Appendix E
Landslide Inventory

APPENDIX E - LANDSLIDE INVENTORY

TABLE OF CONTENTS

Page

List of Figures

APPENDIX E
LANDSLIDE INVENTORY

E1 INTRODUCTION

This appendix presents summary information and site maps of each landslide that was identified along the IPC Proposed Route, IPC Alternate and NEPA Alternate route alignments, and certain other landslides within 1-mile-wide alignment corridors that could potentially affect the stability of tower foundations. The majority of the transmission line routes were reviewed, and landslides compiled by Shaw Environmental & Infrastructure, Inc. (Shaw), and the findings of their research were first presented in their Desktop Geotechnical Report, dated January 19, 2012. Landslides along subsequent new alignments, such as the IPC Willow Creek Alternate and the NEPA Flagstaff Alternate, as well as changes to the previous alignments, were compiled by Shannon & Wilson, Inc. (S&W). Data for the new alignments and changes to the previous alignments are integrated with the IPC Proposed Route in this appendix. The landslide inventory was compiled from the following data sources:

- GIS files compiled by Oregon Department of Geology and Mineral Industries (DOGAMI) in the 2008 Statewide Landslide Information Database for Oregon (SLIDO-1); Initially reported in the Draft Desktop Geotechnical Report by Shaw, this data included a review of the landslides within a 1-mile wide route corridor;
- Geologic maps published by DOGAMI; map data was geo-referenced to confirm accurate location along the various routes; a search was made to verify that each map landslide was included in SLIDO-1 (2008) and the 2011 SLIDO release 2 (SLIDO-2);
- Site reconnaissance (by Shaw) of landslide locations conducted on October 26-28 and November 15-18, 2011. The second site visit was ended on November 18, 2011, due to access limitations resulting from snowfall and winter conditions;
- Site reconnaissance (by S&W) along new alignments and select changes conducted July 30 through August 2, 2012;
- Aerial Photograph review of 1:24,000 scale aerial photographs provided by 3Di, LLC of Eugene, Oregon (3Di), and the ESRI Microsoft Virtual Earth layer in GIS, and review of 1:24,000 USGS topographic quadrangle;.
- Review of the Digital Terrain Model (DTM) data provided by 3Di along 1-mile-wide route corridors;
- DOGAMI LiDAR Data Viewer (LiDAR data was only available for portions of the Kamelse, Hilgard, and Meacham Lake quadrangles).

A detailed summary of each mapped landslide which has been judged potentially capable of impacting the stability of one or more transmission line towers on the routes referenced above is presented below. Map Sheet 1 (following the text below) presents an index map to the Landslide Inventory Maps (Sheets 2 through 35). All recognized landslide features are shown within the limits of each map sheet, however, only those features judged potentially capable of impacting tower stability are discussed. The landslide descriptions and the map sheets are arranged from north to south, beginning in Morrow County, Oregon and ending in Malheur County, Oregon.

E2 LANDSLIDE DESCRIPTIONS

E2.1 SLIDO 1316

SLIDO 1316
Northing: 5051807
Easting: 298836
Sheets 2, 5

SLIDO 1316 is a broad gently sloping alluvial fan, and is not a landslide. A site visit was conducted on 11/18/2011.

E2.2 PLS-005

PLS-005
Northing: 5021676
Easting: 402123
Sheet 7

PLS-005 is a small (19-acre) potential landslide that was identified on the DOGAMI LiDAR Data Viewer. PLS-005 had not been verified in the field, and should not be considered to be a landslide based solely on interpretation of the LiDAR data. This small potential landslide is located approximately 1,000 feet east of proposed tower location 473, and will not impact the proposed alignment.

E2.3 SLIDO 2353

SLIDO 2353
Northing: 5018900
Easting: 406277
Sheets 8, 9

SLIDO 2353 (SLIDO2 FernML2010_130) is referenced at the scale of 1:100,000 (Ferns et al., 2010). However, this landslide (Holocene Qls) has been mapped at the scale of 1:24,000 and covers 132 acres (Barrash et al., 1980).

Proposed tower 490 is located within the landslide. Review of aerial photos, the DTM, and LiDAR images suggest that most of this landslide is relatively stable based on the roads and numerous trees present within the landslide mass. However, the LiDAR and DTM images show that proposed tower 490 is to be located on the left flank of a smaller and more recently active landslide within the larger mapped landslide.

This area was not accessible for a site visit. Tower location 490 should be further evaluated for slope stability when site access is allowed.

E2.4 PLS-003

PLS-003
Northing: 5018325
Easting: 408800
Sheet 9

PLS-003 is a small (9-acre) potential landslide that was identified on the DOGAMI LiDAR Data Viewer. PLS-003 had not been verified in the field, and should not be considered to be a landslide based solely on interpretation of the LiDAR data. This small potential landslide is located approximately 1,700 feet northeast of proposed tower location 496, and will not impact the proposed alignment.

E2.5 MLS-006

MLS-006
Northing: 5013225
Easting: 407245
Sheets 10, 11

MLS-006 is a small (98-acre) landslide that is not included in SLIDO, but is on the 1:24,000 scale *Geologic Map of the Hilgard Quadrangle* (Barrash et al., 1980). It is located 1,200 feet northwest of the proposed alignment route near tower locations 16-17. However, as mapped, this landslide will not affect the alignment.

E2.6 SLIDO 2390

SLIDO 2390
Northing: 5007537
Easting: 417623
Sheet 12

SLIDO 2390 (SLIDO2 FermML2010_114) is referenced at the scale of 1:100,000 (Ferns et al., 2010). However, 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). The geologic map shows the Baldy fault trending northwest through this location with Basalt of Glass Hill (Tgh) and Andesite of Craig Mountain (Tcm) on the down-dropped side and Grande Ronde Basalt (Tgr) on the uplifted footwall side. The DTM model shows what appears to be fault scarp (Baldy fault) at this location, but landslide deposit features are not apparent on the DTM or on aerial photos. Landslide deposits are shown approximately 2,500 east of this location on the Mill Creek Fault, and it appears likely SLIDO 2390 was inaccurately geo-referenced (Barrash et al., 1980). Several other landslides that are shown on the *Geologic Map of the Glass Hill Quadrangle* are either not included in SLIDO or appear to be poorly geo-referenced.

This area was not accessible for a site visit. However, even if a landslide is present at the location shown for SLIDO 2390, the nearest proposed tower (538) is located more than 500 feet uphill of the potential slide area and therefore should not affect the currently proposed alignment.

E2.7 SLIDO 2398

SLIDO 2398
Northing: 5004077
Easting: 419720
Sheet 13

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). The geologic map shows a contact between the Andesite of Craig Mountain (Tcm) and the Grande Ronde Basalt (Tgr) at this location (Barrash et al., 1980). Review of the topographic map, DTM, and aerial photos shows no evidence of a landslide at this location. However, volcanic rocks of the Andesite of Craig Mountain crop out along the western (uphill) boundary of SLIDO 2398, and the upper contact of the Grande Ronde Basalt is known to be landslide prone.

This area was not accessible for a site visit, and the GIS analysis of this location does not confirm the presence of a landslide. However, even if a landslide is present at this location, proposed tower location 551 is 175 feet uphill beyond the mapped extent of SLIDO 2398.

E2.8 SLIDO 48

SLIDO 48
Northing: 5002373
Easting: 419983
Sheets 13, 14

SLIDO 2398 (SLIDO2 FermML2010_109) is referenced at the scale of 1:100,000 (Ferns et al., 2010). However, 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). A unit mapped as soil (Qs) is present on the geologic map near this location (Barrash et al., 1980), and it appears that this unit may have been incorrectly entered in SLIDO as landslide deposits (Qls).

This area was not accessible for a site visit. However, review of the topographic map, the DTM, aerial photos, and the geologic map does not indicate the presence of a landslide.

E2.9 SLIDO 2280, 2282, 2279, 2281, 56

SLIDO 2280 AND 2282
Northing: 5001693
Easting: 421505
Sheet 14

SLIDO 2279
Northing: 5001494
Easting: 421225
Sheet 14

SLIDO 2281
Northing: 4999554
Easting: 422283
Sheets 14,15

SLIDO 56
Northing: 4998896
Easting: 421881
Sheet 15

SLIDO 2280 and 2282 are a single small landslide (12.7 acres) that is located on the boundary between the USGS Glass Hill and Craig Mountain quadrangles. The proposed alignment crosses this landslide between proposed towers 559 and 560. An existing road is present in the apparent head scarp area (near the 2280 and 2282 contact line).

Review of aerial photos and the DTM suggests that this landslide (SLIDO 2280 and 2282) represents a debris flow source area for landslide deposits and colluvium that have been deposited in SLIDO 2281, and that this area is relatively stable based on the presence of existing roads and trees within the landslide source area (SLIDO 2280 and 2282).

SLIDO 2279 is a small landslide located 500 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 560 and 561.

SLIDO 56 and 2281 are mapped as the same landslide complex with different boundaries. SLIDO 56 is referenced to the *Spatial Digital Database for the Geologic Map of Oregon* at the scale of 1:500,000 (Walker et al., 2002), and SLIDO 2281 is referenced at the scale of 1:24,000 (Ferns, et al., 2001). Portions of this landslide complex are also mapped at the scale of 1:24,000 on the *Geologic Map of Craig Mountain Quadrangle* and the *Geologic Map of the Glass Hill Quadrangle* (Barrash et al., 1980). The northern portion of this landslide complex (north of tower 562) was mapped as colluvium by Barrash, et al. (1980).

Based on review of the DTM map of the northern portion of SLIDO 2281, proposed tower location 561 appears to be located in a small (2-acre) potential debris flow pathway within SLIDO 2281. However, a site visit, when access is allowed, would be required to confirm if there is a potential hazard.

Proposed towers 562 to 564 are located along the toe of the mapped landslide deposits (and at the contact with colluvium) as confirmed by the DTM and the 1:24,000 scale *Geologic Map of Craig Mountain Quadrangle* (Barrash et al., 1980). This area was not accessible for a site visit, and a site inspection is recommended to determine if there is evidence of active slope movement uphill from proposed towers locations 562 to 564.

E2.10 SLIDO 1148, 1181, 1185

SLIDO 1148
Northing: 4938060
Easting: 465859
Sheets 16 - 20

SLIDO 1185
Northing: 4931564
Easting: 471130
Sheet 20

SLIDO 1181
Northing: 4929009
Easting: 470137
Sheets 16 - 20

SLIDO 1148, 1181, and 1185 all consist of stream channel alluvium (Qal) and not landslide deposits (Qal) as shown on the 1:62,500 scale *Geologic Map of the Durkee Quadrangle* (Prostka, 1967) and the 1:100,000 scale *Geologic map of the Oregon part of the Baker 1 X 2 degree quadrangle, Baker and Malheur Counties,* Oregon (Brooks et al., 1976).

SLIDO 1148 consists of 4,456 acres of alluvium with a dendritic drainage pattern that is not a landslide. The geologic map shows this material to be alluvium (Qal) that is incised into and deposited on poorly consolidated tuffaceous sedimentary rocks (Tst) (Brooks et al., 1976). The proposed transmission line route crosses stream channel alluvium between proposed towers 54 to 56, 775 to 776, 783 to 785, 790 to 792, and 811 to 812.

A site visit was conducted on 10/26/2011 which was restricted to access on public roads. Steep and unstable stream banks were observed downstream of proposed tower location 784, but no landslides were observed in the area.

SLIDO 1185 consists of 97 acres of alluvium along Pearce Gulch approximately 1.5 miles southeast of SLIDO 1148. The geologic map shows this material to be alluvium (Qal) that is deposited on poorly consolidated tuffaceous sedimentary rocks (Tst) (Brooks et al., 1976). The proposed transmission line route crosses the stream channel alluvium between proposed towers 818 and 820.

SLIDO 1181 consists of alluvium in Sisley Creek near the town of Weatherby and the confluence with the Burnt River. The mapped extent of SLIDO 1181 includes Interstate 84. The geologic map shows stream channel alluvium (Qal) deposited on Jurassic and Triassic sedimentary rocks. The alignment crosses Sisley Creek Canyon between proposed tower locations 828 and 829. These towers are located above the mapped extend of the alluvium.

E2.11 PLS-011

PLS-011
Northing: 4921189
Easting: 473299
Sheet

PLS-011 is a small (1.7-acre) potential landslide that was indentified in the field based on geomorphology characteristic of a landslide. No evidence of recent movement was observed. The nearest proposed tower location (848) is 500 feet uphill of this small potential landslide and the tower would not be affected by it.

Photo 1: Toe of PLS-011 looking northeast from Dixie Creek Road

E2.12 SLIDO 1706

SLIDO 1706
Northing: 4917799
Easting: 472736
Sheets 21, 22

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 boundary of SLIDO 1706 includes proposed tower locations 858 to 860 and 4 existing transmission towers. However, mapped landside deposits (Qls) north of 1706 also include proposed tower locations 852 to 855 and 3 existing transmission towers.

On November 17, 2011, we attempted to access this area from the south, but did not have access beyond proposed tower location 864, 1.2 miles southeast of tower location 860. Tower locations within this landslide should be further evaluated for slope stability.

E2.13 SLIDO 1708

SLIDO 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 southeast facing slope above Goodman Creek (Brooks, 1979). Aerial photos show existing transmission towers within the mapped landslide footprint. One of the existing towers is located in the assumed headscarp area 350 feet east of proposed tower location 862.

On November 17, 2011, we attempted to access this area from the south, but did we not have access beyond proposed tower location 864, 3,000 feet southeast of tower location 862.

The presence of existing transmission towers within this landslide suggests that the site is stable. However, a site visit is recommended when site access is possible to confirm that tower 862 is located safely upslope of this landslide.

E2.14 PLS-014

PLS 014
Northing: 4919678
Easting: 473265
Sheets 21, 22

PLS-014 is a possible landslide which is crossed by the IPC Proposed Route in the Burnt River Canyon section between Mileposts 193 and 194 (Tower numbers 852 through 855). PLS-014 is

not included in either of the SLIDO releases, but is shown in published geologic mapping (Brooks, H.C., 1979, *Geologic map of the Huntington and Part of the Olds Ferry 15' Quadrangles, Baker and Malheur Counties, Oregon*: Oregon Department of Geology and Mineral Industries, Geologic Map Series GMS-13, scale 1:62,500).

E2.15 SLIDO 1711

SLIDO 1711
Northing: 4914501
Easting: 475058
Sheet 23

SLIDO 1711 is referenced at a scale of 1:62,500 as a 133-acre landslide complex (Brooks,1979). The existing transmission line and access road trends parallel to and along the mapped upslope boundary (scarp) of the landslide area, which is located approximately 500 feet down slope of the proposed alignment route (proposed tower locations 866 to 868). The proposed towers are located at ridge spurs between gullies (potential debris flow pathways) that drain to the landslide area. Review of the DTM shows that old debris flow source areas appear to be present upslope of the proposed alignment route.

On November 17, 2011, a site visit of this landslide was conducted by driving the access road along the existing transmission line. Since the proposed alignment is located upslope of the existing transmission line towers, which are located upslope of SLIDO 1711, it appears that SLIDO 1711 will not affect the proposed alignment. The debris flow sources and chutes will similarly be avoided.

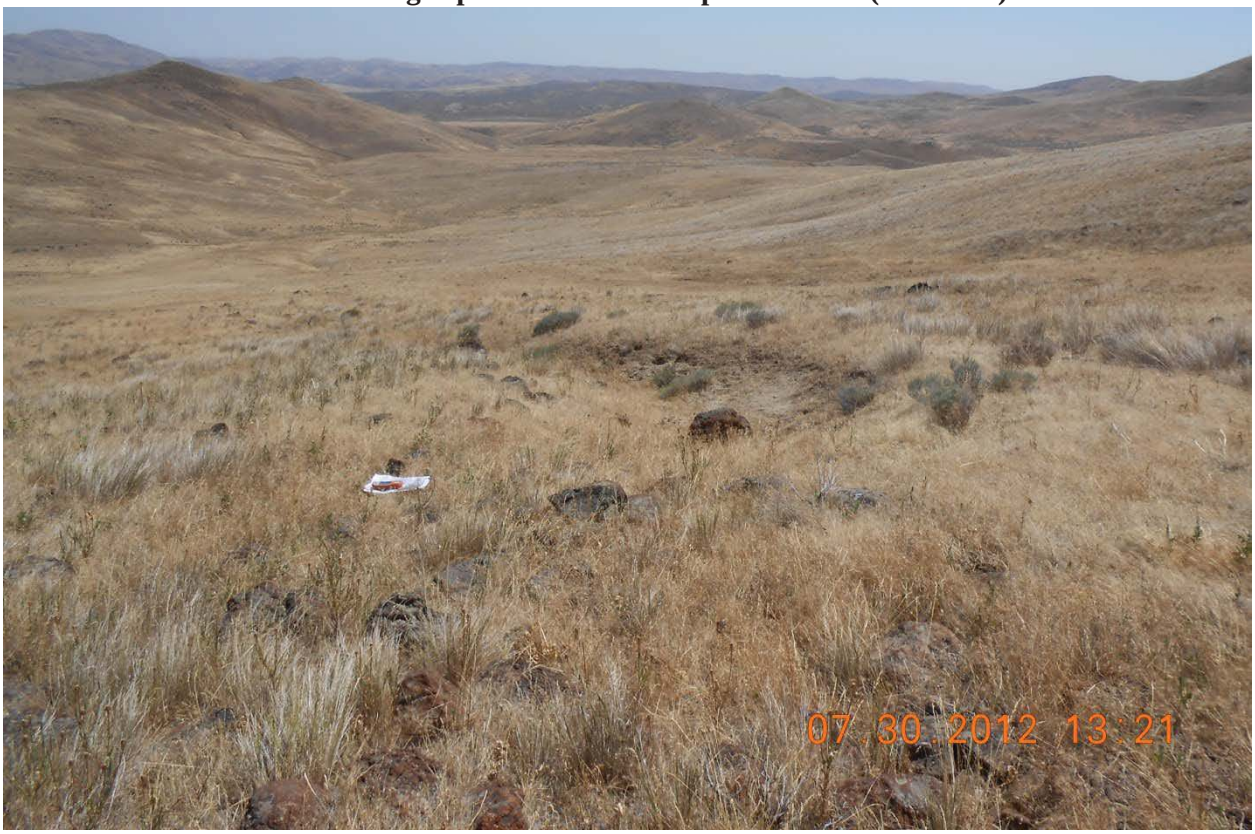
E2.16 PLS-012

PLS-012
Northing: 4908972
Easting: 475525
Sheet 24

The feature designated PLS-012 is not identified as a landslide in SLIDO or on published geologic maps. During field reconnaissance, however, some observations were made that suggest PLS-012 is a possible landslide. These observations included uneven topography (Photo 1), mixed lithology in the float material, and an arcing depression near the top of the feature. The nearest proposed tower locations, towers 7 and 8, are approximately 200 feet away from apparent extents of the PLS-012 feature; and while debris from PLS-012 would likely head toward the location of tower 8, it does not appear likely that the material would remobilize in a mass failure. In our opinion, risks posed to the proposed alignment by PLS-012 are low.

Photo 2: Looking west at PLS-012 and approximate location of tower 7 (7/30/2012)

Photo 3: Arcing depression near the top of PLS-012 (7/30/2012)



E2.17 PLS-013

PLS-013
Northing: 4907116
Easting: 476430
Sheet 24

The feature designated PLS-013 is not identified as a landslide in SLIDO or on published geologic maps. However, during review of aerial photos and field reconnaissance, we observed characteristics consistent with a possible rock slide. The feature is more than 500 feet from the closest proposed tower locations, towers 13 and 14, and feeds into a drainage well below and away from either tower. In our opinion, PLS-013 does not pose a risk to the proposed alignment, though it should be avoided or minimally disturbed during access road construction.

Photo 4: Looking north, across a drainage, at PLS-013 from the approximate location of Tower-14 (7/30/2012)

E2.18 SLIDO 3461

SLIDO 3461
Northing: 4901317
Easting: 475581
Sheet 25

SLIDO 3461 is referenced at the scale of 1:62,500 (Brooks, 1979). Brooks (1979) mapped the area as Terrace and fan deposits, consisting of unconsolidated, non-bedded, and poorly sorted sediments that range from clay to boulders. In the reference map, the area is not described as a landslide.

During our hazard reconnaissance, we observed SLIDO 3461 from Lockett Road, which runs between the feature and the proposed alignment. The area did not appear to be a landslide. Moreover, the portion of the alignment near SLIDO 3461 is located more than 300 feet to the southeast, on the opposite side of a drainage. It is our opinion that SLIDO 3461 poses little risk to the proposed alignment.

E2.19 SLIDO 2027, 2030

SLIDO 2027
Northing: 4866541
Easting: 461275
Sheets 27, 28

SLIDO 2030
Northing: 4865497
Easting: 462136
Sheet 28

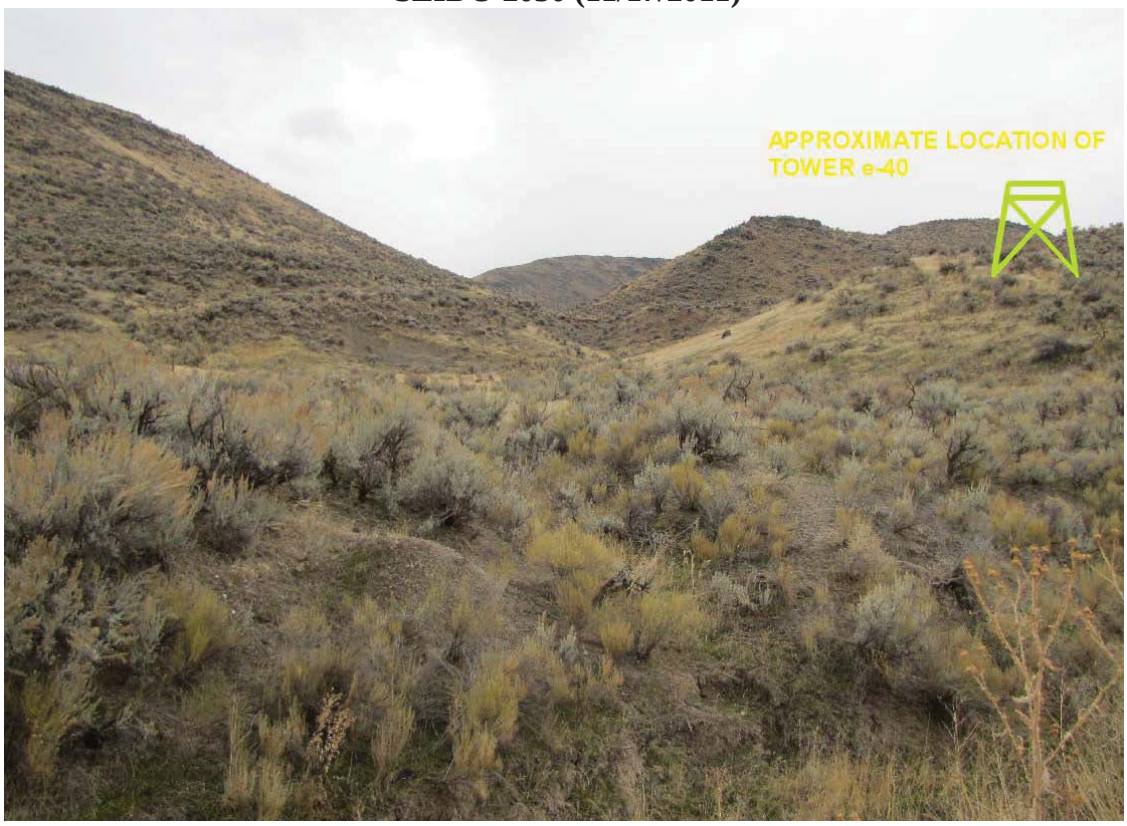
SLIDO 2027 and 2030 are referenced at the scale of 1:100,000 (Ferns et al., 1993). However, these landslide deposits (Pleistocene and Holocene Qls) have been mapped at the scale of 1:24,000 (Brooks, 1991). SLIDO 2030 is described on the geologic map as a slumped section of upper-Miocene volcanic rocks 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 2 landslide areas cover 1,570 acres and are separated by the Malheur River. The proposed alignment route crossed the Malheur River Canyon along the northeastern edge of SLIDO 2027. Proposed tower 1040 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 a talus slope, and proposed tower 1041 is located in landslide deposits between the canal and the Malheur River. Proposed towers 1043 to 1044 are located in the slumped volcanic rocks (SLIDO 2030) on the eastern 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 very likely relatively stable. However, actual proposed tower locations should be inspected for stability during geotechnical exploration and tower construction.

Photo 5: Looking north towards tower 1042 (formerly tower e-29) and eastern flank of SLIDO 2027 (11/17/2011)

Photo 6: Looking north toward Oregon Canal and eastern flank of SLIDO 2027 (11/17/2011)

Photo 7: Looking south towards tower 1043 (formerly tower e-40) and SLIDO 2030 (11/17/2011)



E2.20 SLIDO 2039

SLIDO 2039
Northing: 4840785
Easting: 466297
Sheet 30

SLIDO 2039 is referenced at the scale of 1:100,000 (Ferns et al., 1993) as a 51-acre landslide. On November 17, 2011, a site visit of this landslide area was conducted. No evidence of recent movement was observed, and proposed tower location 59 appeared to be located on alluvium beyond the toe of the landslide.

Photo 8: Looking northwest towards tower 59 (formerly tower MAL_S-73) location and toe of SLIDO 2039 (11/17/2011)

E2.21 SLIDO 2051

SLIDO 2051
Northing: 4835020
Easting: 477060
Sheets 32, 33

SLIDO 2051 is referenced at the scale of 1:100,000 (Ferns et al., 1993). However, these landslide deposits (Pleistocene and Holocene Qls) have been mapped at the scale of 1:24,000 and cover 1,220 acres (Ferns and Ramp, 1989). This landslide consists of large slump and debris flow deposits from the northeast flank of Grassy Mountain. The landslide deposits are composed of blocks of capping basalt (Tgb) and underlying sedimentary deposits (Tgs) that contain landslide prone bentonitic clay (Ferns and Ramp, 1989). The IPC Malheur S Alternate Route crosses this landslide deposit.

Site visits were conducted on October 27 and November 16, 2011. Recent debris flow deposits and scarps associated with slumped blocks were observed in places within and outside of the perimeter of the mapped landslide deposits.

The northernmost of the 3 proposed route alternatives crosses the northern tip of the landslide between proposed towers 94 and 95. Fresh landslide scarps were observed and photographed 200 feet west of proposed tower 95 (See photos 1 and 2). However, in-place bedded Owyhee Basalt (Tbo) can be seen on the aerial photo at the proposed location of tower 95 (Ferns and Ramp, 1989).

The southernmost proposed route alternative (NEPA Malheur A) is located along a debris flow deposit that runs west to east towards the Owyhee River (See photo 3).

Photo 9: Looking east at landslide scarps 200 feet west of tower 95 (formerly tower MAL_S-109)

Photo 10: Head scarp 200 feet west of tower 95 (formerly tower MAL_S-109)

Photo 11: Looking west at landslide deposits and the tower formerly identified as MAL-A-141.

E2.22 SLIDO 2067

SLIDO 2067
Northing: 4829273
Easting: 487568
Sheet 34

SLIDO 2067 is referenced at the scale of 1:100,000 (Ferns et al., 1993). However, this landslide (Holocene Qls) has been mapped at the scale of 1:24,000 and covers 1,220 acres (Ferns, 1988). The extent of this landslide has been further refined based on the DTM map, which shows that proposed tower 130 is located on the left flank of the landslide near the head scarp.

This area was not accessible for a site visit. Tower locations 129 and 130 should be further evaluated for slope stability.

E2.23 MLS-002

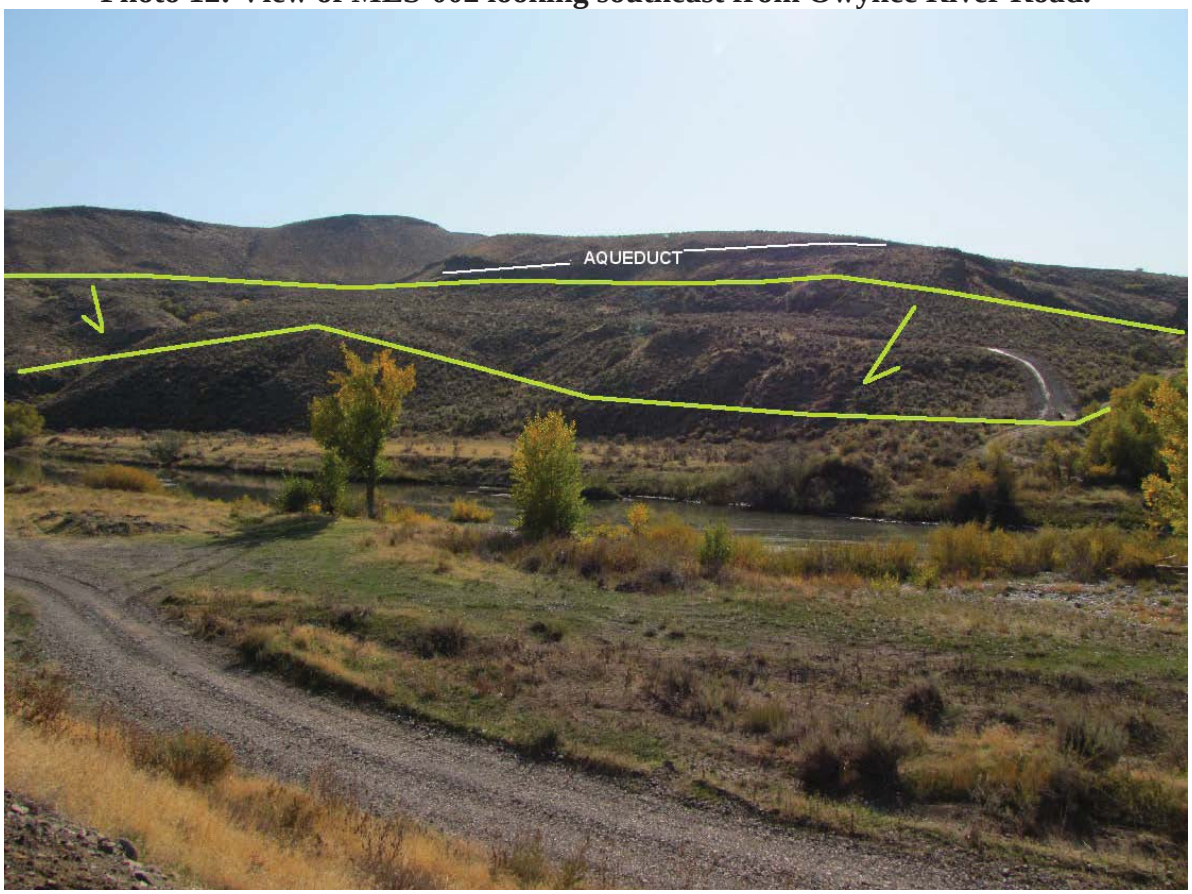
MLS-002
Northing: 4842280
Easting: 486369
Sheet 35

MLS-002 is a mapped landslide located along the proposed alignment. This landslide is not included in SLIDO, but is on the 1:24,000 scale *Geologic Map of Owyhee Dam Quadrangle* (Ferns, 1989b). Proposed towers 1145 to 1147 are located within the mapped landslide.

This landslide complex was observed from Owyhee Lake Road during a site visit on October 2, 2011, and at that time construction was occurring on the canal road within the landslide between proposed tower locations 1146 and 1147. 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, tower locations within this landslide should be further evaluated for slope stability.

Photo 12: View of MLS-002 looking southeast from Owyhee River Road.



Sheet 5
Sheet 2 to 4
Sheet 6
Sheet 7
Sheet 8
Sheet 10
Sheet 11
Sheet 12
Sheet 9
Sheet 13
Sheet 14
Sheet 15
Sheets 16 to 20
Sheet 21 to 24
Sheet 26
Sheet 25
Sheets 27 to 29
Sheet 35
Sheets 30 to 33
Sheet 34

LEGEND

- IPC Proposed Route
- IPC Alternative
- NEPA Alternative
- Map Sheets

0 20 40 Miles

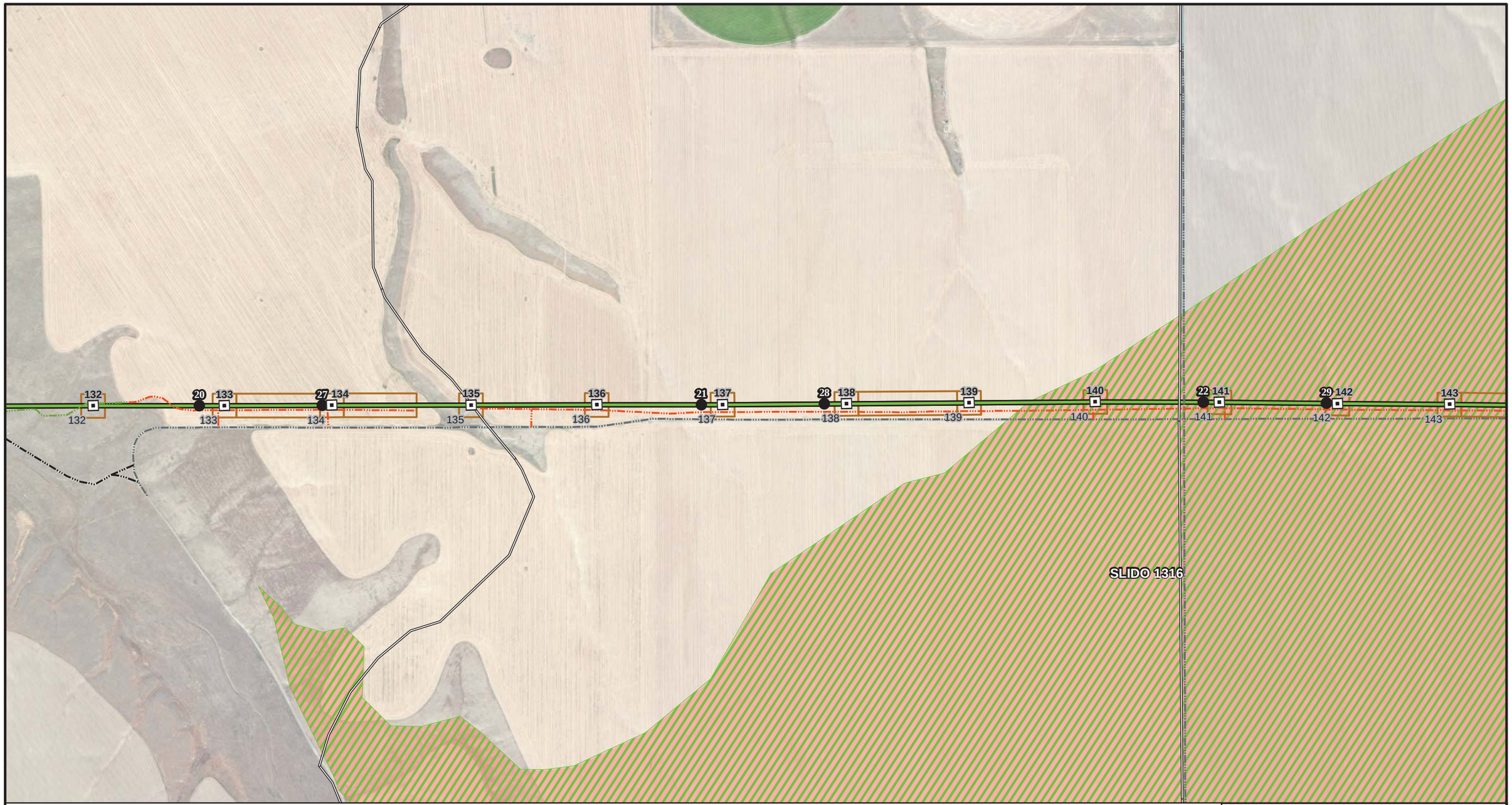
Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

LANDSLIDE INVENTORY INDEX MAP

August 2012

22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS



LEGEND

TRANSMISSION FEATURES
- IPC Proposed Route
- IPC Alternative
- NEPA Alternative
- Work Area
- Mileposts
- Towers

MAPPED FEATURE ORIGIN
- Field Mapping
- SLIDO
- Published Mapping

SLIDO CLASSIFICATION
- Fan
- Landslide
- Talus - Colluvium

PRELIMINARY ACCESS PATHS
- Bladed
- Bladed ATV
- Overland Clear and Cut
- Overland Travel
- Overland with Clearing
- Existing Access, To Be Improved
- Existing Access, May Need Repairs
- Existing Access, No Improvement

EXISITING TRANSPORATION ROADS
- Primary Limited Access Road
- Primary US and State Highways
- Railroad

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

August 2012 22-1-02947-200

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LEGEND

TRANSMISSION FEATURES
- IPC Proposed Route
- IPC Alternative
- NEPA Alternative
- Work Area
- Mileposts
- Towers

MAPPED FEATURE ORIGIN
- Field Mapping
- SLIDO
- Published Mapping

SLIDO CLASSIFICATION
- Fan
- Landslide
- Talus - Colluvium

PRELIMINARY ACCESS PATHS
- Bladed
- Bladed ATV
- Overland Clear and Cut
- Overland Travel
- Overland with Clearing
- Existing Access, To Be Improved
- Existing Access, May Need Repairs
- Existing Access, No Improvement

EXISITING TRANSPORATION ROADS
- Primary Limited Access Road
- Primary US and State Highways
- Railroad

MAPPED SLIDE FEATURES
- Flow Direction
- Scarp
- Feature Limits

0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

LANDSLIDE INVENTORY

August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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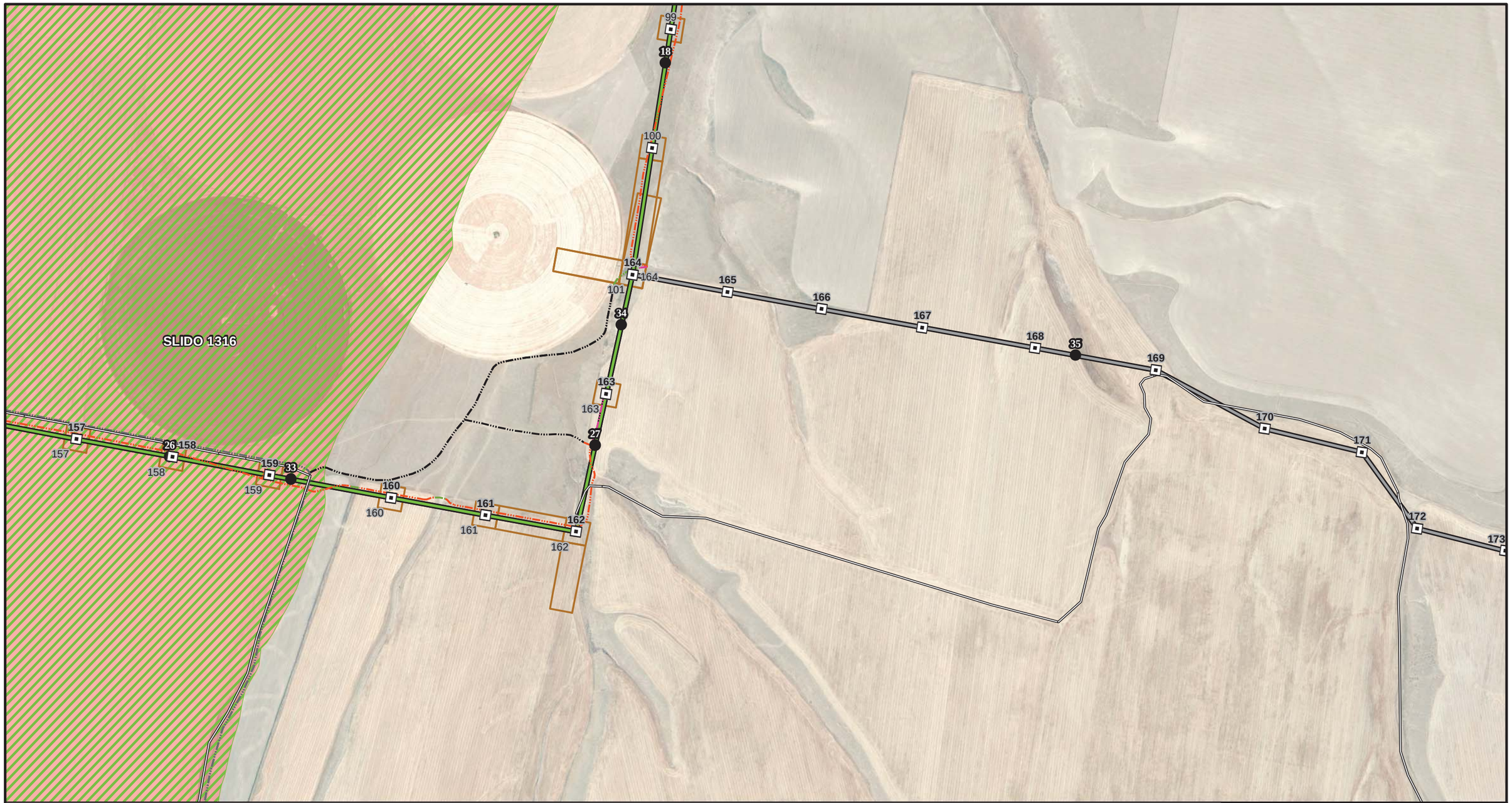

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- IPC Alternative
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- Towers

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- Fan
- Landslide
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- Overland Travel
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EXISITING TRANSPORATION ROADS
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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

LANDSLIDE INVENTORY

August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 4 of 35

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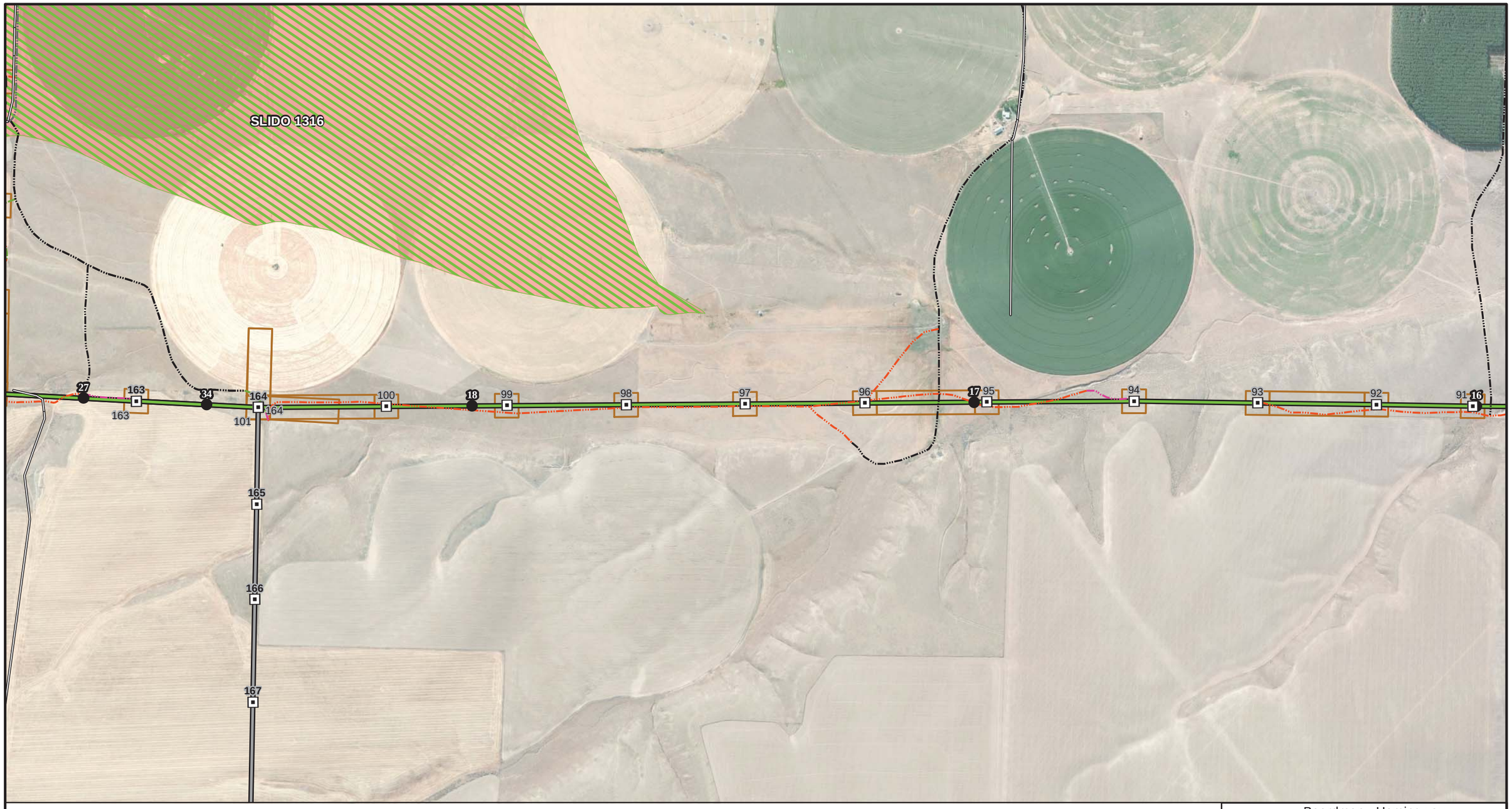

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August 2012 22-1-02947-200

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 6 of 35

T:\Projects\22-1\2947_B2H\Awmxd\H-1\Appendix_E.mxd 8/22/2012 atj

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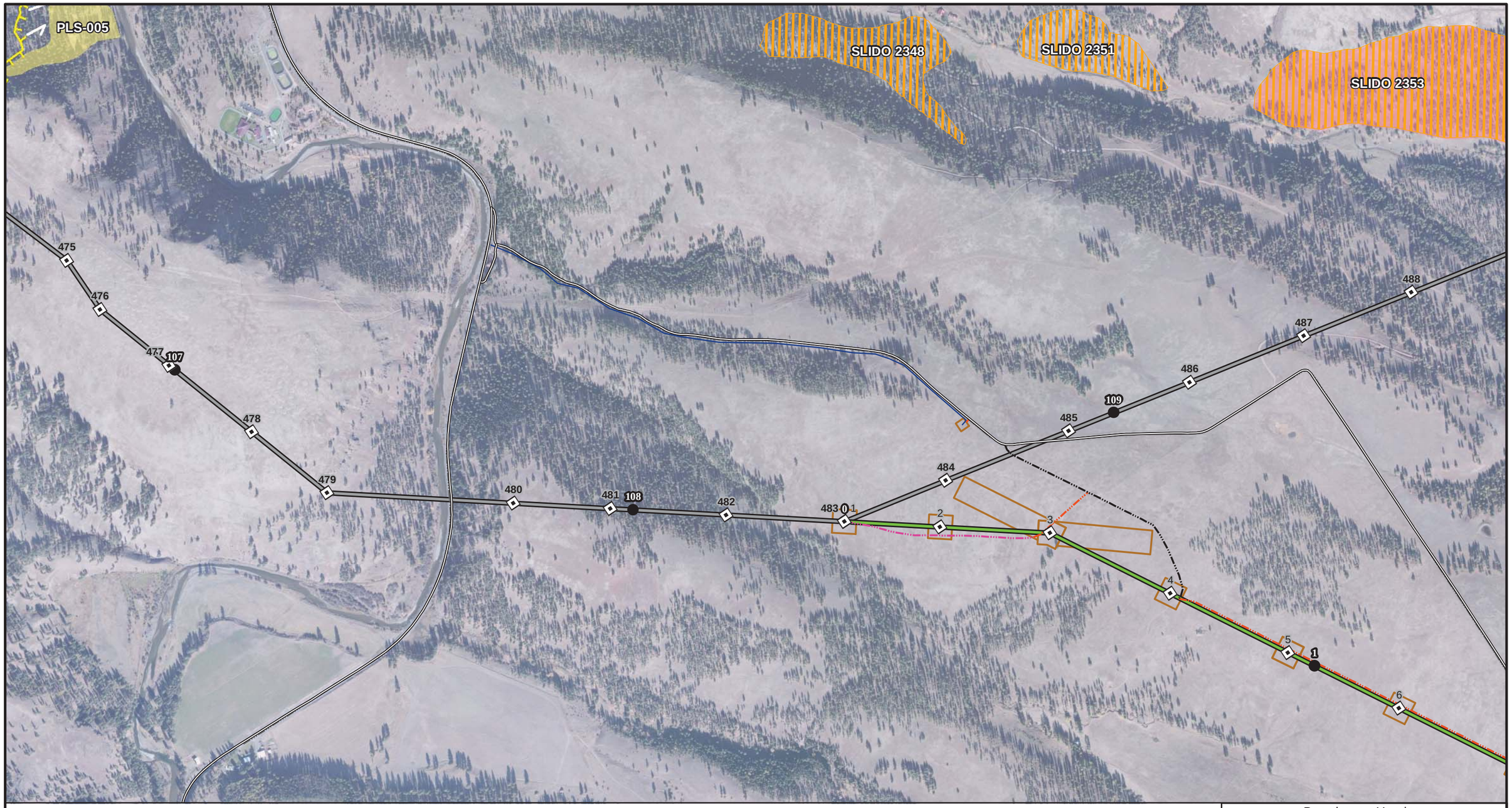

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LANDSLIDE INVENTORY

August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 8 of 35

T:\Projects\22-1\2947_B2HVAvmxdlH-1VAppendix_E.mxd 8/22/2012 atj

SLIDO 2361

PLS-003

SLIDO 2353

SLIDO 2359

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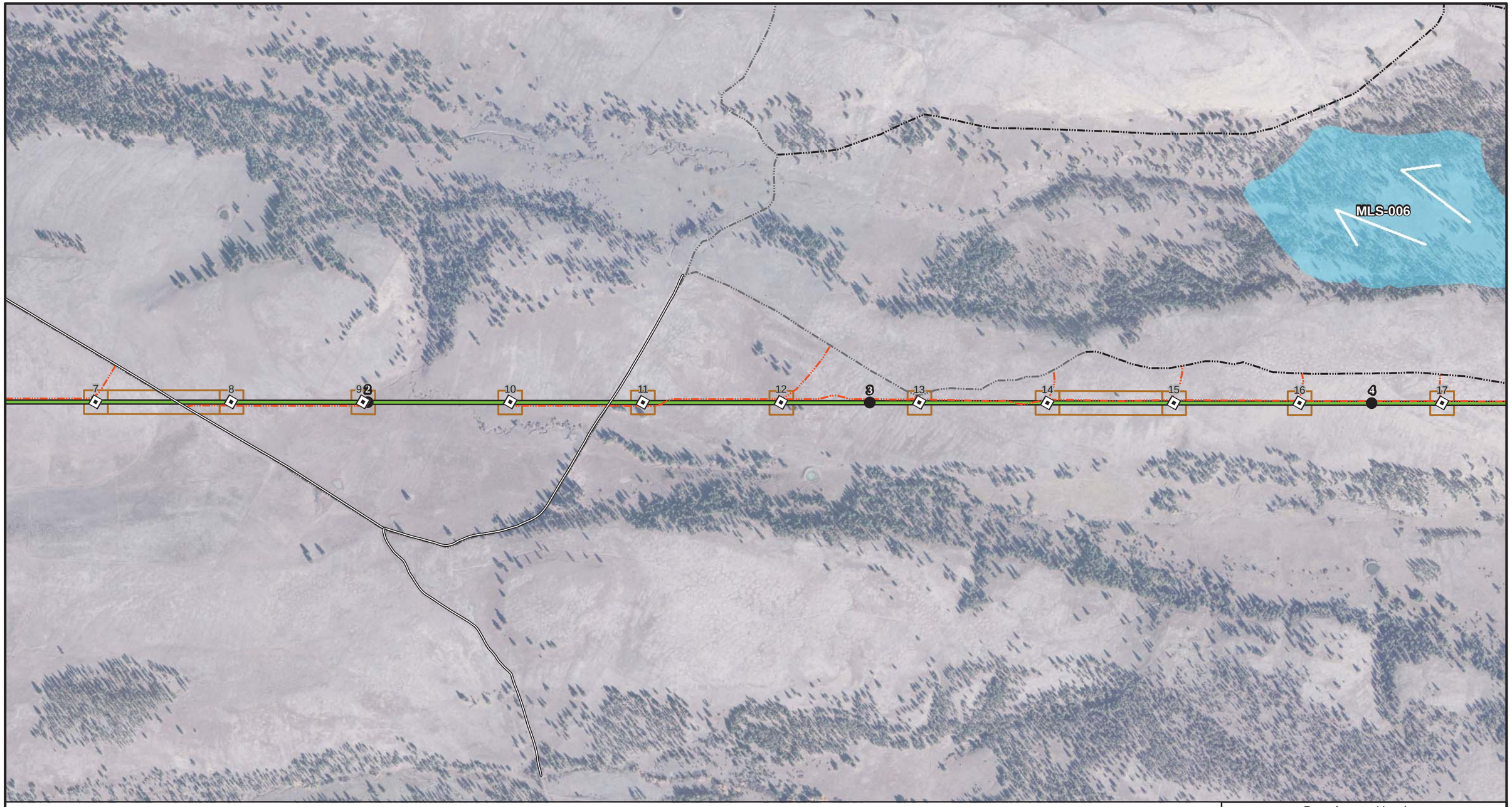

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 10 of 35

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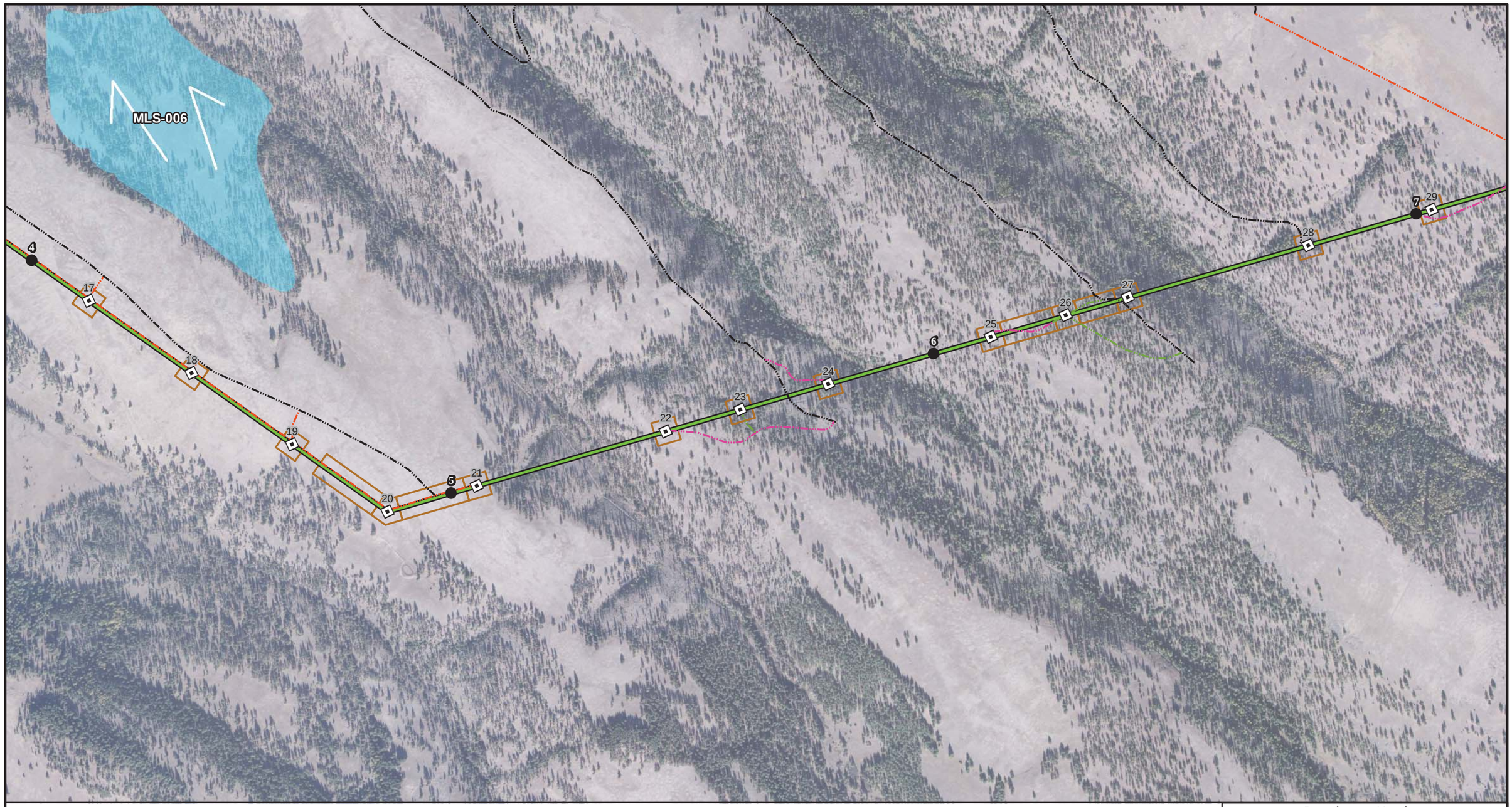

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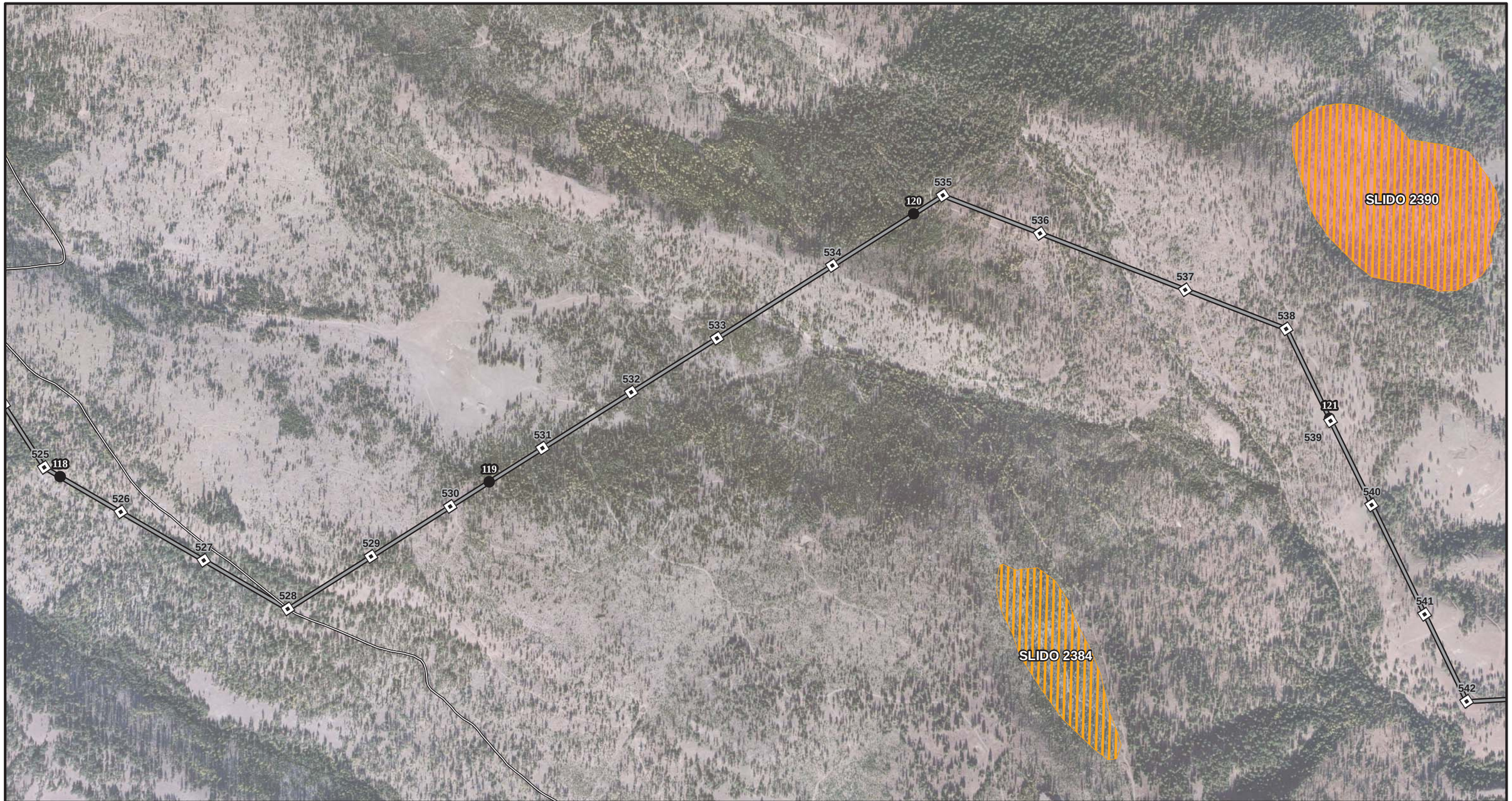

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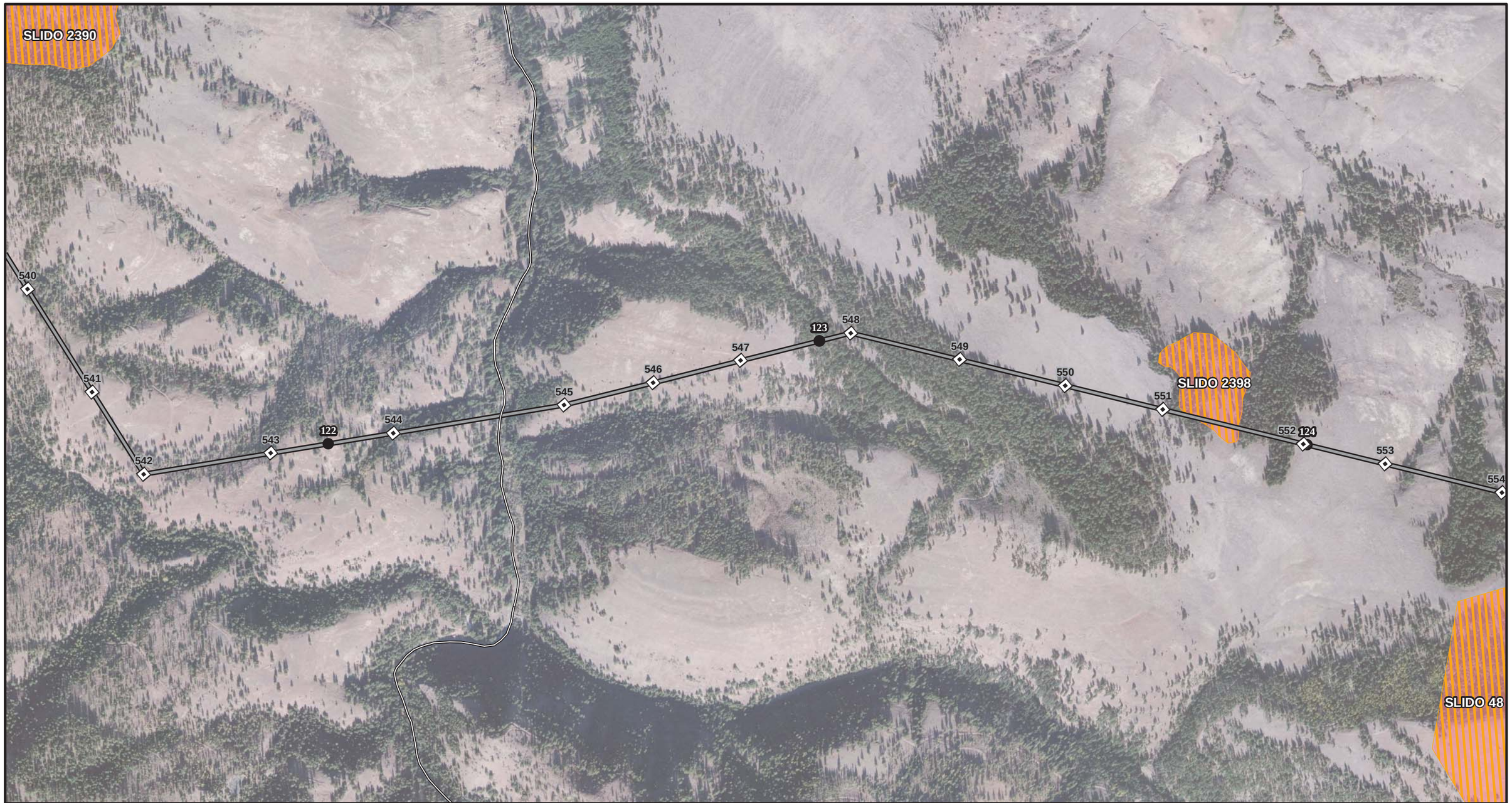

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 13 of 35

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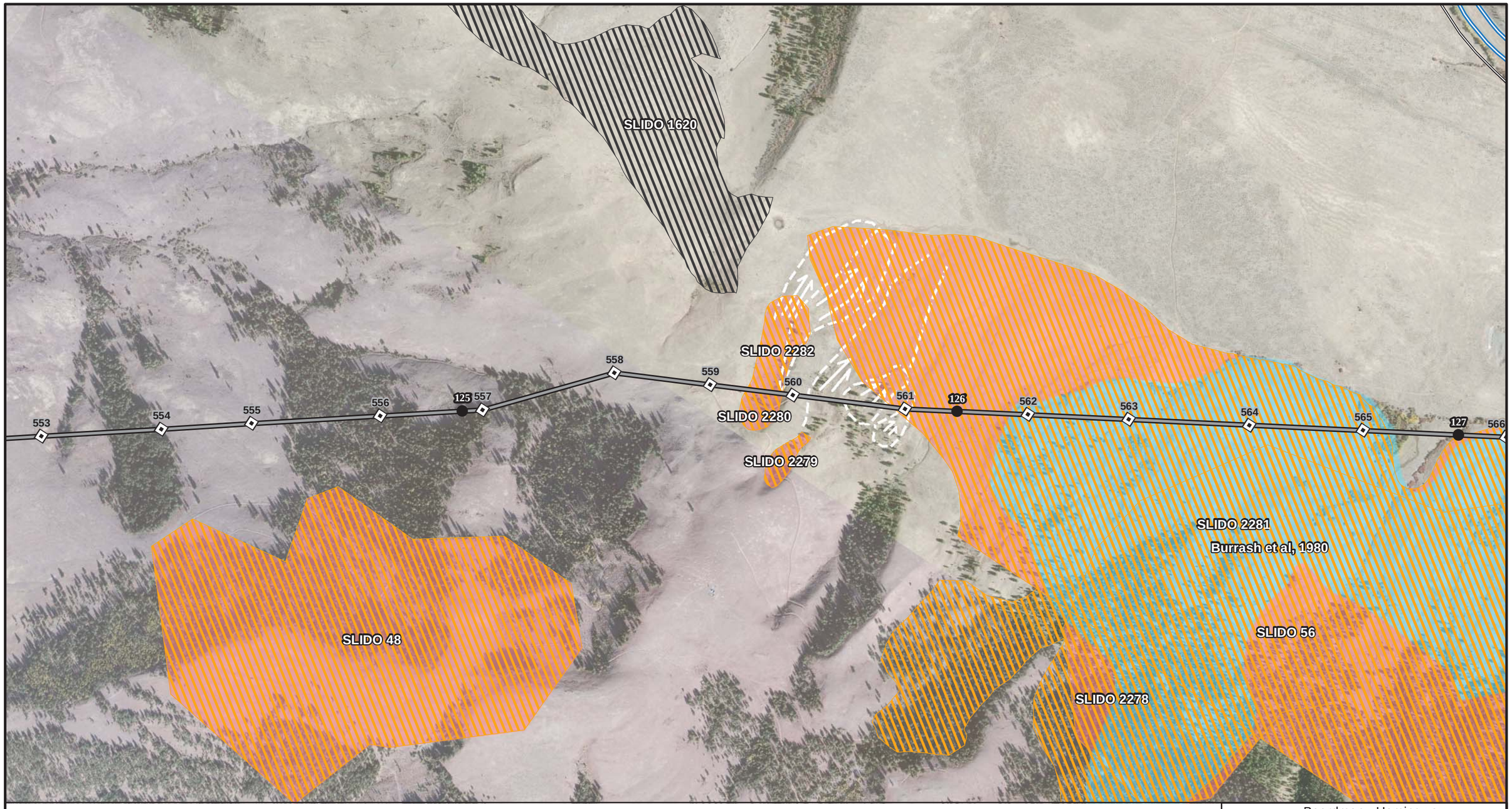

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SHANNON & WILSON, INC.
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Burrash et al, 1980

SLIDO 2281

SLIDO 56

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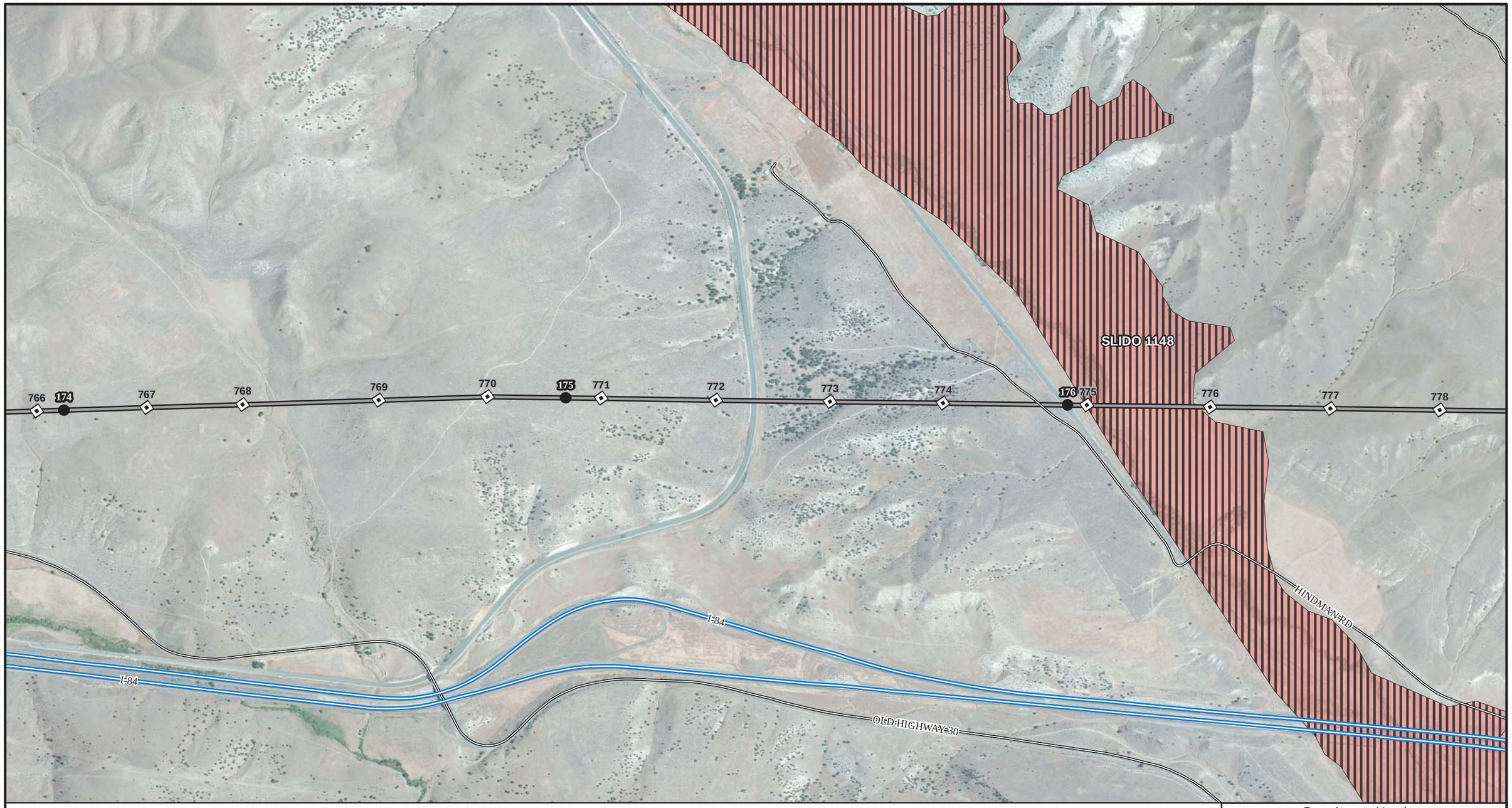

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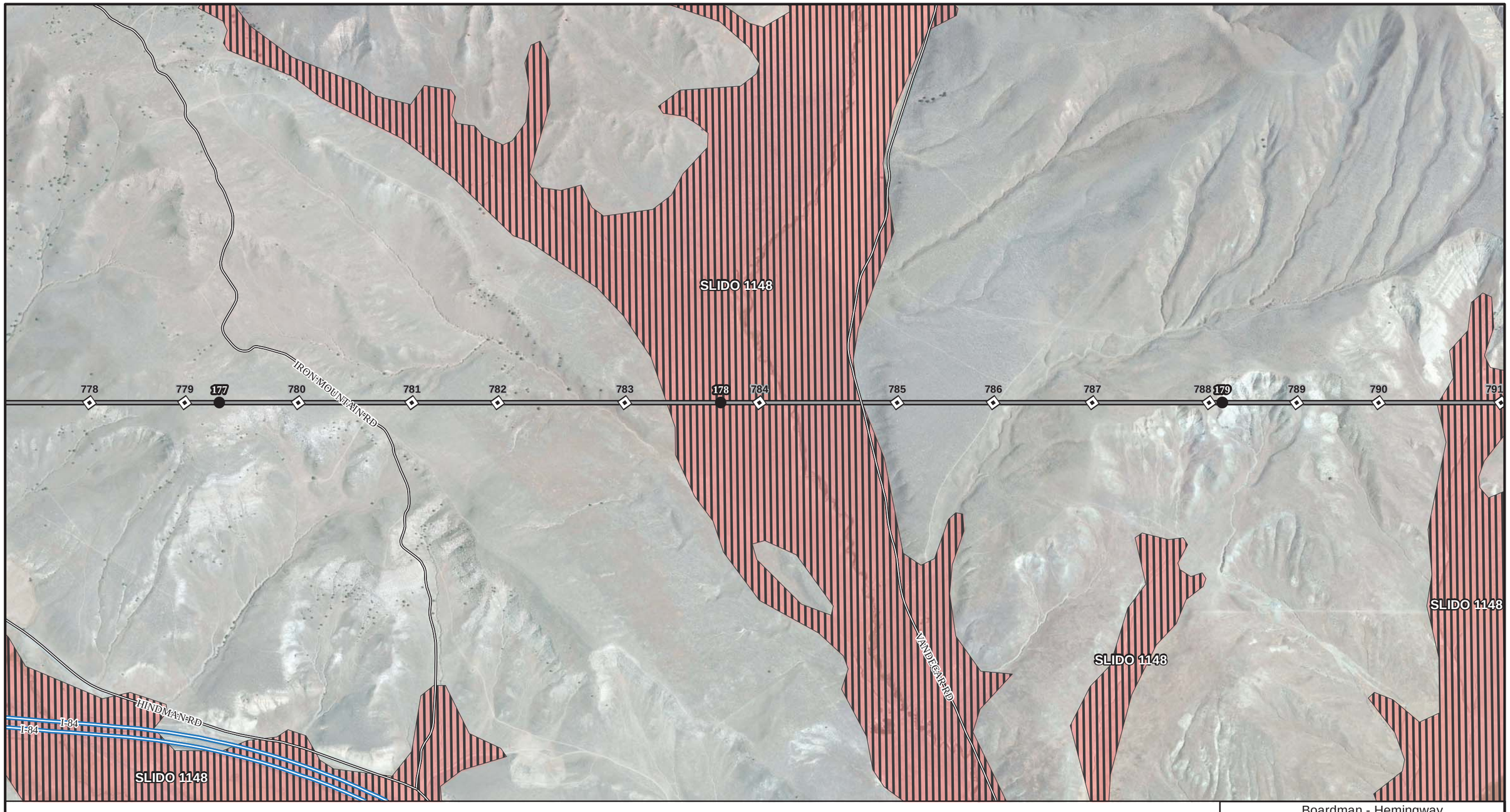

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T:\Projects\22-1\2947_B2H\Avmxd\H-1\Appendix_E.mxd 8/22/2012 atj

SLIDO 1178

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SLIDO 1148

SLIDO 1148

MANNING CREEK RD

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SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 18 of 35

T:\Projects\22-1\2947_B2HVAvmxdH-1\Appendix_E.mxd 8/22/2012 atj

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SLIDO 1148
SLIDO 1185
PLANO RD

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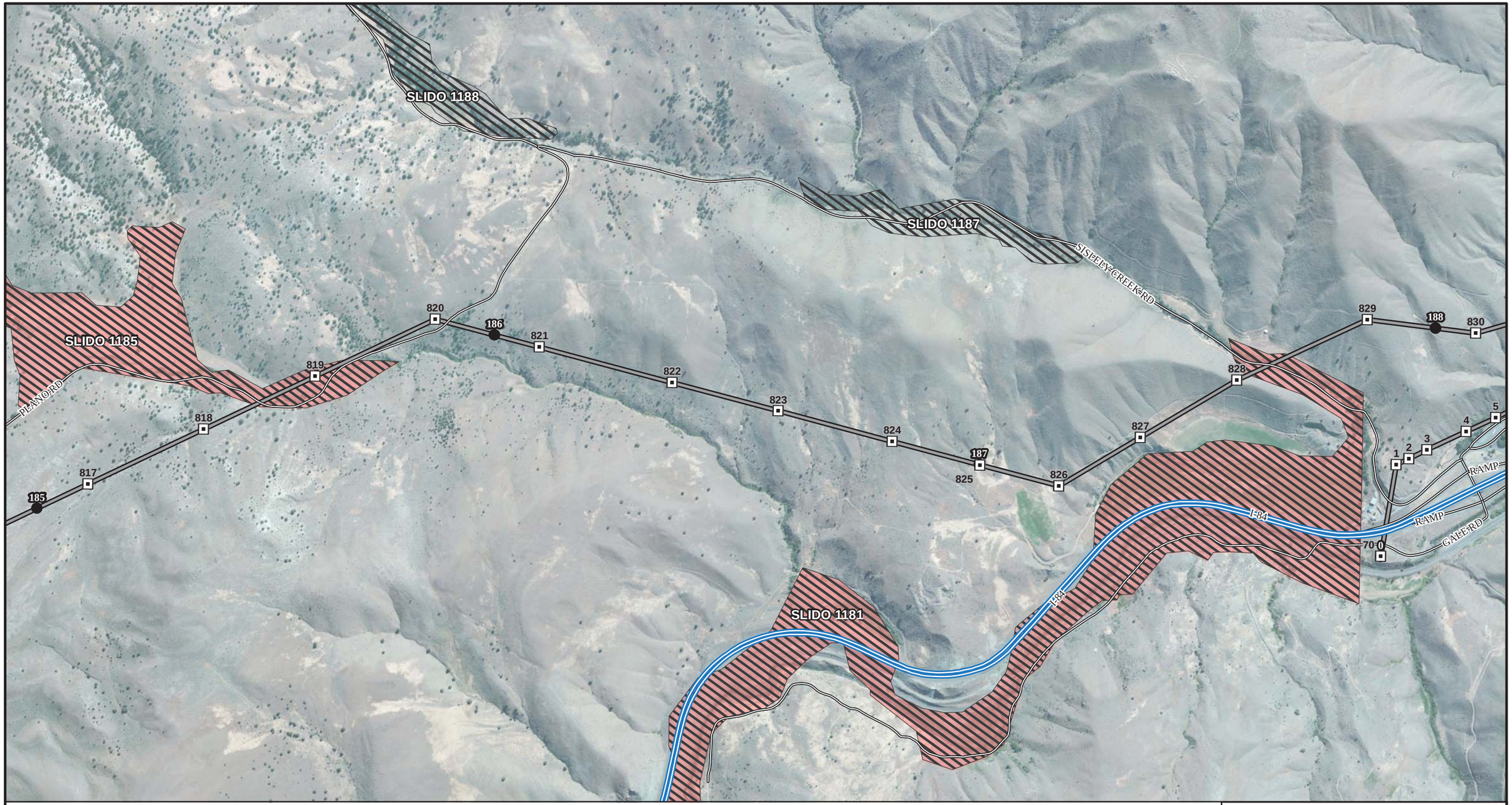

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Sheet 20 of 35

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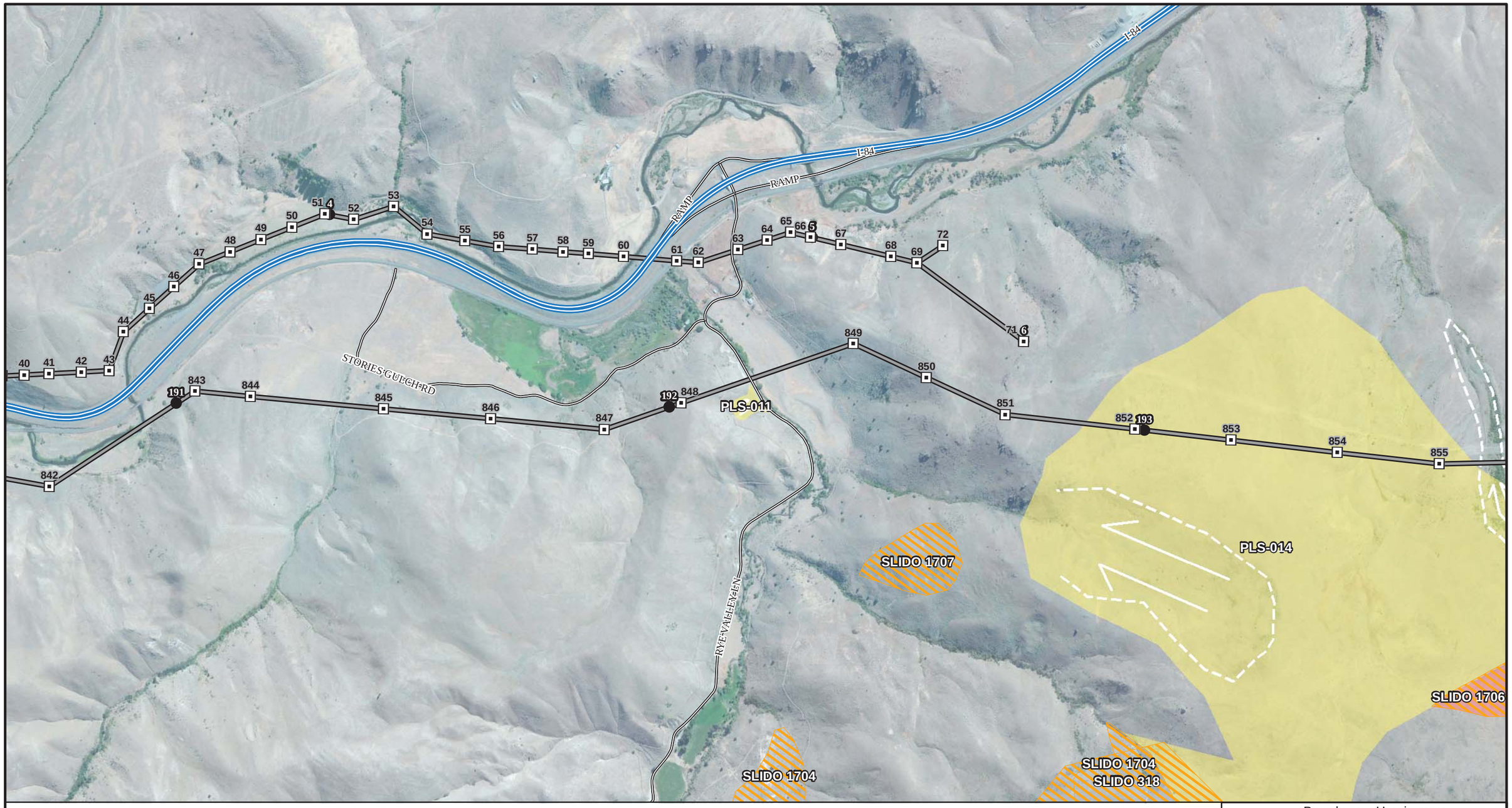

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MAPPED SLIDE FEATURES
- Flow Direction
- Scarp
- Feature Limits

0 1,000 2,000 Feet

Boardman - Hemingway
500kV Transmission Line
Oregon - Idaho

LANDSLIDE INVENTORY

August 2012 22-1-02947-200

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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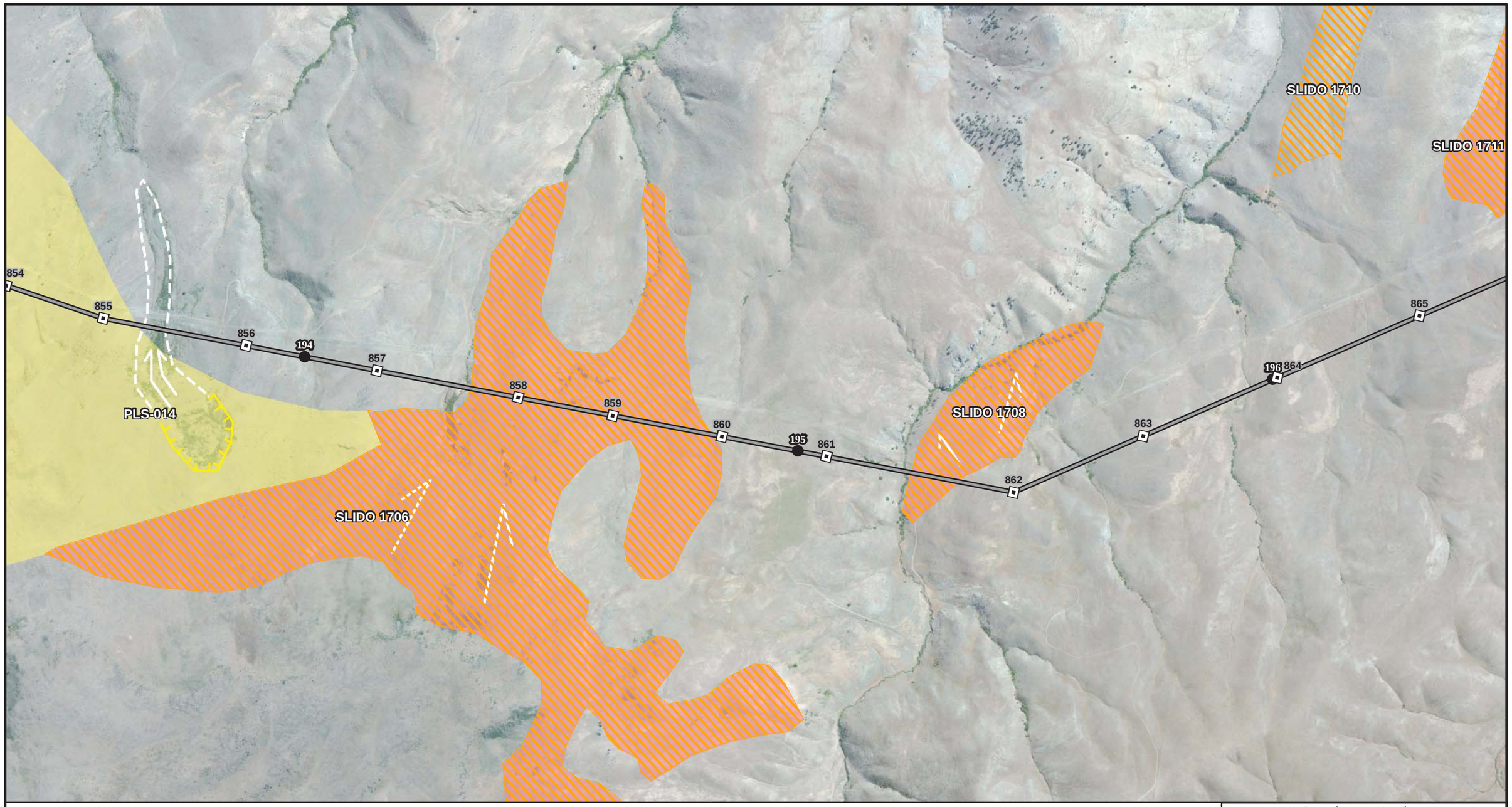

LEGEND

TRANSMISSION FEATURES
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- IPC Alternative
- NEPA Alternative
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- Mileposts
- Towers

MAPPED FEATURE ORIGIN
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SLIDO CLASSIFICATION
- Fan
- Landslide
- Talus - Colluvium

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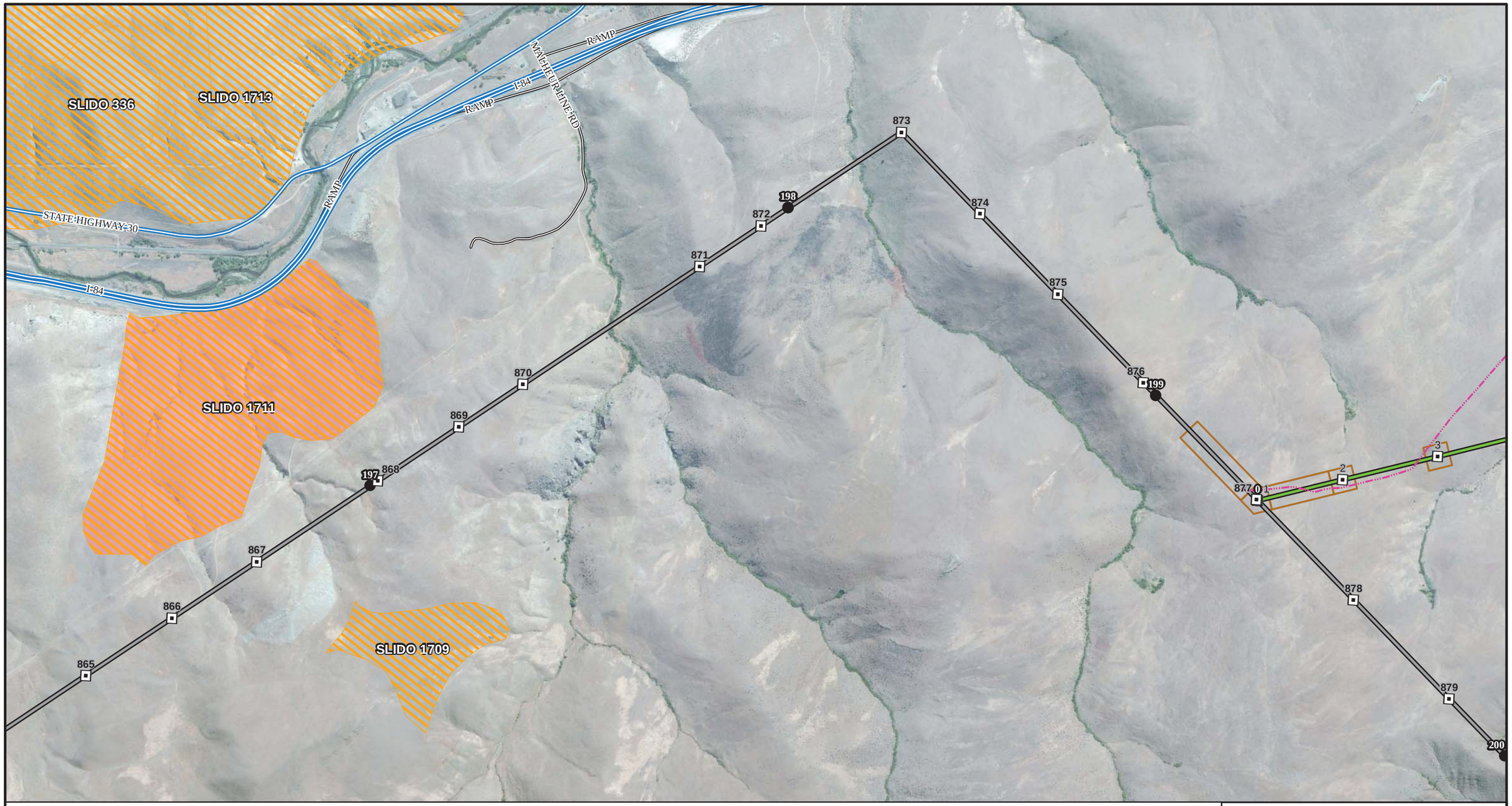

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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876
199
877
878
879
200
880
MATTHEWS LINE RD
PLS-012
PLS-013
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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 24 of 35

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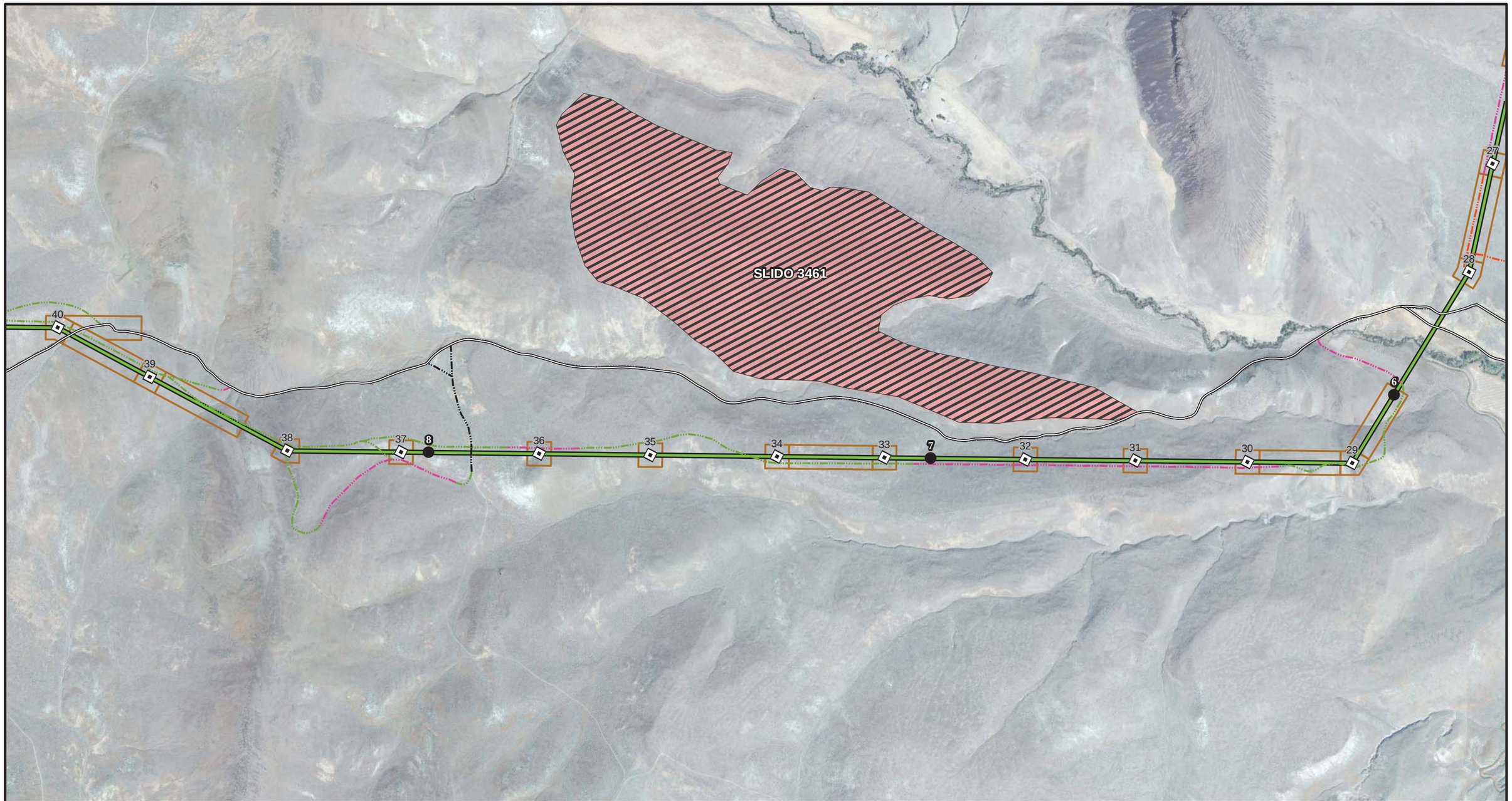

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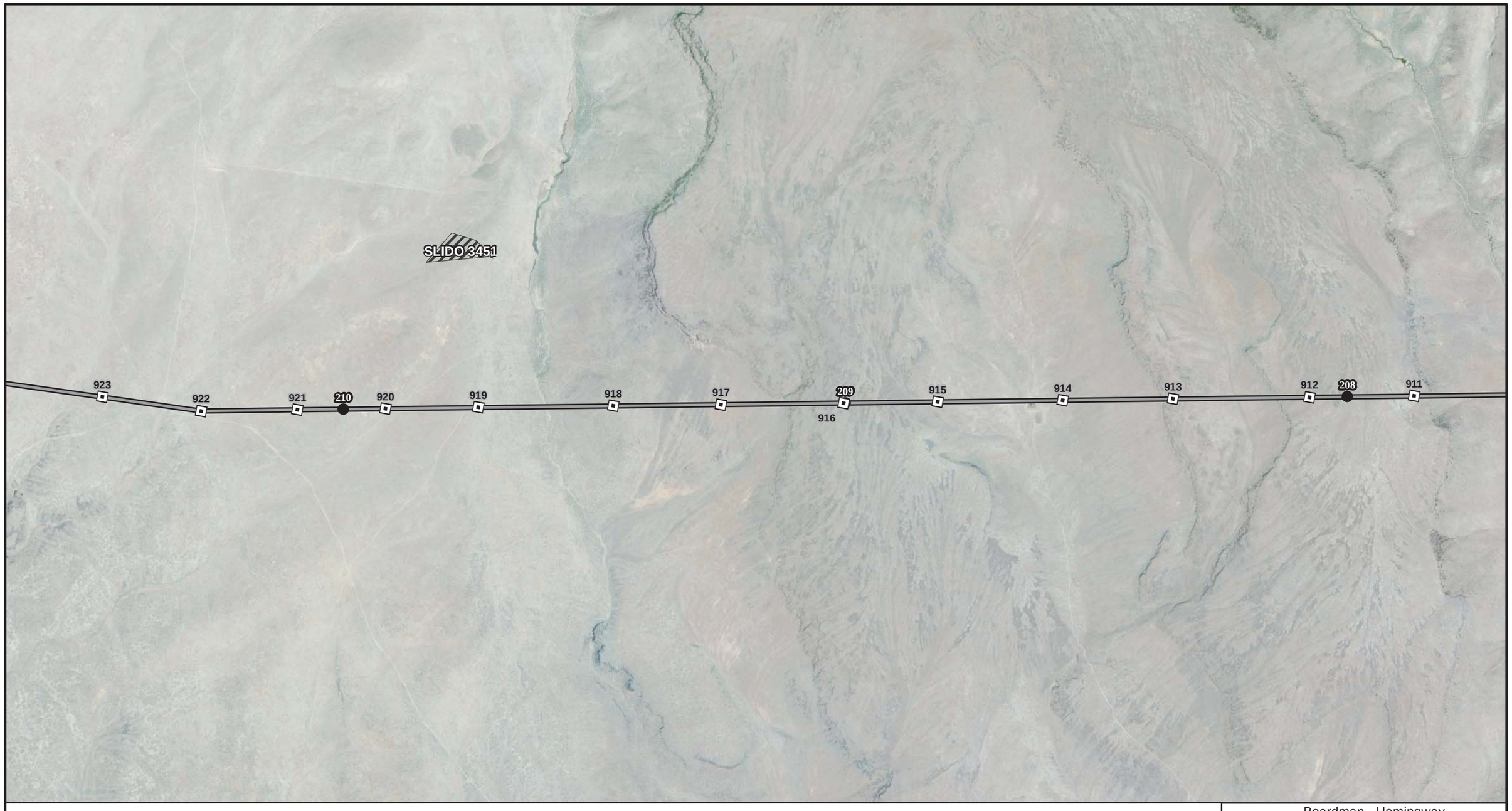

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August 2012 22-1-02947-200

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 27 of 35

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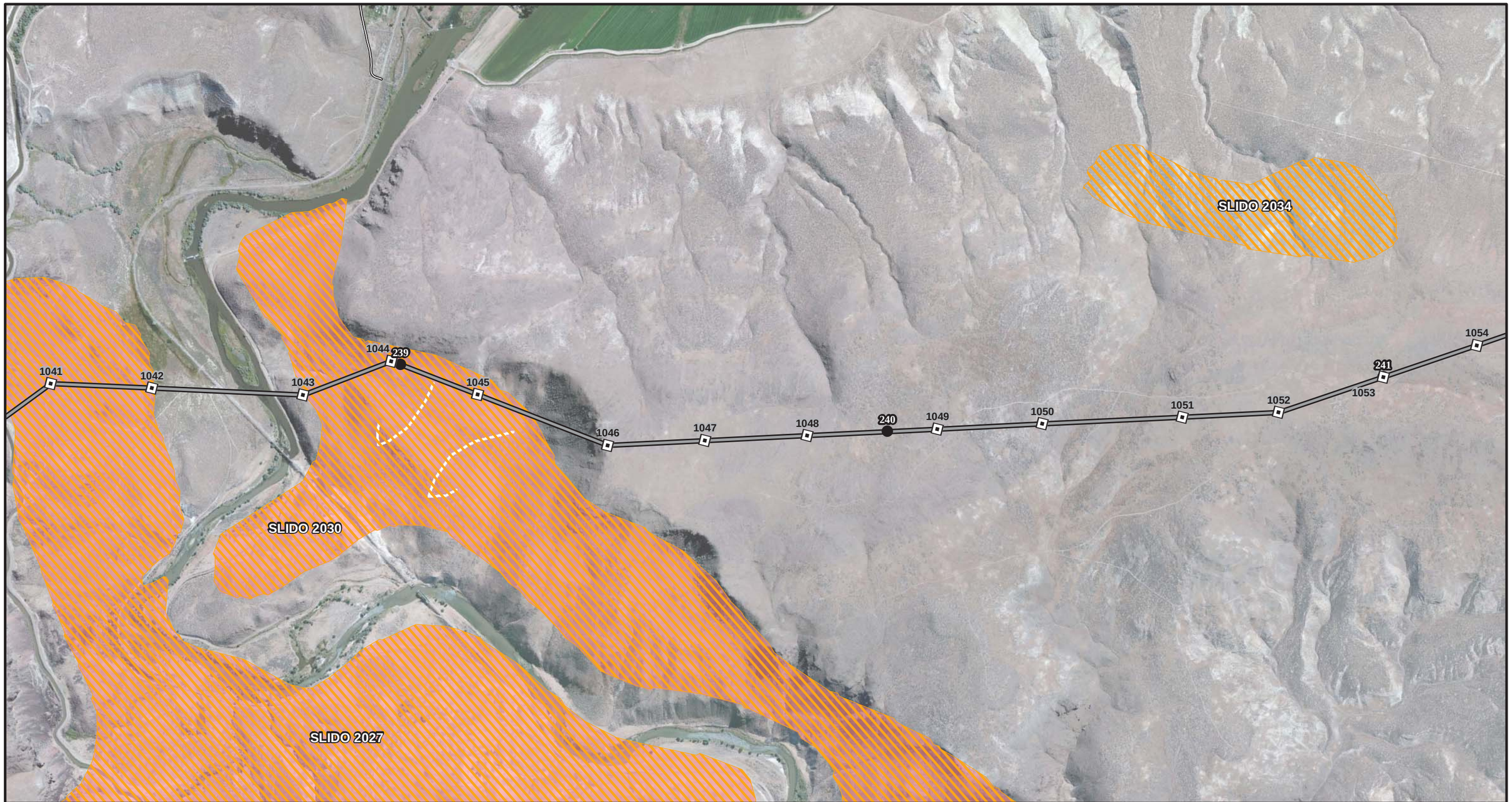

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
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August 2012 22-1-02947-200

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 30 of 35

T:\Projects\22-1\2947_B2H\Avmxd\H-1\Appendix_E.mxd 8/22/2012 atj

16 72 73 74 75 76 17 77 78 79 80 81 18 82 83 84 85

SLIDO 2044

LEGEND

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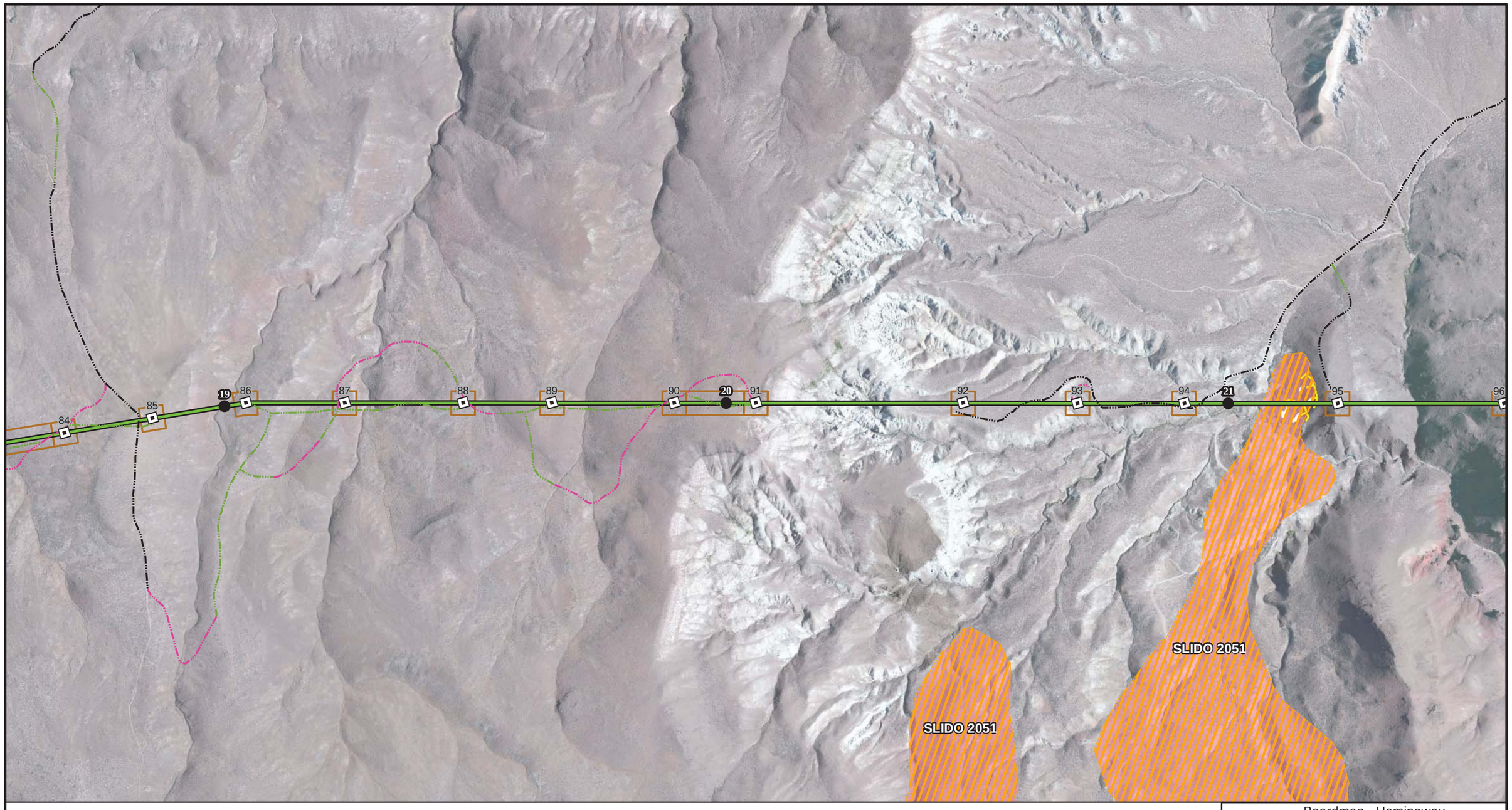

LEGEND

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August 2012 22-1-02947-200

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 33 of 35

T:\Projects\22-1\2947_B2HAvmxdH-1\Appendix_E.mxd 8/22/2012 atj

122 123 124 28 125 126 127 128 29 129 130 131 132 133 30 134 135

SLIDO 2068

SLIDO 2067

LEGEND

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T:\Projects\22-1\2947_B2HAvmxdH-1\Appendix_E.mxd 8/22/2012 atj

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August 2012 22-1-02947-200

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Sheet 35 of 35

T:\Projects\22-1\2947_B2H\Avmxd\H-1\Appendix_E.mxd 8/22/2012 atj