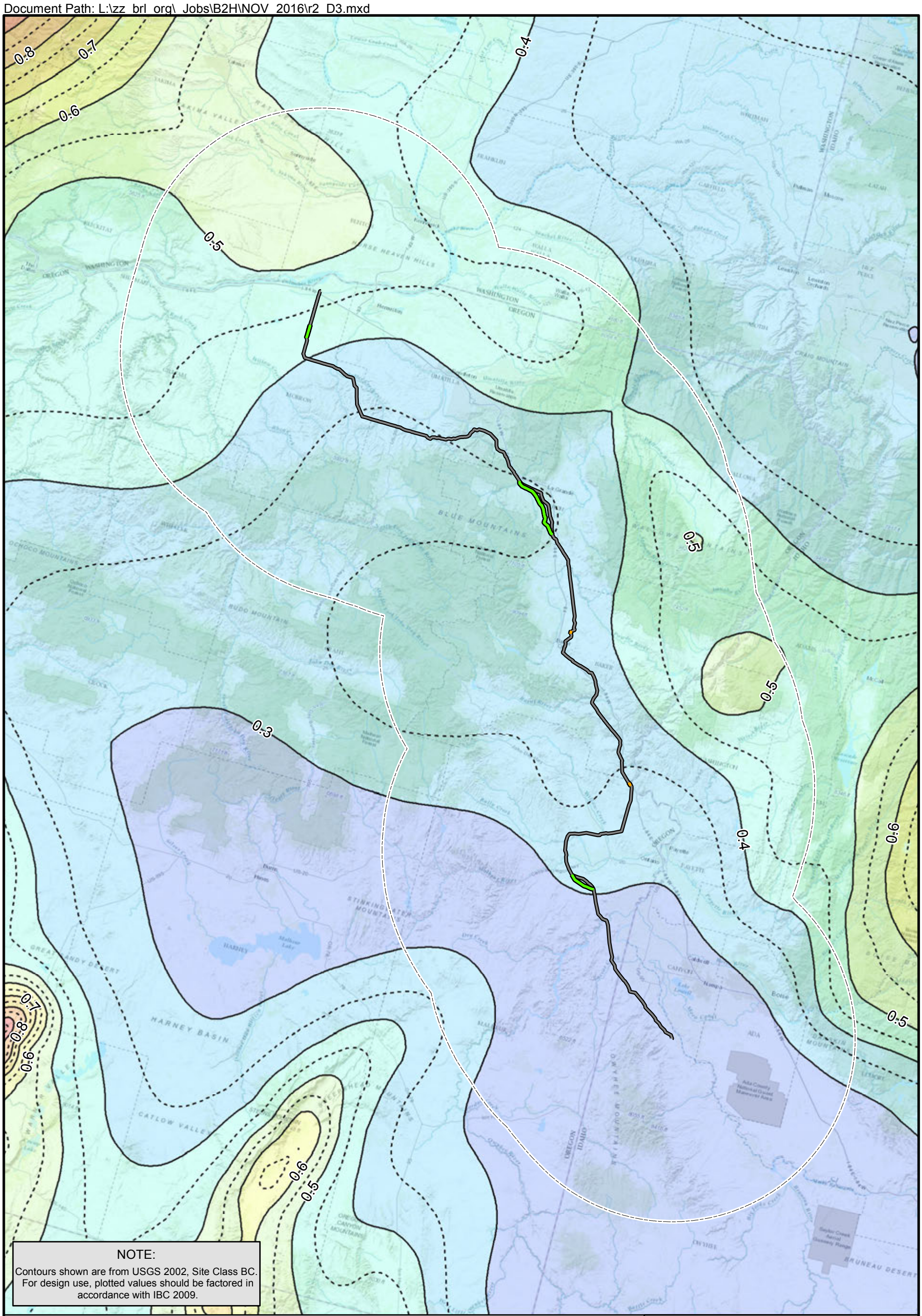
PEAK GROUND ACCELERATION
2,500 YEAR RETURN PERIOD
2002 USGS PSHA

January 2018 24-1-03820-006

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FIG. D2

Document Path: L:\zz_brl_org_Jobs\B2H\NOV_2016\r2_D3.mxd



LEGEND

ALIGNMENTS

Alternative Route

IPC Proposed Route

Proposed Rebuild

SPECTRAL ACCELERATION (g)

0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0

BOUNDS

50 Mile Project Buffer

Source: USGS 2002

N W E S

0 12.5 25

Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

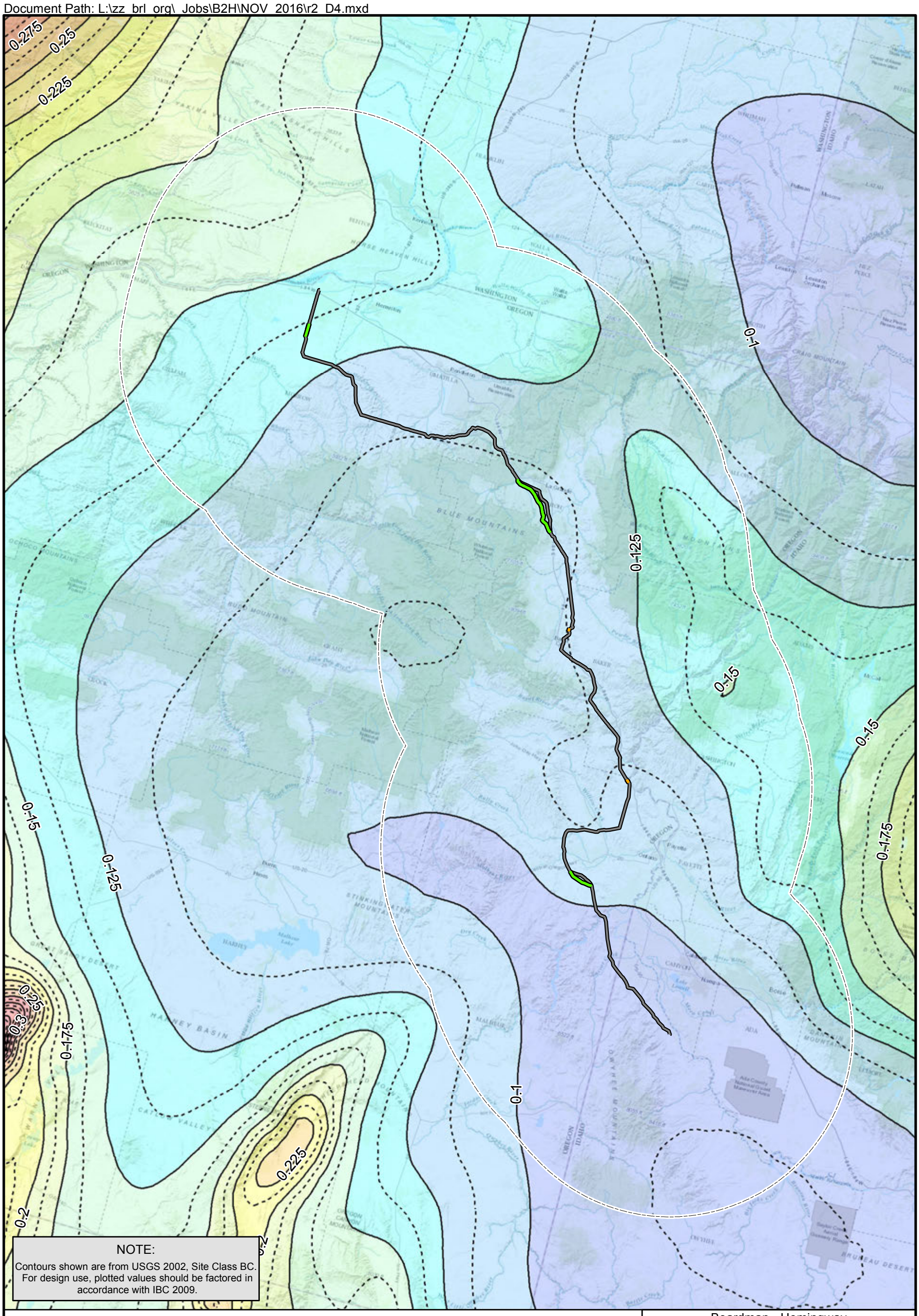
0.2 SEC PERIOD
SPECTRAL ACCELERATION
2,500 YEAR RETURN PERIOD
2002 USGS PSHA

January 2018 24-1-03820-006

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FIG. D3

Document Path: L:\zz_brl_org_Jobs\B2H\NOV_2016\r2_D4.mxd



LEGEND

ALIGNMENTS

Alternative Route

IPC Proposed Route

Proposed Rebuild

SPECTRAL ACCELERATION (g)

- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.125
- 0.125 - 0.150
- 0.150 - 0.175
- 0.175 - 0.200
- 0.200 - 0.225
- 0.225 - 0.250
- 0.250 - 0.275
- 0.275 - 0.300
- 0.300 - 0.350

BOUNDS

50 Mile Project Buffer

Source: USGS 2002

N W E S

0 12.5 25

Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

1.0 SEC PERIOD
SPECTRAL ACCELERATION
2,500 YEAR RETURN PERIOD
2002 USGS PSHA

January 2018 24-1-03820-006

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FIG. D4

Document Path: L:\Jobs\B2H\NOV_2016\r2_D5_18.mxd

NOTE:
Contours shown are from USGS 2002, Site Class BC. For design use, plotted values should be factored in accordance with IBC 2009.

LEGEND

ALIGNMENTS

Alternative Route

IPC Proposed Route

Proposed Rebuild

PEAK GROUND ACCELERATION (g)

0.10
0.2
0.3
0.4
0.5
0.6
0.7
0.8

BOUNDS

50 Mile Project Buffer

Source: USGS 2002

N
W
E
S

0 12.5 25
Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

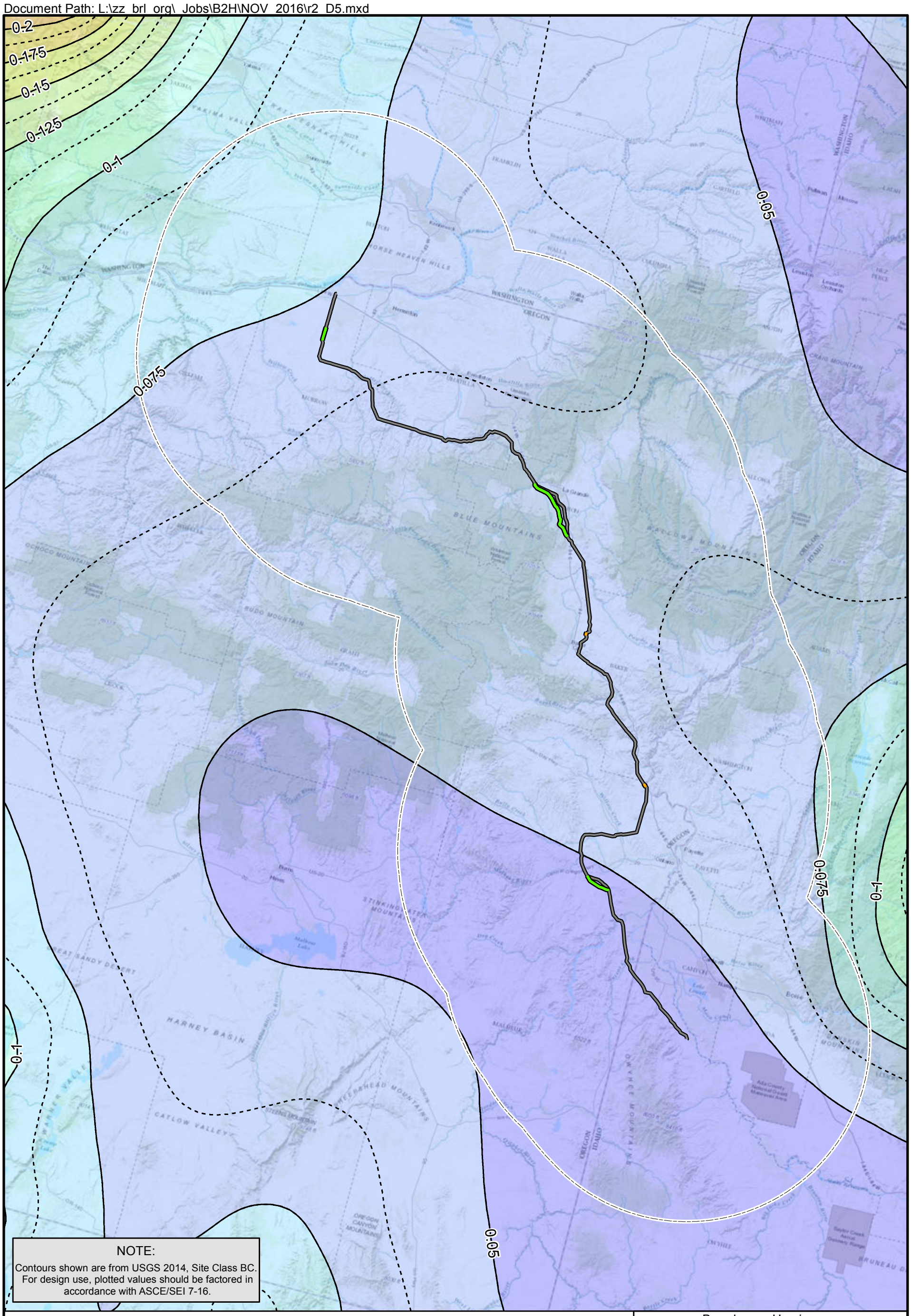
PEAK GROUND ACCELERATION
5000 YEAR RETURN PERIOD
2002 USGS PSHA

January 2018 24-1-03820-006

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. D5

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Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

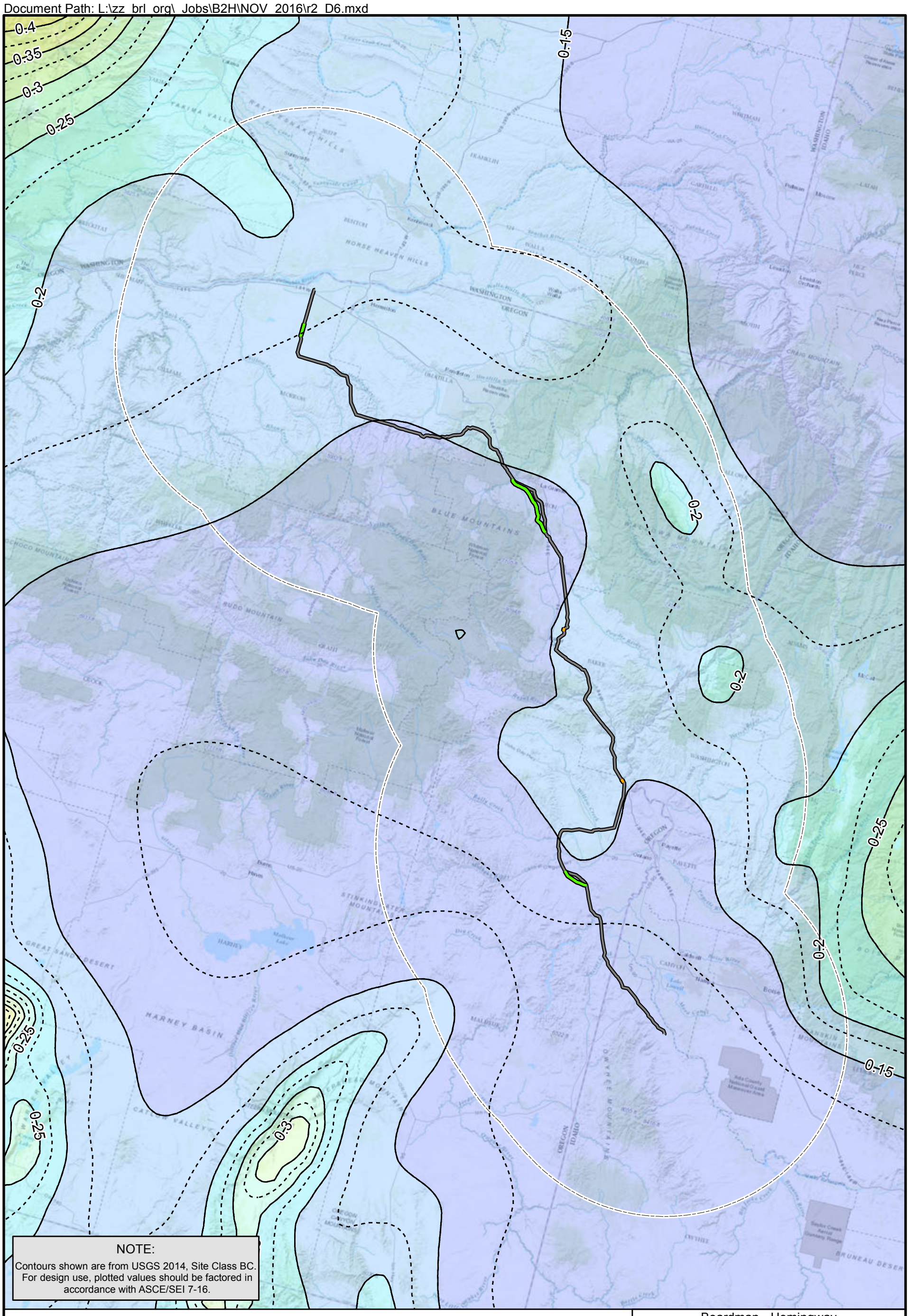
PEAK GROUND ACCELERATION
500 YEAR RETURN PERIOD
2014 USGS PSHA

January 2018 24-1-03820-006

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FIG. D6

Document Path: L:\zz_brl_org_Jobs\B2H\NOV_2016\r2_D6.mxd



LEGEND

ALIGNMENTS

Alternative Route

IPC Proposed Route

Proposed Rebuild

PEAK GROUND ACCELERATION (g)

0.05 - 0.10
0.10 - 0.15
0.15 - 0.20
0.20 - 0.25
0.25 - 0.30
0.30 - 0.35
0.35 - 0.40
0.40 - 0.45
0.45 - 0.50
0.50 - 0.55
0.55 - 0.60

BOUNDS

50 Mile Project Buffer

Source: USGS 2014

N W E S

0 12.5 25

Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

PEAK GROUND ACCELERATION
2,500 YEAR RETURN PERIOD
2014 USGS PSHA

January 2018 24-1-03820-006

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. D7

Document Path: L:\zz_brl_org_Jobs\B2H\NOV_2016\r2_D7.mxd

NOTE:
Contours shown are from USGS 2014, Site Class BC. For design use, plotted values should be factored in accordance with ASCE/SEI 7-16.

LEGEND

ALIGNMENTS
Alternative Route
IPC Proposed Route
Proposed Rebuild

SPECTRAL ACCELERATION (g)
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0

BOUNDS
50 Mile Project Buffer

Source: USGS 2014

N W E S

0 12.5 25
Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

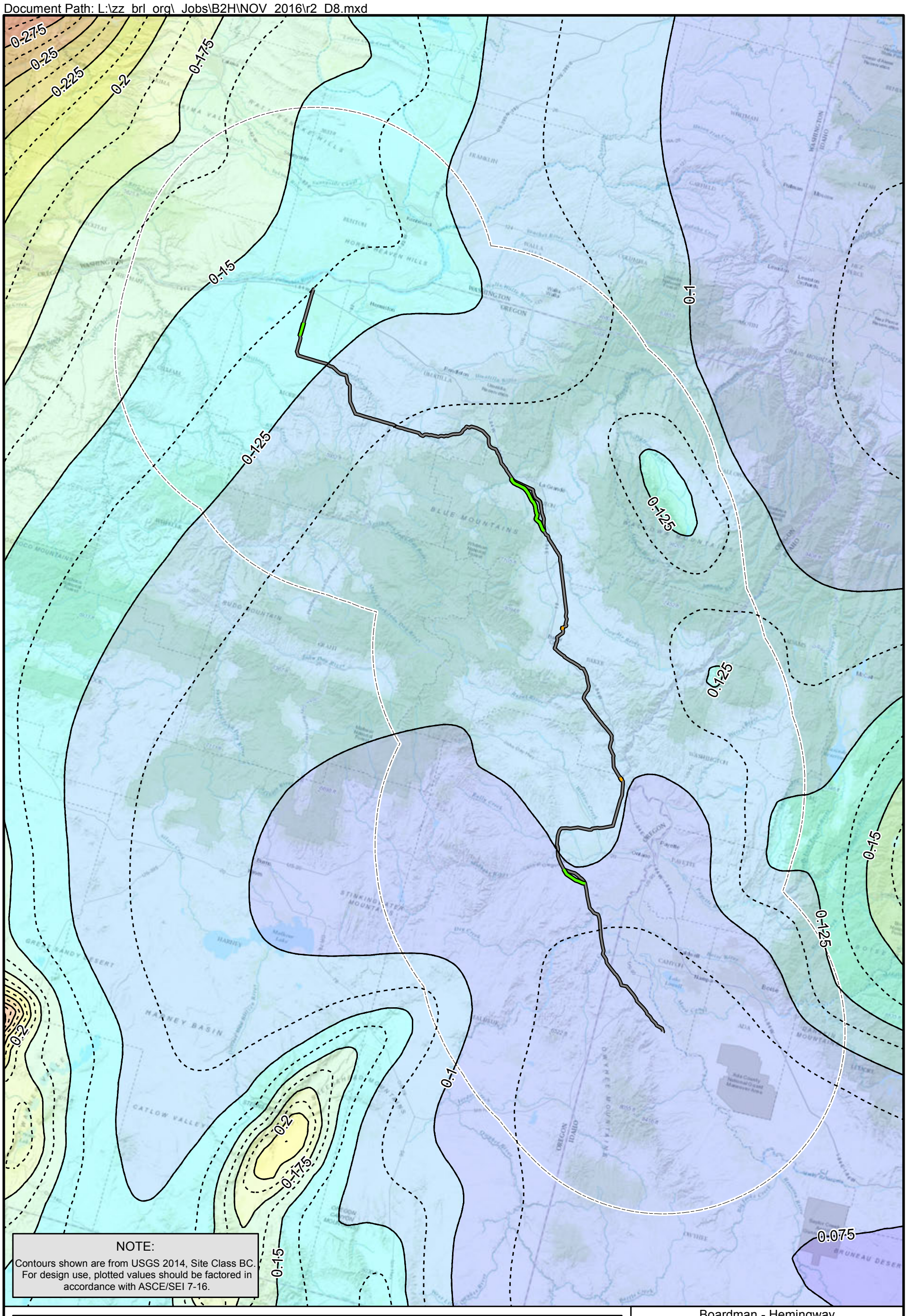
0.2 SEC PERIOD SPECTRAL ACCELERATION 2,500 YEAR RETURN PERIOD 2014 USGS PSHA

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FIG. D8

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LEGEND

ALIGNMENTS

Alternative Route

IPC Proposed Route

Proposed Rebuild

SPECTRAL ACCELERATION (g)

- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.125
- 0.125 - 0.150
- 0.150 - 0.175
- 0.175 - 0.200
- 0.200 - 0.225
- 0.225 - 0.250
- 0.250 - 0.275
- 0.275 - 0.300
- 0.300 - 0.350

BOUNDS

50 Mile Project Buffer

Source: USGS 2014

N W E S

0 12.5 25

Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

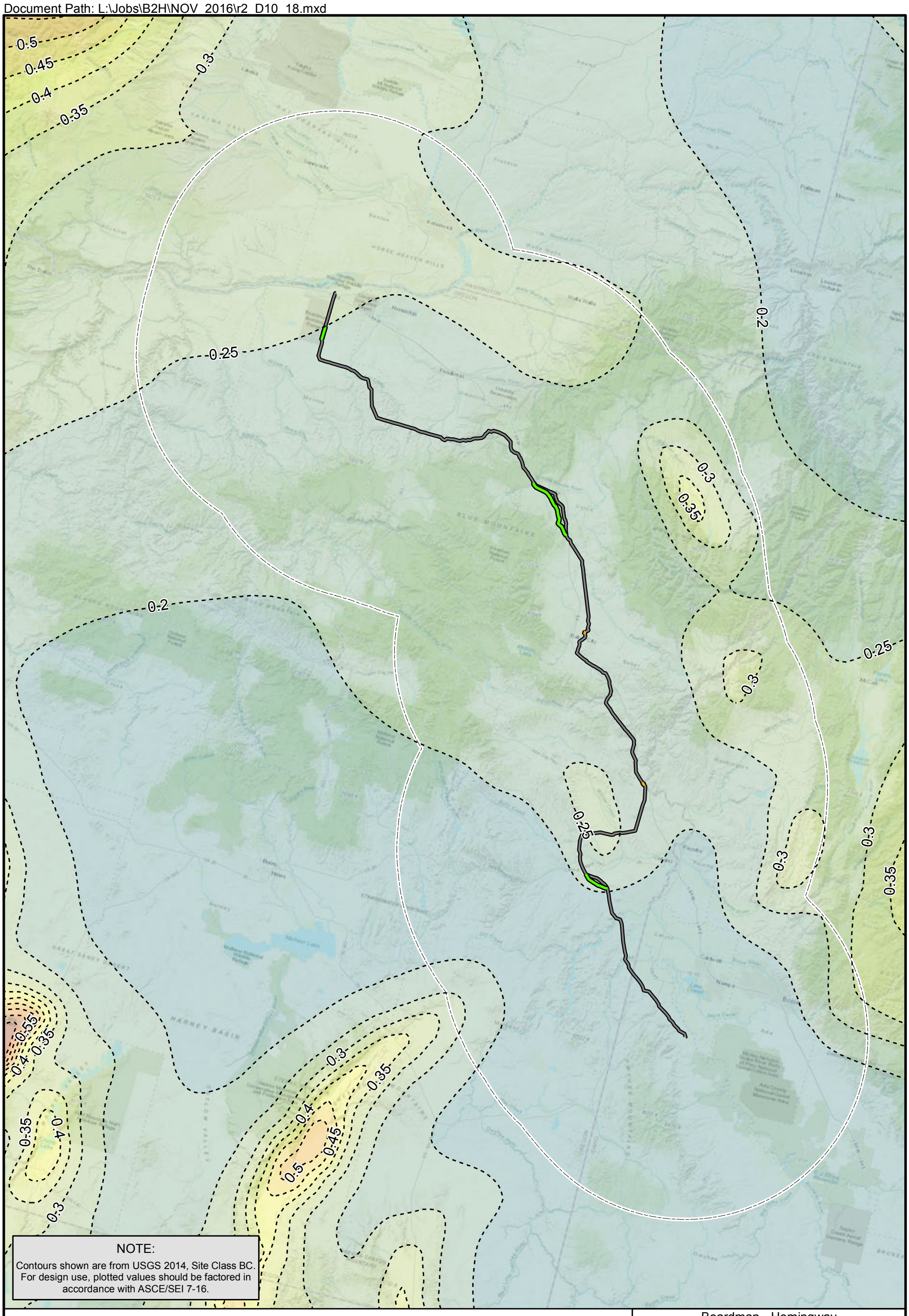
1.0 SEC PERIOD
SPECTRAL ACCELERATION
2,500 YEAR RETURN PERIOD
2014 USGS PSHA

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FIG. D9

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Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

PEAK GROUND ACCELERATION
5,000 YEAR RETURN PERIOD
2014 USGS PSHA

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FIG. D10

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Hite Fault System

West Grande Ronde Valley Fault Zone

Unnamed East Baker Valley Faults

West Baker Valley Fault

South Grande Ronde Valley Faults

Juniper Mountain Fault

Cottonwood Mountain Fault

Faults Near Owyhee Dam

Owyhee Mountain Faults

LEGEND

ALIGNMENTS

Alternative Route

IPL Proposed Route

Proposed Rebuild

FEATURES

50 Mile Project Buffer

Fault

Source:
USGS Quternary Fault and Fold Database of the United States.

N W E S

0 12.5 25

Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

QUATERNARY FAULTS

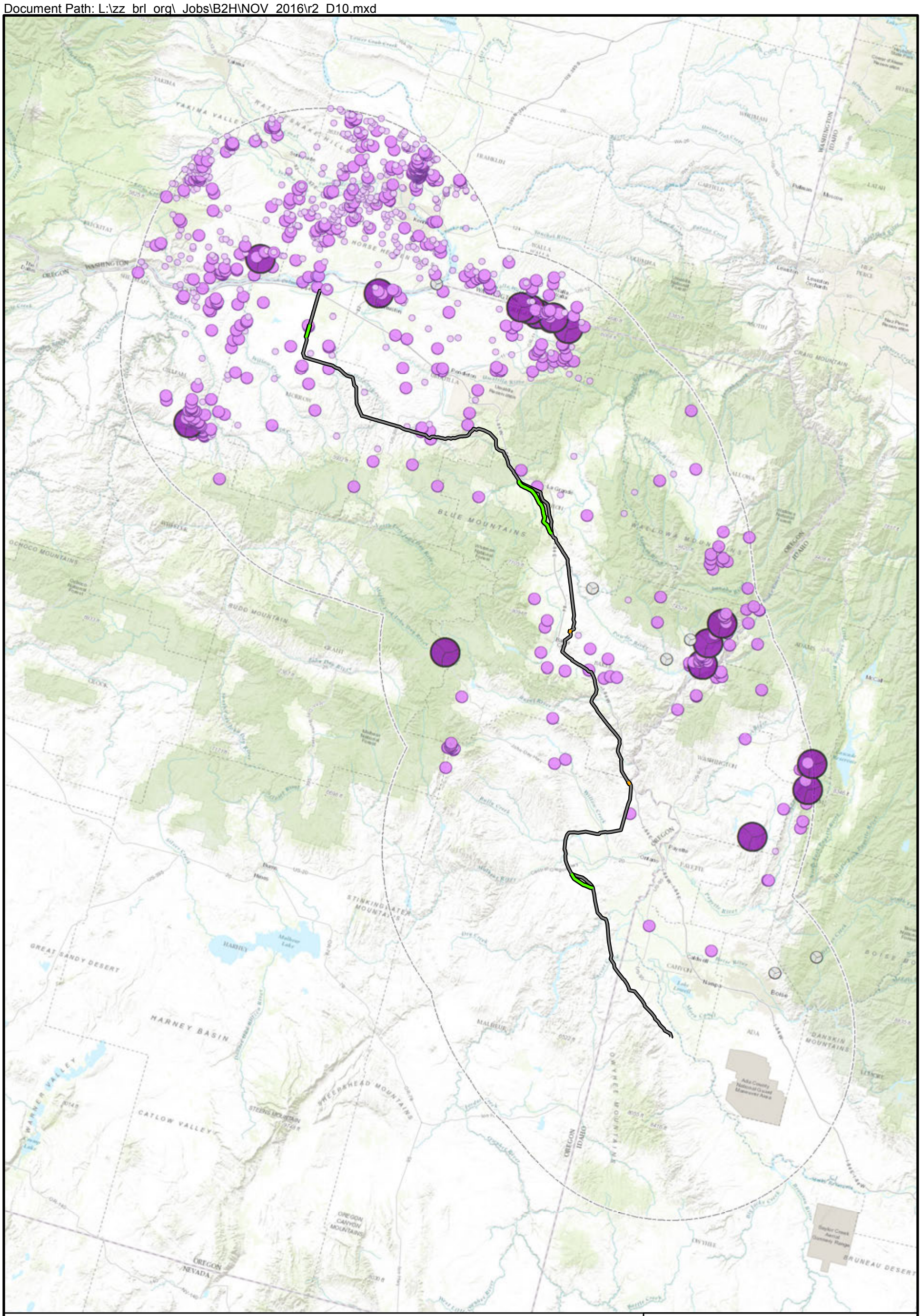
January 2018

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FIG. D11

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LEGEND

ALIGNMENTS
- Alternative Route
- IPL Proposed Route
- Proposed Rebuild

MAGNITUDE
- Unknown
- Less Than 2.0
- 2.1 - 3.9
- Greater Than 4.0

BOUNDS
- 50 Mile Project Buffer

Source: USGS

N W E S

0 12.5 25
Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

HISTORICAL EARTHQUAKES

January 2018 | 24-1-03820-006

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FIG. D12

APPENDIX E

LANDSLIDE INVENTORY

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APPENDIX E

LANDSLIDE INVENTORY

E.1 INTRODUCTION

This appendix presents summary information and site maps of each landslide that was identified along the proposed alignments that could potentially affect the stability of proposed tower foundations or associated work areas or multi-use areas. This landslide inventory was compiled from review of published literature and limited field reconnaissance.

The proposed alignments reviewed include the IPC Proposed Route; Proposed 230 kV Rebuild; Proposed 138 kV Rebuild; West of Bombing Range Road Alternative 1; West of Bombing Range Road Alternative 2; Morgan Lake Alternative; and Double Mountain Alternative. Shaw Environmental & Infrastructure, Inc. (Shaw) reviewed the majority of the transmission line route and compiled identified landslides in their Desktop Geotechnical Report, dated January 19, 2012. Landslides along subsequent new alignments and changes to the previous alignments were compiled by Shannon & Wilson, Inc. In this appendix, Shannon & Wilson has integrated the relevant data compiled by both Shannon & Wilson and Shaw. The landslide inventory was compiled from the following data sources:

- Review of GIS files compiled by Oregon Department of Geology and Mineral Industries (DOGAMI) in the Statewide Landslide Information Database for Oregon (SLIDO), version 3.4 (Burns and Watzig, 2017); the review included landslides within a 1-mile wide route corridor; initial work by Shaw utilized SLIDO, version 2 (Burns and others, 2011);
- Review of existing geologic maps, including Engineering Geology of the La Grande Area, Union County, Oregon, by Schlicker and Deacon (1971); the maps were compiled and geo-referenced in GIS along the alignment to confirm the location of each SLIDO landslide along the route and to check that each mapped landslide was included in the SLIDO database;
- Site reconnaissance (by Shaw) along portions of the original alignment, conducted on October 26-28 and November 15-18, 2011;
- Site reconnaissance (by Shannon & Wilson) along portions of new alignment alternatives and select alignment changes, conducted July 30 through August 2, 2012, and October 16-18, 2013;
- Review of aerial photography (Shaw reviewed 1:24,000 scale aerial photographs provided by 3Di, LLC, of Eugene, Oregon (3Di), and the ESRI Microsoft Virtual Earth

layer in GIS; Shannon & Wilson reviewed aerial photographs from both ESRI and Google Earth);

- Review of Digital Terrain Models (DTMs) along 1-mile-wide route corridors; and
- DOGAMI LiDAR Data Viewer (relevant LiDAR data was only available for portions of the Meacham Lake, Huron, Kamela SE, Hilgard, LaGrande SE, Glass Hill, Craig Mountain, North Powder, Telocaset, Baker, Virtue Flat, and Owyhee Dam quadrangles); No LiDAR data was available in Idaho.

A summary description is presented below for each identified landslide feature that intersects one of the alignments, as well as for landslide features that are near the alignments and oriented in such a way that they could be reasonably suspected of having the capacity to impact proposed structures. The text is followed by map sheets that show the locations of mapped landslides relative to the proposed alignment features.

The Landslide Inventory Index Map (Sheet 1) shows the entire project alignment and locations of subsequent Landslide Inventory maps (Sheets 2 through 26). Where map sheets are not shown along the alignment on the Landslide Inventory Index Map (Sheet 1), relevant landslides were not identified based on the data sources reviewed. All recognized landslide features are shown within the limits of each map sheet. However, discussions are only provided for those features judged potentially capable of impacting proposed structure stability. The map sheets and landslide descriptions are arranged from north to south, beginning in Morrow County, Oregon, and ending in Malheur County, Oregon.

Table E1 presents landslide data for multi-use areas located away from the proposed alignment such that they fall outside the boundaries of the maps presented. Table E1 includes all multi-use areas not shown on the landslide map sheets for which a SLIDO feature or suspected landslide is identified within a half mile.

Mapped features were given designations based on their source. Features identified in the SLIDO database are preceded by “SLIDO.” Features that were identified from published geologic maps, but not included in the SLIDO database, were designated with an arbitrary number, preceded by “MLS.” Features identified from field reconnaissance or review of LiDAR or aerial imagery were designated with an arbitrary number, preceded by “PLS.” Each description below is preceded by a header that provides UTM coordinates (in meters) for a point near the geographic center of discussed feature.

In the time since Shaw issued their Desktop Geotechnical Report in 2012, SLIDO has changed the identification labels of some landslides in its database multiple times. The current version of

SLIDO-3.4 uses identification labels that contain both an abbreviation of the data source and a number. In the Landslide Inventory maps and landslide descriptions below, we abbreviate the landslide identification labels by using only the number following the data source. For example, we refer to SLIDO-3.4 landslide "MadiIP2007_43" as "SLIDO 43." Full SLIDO-3.4 identification labels are provided in the headers for each description.

E.2 LANDSLIDE DESCRIPTIONS

E.2.1 SLIDO 43

SLIDO-3.4 MadiIP2007_43
Northing: 5051807
Easting: 298836
Sheets 2, 3

SLIDO 43 intersects the alignment between towers 17/1 and 23/1. It is a broad, gently sloping alluvial fan and is not a landslide. A site visit was conducted on November 18, 2011.

E.2.2 PLS-001

PLS-001
Northing: 5031371
Easting: 391097
Sheet 4

PLS-001 is an approximately 230-acre potential landslide that was identified from available LiDAR data. PLS-001 has not been verified in the field and should not be considered a landslide based solely on interpretation of the LiDAR data. This IPC Proposed Route crosses this potential landslide between towers 89/4 and 90/3, potentially affecting the stability of towers 89/4 through 90/2, and associated work areas. A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.3 PLS-002

PLS-002
Northing: 5026719
Easting: 396357
Sheet 5, 6

PLS-002 is an approximately 460-acre potential landslide that was identified in available LiDAR data. PLS-002 has not been verified in the field and should not be considered a landslide based solely on interpretation of the LiDAR data. The IPC Proposed Route passes above this potential landslide between towers 93/5 and 95/3, potentially affecting the stability of those proposed towers and associated work areas. A field reconnaissance along this portion of the alignment should be performed as part of the geotechnical exploration program.

E.2.4 SLIDO 10

SLIDO-3.4 BussC2006_10
Northing: 5022505
Easting: 397680
Sheet 6

SLIDO 10 is referenced at a scale of 1:100,000 (Buss, 2006), and it's located over 2,000 feet southwest of the IPC Proposed Route, near tower 96/3. It is mapped as talus/colluvium and will not likely impact the proposed alignment or any associated work areas or multi-use areas. A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.5 SLIDO 134

SLIDO-3.4 FernML2010_134
Northing: 5018900
Easting: 406277
Sheet 8

SLIDO 134 is referenced at a scale of 1:100,000 from Ferns et al., 2010. The same limits of this landslide (Holocene Qls) were mapped at the scale of 1:24,000 by Barrash and others (1980), covering approximately 132 acres. Schlicker and Deacon (1971) mapped slightly different extents of the same feature at a scale of 1:24,000. IPC Proposed Route towers 102/1 and 102/2 and associated work areas are on the margins of the mapped landslide limits, and Morgan Lake Alternative tower ML-4/2 and its associated work area are within the mapped landslide limits.

Review of aerial photos, the DTM, and LiDAR images suggest that most of this landslide has not recently been active. However, a field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.6 SLIDO 129

SLIDO-3.4 FernML2010_129
Northing: 5019127
Easting: 407892
Sheet 9

SLIDO 129 is referenced at a scale of 1:100,000 (Ferns et al., 2010) and its mapped extents intersect the IPC Proposed Route between towers 103/3 and 103/4. The slide appears to be contained within a drainage spanned by the two towers and is therefore unlikely to affect the proposed towers or work areas. A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.7 SLIDO 127

SLIDO-3.4 FernML2010_127
Northing: 5018167
Easting: 411384
Sheets 9, 11

SLIDO 127 is referenced at a scale of 1:100,000 (Ferns et al., 2010) and is located about 200 feet south of the IPC Proposed Route, between towers 105/5 and 106/1. It is mapped as a landslide, but does not appear to be recently active, based on review of aerial photographs. Proposed towers 105/5 and 106/1, and associated work areas, are in the proximity of the mapped debris fan, and a field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.8 Schlicker and Deacon, 1971

Northing: 5018552
Easting: 412472
Sheets 11

Schlicker and Deacon (1971) mapped several landslides in the areas west and south of La Grande at a scale of 1:24,000. The majority of the landslide features mapped by Schlicker and Deacon (1971) were similarly mapped as landslides or alluvial fans in Ferns and others (2010), which is locally the basis of the current SLIDO database. While the two map sets generally agree, there are differences in the mapped limits of some landslide and alluvial fan areas. One of the landslides mapped by Schlicker and Deacon (1971), not included in SLIDO, intersects the IPC Proposed Route between towers 106/3 and 106/4. Based on review of topography and aerial photographs, this mapped landslide may impact the proposed work areas around tower 106/4. A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.9 SLIDO 380, 33

SLIDO-3.4 FernML2010_380
Northing: 5016237
Easting: 414116
Sheets 11, 12

SLIDO-3.4 WalkGW2002_33
Northing: 5016237
Easting: 414116
Sheets 11, 12

SLIDO 380 and 33 appear to refer to the same landslide feature and are referenced at scales of 1:100,000 and 1:500,000, respectively (Ferns et al., 2010; Walker, 2002). The IPC Proposed Route crosses the mapped limits of the slide between towers 108/2 and 109/2, and may affect stability at towers 108/3 through 109/2, along with associated work areas. Schlicker and Deacon (1971) mapped slightly different extents of the same features at a scale of 1:24,000. In the Schlicker and Deacon (1971) map, the extents of one slide area are about 650 feet southeast of tower 107/4 and 465 feet northeast of tower 107/5. A field reconnaissance of all these areas should be performed as part of the geotechnical exploration program.

E.2.10 SLIDO 225

SLIDO-3.4 FernML2010_225
Northing: 5013877
Easting: 417421
Sheets 12, 13

SLIDO 225 is mapped as a landslide referenced at a scale of 1:100,000 (Ferns et al., 2010). It intersects the IPC Proposed Route between towers 110/2 and 112/2, and may affect stability at towers 110/1 through 112/1, along with associated work areas. A field reconnaissance of this area should be performed as part of the geotechnical exploration program. Schlicker and Deacon (1971) mapped slightly different extents of the same feature at a scale of 1:24,000.

E.2.11 SLIDO 115

SLIDO-3.4 FernML2010_115
Northing: 5010654
Easting: 418706
Sheet 13

SLIDO 115 is referenced at a scale of 1:100,000 (Ferns et al., 2010), and its mapped extents intersect the IPC Proposed Route between towers 112/5 and 113/1. The feature is mapped as an alluvial fan, not a landslide; and the material appears to be contained within a drainage spanned by the two towers. The feature is unlikely to affect the proposed towers or associated work areas. However, a field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.12 SLIDO 114

SLIDO-3.4 FernML2010_114
Northing: 5009120
Easting: 419492
Sheets 13, 14

SLIDO 114 is mapped as a landslide and referenced at a scale of 1:100,000 (Ferns et al., 2010). It intersects the IPC Proposed Route between towers 113/3 and 114/3, and may affect stability at towers 113/4, 113/5, 114/2, along with associated work areas. A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.13 SLIDO 117

SLIDO-3.4 FernML2010_117
Northing: 5007537
Easting: 417623
Sheet 15

SLIDO 117 is referenced at the scale of 1:100,000 (Ferns et al., 2010). The feature is located approximately 1,000 feet east of the Morgan Lake Alternative alignment, near towers ML-14/2 and ML-14/3. A landslide is not shown at this location on the 1:24,000 scale *Geologic Map of the Glass Hill Quadrangle* (Barrash et al., 1980), and landslide deposit features are not apparent on the DTM or on aerial photos. Landslide deposits are shown on the Barrash et al. (1980) map approximately 2,500 east of SLIDO 117, further away from the alignment, and it may be possible that SLIDO 117 was inaccurately geo-referenced. A field reconnaissance of the area around SLIDO 117 should be performed as part of the geotechnical exploration program.

E.2.14 SLIDO 112

SLIDO-3.4 FernML2010_112
Northing: 5004077
Easting: 419720
Sheet 15

SLIDO 112 is referenced at the scale of 1:100,000 (Ferns et al., 2010), but no landslide is shown at the location of SLIDO 112 on the 1:24,000 scale *Geologic Map of the Glass Hill Quadrangle* (Barrash et al., 1980). The mapped limits of SLIDO 112 intersect the Morgan Lake Alternative alignment between towers ML-17/2 and ML-17/3, with the limits of the feature being approximately 150 feet southeast of tower ML-17/2. The OGDC geologic map shows a contact between the Dacite of Mount Emily (Tpd) and the Grande Ronde Basalt (Tcgf) at this location. Review of the DTM and aerial photos shows no evidence of a landslide, but the upper contact of the Grande Ronde Basalt is known to be landslide prone. A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.15 SLIDO 48

SLIDO-3.4 WalkGW2002_48
Northing: 5002373
Easting: 419983
Sheet 16

SLIDO 48 is mapped as a landslide and referenced at a scale of 1:500,000 (Walker, 2002). A landslide is not shown at this location on the 1:100,000 scale map by Ferns et al. (2010) or the 1:24,000 scale map by Barrash et al. (1980). Review of the DTM and aerial photographs does not suggest the presence of a landslide, but field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.16 SLIDO 311

SLIDO-3.4 FernML2010_311
Northing: 5002434
Easting: 421959
Sheet 16

SLIDO 311 is referenced at a scale of 1:100,000 (Ferns et al., 2010), and its mapped extents intersect the IPC Proposed Route between towers 118/4 and 118/6 and the Morgan Lake Alternative alignment between towers ML-19/2 and ML-19/3. While IPC Proposed Route tower 118/5 and its associated work area are within the area mapped as SLIDO 311, the feature is considered as talus/colluvium, not a landslide, and is therefore unlikely to affect either alignment. While review of the DTM and aerial photographs does not suggest the presence of a landslide, a field reconnaissance of the area should be performed as part of the geotechnical exploration program.

E.2.17 SLIDO 2280, 2282, 2279, 2281, 56

SLIDO-3.4 FernML2001a_2280 and FernML2001b_2282
Northing: 5001693
Easting: 421505
Sheets 16

SLIDO-3.4 FernML2001b_2281
Northing: 4999554
Easting: 422283
Sheets 16

SLIDO-3.4 FernML2001a_2279
Northing: 5001494
Easting: 421225
Sheets 16

SLIDO-3.4 WalkGW2002_56
Northing: 4998896
Easting: 421881
Sheet 16

SLIDO 2280 and 2282 are a single small landslide that is located on the boundary between the USGS Glass Hill and Craig Mountain quadrangles. Review of the DTM and aerial photographs suggest that the features of the landslide extend beyond the SLIDO mapped limits, as shown on the Landslide Inventory (Sheet 16). The IPC Proposed Route crosses the apparent landslide limits between towers 118/6 and 119/2. An existing road is present in the apparent head scarp area (near the 2280 and 2282 contact line).

SLIDO 2279 is a small landslide located 300 feet south of SLIDO 2280 and 2282. An existing road is present in the apparent head scarp area. Review of the DTM suggests that SLIDO 2279 represents a debris flow source area for landslide deposits and colluvium that have been deposited in SLIDO 2281 between proposed tower locations 119/1 and 119/2.

SLIDO 56 and 2281 are mapped as the same landslide complex with different boundaries. SLIDO 56 is referenced at a scale of 1:500,000 (Walker et al., 2002), and SLIDO 2281 is referenced at a scale of 1:24,000 (Ferns, et al., 2001b). Portions of this landslide complex are also mapped at a scale of 1:24,000 by Barrash et al. (1980). The northern portion of the landslide complex, where the mapped extents intersect the IPC Proposed Route, was mapped as

colluvium by Barrash, et al. (1980). However, landslide debris from SLIDO 2279, 2280, and 2282 are apparent in LiDAR data from this area.

Field reconnaissance between towers 118/6 and 119/3 should be performed as part of the geotechnical exploration program.

E.2.18 SLIDO 1113

SLIDO-3.4 AshlRP1966_1113
Northing: 4937305
Easting: 457071
Sheet 17

SLIDO 1113 is referenced at a scale of 1:21,100 (Ashley, 1966), and its mapped extents intersect the IPC Proposed Route between towers 171/1 and 171/2. The feature is mapped as alluvial fan deposits, not a landslide, and it is spanned between the two towers, so it is unlikely to affect the proposed tower foundations or associated work areas. For confirmation, a field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.19 SLIDO 1115

SLIDO-3.4 AshlRP1966_1115
Northing: 4936808
Easting: 457368
Sheet 17

SLIDO 1115 is referenced at a scale of 1:21,100 (Ashley, 1966), and its mapped extents intersect the IPC Proposed Route between towers 171/2 and 171/3. The feature is mapped as alluvial fan deposits, not a landslide, and it is spanned between the two towers, so it is unlikely to affect the proposed tower foundations or associated work areas. For confirmation, a field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.20 SLIDO 1103

SLIDO-3.4 AshlRP1966_1103
Northing: 4935742
Easting: 459042
Sheets 17

SLIDO 1103 is mapped by Ashley (1966) as stream alluvium and alluvial fans, not a landslide. The IPC Proposed Route crosses the feature between towers 171/4 and 172/1. The proposed tower locations and associated work areas are outside and above the mapped limits of the alluvium, which forms a flood plain along the banks of Burnt River. The area between towers 171/4 and 172/1 was visited on October 18, 2013, and evidence of landslide hazards was not observed.

E.2.21 SLIDO 1677

SLIDO-3.4 AshlRP1966_1677
Northing: 4935755
Easting: 457095
Sheet 17

SLIDO 1677 is referenced at a scale of 1:21,100 (Ashley, 1966), and its mapped extents intersect the IPC Proposed Route between towers 171/4 and 172/1. The feature is approximately 400 feet northeast of proposed tower 172/1 and is mapped as a landslide. Tower 172/1 and its associated work area are located on a ridge, well outside and above the mapped extents; but a field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.22 SLIDO 164, 167

SLIDO-3.4 AshlRP1966_164
Northing: 4932113
Easting: 459313
Sheet 18

SLIDO-3.4 AshlRP1966_167
Northing: 4931951
Easting: 459819
Sheet 18

SLIDO 164 and 167 were mapped as talus or colluvium by Ashley (1966), at a scale of 1:21,100. The IPC Proposed Route crosses the features between towers 175/1 and 175/3, with tower 175/2 and much of its associated work area being within the mapped extents. As the deposits are mapped as talus or colluvium, and not as landslides, and since tower 175/2 is on relatively level ground, the deposits are not likely to threaten the stability of proposed structures or work areas. For confirmation, a field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.23 PLS-005

PLS-005
Northing: 4921189
Easting: 473299
Sheet 20

PLS-005 is a small (approximately 1.7-acre) potential landslide that was identified during field reconnaissance. No evidence of recent movement was observed. The nearest proposed tower location (IPC Proposed Route tower 186/2) is approximately 500 feet uphill of this small potential landslide, and the proposed tower and work area would not be affected by it.



Photo 1: Toe of PLS-005 looking northeast from Dixie Creek Road

E.2.24 MLS-001

MLS 001
Northing: 4919678
Easting: 473265
Sheet 20, 21

MLS-001 is a possible landslide which crosses the IPC Proposed Route between towers 186/4 and 187/4, potentially affecting towers 187/1 to 187/4 and all associated work areas. MLS-001 is not included in SLIDO but is shown in published geologic mapping (Brooks, H.C., 1979). A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.25 SLIDO 1706

SLIDO-3.4 BrooHC1979a_1706
Northing: 4917799
Easting: 472736
Sheets 21

SLIDO 1706 is referenced at a scale of 1:62,500 as a 387-acre landslide, and is part of a large landslide complex (approximately 3,300 acres) that extends around the north side of Table Rock Butte (Brooks, 1979). The IPC Proposed Route crosses the mapped extents of SLIDO 1706

between tower locations 188/1 and 188/3. A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.26 SLIDO 1708

SLIDO-3.4 BrooHC1979a_1708
Northing: 4916158
Easting: 473547
Sheet 22

SLIDO 1708 is referenced at a scale of 1:62,500 as a 39-acre landslide on a northwest-facing slope above Goodman Creek (Brooks, 1979). The IPC Proposed Route crosses the landslide between towers 189/1 and 189/3, with tower 189/2 and its associated work area located within the mapped extents. Aerial photographs show existing transmission towers within the mapped limits of SLIDO 1708. The presence of existing transmission towers within this landslide suggests that the site is stable. However, a field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.27 SLIDO 1711

SLIDO-3.4 BrooHC1979a_1711
Northing: 4914501
Easting: 475058
Sheet 22

SLIDO 1711 is referenced at a scale of 1:62,500 as a 133-acre landslide complex (Brooks, 1979). An existing transmission line and access road run parallel to and along the mapped upper boundary of the landslide area. The IPC Proposed Route crosses the landslide below the existing road and transmission line, between proposed towers 190/2 and 191/2. The proposed towers and associated work areas are located at ridge spurs, between the gullies which are potential debris flow pathways. A field reconnaissance of this area should be performed as part of the geotechnical exploration program.

E.2.28 SLIDO 384, 1690, 1691

SLIDO-3.4 WalkGW2002_384
Northing: 4895721
Easting: 483947
Sheet 24

SLIDO-3.4 BrooHC1976_1691
Northing: 4895834
Easting: 484544
Sheet 24

SLIDO-3.4 BrooHC1976_1690
Northing: 4865101
Easting: 483604
Sheet 24

SLIDO 384 is referenced at a scale of 1:500,000 (Walker, 2002) and SLIDO 1690 and 1691 are referenced at a scale of 1:250,000 (Brooks and others, 1976). Brooks (1976) mapped the area as landslide deposits. The proposed locations of IPC Proposed Route towers 204/2 through 205/2 and associated work areas are within the limits of the mapped landslide deposits. On October 17, 2013, a site visit of this landslide area was conducted. It is our opinion that SLIDO 384, 1690, and 1691 map an ancient landslide complex. We observed some eroded (old) scarps, areas of hummocky topography, and generally mature drainages. The lack of fresh scarps and maturity of the drainages suggests that the landslide is old and may not be currently active. If scarps, steep slopes, and loose material are avoided, it may be possible to build tower foundations through the complex. More detailed reconnaissance of the area should be performed as part of the geotechnical explorations.



Photo 2: Looking south into the toe of landslide complex; approximate locations of towers 204/2 through 204/4 shown for reference.

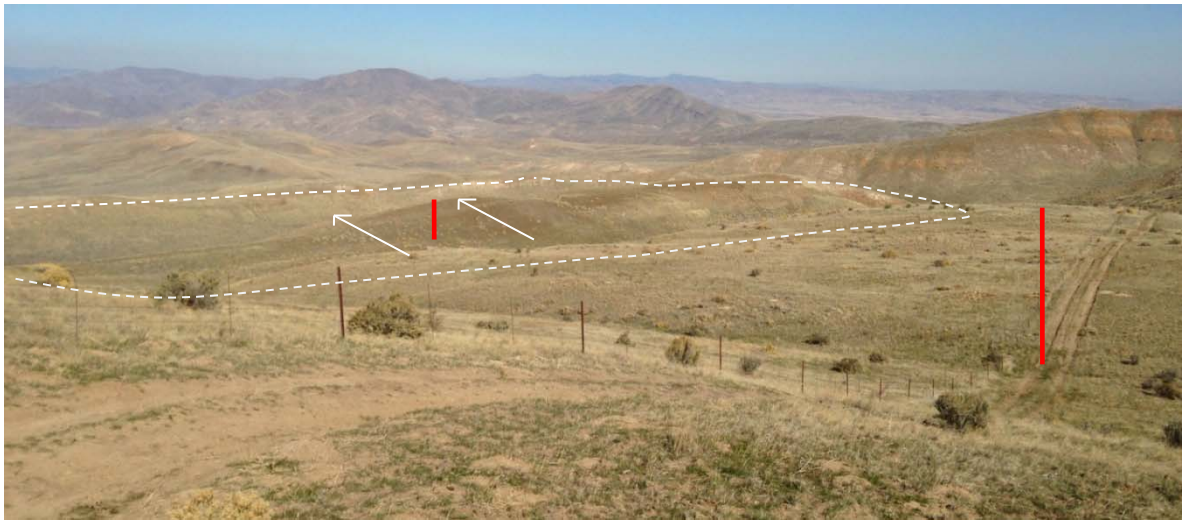


Photo 3: Looking north into the landslide complex; approximate locations of towers 205/2 and 205/3 shown for reference.

E.2.29 SLIDO 2027, 2030

SLIDO-3.4 FernML1993a_2027
Northing: 4866541
Easting: 461275
Sheet 25

SLIDO-3.4 FernML1993a_2030
Northing: 4865497
Easting: 462136
Sheet 25

SLIDO 2027 and 2030 are referenced at the scale of 1:100,000 (Ferns et al., 1993a). However, these landslide deposits (Pleistocene and Holocene Qls) have been mapped at the scale of 1:24,000 (Brooks, 1991). SLIDO 2030 is described as a slumped section of upper-Miocene volcanic rocks over 2 miles long and up to 2,000 feet wide, and SLIDO 2027 is described as a hummocky area underlain by a fragmented sequence of sedimentary deposits with blocks of andesite or basalt (Brooks, 1991). These two landslide areas cover 1,570 acres and are separated by the Malheur River. The IPC Proposed Route crosses the Malheur River Canyon along the northeastern edge of SLIDO 2027 and 2030. Proposed tower 232/3 is located on a bedrock bluff of upper-Miocene volcanic rock. A talus slope is present between the bluff and the Oregon Vale Canal. The canal is located on the landslide deposits (SLIDO 2027) at the base of the talus slope; and proposed tower 232/4 is located in landslide deposits between the canal and the Malheur River. Proposed towers 233/1 to 233/3 are located in the slumped volcanic rocks (SLIDO 2030) on the eastern/southern side of the river.

On November 17, 2011, a site visit of this landslide area was conducted by walking along the access road on the southeast side of the Malheur River from the eastern end of SLIDO 2030. Since the Oregon Canal is constructed on SLIDO 2027, these landslide deposits are potentially relatively stable. More detailed reconnaissance of the area should be performed as part of the geotechnical explorations.

E.2.30 MLS-002

MLS-002
Northing: 4842280
Easting: 486369
Sheet 26

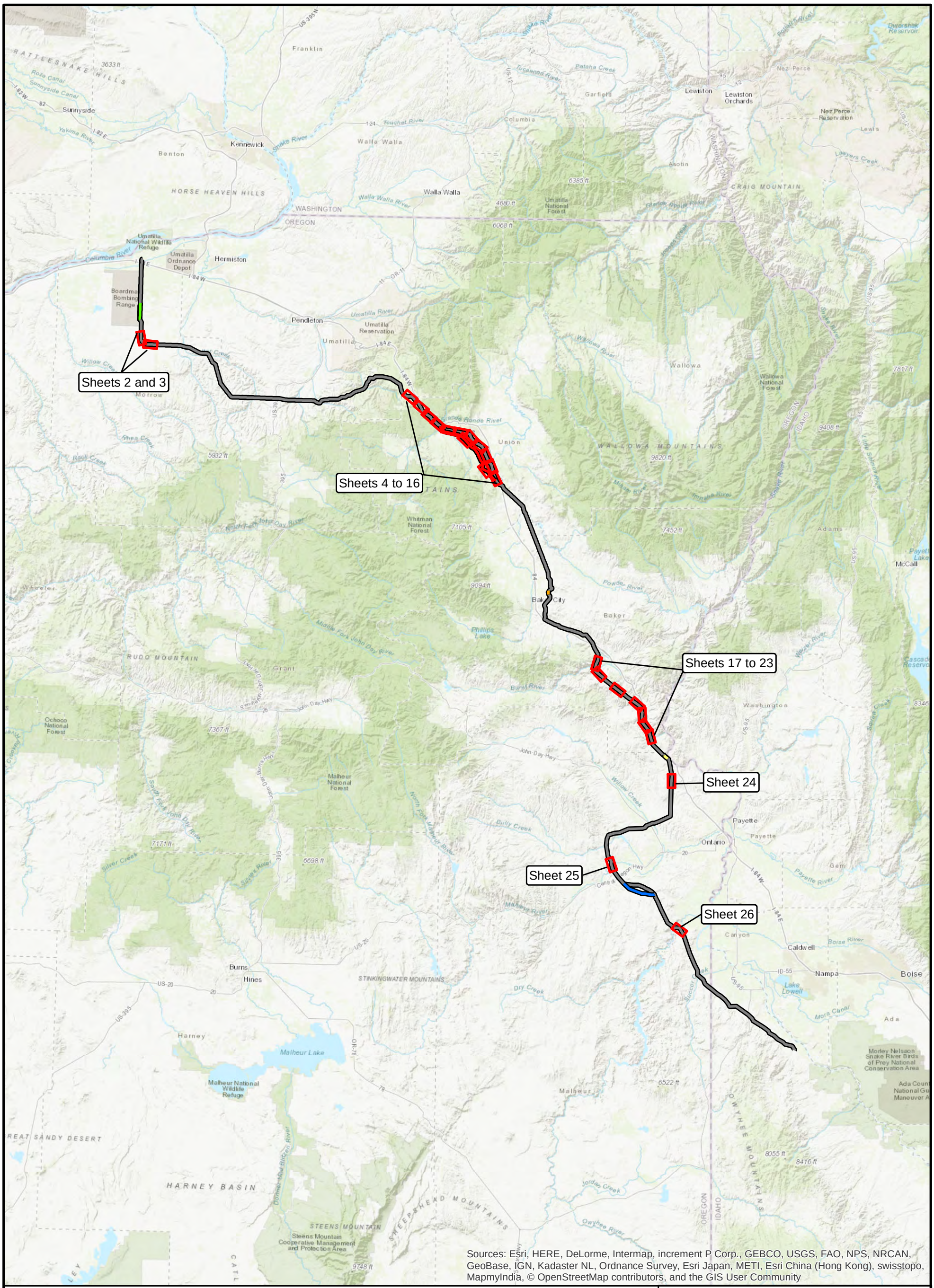
MLS-002 is not included in SLIDO but is on the 1:24,000 scale *Geologic Map of Owyhee Dam Quadrangle* (Ferns, 1989). IPC Proposed Route tower 256/2 and its associated work area are located on the eastern margin of the mapped landslide. This landslide complex was observed from Owyhee Lake Road during a site visit on October 2, 2011. A canal and aqueduct are located on the bluff immediately above the landslide, and a siphon pipe that crosses the Owyhee River Canyon is located along the western edge of the landslide complex. The presence of the water facilities and roads suggests that this landslide is relatively stable. However, more detailed reconnaissance of the area should be performed as part of the geotechnical explorations.



Photo 4: View of MLS-002 looking southeast from Owyhee River Road.

TABLE E1: LANDSLIDE DATA FOR MULTI-USE AREAS LOCATED OUTSIDE MAP BOUNDARIES

Multi-Use Area	Northing (meters)	Easting (meters)	SLIDO ID	Distance to Multi-Use Area (feet)	Direction from Multi-Use Area	Map Unit Label	SLIDO Type	Likely Hazard
MU BA-04	4936252	461150	AshlRP1966_1103	1,800	NW	Qal	Fan	none
MU BA-04	4936252	461150	ProsHJ1967_1148	1,190	N	Qal	Talus-Colluvium	none
MU BA-04	4936252	461150	ProsHJ1967_1149	2,430	SW	Qal	Talus-Colluvium	none
MU BA-05	4921133	473443	BrooHC1979a_1707	1,078	SW	Qls	Landslide	low
MU BA-06	4911097	478177	BrooHC1979a_3463	890	W	Qtg	Talus-Colluvium	none
MU MA-07	4839634	492740	FernML1993a_2070	1,460	SW	Qls	Landslide	none
MU MO-02	5051813	301969	MadiIP2007_43	330	W	Qf	Fan	none



LEGEND

- IPC Proposed Route
- West Bombing Range Road Alternative 1
- West Bombing Range Road Alternative 2
- Morgan Lake Alternative
- Proposed 230-kV Rebuild
- Proposed 138-kV Rebuild
- Double Mountain Alternative
- Map Sheets

0 20 40 Miles

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

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- Structure Work Areas

ROADS

- New, Bladed
- New, Primitive
- Existing, Moderate to Extensive Improvements
- No Substantial Improvements
- Primary US and State Highways
- Railroad

MAPPED FEATURE ORIGIN

- Published Mapping
- SLIDO (Pre 3.4)
- Field, LiDAR, and Photo Mapping

SLIDO 3.4 CLASSIFICATION

- Fan
- Landslide
- Talus - Colluvium

MAPPED SLIDE FEATURES

- Flow Direction
- Scarp
- Feature Limits

N E S W

0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

LANDSLIDE INVENTORY

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- Field, LiDAR, and Photo Mapping

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MAPPED SLIDE FEATURES

- Flow Direction
- Scarp
- Feature Limits

N W E S

0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

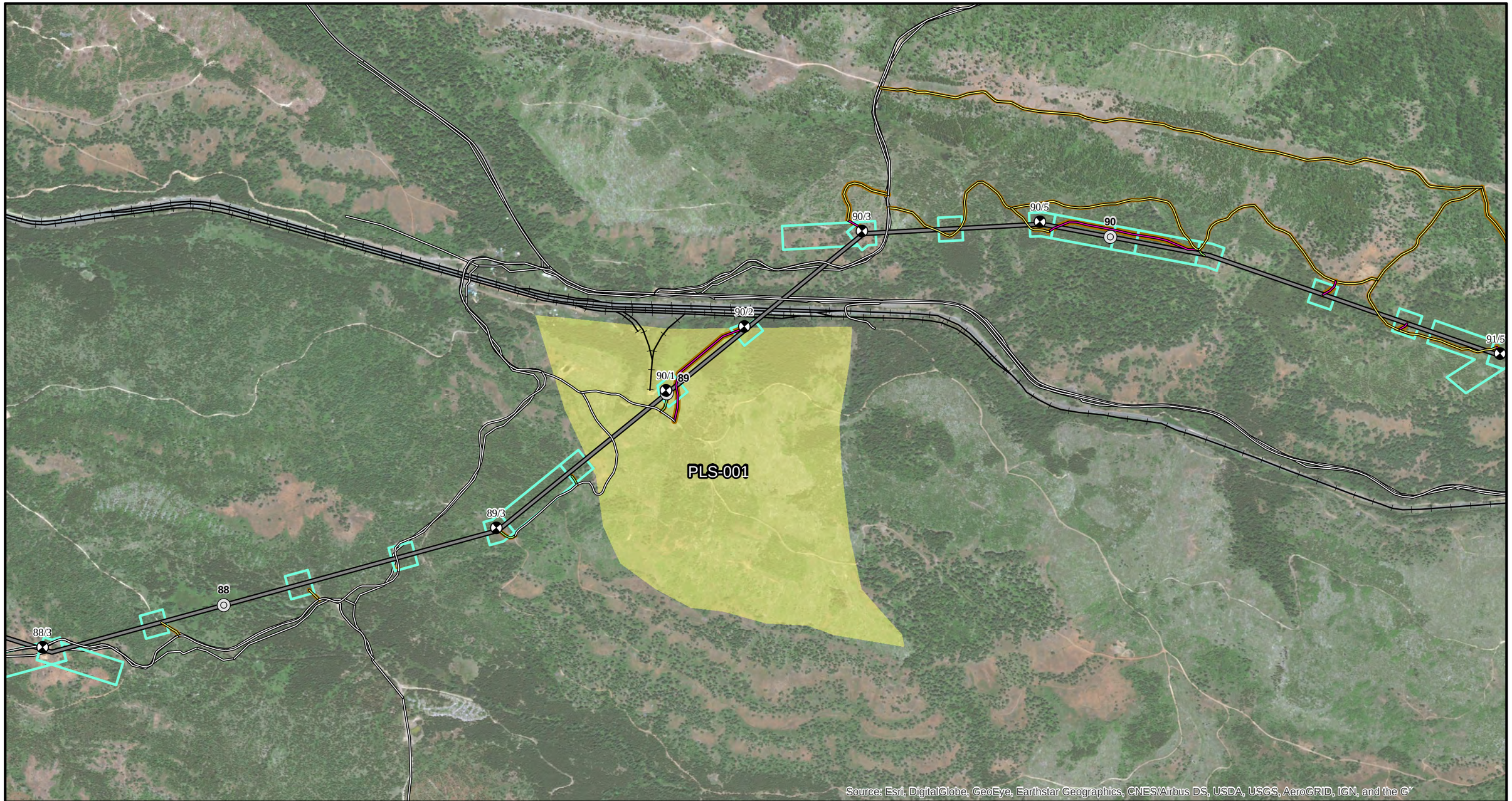
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- Feature Limits

0 1,000 2,000 Feet

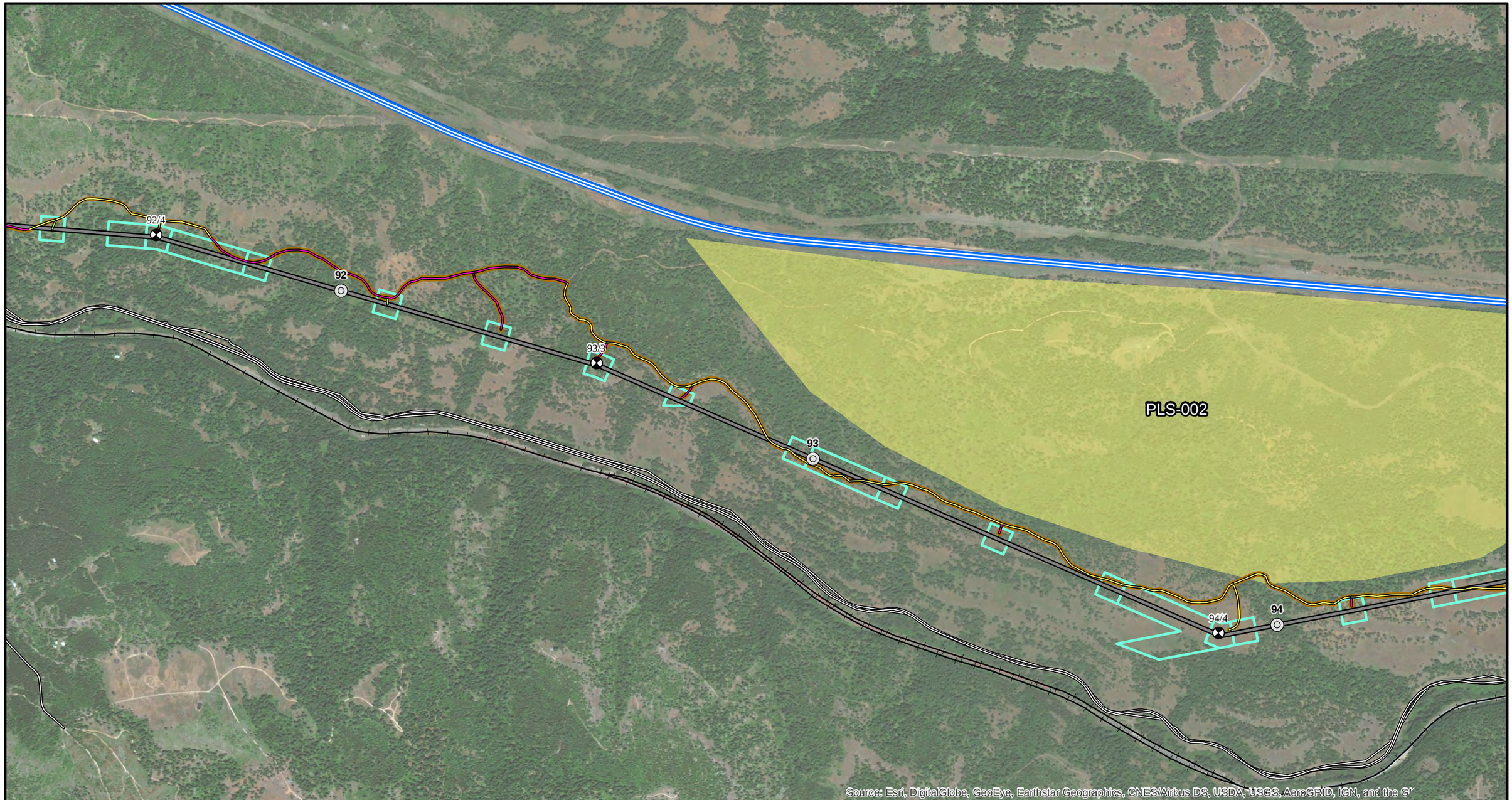
Boardman - Hemingway
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Oregon - Idaho

LANDSLIDE INVENTORY

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SLIDO 3.4 CLASSIFICATION

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MAPPED SLIDE FEATURES

- Flow Direction
- Scarp
- Feature Limits

0 1,000 2,000 Feet

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Oregon - Idaho

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SL006-0248-02LW1

SL006-0250-15LW1

PLS-002

95/3

95/4

95

96/4

96/5

96

97/1

97

SLIDO 10

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the G

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SLIDO 3.4 CLASSIFICATION

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MAPPED SLIDE FEATURES

- Flow Direction
- Scarp
- Feature Limits

0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

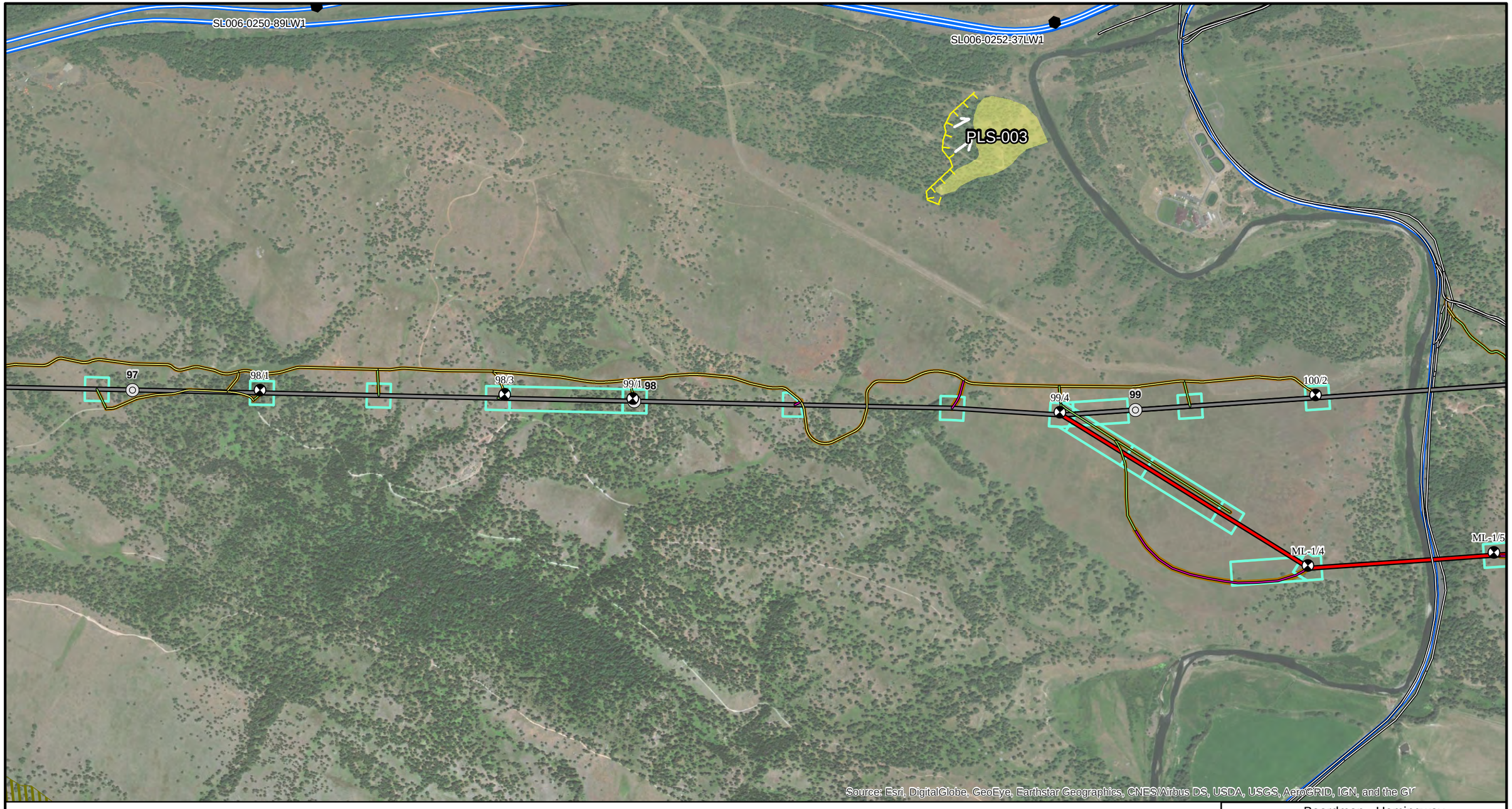
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- Feature Limits

0 1,000 2,000 Feet

Boardman - Hemingway
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Oregon - Idaho

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SLIDO 303
SLIDO 138
SLIDO 136
SLIDO 134
Schlicker and Deacon, 1971
100/3
100
101/1
101
102
ML-1/5
1
ML-2/3
2
3
ML-4/1
ML-4/2
ML-4/3
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS Us

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- Talus - Colluvium

MAPPED SLIDE FEATURES
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N W E S

0 1,000 2,000 Feet

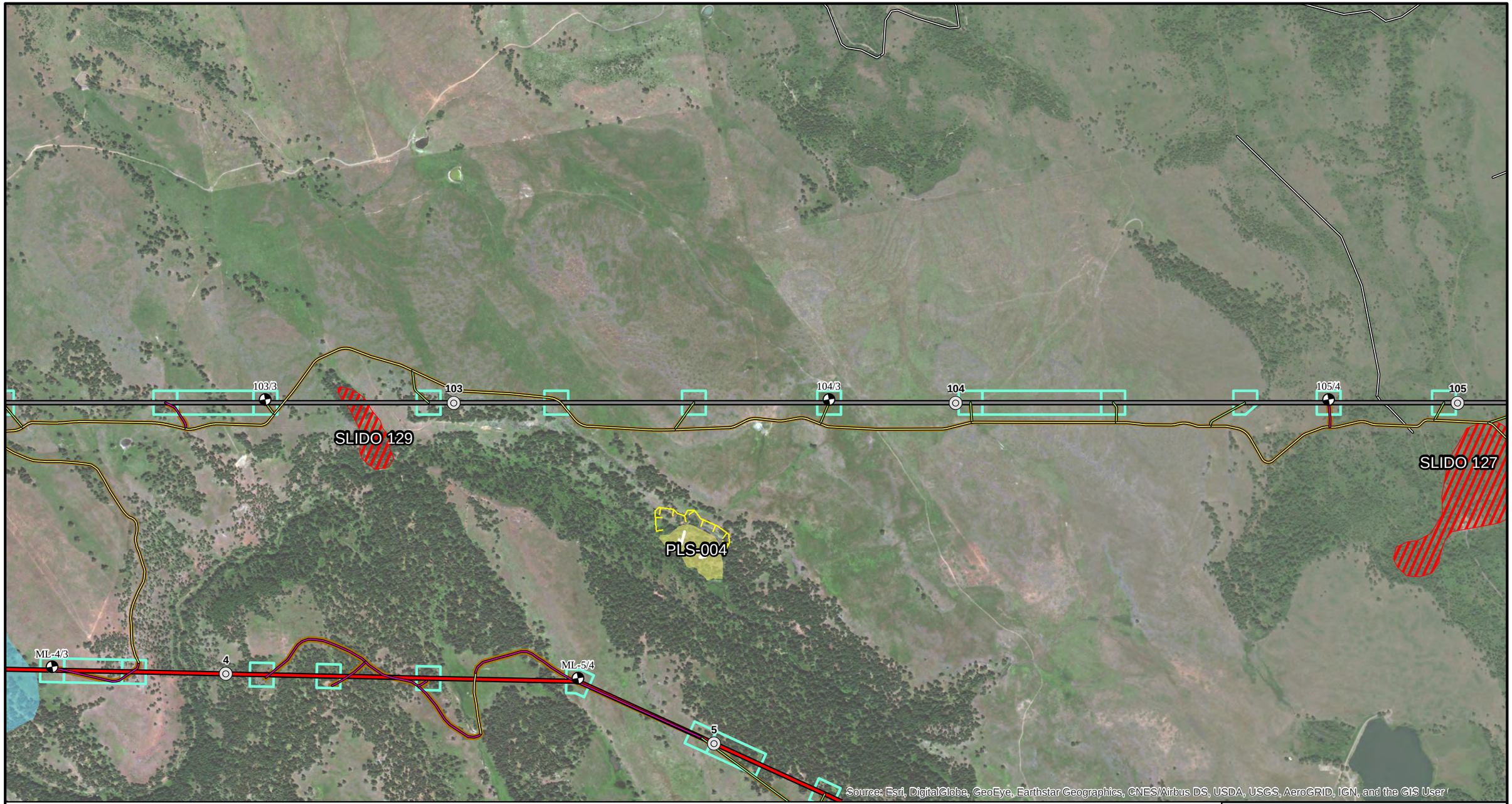
Boardman - Hemingway
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Oregon - Idaho

LANDSLIDE INVENTORY

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SLIDO 3.4 CLASSIFICATION

- Fan
- Landslide
- Talus - Colluvium

MAPPED SLIDE FEATURES

- Flow Direction
- Scarp
- Feature Limits

N W E S

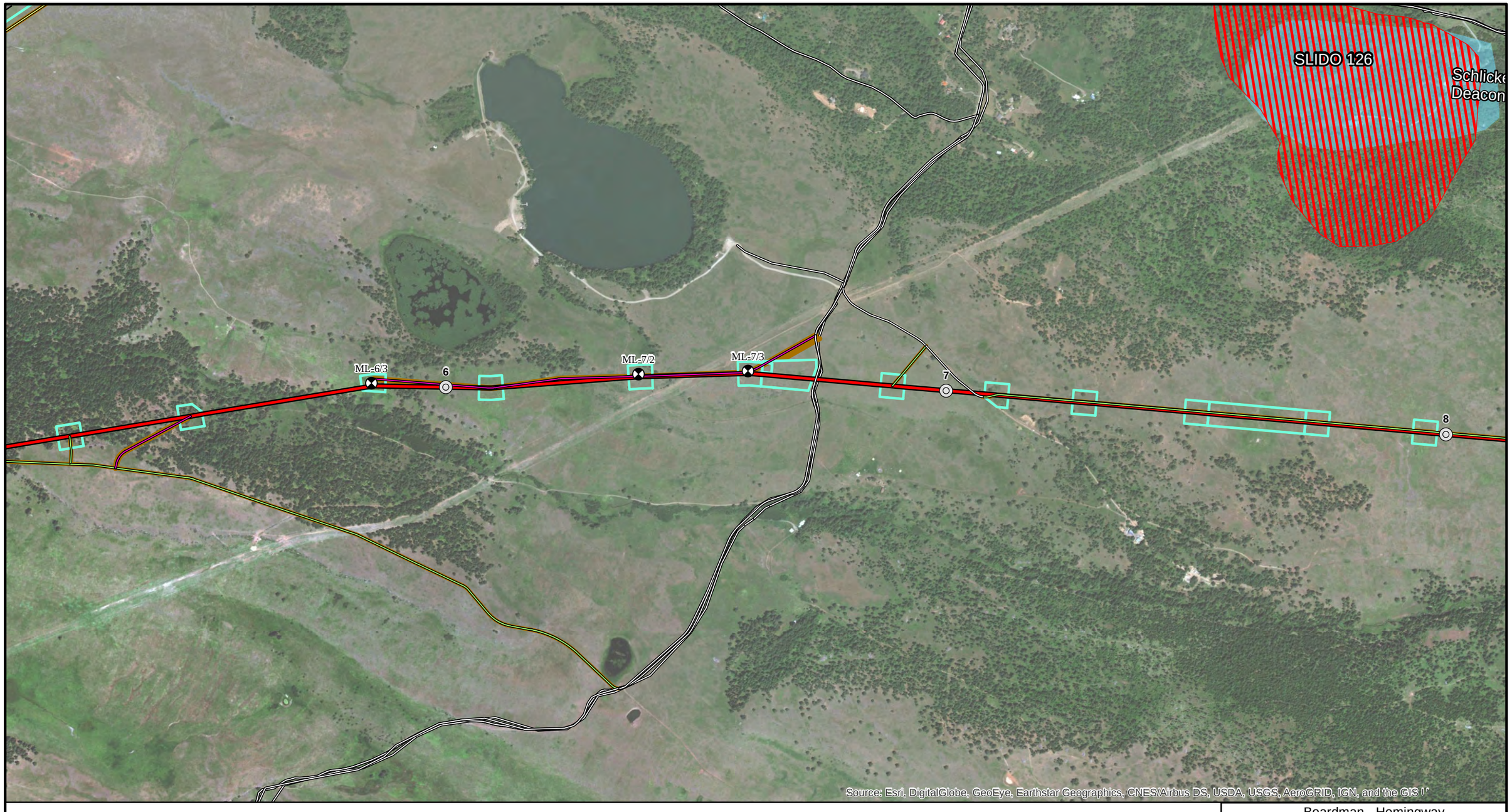
0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

LANDSLIDE INVENTORY

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MAPPED SLIDE FEATURES

- Flow Direction
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- Feature Limits

0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
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SLIDO 332
SLIDO 351
Schlicker and Deacon, 1971
Schlicker and Deacon, 1971
Schlicker and Deacon, 1971
Schlicker and Deacon, 1971
SLIDO 380
106/3
106
105
107
108
SLIDO 127
SLIDO 126
Schlicker and Deacon, 1971
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

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MAPPED SLIDE FEATURES
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0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

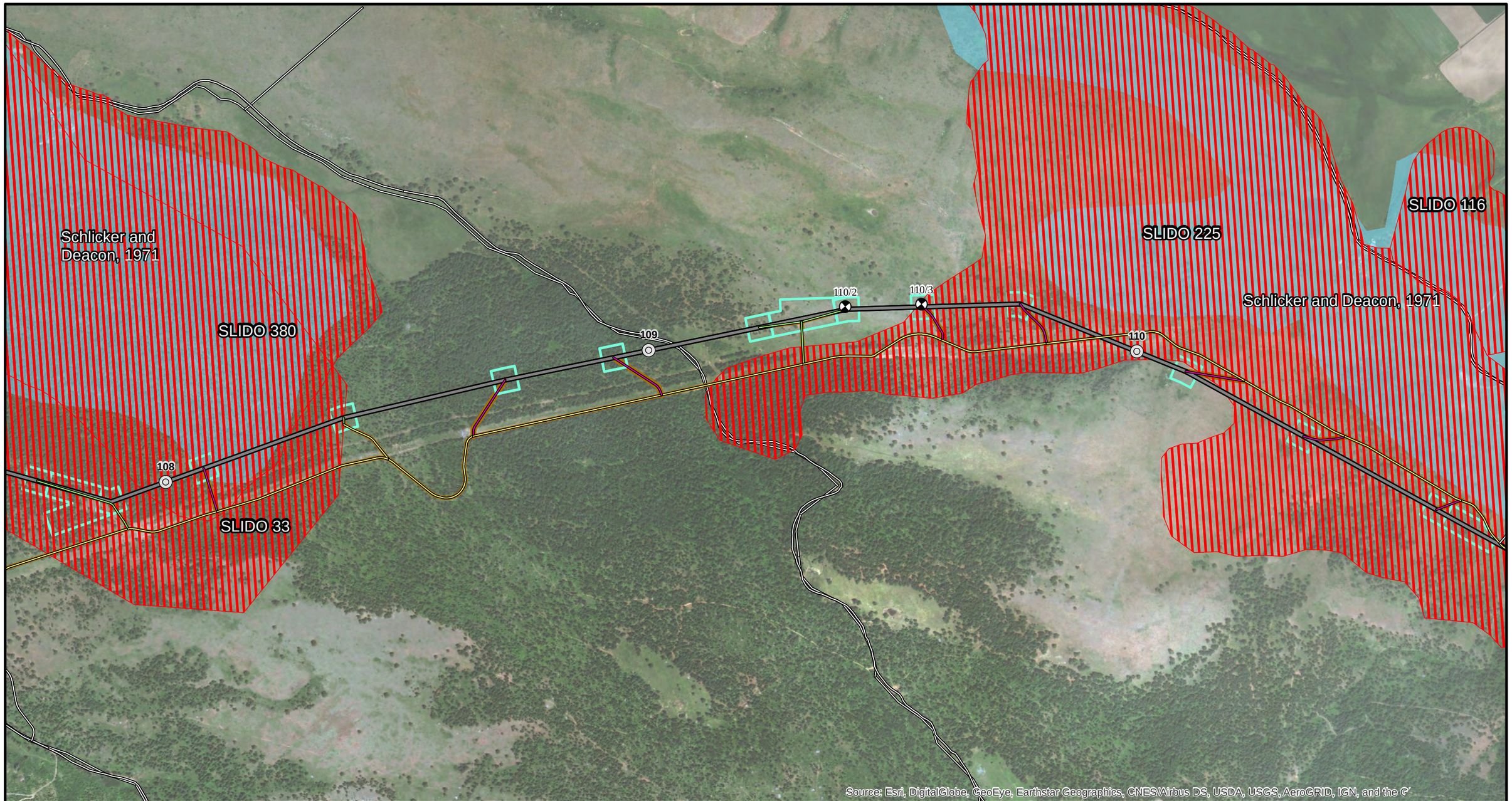
LANDSLIDE INVENTORY

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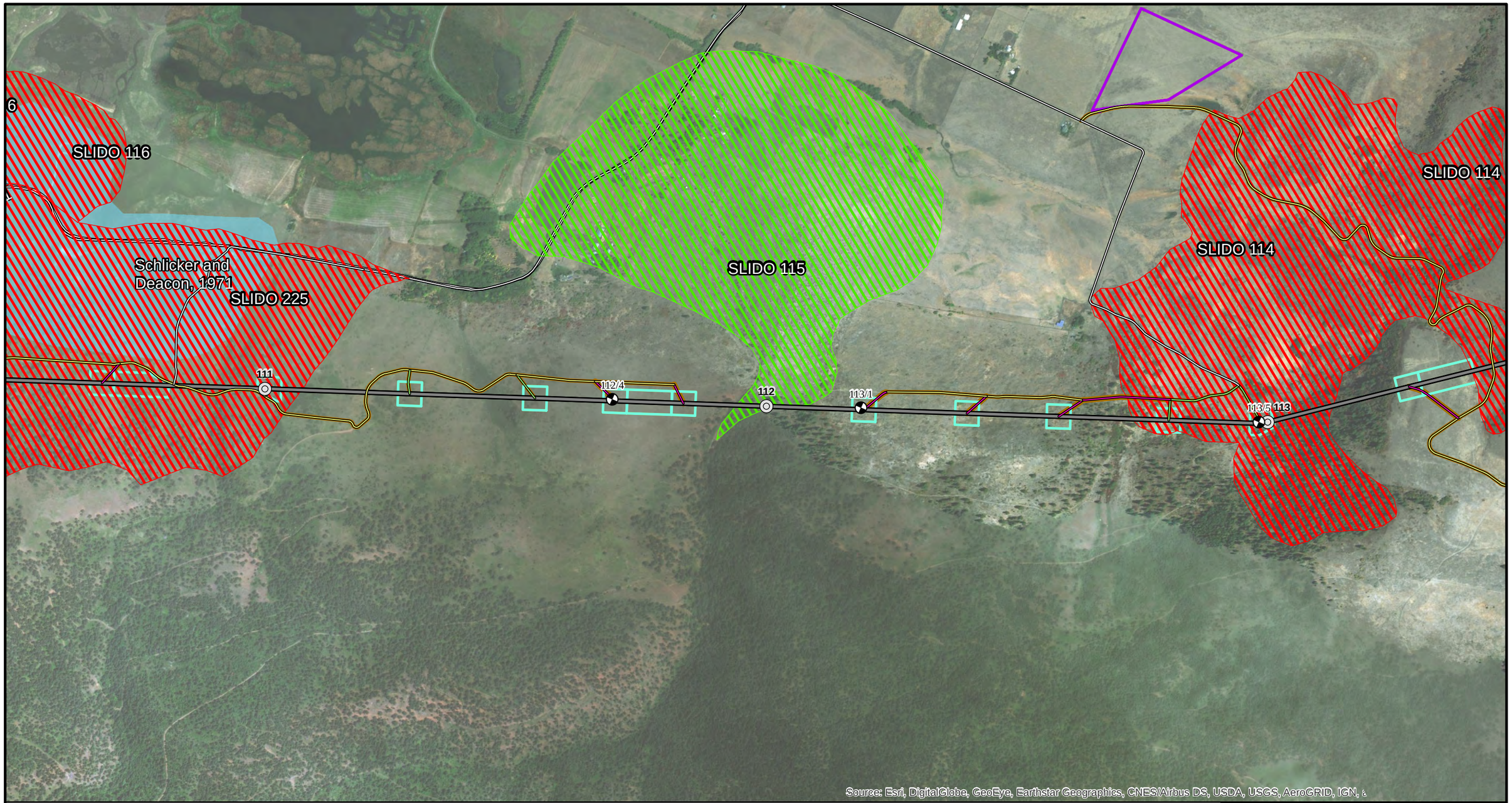
LANDSLIDE INVENTORY

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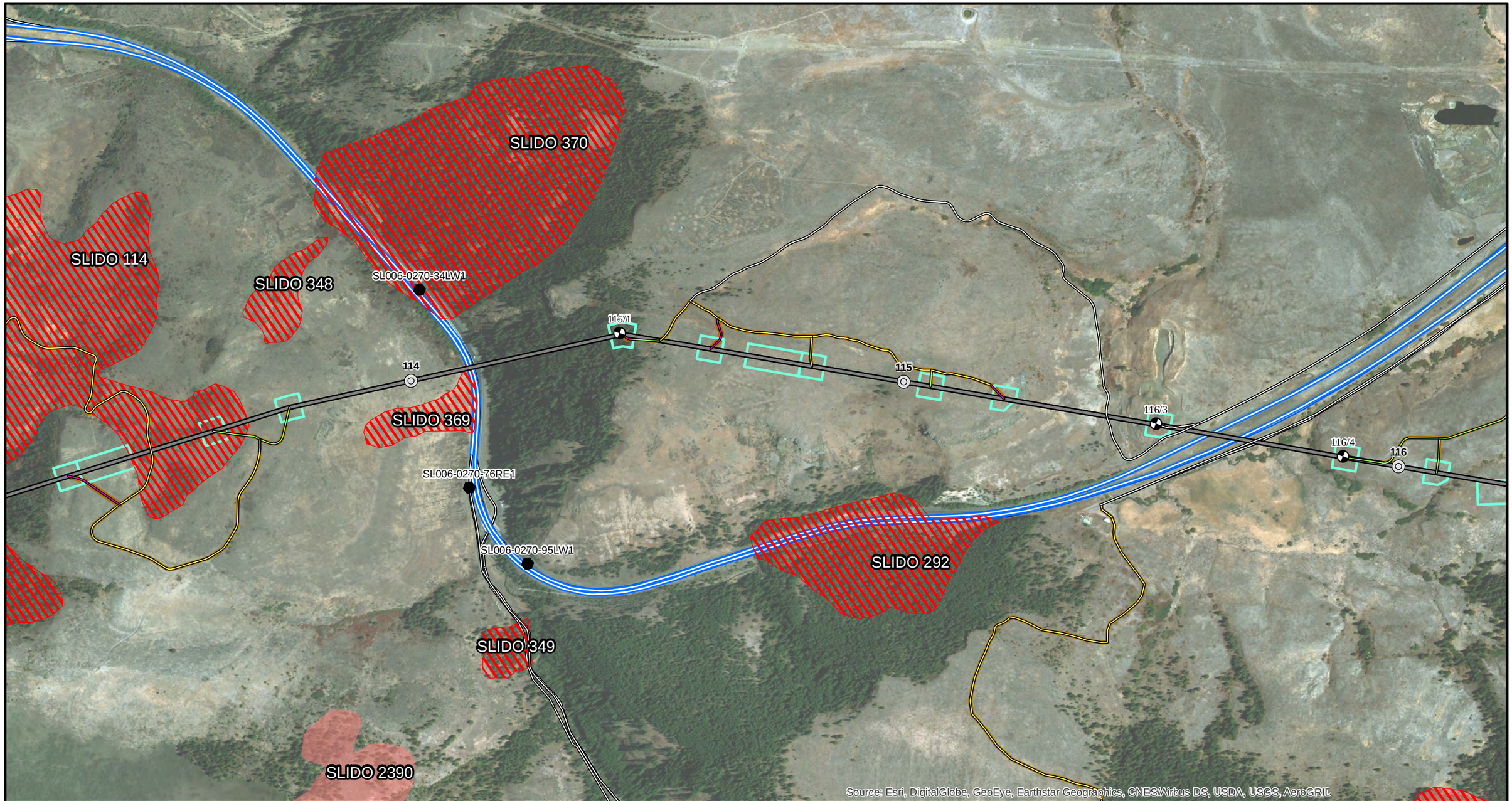
LANDSLIDE INVENTORY

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LEGEND

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SLIDO 3.4 CLASSIFICATION

- Fan
- Landslide
- Talus - Colluvium

MAPPED SLIDE FEATURES

- Flow Direction
- Scarp
- Feature Limits

0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

LANDSLIDE INVENTORY

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SLIDO 117

SLIDO 112

SLIDO 293

ML-14/3

14

ML-15/2

ML-15/4

15

ML-16/1

ML-16/4

16

ML-17/2

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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SLIDO 186
SLIDO 185
SLIDO 311
SLIDO 2282
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SLIDO 2280
SLIDO 2279
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SLIDO 056
SLIDO 112
SLIDO 48
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117/2
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ML-19/1
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ML-17/2

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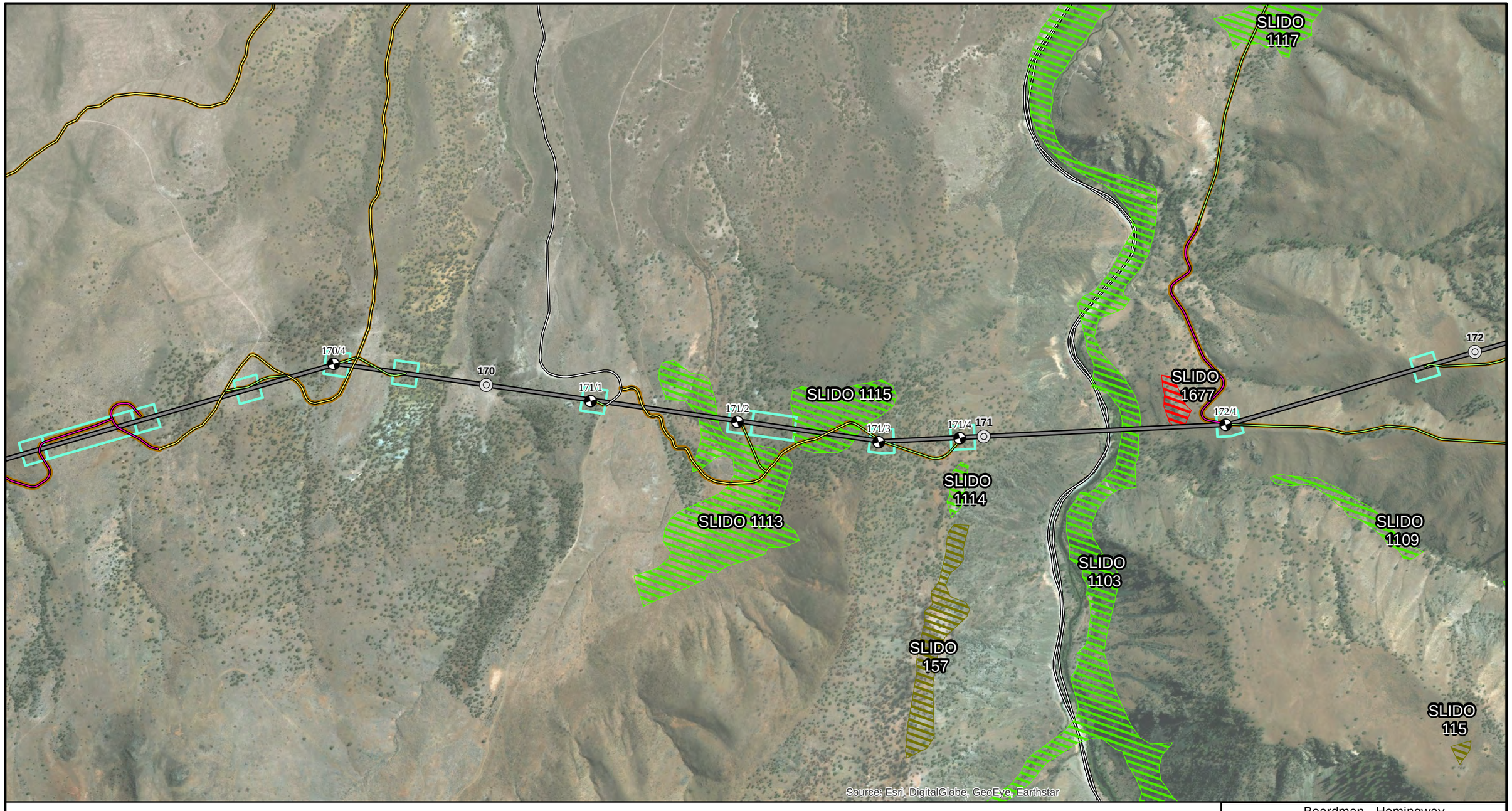
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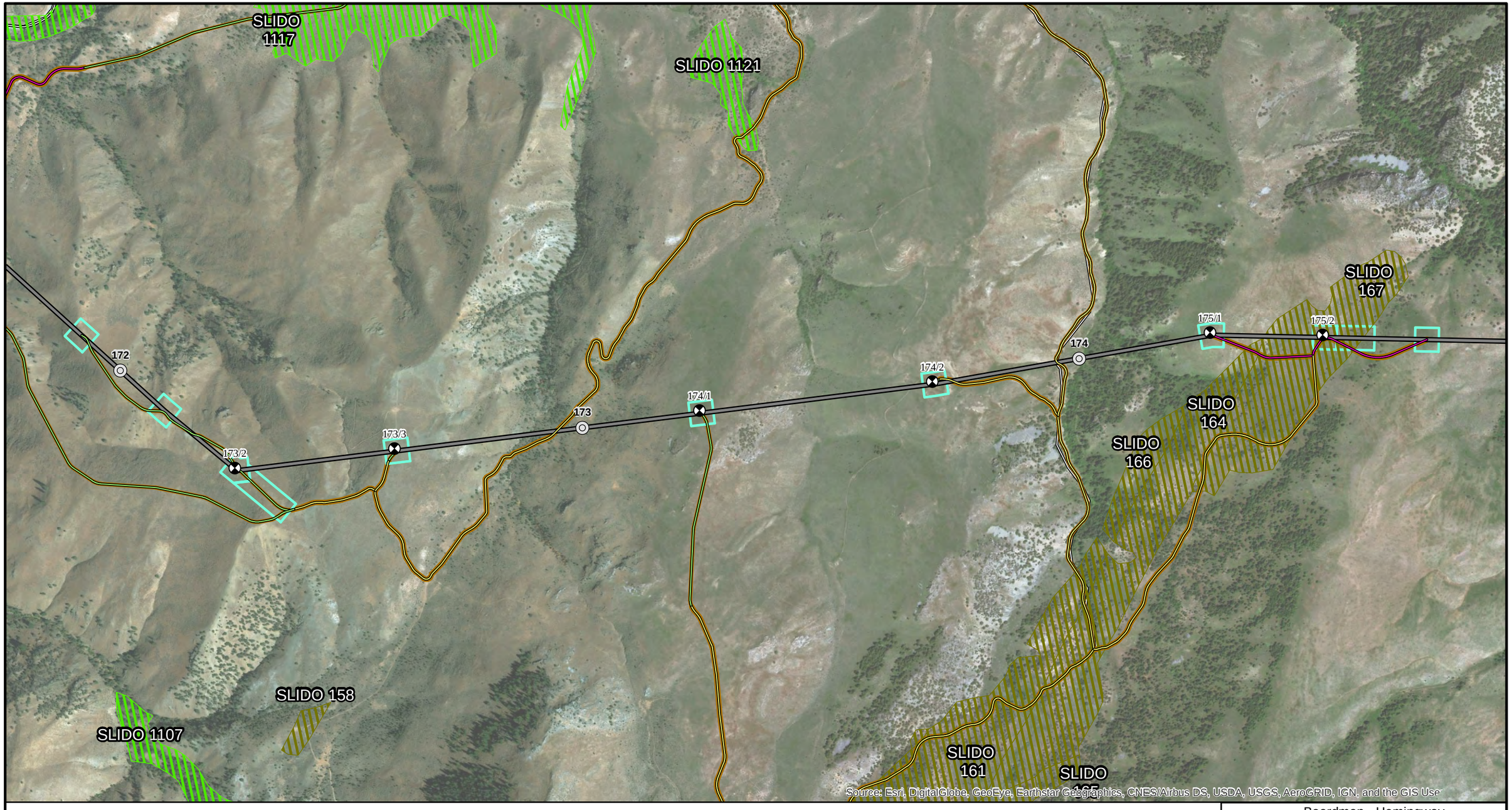
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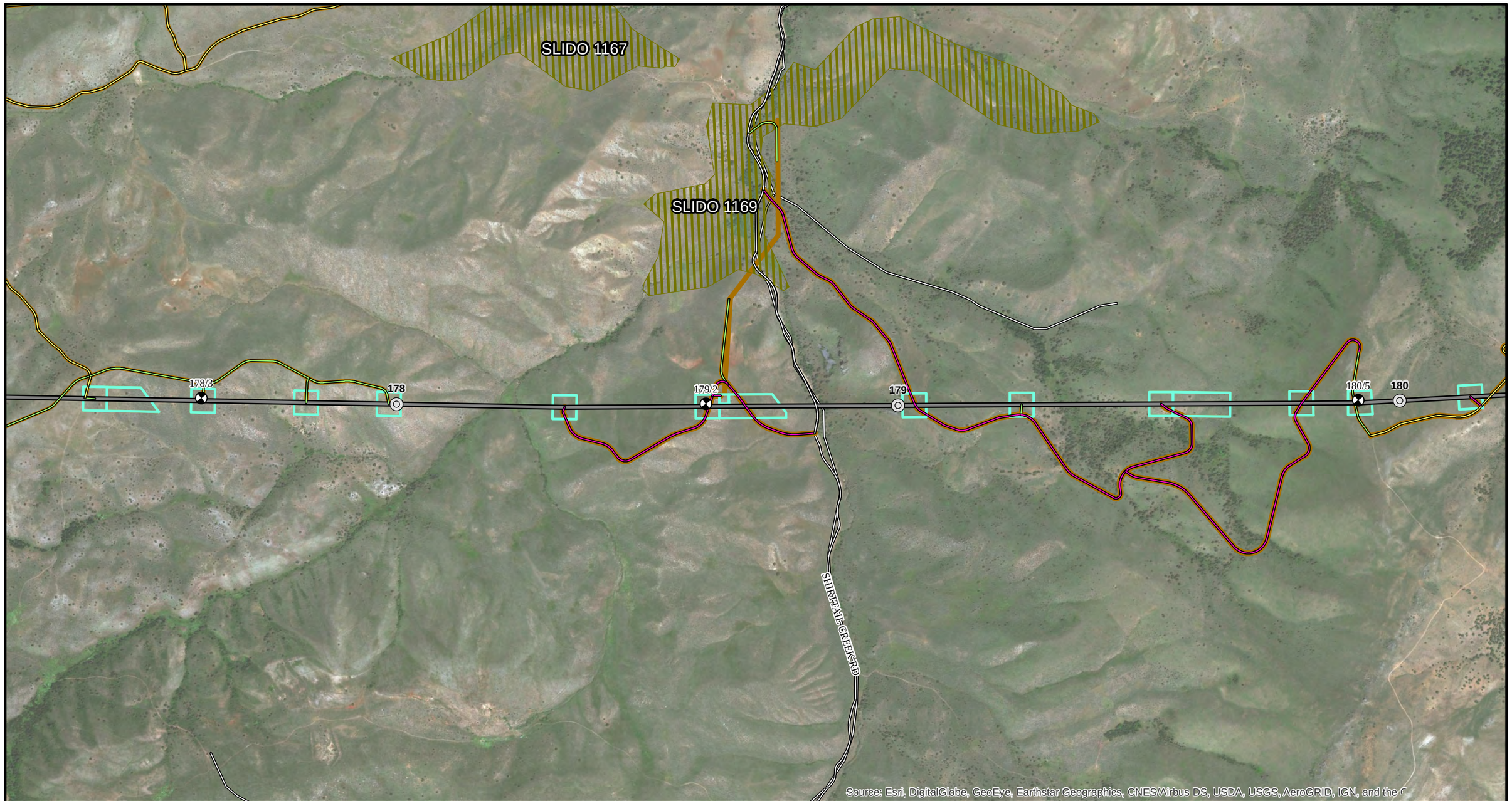
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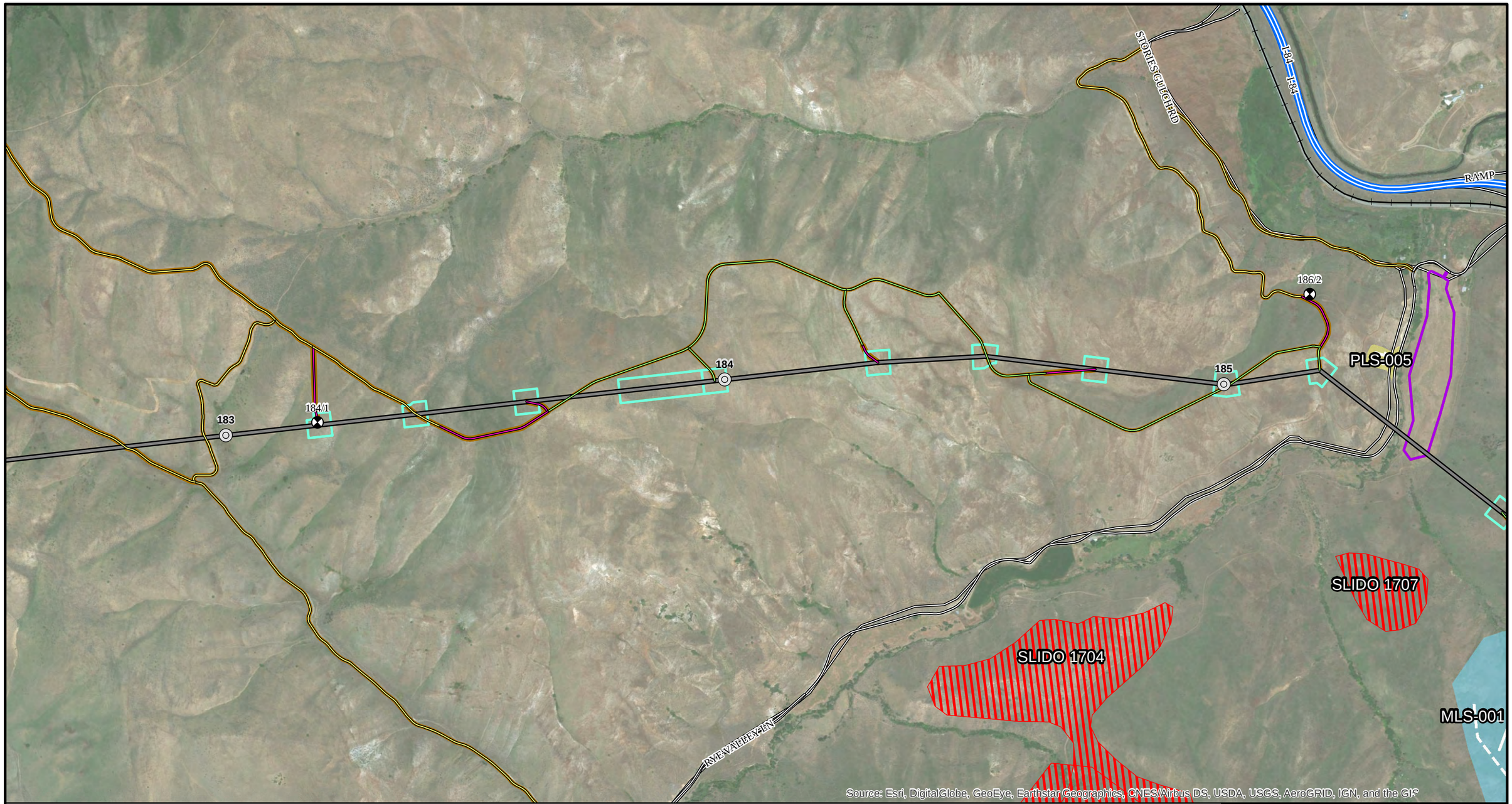
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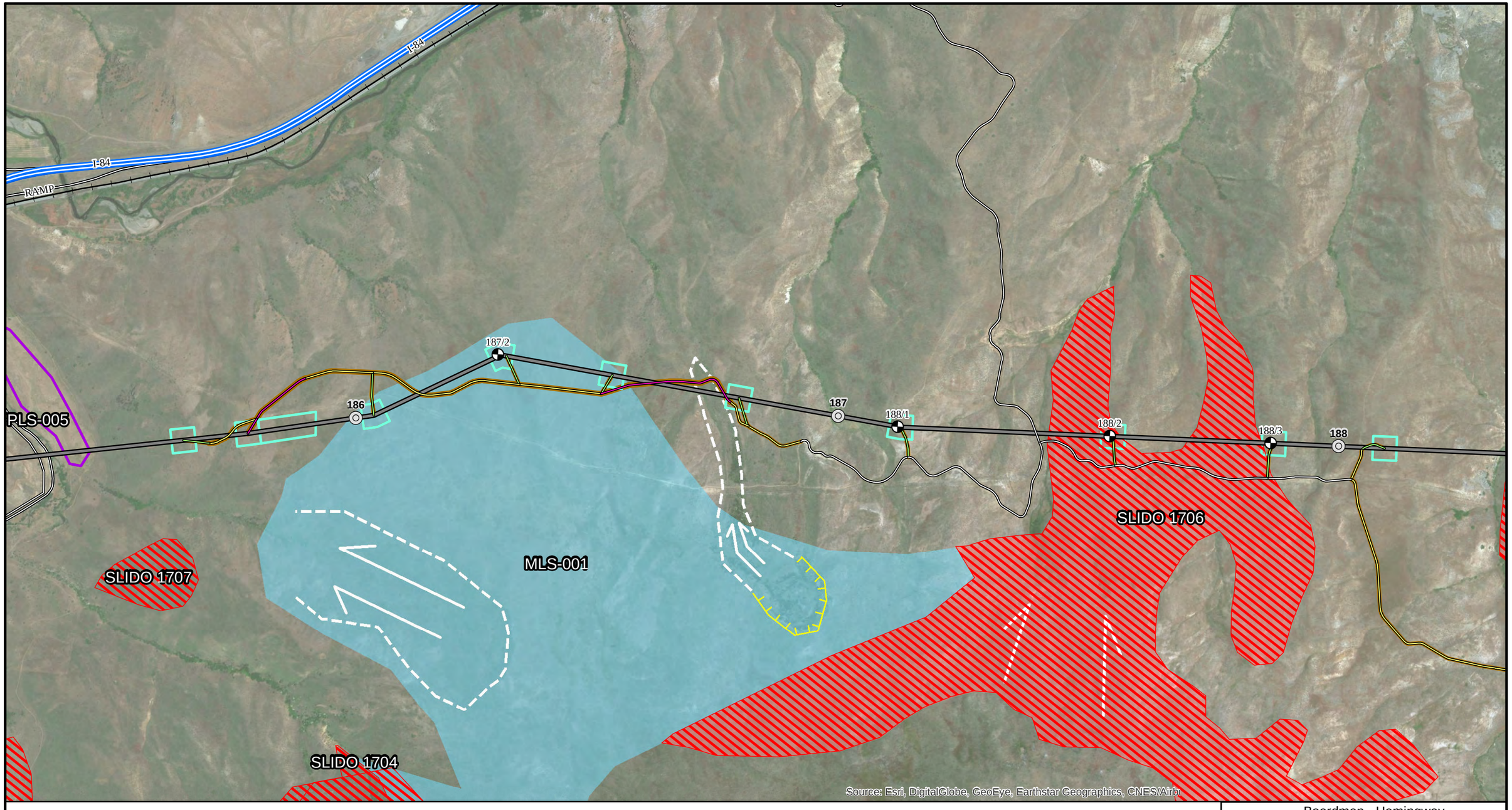
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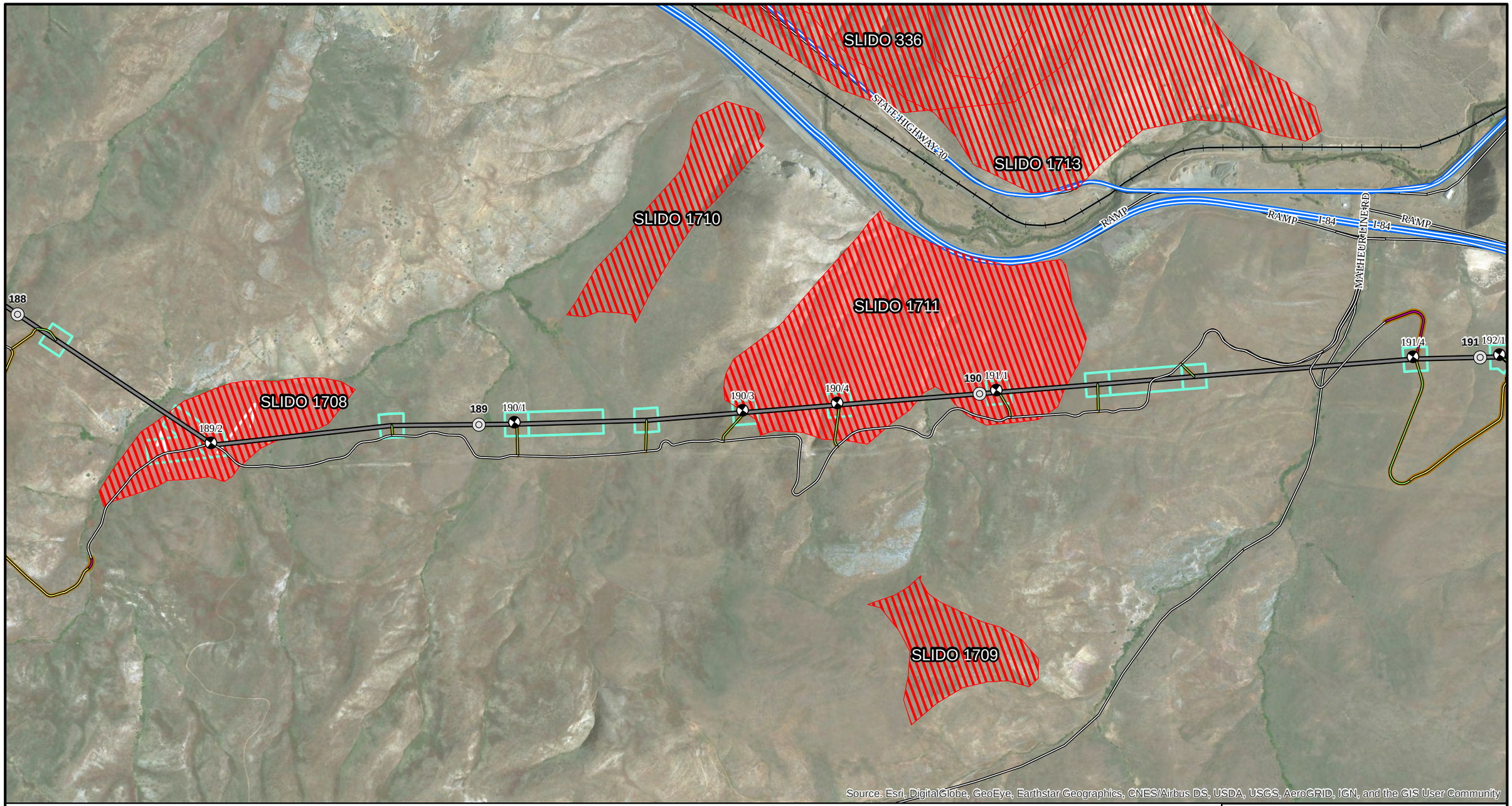
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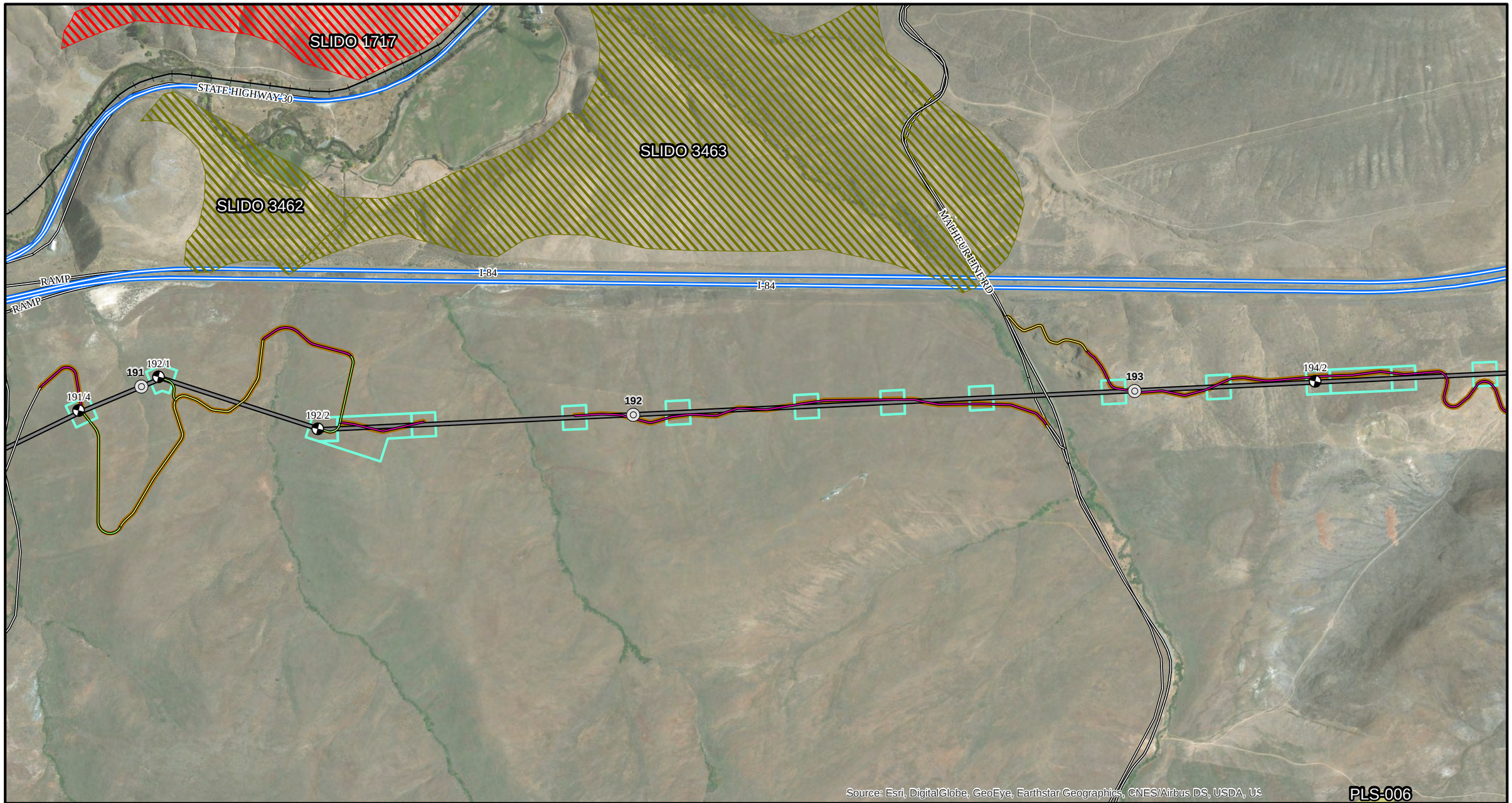
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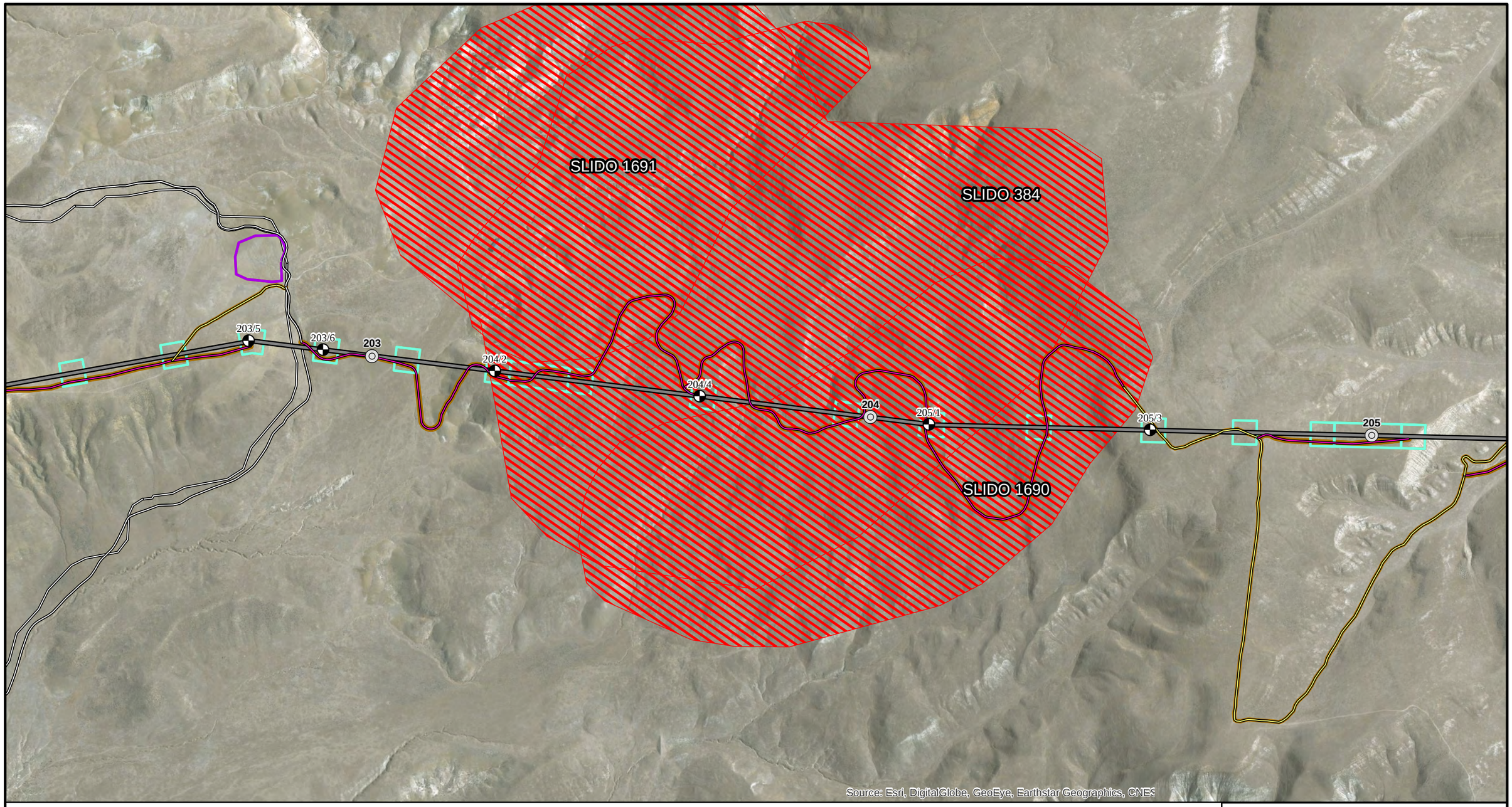
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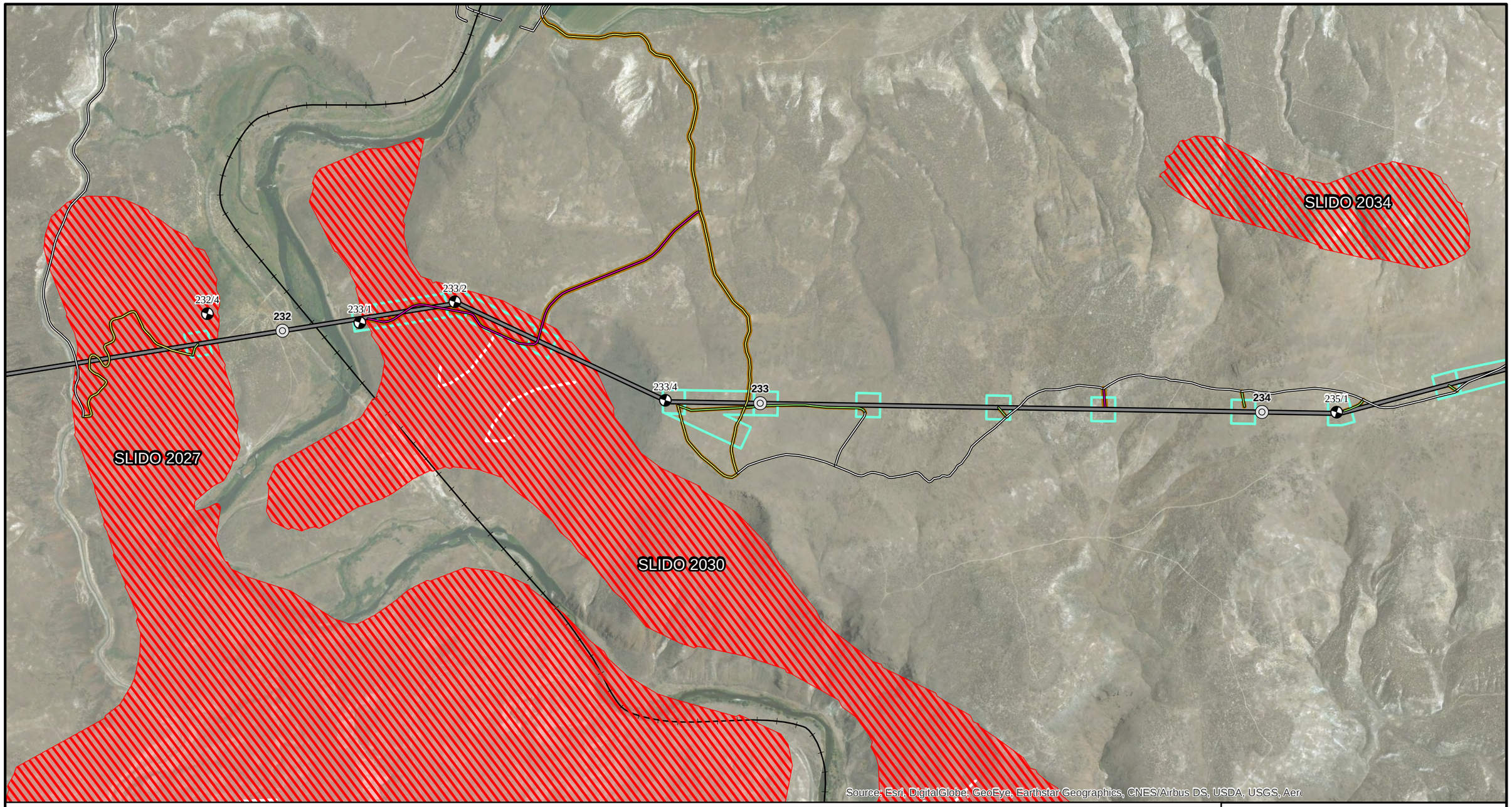
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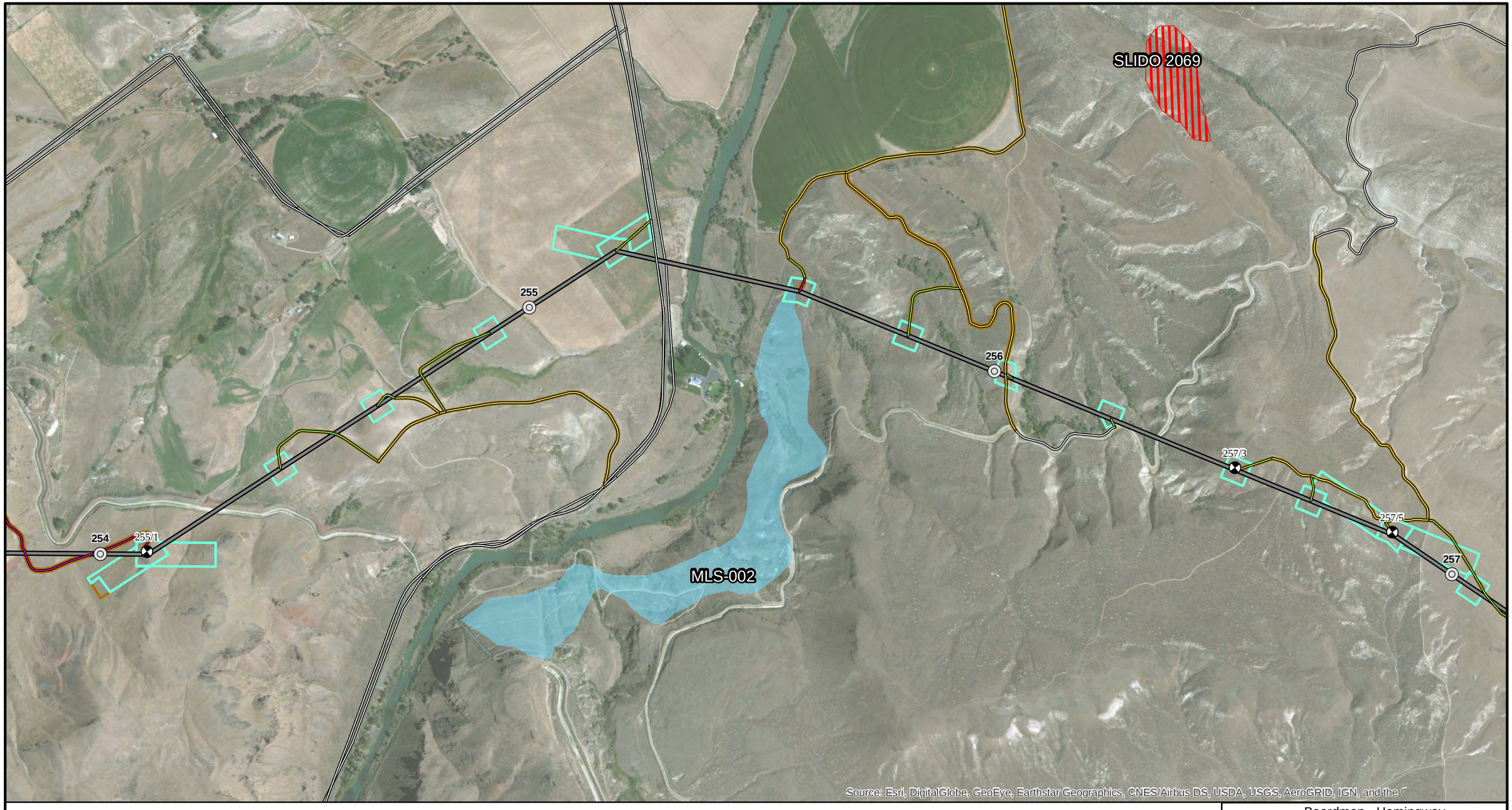
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APPENDIX F

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL / ENVIRONMENTAL REPORT

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

ATTACHMENT H-2
LETTER TO DOGAMI

17 December 2012

Mr. Bill Burns
Oregon Department of Geology and Mineral Industries
800 NE Oregon Street, #28
Portland, OR 97232

Subject: Boardman to Hemingway Transmission Line Project. Evidence of DOGAMI Consultation.

Dear Mr. Burns:

As you are aware, Idaho Power Company (IPC) is proposing to construct a transmission line (Boardman to Hemingway Project, Project, or B2H) from the Grassland Substation near Boardman, Oregon to the Hemingway Substation in southwest Idaho. The Project will comprise 298.6 miles of single-circuit 500-kV electric transmission line, 5.0 miles of existing 138- and 69-kV transmission lines rebuilt onto double-circuit structures, and 0.3 mile of 138-kV transmission line. The purpose of IPC's proposed Project is to provide additional capacity connecting the Pacific Northwest and the Intermountain regions of southwestern Idaho to alleviate existing transmission constraints and ensure sufficient capacity to meet present and forecasted load requirements. Federal and state laws require IPC to plan for and meet load and transmission requirements. The Project has been selected by IPC as a critical component in an overall resource portfolio that best balances cost, risk, and environmental concerns.

IPC is currently seeking permits for the Project via Oregon's Department of Energy, Energy Facilities Siting Council (EFSC). Oregon Administrative Rule OAR 345-021-0010(1)(h) requires information be provided to meet EFSC's Structural Standard (OAR 345-022-0020). To meet this standard, IPC is preparing an Exhibit H report. One of the requirements stated in Exhibit H (OAR 345-0021-0010(1)(h)(C) is to provide evidence of consultation with Oregon Department of Geology and Mineral Resources (DOGAMI).

DOGAMI and the Oregon Department of Energy were consulted at an in person meeting on April 4, 2011 in Portland, Oregon. We recognize the following comments made by DOGAMI at that meeting:

1) The SLIDO (Statewide Landslide Inventory Database for Oregon) was being updated based on new LIDAR data, and you requested that the updated SLIDO II data should be incorporated into the geotechnical hazard assessment and engineering design prior to construction.
2) Geological and soil hazard analysis is not required at each tower location. The degree of investigation should be contingent on the type of hazards present, facility to be constructed, and potential danger to human safety. The degree of analysis will vary across the Project corridor.

1221 W. Idaho St. (83702)
P.O. Box 70
Boise, ID 83707

3) The most recent IBC and Oregon Structural Specialty Code (OSSC) requirements should be used although current Oregon Administrative Rules reference historical IBC requirements.
4) You were aware that in transmission line construction, design for wind and ice forces is more than sufficient to account for typical seismic forces.
5) A detailed geotechnical plan may be submitted concurrently with the Application for Site Certification (ASC) and the Engineering Geologic Report for the Project may be submitted after filing the ASC.
6) Exhibit H should contain as much detail as possible. DOGAMI will only review Exhibit H and its Attachment so reference should not be made to other documents.
7) You indicated that the April 2011 meeting would satisfy the requirements of DOGAMI consultation.

To further inform DOGOMI about the Project, IPC has prepared an Engineering Geology and Seismic Hazards Supplement that provides an analysis of geologic features along the Project's proposed routes (Attached). The desk top study presents the regional geologic and tectonic setting, seismic hazards, and non-seismic geologic hazards that could affect the Project. The Engineering Geology and Seismic Hazards Supplement was based on review of literature and existing mapping. The desktop geology report will be an attachment to Exhibit H of the preliminary Application for Site Certificate that IPC will submit to the ODOE in February 2013.

To continue the consultation with DOGAMI, this letter provides an additional opportunity for any further DOGAMI comments that may have been considered since the April 2011 meeting. Please contact us if you have additional comments. Alternatively, we propose to use this letter to serve as documentation of the DOGAMI consultation.

We appreciate your attention to this matter and look forward to any additional comments. If you have any questions, please contact us at your convenience.

Respectfully submitted,

Todd Adams
Project Manager

Attachments: Desktop Geologic Report