

# Appendix A

## Reconnaissance Report



Lolo Pass Road Access Alternatives Project  
OR CLACK 37005 (1)  
Clackamas County, Oregon

October 2014 Reconnaissance Report



**Prepared for:**

Western Federal Lands Highway Division  
WFLHD Task Order No. T-14-002, DTFH70-10-D-00019

**Prepared by:**





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## ACRONYMS

APE	Area of Potential Effect
DEQ	Oregon Department of Environmental Quality
DOGAMI	Department of Geology and Mineral Industries
EPA	U.S. Environmental Protection Agency
F	Forest
FHWA	U.S. Department of Transportation Federal Highway Administration
LCR	Lower Columbia River
LDR	Low Density Residential
MHNF	Mount Hood National Forest
MP	Mile Point
NRCS	U.S. Department of Agriculture Natural Resources Conservation Service
ODFW	Oregon Department of Fish and Wildlife
ORBIC	Oregon Biodiversity Center
R	Residential
RCRA	Resource Conservation and Recovery Act
US 26	US Highway 26
WFLHD	Western Federal Lands Highway Division

## INTRODUCTION

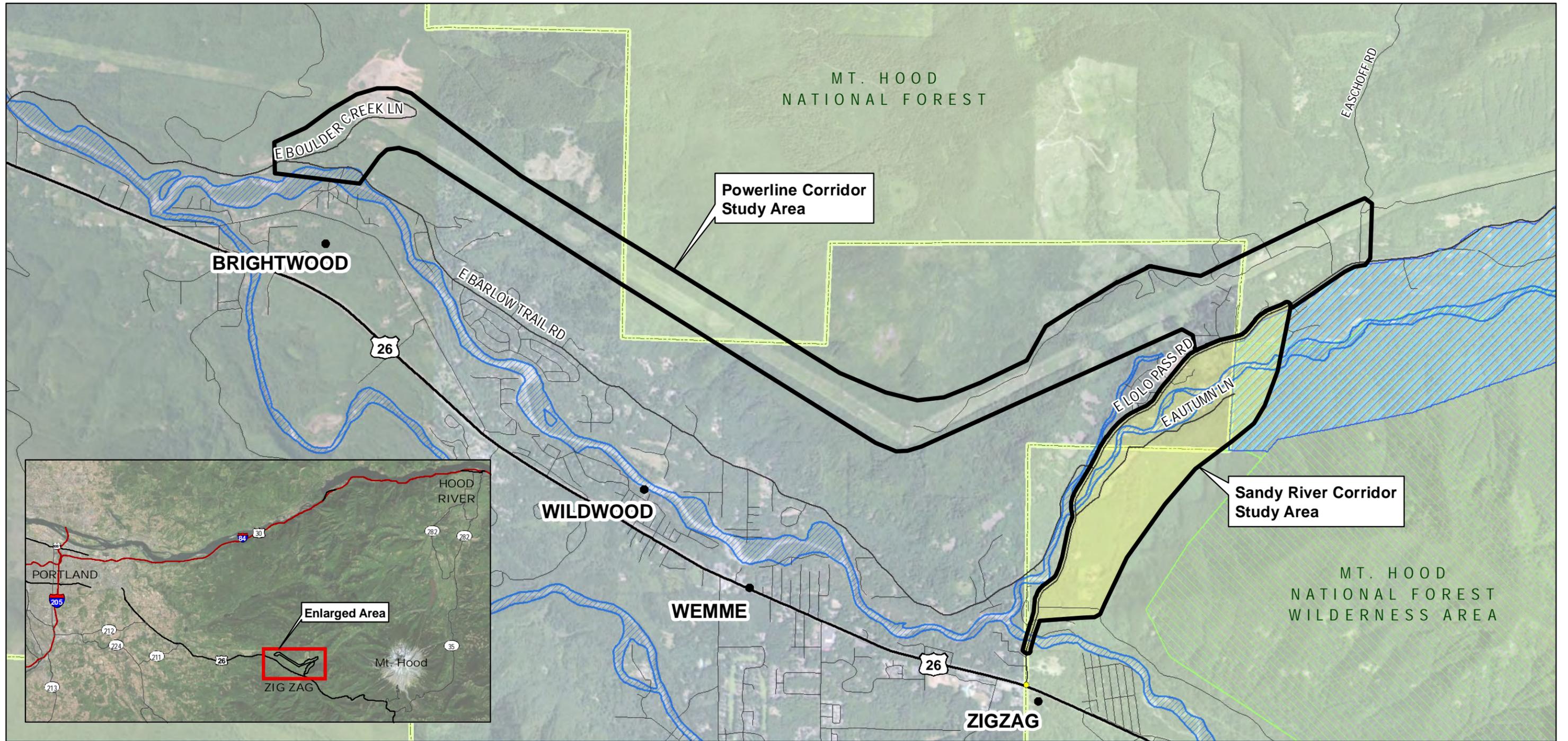
### PROJECT DESCRIPTION

The Western Federal Lands Highway Division (WFLHD) of the U.S. Department of Transportation, Federal Highway Administration (FHWA) and Clackamas County will be evaluating options to provide safe, long-term access to public lands (including the Mount Hood National Forest [MHNH]) and private properties. The Lolo Pass Road Access Alternatives Study (study) will address long-term flooding and access issues on the portions of Lolo Pass Road that have been, and will continue to be vulnerable to severe damage from major floods and ongoing river channel migration. The purpose of this Reconnaissance Report is to identify features of the natural and built environment within the project area that may constrain or influence the development of reasonable access solutions to be addressed in the study.

As shown in Figure 1, the project area is located just north of the intersection of U.S. Highway 26 (US 26) and Lolo Pass Road near Mt. Hood Village and Rhododendron, in Clackamas County, Oregon.

Portions of Lolo Pass Road, the road subgrade, and adjoining residential properties were critically damaged during a major Sandy River flood and channel migration in January 2011. The road is in jeopardy of being destroyed by repeated flooding and Sandy River channel migration, which would completely cut off access to public lands used for resources and recreation and rural residential communities. The only currently identified access to the properties and public lands north of the washout requires driving more than 50 miles to Hood River over a mountain pass that is not traversable in the winter due to high snow levels. Figure 1 shows the project area.

The January 2011 flood, as well as other floods and channel movements in the past, have adversely affected the quality of life and viability of the area surrounding the portion of Lolo Pass Road along the Sandy River. Residents fear that a future event will again isolate their homes and threaten their property and lives. Providing reliable and permanent access will improve livability for the surrounding area including seniors, non-drivers, economically disadvantaged, visitors, and others. Additionally, it will ensure that this popular public access to natural and recreational attractions in the MHNH will be continuously maintained. In fiscal year 2012, the MHNH as a whole had 2.6 million estimated site visits, 1.9 million visits to developed sites and 203,000 visits to Wilderness areas. The MHNH collected over \$400,000 in recreation fees in fiscal year 2011, and invested \$368,000 of those fees back into recreation facilities and services for the public (MHNH no date-a). The local communities of Mt. Hood Village, Zigzag, Brightwood, Welches, and Rhododendron depend on tourism for their viability. Tourists visiting

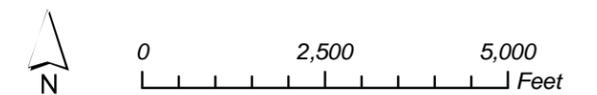


**Lolo Pass Road Access Alternatives**

- Legend**
- Powerline Corridor Study Area
  - Sandy River Corridor Area
  - FEMA Floodway
  - Mt. Hood National Forest
  - Mt. Hood Wilderness
  - Wild & Scenic Sandy River (Recreation)

**Powerline Corridor and Sandy River Corridor Study Areas**

**Figure 1. Areas of Study**



**Data Sources:**  
 ESRI, ArcGIS Online, World Imagery. 2010. Microsoft.

and staying in these communities use trails and campgrounds along Lolo Pass Road. The roadway directly serves Zigzag Village, it is the sole winter access to 250 homes, and the community depends on it to provide access to campgrounds, and cabins, and hiking trails. Multiple MHNH recreation resources are at the northeast corner of both access alternatives: McNeil Campground, Riley Horse Campground, Lost Creek Campground, French's Dome Trailhead, and Ramona Falls Trailhead (the bridge access to Ramona Falls currently is washed out from high and swift water). Zigzag Mountain Trailhead #775 and Lower Hunchback Trailhead are near the intersection of East Lolo Pass Road with US 26 (MHNH no date-b).

During and after the January 2011 flood event, several community meetings were held with representatives from the County, State, and Federal agencies as well as local utilities, community groups, and emergency responders. The community is engaged in issues related to the road, and the alternatives access feasibility study will utilize and leverage these established public and agency contacts and networks.

The proposed project would evaluate several potential access alternatives, including:

- Improving Lolo Pass Road in its current location to mitigate and minimize impacts from future flooding and channel migration.
- Constructing a new bridge over the Sandy River that could accommodate large floods and channel shifts with two potential new Lolo Pass Road route alignments located east of the existing route and further away and upland from the Sandy River.

In addition to these access alternatives, the County has considered potential improvements to a primitive power line access road. While this concept will be considered further in comparison to other potential alignments, it does not appear to be a feasible alternative to be improved as a primary access route due to substantial out-of-direction travel distance, highly variable terrain, natural hazard (landslide) areas, numerous stream crossings, wetlands, and other potential sensitive habitat.

The next phase of this study will determine the comparative feasibility of these potential alternatives, based on criteria to be established by WFLHD, Clackamas County, and other stakeholders, including the public.

## EXISTING ROADWAY CONDITIONS

### USE

Lolo Pass Road is a Clackamas County rural arterial and a designated Federal Forest Highway. It provides public access from US 26 to the west side of the MHNH. The road serves as the sole winter access to the MHNH north of East Barlow Trail Road along the upper Sandy River and is the only access road for more than 250 residences, plus cabins and public campgrounds north of the Sandy River and East Barlow Trail Road. Figure 1 shows the forest lands accessed by Lolo Pass Road.



EXISTING TRAFFIC VOLUMES

The annual average daily traffic volumes as reported by Clackamas County in 2011 from their traffic counters [locations] are shown in Table 1.

<b>Table 1. Clackamas County Average Daily Traffic Counts (at E Lolo Pass Rd)</b>	
<b>Location 1 (On Lolo Pass Rd): Approximately 109 ft. North from Highway 26</b>	
<b>Year</b>	<b>Average Daily Traffic</b>
2011	1870
2008	1400
2005	1950
2002	1850
2000	1750
<b>Location 2 (On Lolo Pass Rd): Approximately 694 ft. South of Intersection of E Barlow Trail Rd and E Lolo Pass Rd</b>	
<b>Year</b>	<b>Average Daily Traffic</b>
2011	1265
2008	980
2005	1000
2002	1300
2000	1250
<b>Location 3 (On Lolo Pass Rd): Approximately 290 ft. North of Intersection of E Barlow Trail Rd and E Lolo Pass Rd</b>	
<b>Year</b>	<b>Average Daily Traffic</b>
2011	950
2008	730
2005	690
2002	1100
2000	970
<b>Location 4 (On Barlow Trail Rd): Approximately 900 ft. South of the Intersection of E Barlow Trail Rd and E Lolo Pass Rd</b>	
<b>Year</b>	<b>Average Daily Traffic</b>
2011	570
2008	400
2005	NA
2002	NA
2000	NA

Source: Clackamas County 2011

CRASH HISTORY

Table 2. Crash History on US 26 and Lolo Pass Road															
Study Location								Severity				Surface			
	Fix	Turn	Other	Angle	Rear-End	Sideswipe-Meeting	Total	Fatal & Serious Injury	Minor Injury	Property Damage Only	Wet	Ice/Snow	Dry	Unknown	
US 26	3	3	1	1	1	0	9	0	2	7	1	3	4	1	
E Lolo Pass Rd	4	1	0	0	0	1	6	2	1	3	1	4	1	0	
<b>Totals</b>	<b>7</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>15</b>	<b>2</b>	<b>3</b>	<b>10</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>1</b>	

Source: ODOT 2014

US 26 AT EAST LOLO PASS ROAD

According to historical crash data from ODOT’s database of State Highway Crash Reports, the intersection of US 26 and East Lolo Pass Road (influence area mile point [MP] 41.49-MP 41.69) experienced nine crashes between the years of 2009 and 2013. None of the nine crashes resulted in fatalities. Two of the crashes resulted in minor injuries and seven of the crashes resulted in property damage. One third of the crashes were determined to be turning movement collisions with another third of the crashes classified as fixed object collisions, and one collision involving an animal. For the majority of the crashes, the surface during the collision was dry. However, four of the collisions had surfaces that were wet, icy, or had accumulated snow. Causes for reported collisions include improper overtaking, other improper driver<sup>1</sup>, a tire failure, a failure to yield, and speeding. None of the crashes were attributed to alcohol.

EAST LOLO PASS ROAD

Along East Lolo Pass Road north of US 26, between the years of 2009 and 2013, six crashes were reported. Of the six crashes, none of them resulted in fatalities. However, two of the crashes resulted in major injuries and one of the crashes resulted in a minor injury. Three of the crashes resulted in property damage only. Four of the crashes were collisions with a fixed

<sup>1</sup> One of the following: Failure to follow traffic laws, maintain speed, maintain lane, or other driver related error.

object. One of the crashes was a collision caused by a sideswipe meeting. For the majority of the crashes, the surface was either wet, icy, or had accumulated snow. The causes for the majority of the crashes included speeding, and failure to maintain lane. Two of the crashes involved another vehicle, with one of them involving a turning movement crash at a 3-leg intersection. None of the crashes were alcohol related.

## GENERAL CONDITIONS

Lolo Pass Road within the project area is not sustainable in its current configuration and structural condition. Based on historical evidence, the Sandy River will continue to reach flood stage and shift its channel as it has for hundreds of years, and the road will be damaged or overtopped again in the future.



State and local funding resources are not sufficient to continue to rebuild the roadway in perpetuity. The January 2011 flooding resulted in more than \$3 million in road and bridge repairs. A new solution is needed to ensure the safety of the travelling public and access to the MHNF. A fiscally sustainable permanent fix will save the public and several agencies money in the long run.

While the primary need for the project is to ensure long-term, viable access, Lolo Pass Road does not meet current design standards for roadside safety features, vertical alignment, sight distance, clear zone, or provisions for bicyclists and pedestrians. However, the Clackamas County Transportation System Plan lists a project to perform a safety analysis and add paved shoulders to Lolo Pass Road from US 26 to Barlow Trail Road. It is listed as project number U245, a previously planned project, with an estimated cost of \$5,340,000 and a projected future demand of 2,500 (Clackamas County 2013).

Representatives from the County, WFLHD, and the consultant project team visited the project area on July 16, 2014. A photo from that site visit and a map showing potential location of a new bridge over the Sandy River crossing are shown below.



***Powerline Corridor view to west from Ashcroff Road.***

## NATURAL AND BUILT ENVIRONMENTAL RESOURCES

This section presents reconnaissance-level information regarding land use, streams and wetlands, threatened and endangered species, geologic hazards, floodplains, cultural resources, and hazardous materials. The information is intended to provide an overview of potential opportunities and constraints, and is derived from existing data sources. The section that follows lists the more detailed and project-specific evaluations of these resources needed in order to develop the project alternatives.

### LAND USE

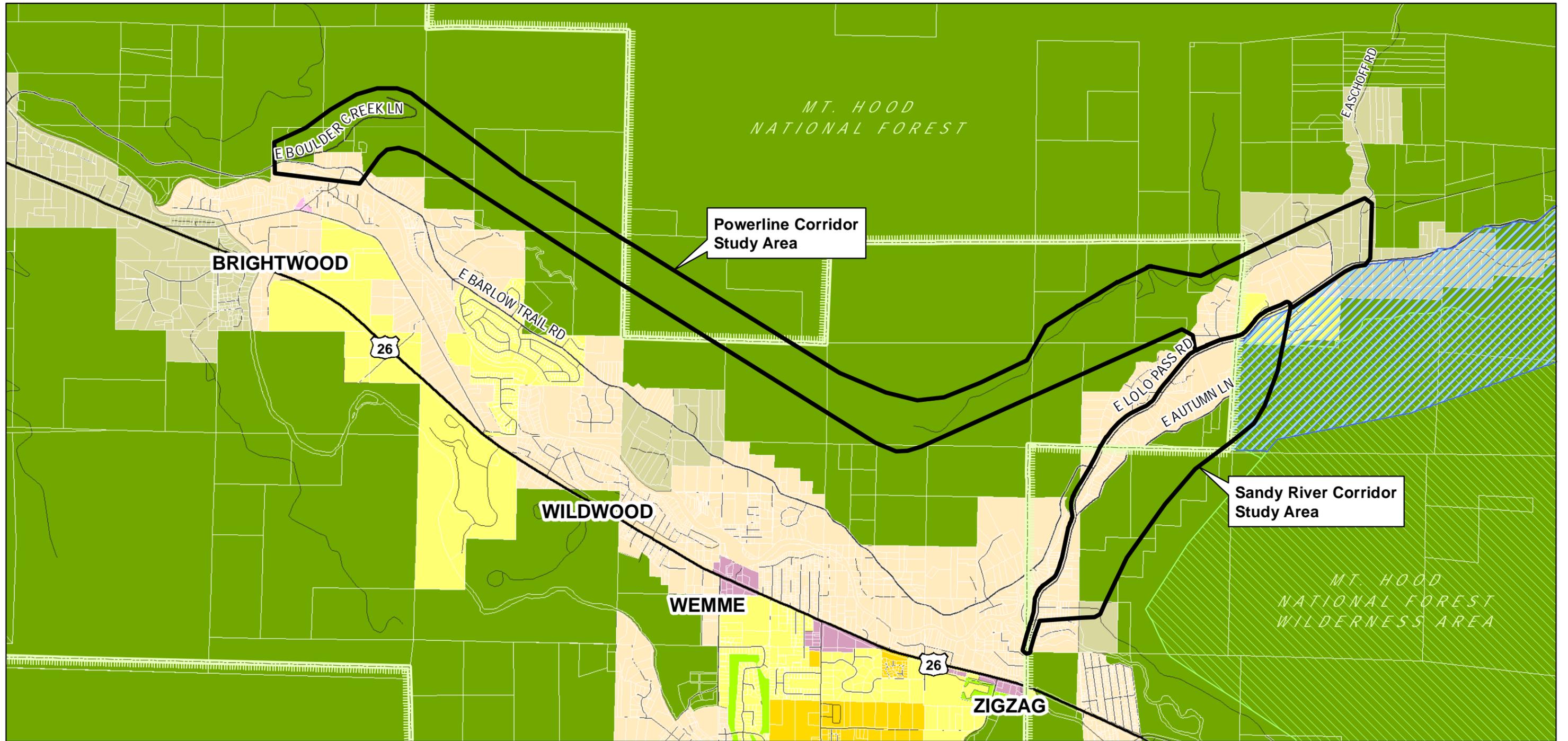
As shown in Figure 2, most of the APE is located within the MHNH. These lands are designated Forest (F) on the Clackamas County Comprehensive Plan map and zoned as Timber District (TBR) on the Clackamas County Zoning map. The other properties with the APE are located within the Villages at Mt Hood. These properties are designated Rural (R) and Low Density Residential (LDR) on the Clackamas County Comprehensive Plan map and zoned as Recreation Residential – 2 acre (RR), Rural Residential Farm Forest – 5 acre (RRFF5) and Hoodland Residential (HR) on the Clackamas County Zoning map. (Clackamas County 2014).

The Clackamas County Transportation System Plan (Chapter 5 of the Comprehensive Plan requires a new road on forest lands meet the provision of Policy 5.O.11 or an exception be taken to Goal 4. The Timber District (TBR) is intended to implement Goal 4: Forest Lands of the Statewide Planning Goals and “conserve forest lands by maintaining the forest land base”. The construction of new road alignments in the TBR district is a Conditional Use (Section 406, Table 406-1 and Sections 1203 and 1300).

#### *5.O.11 Rural*

*Consistent with ORS 215.283(3) and OAR 660, Division 12, County road capital improvement projects may be designed and constructed to improve safety and bring roads up to county standards outside the UGB. **If the road capital improvement project is not otherwise allowed and would require expansion of right-of-way exceeding the road improvements allowed in the Agriculture or Forest districts, a goal exception would be required for such a project, as provided for in ORS 215.283(3).***

Uses within both the Powerline Corridor and the Sandy River Corridor are forest-related with some scattered residences. Outside the APE, uses southwest of the intersection of East Lolo Pass Road and US 26 are Hoodland County Park, USFS ranger station, and private residences. The north side of US 26 is mostly forest, with a few scattered residences. The communities of Wemme, Wildwood, and Brightwood are to the west, and Rhododendron is to the east.



Lolo Pass Road Access Alternatives

**Legend**

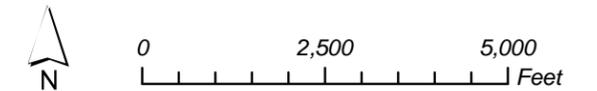
- Study Areas
- Mt. Hood National Forest
- Mt. Hood Wilderness
- Wild & Scenic Sandy River (Recreation)

**Clackamas County Zoning Designations**

- |                                    |   |
|------------------------------------|---|
| Hoodland Residential (HR)          | Rural Residential Farm Forest, 5-acre (RRFF5) |
| Mountain Recreational Resort (MRR) | Rural Commercial (RC)                         |
| Open Space Management (OSM)        | Rural Tourist Commercial (RTC)                |
| Recreational Residential (RR)      | Timber District (TBR)                         |

**Powerline Corridor and Sandy River Corridor Study Areas**

**Figure 2. Local Zoning Classifications**



**Data Sources:**  
 ESRI, ArcGIS Online, World Imagery, 2010. Microsoft. US Forest Service.

## STREAMS AND WETLANDS

Lolo Pass Road parallels the Sandy River. Clear Creek parallels the Sandy River and is separated from it by Lolo Pass Road.

The powerline corridor is adjacent to the Sandy River at its west end, and tributaries in the western tip of the powerline corridor drain to North Boulder Creek, a tributary of the Sandy River (see maps in Appendix C). The corridor extends upstream along the Sandy River valley slope above Hackett Creek to cross seven streams: three unnamed Hackett Creek tributaries, Minikahda Creek, and three other unnamed tributaries to Clear Creek.

The wetlands shown on the National Wetlands Inventory maps (Appendix C) almost all coincide with or adjoin the Sandy River channel, and are likely to be included as part of the Sandy River for jurisdictional purposes. The three exceptions in the study area are a large forested wetland to the east of Autumn Lane, and two small ponds west (uphill) of Lolo Pass Road. No wetlands are shown in the powerline corridor study area.

The Clackamas Soil Survey shows seven general soil types within the study area (see maps in Appendix C). None of them are listed as hydric (formed under wet conditions) by the Natural Resource Conservation Service (NRCS 2014). Therefore, soils mapping does not indicate that unmapped areas may contain wetlands. However, given the high rainfall totals in the area, the position of the powerline corridor on a steep slope below the Bull Run Watershed, and the position of Lolo Pass Road in the study area at the base of steep forested slopes, unmapped wetlands fed by groundwater are likely to occur.

## THREATENED AND ENDANGERED SPECIES OCCURRENCE

Based on existing information, federally listed and endangered fish under jurisdiction of NMFS are present in the study area as summarized in Table 3. Although several of these species are present downstream of the study area in Hickman Creek, resources do not indicate any presence in the on-site Hickman Creek tributaries. The Sandy River and Clear Creek are designated as Critical Habitat for steelhead trout and Chinook salmon. Note that construction of new impervious surface anywhere in the project may trigger the Endangered Species Act documentation requirements because of potential downstream effects. It is likely that native resident cutthroat trout, sculpin, and possibly other non-listed fish are present in all perennial streams within the study area.

**Table 3: Threatened and Endangered NMFS Fish Species Occurrence Summary**

<b>Species (Status)</b>	<b>Sandy River</b>	<b>Clear Creek</b>	<b>Minikahda Creek</b>	<b>North Boulder Creek</b>
Lower Columbia River (LCR) winter steelhead (listed threatened)	X	X		X
LCR summer steelhead (listed threatened)	X			
LCR coho salmon (listed threatened)	X	X	X	X
LCR spring Chinook salmon (listed threatened)	X	X		X

Source: ODFW 2014.

The U.S. Fish and Wildlife Service (USFWS) Information Planning and Conservation System identifies eight USFWS listed and proposed species that may be within the project area of potential impact. Information on potential occurrence of listed plants and wildlife has been obtained from Oregon Biodiversity Information Center (ORBIC) and is presented in Table 4. Portions of the study area lie within the MHNH. For these areas, the U.S. Forest Service will likely require studies to determine occurrence of additional species beyond those on the federal Threatened and Endangered Species list.

**Table 4: Threatened and Endangered USFWS Species Potential Occurrence Summary**

<b>Species (Status)</b>	<b>Actual Occurrence</b>
Northern spotted owl (listed threatened)	None within project footprint, but four occurrences within one mile of project areas
Marbled murrelet (listed threatened)	None, site is too far inland
Streaked horned lark (listed threatened)	None, no suitable sparse vegetation habitat in the API
Yellow billed cuckoo (proposed threatened)	None, no suitable riparian habitat in the API
Bull trout (listed threatened)	None, no documented occurrence
Nelson's checker-mallow (listed threatened)	None, no documented occurrence
Water howellia (listed threatened)	None, no documented occurrence
Willamette Daisy listed endangered)	None, no suitable prairie habitat in the API

Source: USFWS 2014.

## GEOLOGICAL HAZARDS

The geotechnical consultant evaluated existing geotechnical conditions by reviewing published geologic mapping of the area, review of aerial photographs of the site from the 1960s, and topographic maps derived from publicly available airborne lidar (light detection and ranging) survey information from the Oregon Department of Geology and Mineral Industries (DOGAMI) and by conducting a ground-level reconnaissance on July 16, 2014. The findings are included in their Geologic Reconnaissance and Preliminary Geotechnical Evaluation Memorandum in Appendix D.

## POWERLINE CORRIDOR

The powerline corridor crosses over 2 miles of mapped landslide deposits, 11 significant drainage ravines, stream crossings may be subject to fast moving debris flows carrying significant amounts of sediment and entrained woody debris

## SANDY RIVER CORRIDOR

The actively meandering river channel could relocate to any portion of the area mapped as debris flow within the design life of a proposed new bridge across the Sandy River. Therefore, a bridge span that is longer than the limits of this area to pass the design level flood will need to be considered. Considering the relatively small drainage basins collected by the streams that form the alluvial fan deposits at the east end of Autumn Lane, large-span culverts will likely be appropriate for these stream crossings. There may be landslide debris area at the connection point with Lolo Pass Road. The primary geotechnical considerations for design of bridge foundations will be the characteristics of alluvial and debris flow sediments underlying the site and the depth and quality of the underlying rock.

## FLOODPLAINS

The Oregon Department of Geology and Mineral Industries (DOGAMI) is contracted to remap the Sandy River basin for a multi-agency team. DOGAMI has completed the channel migration hazard data and mapping project (English et al. 2013).

## HYDROLOGIC CONDITIONS

The Sandy River and its tributaries originate high on the western slopes of Mount Hood from the Sandy, Palmer, Reid, and Zigzag glaciers. The Sandy River transports large amounts sediment during the spring and summer months, and during large flood events. The sediment supplied by the glaciers and the surrounding steep erodible slopes can migrate downstream in

waves which results in localized rise then fall of the channel bed elevations. As the river evolves, channel erosion and hillside erosion also contributes to the development of debris torrents and localized deposition along segments of the river. High flood waters combined with these changes to the channel have caused damage to Lolo Pass Road on a number of occasions.

Erosion of channel banks and channel bottoms, deposition of large amounts of material in the channel, and channel migration or avulsion pose a special problem within the Sandy River. Roads, bridges, homes, and other infrastructure may be lost due to these catastrophic changes which traditional FEMA floodplain mapping does not address. The erosion and channel migration within the Sandy River can quickly alter or create new adjacent flood-prone areas and hazards beyond the limits of the FEMA mapped floodplain. To better prepare for and anticipate hazards within the Sandy River Basin, flood hazard mapping needs to be modified to more clearly represent areas that are vulnerable to future floods and changes in the river.

The Oregon Department of Geology & Mineral Industries (DOGAMI) has been contracted to remap the Sandy River Basin to better understand the rivers movements and associated hazards. Preliminary channel migration hazard maps prepared by DOGAMI only extend through the south half of the study area, just north of the Sandy River (Lolo Pass Road) Bridge.

Based on the maps prepared by DOGAMI, lidar contour data, and field observations the majority of Lolo Pass Road within the study area lies within the channel migration zone. During the 2011 flood, the Zigzag River undermined the south abutment of the Zigzag River (Lolo Pass Road) Bridge. The Sandy River washed out a 300-foot segment of Lolo Pass Road approximately 0.23 miles north of East Barlow Trail Road. Flood waters also eroded the roadway embankment north of the Sandy River (Lolo Pass Road) Bridge and ran south along roadway and ditch causing erosion damage at the north bridge approach.

The County made emergency repairs on the Zigzag River (Lolo Pass Road) Bridge approaches and installed riprap to protect it from further erosion. They repaired the damaged segments of road, re-channeled a section of the Sandy River, stabilized the banks with riprap and plantings, and added large woody debris for riparian and fish habitat.

## CULTURAL RESOURCES

The Oregon National Historic Trail crosses Lolo Pass Road in the Vicinity of Mountain Drive, north of the Zig Zag River. It continues to the west near or along East Barlow Trail Road through Brightwood. The Oregon National Historic Trail includes Barlow Road in the project area. Barlow Road was used to provide an alternative to the route along the Columbia River. There is signage for the Barlow Road in the southern section of the project area, adjacent to Lolo Pass Road. Barlow Road is listed on the National Register of Historic Places for a section east of the

project area (extending approximately from Rhododendron, OR to Wamic, OR) (NPS no date and Oregon Parks and Recreation Department no date).

There are no recorded historic buildings in the project area, though many are over 40 years old and should be evaluated for significance if they will be affected by the project. There are two properties that have been identified as eligible for listing on the National Register in the project area: the Harry Morton House and the Barlow Trail Stage Stop Chimneys, both located southeast of the intersection of Lolo Pass Road and Autumn Lane.

The area has potential to contain significant archaeological resources, and thus archaeological reconnaissance work will be required prior to construction.

## HAZARDOUS MATERIALS

Federal and state databases were searched for identified hazardous waste sites on August 14 and 15, 2014. The U.S. Environmental Protection Agency (EPA) keeps detailed information on all businesses dealing with hazardous materials, water discharge, Superfund sites, toxic releases, and air emissions. According to the EPA Facility Register Service website, which includes Resource Conservation and Recovery Act (RCRA) sites, there are no National Priorities List (Superfund) sites within 5 miles of the project site (EPA 2014). There is one RCRA site with 0.25 miles of the study area. The RCRA site is a Conditionally Exempt Small Quantity hazardous waste generator for the United States Department of Agriculture Forest Service, MHNZ Zig Zag Ranger District that supports activities for Forestry.

The Oregon Department of Environmental Quality (DEQ) regulates or permits facilities and sites in the state. The DEQ Facilitator website identifies the following hazardous material sites in or within 0.25 miles of the study area (DEQ 2014):

- 4 Leaking Underground Storage Tanks: three with documented cleanup completed and one with cleanup started.
- 2 Water Quality Permits one individual (Zig Zag Village Homeowners Association) and one industrial (Mt. Hood Asphalt Products, Inc.).

Background data files for each identified site are in Appendix E. The above hazardous materials sites include only those which have been identified through online database review. Further ground level and more detailed site reconnaissance may identify additional hazardous materials locations.

## PRELIMINARY HYDROLOGIC ANALYSIS OF PROJECT ALTERNATIVES

This section outlines preliminary hydrologic analysis for the three currently identified project alternatives: improving the road in its current location, developing a new road and Sandy River (Lolo Pass Road) Bridge crossing east and south of the existing roadway, and constructing a road in the power line corridor.

### IMPROVING AND PROTECT LOLO PASS ROAD IN ITS CURRENT LOCATION

No signs of recent erosion or damage to the emergency repairs made at the Zigzag River (Lolo Pass Road) Bridge were observed during the field reconnaissance. Additional improvements to protect the bridge may not be necessary. However, further hydraulic analysis of the bridge should be performed to ensure that the emergency repairs provide sufficient erosion and scour protection during future floods, and that adequate clearance below the bridge is provided to accommodate anticipated debris flows and channel aggradation or degradation.

Approximately 0.3 miles north of the Zigzag River (Lolo Pass Road) Bridge, the Sandy River forms a meander bend which is migrating southeast. The river is beginning to undermine the roadway just north of where it destroyed a private home during the 2011 flood. Erosion mitigation measures will need to be installed to protect the roadway from further channel migration.

The segment of Lolo Pass Road between the Sandy River (Lolo Pass Road) Bridge and Michigan Avenue is constructed on low embankments which are susceptible to overtopping during flood events. There is a potential for the river to aggrade and possibly form a new channel down the roadway causing significant damage. Upgrading the road to withstand future channel migration will require raising the road grade through this segment. Erosion mitigation measures installed by the County after the 2011 flood appear to be functioning. However, additional erosion mitigation will likely be need as new areas of roadway become threatened by river migration.

Traditional armoring techniques employed on streams may exacerbate stream instability, thereby increasing the risk of flood-related damage downstream. Erosion mitigation measures employed along roadway banks will need to be evaluated for downstream impacts. A variety of mitigation techniques, similar to measures installed by the County after the 2011 flood, will need to be utilized to reduce the potential for downstream erosion.

## NEW BRIDGE LOCATIONS AND LOLO PASS ROAD ALIGNMENTS

Current FEMA maps were reviewed to identify flood hazard zones within the study area. Historic aerial photos and lidar mapping were reviewed to estimate the overall channel migration zones and recent historic channel migration zones (within the last 50 years).

The overall channel migration zone through the study area does not appear to have any confined or narrow areas ideal for a crossing. However, there are several locations where the channel has maintained a more consistent and confined route within the last 50 years. One location, in the vicinity of the east end of Autumn Lane, appears to provide the best opportunity for a crossing location with a narrow flood hazard zone combined with a more confined recent historic channel migration zone (approximately 250 foot width). Field reconnaissance confirmed that this location would be the most practical for a crossing within the study area. Alternatives associated with this location are called the Zigzag Mountain Alternatives.

The potential bridge location provides a crossing at the east end of the study area and coincides with possible alternative alignments for Lolo Pass Road which could be constructed east of Autumn Lane. The approaches to the new bridge could be constructed with minimal private property impacts and without the need to remove or relocate homes.

South of the bridge, the Zigzag Mountain alternative road alignments could be constructed outside of the channel migration zone. The alignments would cross a number of small intermittent drainages requiring installation of large culverts.

North of the bridge, the road alignment would extend across the channel migration zone. Roadway embankments would need to be elevated to match the bridge elevation and to tie into the existing Lolo Pass Road. This would result in increased floodplain and wetland impacts. However, the elevated embankments would allow the roadway to be constructed well above flood levels and will eliminate the potential for overtopping of the road. Erosion mitigation measures will need to be incorporated into the elevated embankment designed to prevent erosion from potential channel migration.

Lidar mapping shows an old abandoned channel within the channel migration zone north of the potential bridge site. This was confirmed by field reconnaissance. Under current conditions the potential for the river to shift into this old channel during the next flood is high. The old channel could send flood waters across several residential properties and along the existing Lolo Pass Road. Constructing a new embankment across the old channel could act to prevent such a catastrophic avulsion from occurring. Further detailed analysis and evaluation will be

needed to determine the impacts a bridge and its approaches may have on channel migration and erosion both upstream and downstream of the site.

## POWER LINE CORRIDOR ACCESS ROAD ALTERNATIVE

BPA has a maintenance access road which follows the power line corridor north of the Sandy River. This access road provided emergency access when a section of Lolo Pass Road was closed during the 2011 flood.

Review of the power line access road revealed that its use as a primary access route would not be practical for a number of reasons. The road traverses over steep mountainous terrain which rises 800 feet above the valley floor. The road crosses multiple drainages and areas identified as geologic hazards. Improving this road from its current primitive condition to a primary access would require over six miles of road construction. Much of the roadway would have to be re-aligned to meet design safety standards. Construction impacts and costs would be significant. The new route would require an extensive amount of regular maintenance and snow removal during the winter months since it traverses hazardous and high elevation terrain.

Although not a likely candidate as a primary access, the County will need to work with the BPA to ensure the road is maintained so as to allow for future use as an emergency access route.

## PROJECT DEVELOPMENT

In order to develop the Project the following steps need to be taken and project area-specific studies and site investigations are recommended.

## PROJECT ACTIVITIES

- **Alternatives screening.** Determine criteria to screen alternatives
- **Public outreach.** Include activity during the next phase of the project to meet with both Clackamas County and WFLHD staff to clarify expectations for stakeholder outreach.
- **Public outreach.** Coordinate with the Clackamas County “Flood of Information III: Preparing for winter on the Sandy River and Its Tributaries public workshop on September 27, 2014.

## STUDIES NEEDED TO SUPPORT SELECTION OF A PREFERRED ALTERNATIVE

- **Wetlands.** A wetland reconnaissance memorandum should be produced once the project work area and staging areas are finalized in order to document determination of wetlands and streams locations.
- **Threatened and Endangered Species.** Endangered Species Act Compliance.

- **Geotechnical—Powerline Corridor Alternative.** Extensive geotechnical investigations will be needed to evaluate the risk of slope instability associated with these hillside cuts and fills.
- **Geotechnical—Zigzag Mountain Alternative Crossing.** Complete a preliminary geotechnical investigation to evaluate the depth of rock and characteristics of the sediments at the proposed bridge location. The geotechnical engineer recommends using sonic drilling methods to complete three borings, one on each the north and south sides of the river, and one in the area of landslide debris in the vicinity of the north bridge approach.
- **Floodplain.** Specific flood information needs to be evaluated from the DOGAMI mapping project.
- **Cultural resources.** A qualified archaeologist needs to perform a site reconnaissance and records search to determine the archaeological and historic resources within the APE and potential project effects.
- **Cultural resources.** Federal funding requires the Project to comply with the National Historic Preservation Act and make a Section 106 Finding.
- **Hazardous materials.** A qualified engineer needs to perform a Level I Site Assessment within a five-mile radius of the APE.

During the next phase of the Project the Design Criteria should be established so that the geotechnical issues noted during the geotechnical site investigation can be categorized and addressed as part of the Project if necessary. Also during the next phase of work the thickness of asphaltic concrete pavement on the deck of the viaducts and the compressive strength of concrete in deck of viaducts should be determined. Both the asphalt thickness and concrete strength would be vital information to determining the scope of the Project.

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# Appendix A

Project Kick-off Meeting Summary Notes – June 26, 2014

## MEETING SUMMARY NOTES

### PROJECT KICKOFF MEETING

#### Lolo Pass Road Access Alternatives

Wednesday April 23, 2014 1:00 p.m.

Clackamas County Dept. of Transportation  
and Development

150 Beavercreek Road

Oregon City, OR 97045

#### Attendance:

<u>Name</u>	<u>Phone Number</u>	<u>Email</u>
<b>Western Federal Lands Highway Division</b>		
Jennifer Corwin	360-619-7623	jennifer.corwin@dot.gov
Sven Leon	360-619-7767	sven.leon@dot.gov
James Neighorn	360-619-7830	james.neighorn@dog.gov
Mike Odom	360-619-7568	mike.odom@dot.gov
<b>Clackamas County</b>		
Nancy Bush	503-655-8665	nbush@clackamas.us
Larry Conrad	503-353-4539	larrycon@clackamas.or.us
Abbot Flatt	503-742-4533	aflatt@co.clackamas.or.us
Martha Fritzie	503-742-4529	mfritzie@clackamas.us
Randy Harmon	503-650-3246	Randyhar2@co.clackamas.or.us
Joel Howie	503-742-4658	jhowie@clackamas.us
Joe Marek	503-742-4705	joem@clackamas.us
Ellen Rogalin	503-742-4274	ellenrog@co.clackamas.or.us
Kath Rose	503-742-4713	kathros@co.clackamas.or.us
<b>David Evans and Associates, Inc.</b>		
John Macklin	503-499-0348	jdm@deainc.com
Scott Richman	503-499-0593	csr@deainc.com
Ted Stewart	503-499-0254	tcst@deainc.com

## **GRI**

Dwight Hardin	503-641-3478	dhardin@gri.com
Michael Zimmerman	503-641-3478	mzimmerman@gri.com

Meeting Agenda items are shown in *italic font*.

### ***Introductions***

Participants introduced themselves (see attendees listed above).

### ***Roles and Responsibilities***

Mike Odom is the WFLHD Project Manager and will manage the use of federal funds dedicated to the study. The project is using federal public lands discretionary funds administered through the WFLHD. WFLHD Hydraulics Engineers will provide technical expertise and support for locating a potential new bridge crossing the Sandy River under one or more of the alternatives to be studied.

Jennifer Corwin, Environmental Specialist, will coordinate with the County's public involvement efforts.

Larry Conrad is the PM for Clackamas County and Joel Howie is the County's Deputy PM. The County will review work products from WFLHD and the consultants, plus provide overall work and schedule coordination, including coordination with the County's floodplain study and anticipated County permit and approvals.

Ellen Rogalin will coordinate the public involvement activities and manage stakeholder notifications and maintain the project website. Kath Rose will lead the right of entry coordination and communications with potentially affected property owners.

WFLHD hired a consultant team that DEA is leading, and Scott Richman is the PM for the DEA team, Ted Stewart is the lead Engineer, and John Macklin is the Biological Resources Specialist. GRI, Inc. is also on the team to address Geology and Soils. Dwight Hardin, George Freitag and Michael Zimmerman will do their work. The consultant team will provide documentation and graphics to support the alternatives analysis.

### ***Project Overview***

This study is in the initial stage of an alternatives analysis and "pre-NEPA" process. From the potential alternative concepts identified to date, the intent is to advance one or two reasonable alternatives to be developed and evaluated in more detail through a subsequent alternatives analysis phase, and likely into a NEPA process that leads to a recommended action. The project will be developed to meet the County's Rural Arterial design standards.

In the initial current work scope, the consultants will prepare a draft and revised Reconnaissance Memorandum to provide an inventory of existing conditions and identify likely fatal flaws that are associated with potential alignment alternatives.

Information from recent LiDAR mapped data from WFLHD will provide topography. Led by Nancy Bush and working with a consultant out of Seattle, Clackamas County completed an extensive Sandy River channel migration and erosion study in December. The County Commissioners received a briefing yesterday on this study.

The County also has extensive GIS data and FEMA has updated draft flood maps. The FEMA maps are scheduled to be adopted next year. DOGAMI also has recently released updated channel hazard maps that cover most of the southern portion of the area that will be studied, but not all of it. Abbott is Larry's backup contact in Planning. She does a lot of GIS work.

Joel Howie will provide John Macklin with the permitting information for the emergency repairs from the 2011 Sandy River flood that destroyed portions of Lolo Pass Road. The County is currently stabilizing a section of the channel adjacent to Barlow Road.

In addition to what was discussed earlier in the meeting, Mike added that \$500,000 of Federal Discretionary Lands funding is available, and the challenge is to get as far into developing a solution as possible with this limited funding. The County wants to be able to be in position for additional funds by advancing the study to project development.

Jennifer suggested that if we can build a record of an alternatives study process that can be used to proceed into more detailed project development, the alternatives study phase could fulfill the Scoping requirement of a NEPA process, and not require us to go back in the process to reconsider alternatives.

Following the flood event in 2011, the County repaired the road, re-channeled a section of the Sandy River, and stabilized the banks with riprap, plus added large woody debris for riparian and fish habitat restoration. Some adjacent property owners have also made modifications to the channel.

Most of the information used to prepare the Reconnaissance documentation will be based on existing GIS data and agency records. More detailed studies, including cultural resources, hazardous materials, and utilities would be done for 1-2 alternatives that the County recommends to be advanced. Evaluation criteria will need to be developed, and will need to be presented to the public.

We need to revisit the schedule in light of the property access timing for the field visit, and to coordinate with the County's public involvement activities planned for the "Flood of Information" – the County's larger flood hazard study.

### ***Project Objectives***

The County needs a document that they can use to support pursuing future grant applications.

Through the "pre-NEPA" alternatives analysis, we need to determine reasonable options to carry forward, and to provide defensible information as the basis for dismissing options that we do not recommend carrying forward.

One objective is to minimize impacts to private properties and right-of-way acquisition. However, it may not be possible to avoid the need to acquire some additional ROW.

The recommended action needs to maintain access to the Mt. Hood National Forest, residences, and emergency and medical services.

County Rural Arterial design standards will be used for Lolo Pass Road. It is designed for 3,000 vehicles per day. Current use is approximately 1,800 vpd. The County has crash data available through 2012.

WFLHD Hydraulics Engineers are looking to identify a potential stable bridge crossing location for alternate access route options.

### ***Access Alternative Concepts***

Mike listed the conceptual alignments to be considered, including:

1. Upgrading the existing Lolo Pass Road alignment to withstand future channel migration and flooding.
2. Establishing 1-2 new corridors that would be generally parallel to Lolo Pass Road and that would circumvent the most vulnerable section of Lolo Pass Road. Such new route(s) would require a new bridge spanning the Sandy River that would need to be located outside of the flood channel hazard areas. One corridor could be parallel to and south of Autumn Lane.
3. Developing an alternate route within the BPA powerline corridor

The powerline corridor has a maintenance access road, and a portion of that was used as an emergency route when a section of Lolo Pass Road was destroyed in 2011. However, this corridor is characterized by significant variations in terrain and environmental resources and hazard areas including active landslides. It does not appear to be a feasible option. However, the group agreed to consider it as part of the reconnaissance using GIS data.

Based on the options listed above, the group agreed on a general APE that would extend from Mountain Road on the south, to Ashoff Road on the north, and encompass a potential new corridor south and east of Autumn Lane. DEA will work with Clackamas County to depict this APE on a map.

Larry noted that at least two of the alternative concepts that are new roadway alignments through forest resource lands protected by Oregon Land Use Goal 4, and would require the County to make goal exceptions.

### ***Field Work***

Mike Odom, WFLHD Hydraulic Engineers, and consultants are tentatively scheduled to conduct a site visit tomorrow. The County requested that the group visiting the site tomorrow be limited, and that the County notify property owners within areas that the team desires access to request

right of entry permission. The County requires six weeks between sending the notices and accessing properties that have granted entry rights. Based on this direction, the team agreed to limit the number of people visiting the site tomorrow to a few WFLHD and County staff, and to schedule the field work with the larger technical resource team until the end of this period. If the County is able to send out letters next week, as discussed, the field visit could occur in early July.

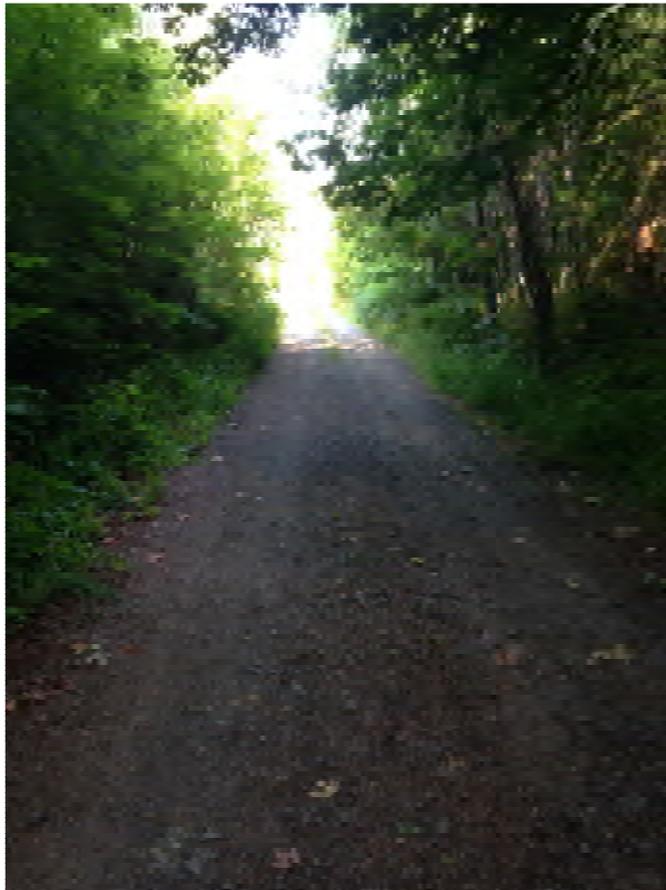
The section of the Sandy River through the Lolo Pass Road access alternatives study area is not navigable. The navigable portion begins approximately 10-miles downstream near the confluence with the Salmon River.

# Appendix B

## Project Site Photographs



Lolo Pass Road; New Bridge over the Zigzag River



Mountain View Road



Historic Barlow Trail Marker



Access road southeast of Autumn Lane



County parcel, former home site in northeastern project area



Sandy River, downed trees and flood deposits



Sandy River in central project area



Sandy River channel



Sandy River, flood debris



Potential new bridge location across Sandy River



Powerline Corridor, looking southwest from Aschoff Road



Powerline Corridor, looking northeast from Aschoff Road



Powerline Corridor, from East Aschcoff Road



Lolo Pass Road northeast of project area

# Appendix C

Environmental Resources Reconnaissance Memorandum,  
David Evans and Associates, Inc., June 12, 2014



DAVID EVANS  
AND ASSOCIATES INC.

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## MEMORANDUM

**DATE:** June 12, 2014  
**TO:** Mike Odom P.E., COR, Project Manager  
Western Federal Lands Highways Division  
610 E. Fifth Street  
Vancouver, WA 98661  
**FROM:** John Macklin, DEA Biologist  
**SUBJECT:** **Environmental Resources Reconnaissance**  
**PROJECT:** Lolo Pass Road Access Alternatives, OR CLACK 37005(1) Task Order No. T-14-002  
**PROJECT NO:** FHAX0000-0210  
**COPIES:** Scott Richman DEA

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### **INTRODUCTION**

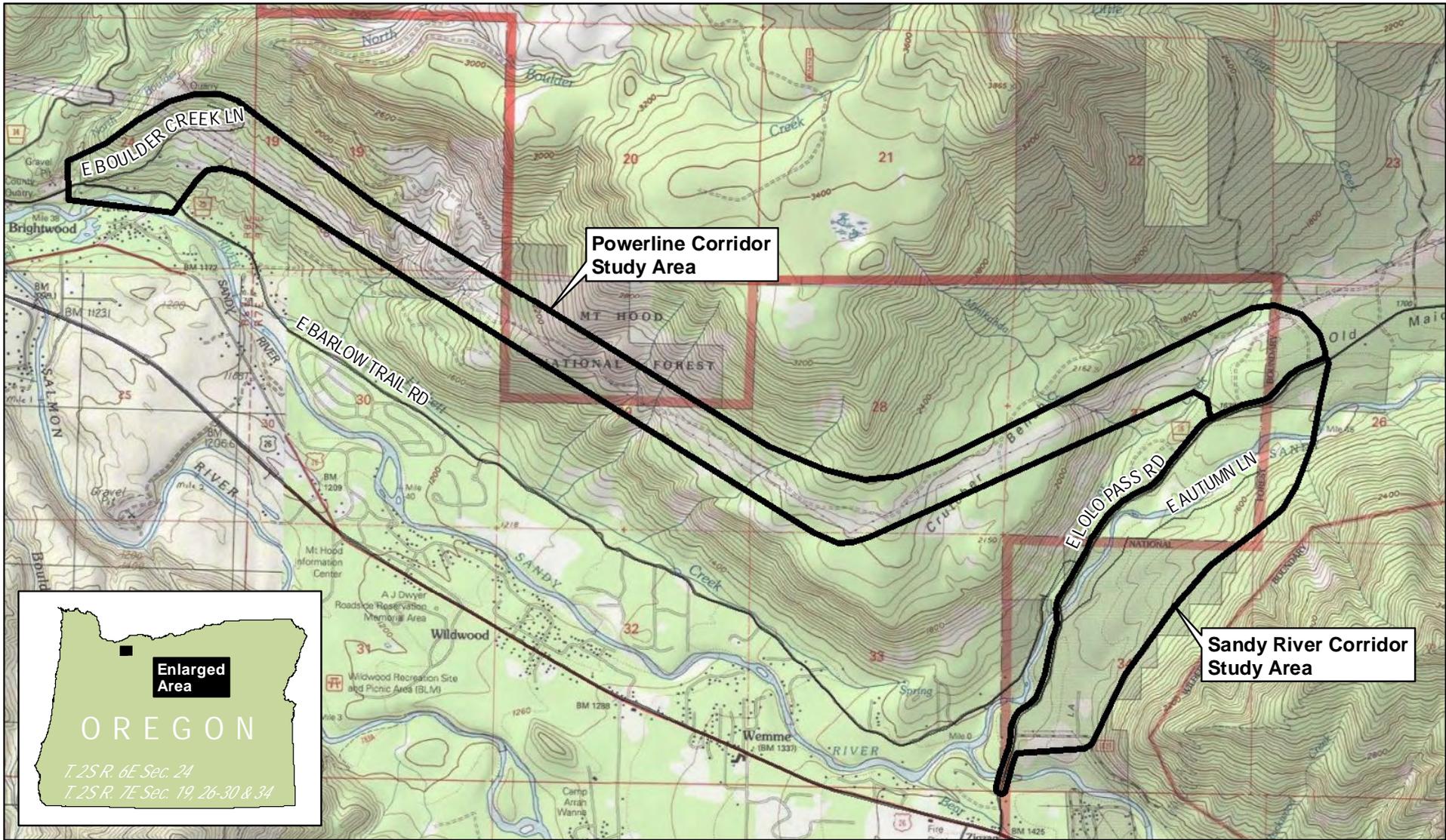
At the request of the Western Federal Lands Highways Division, David Evans and Associates, Inc. (DEA) performed an investigation of environmental resources for the Lolo Pass Road Access Alternatives Study in Clackamas County, Oregon. This preliminary investigation is based only on publicly available information, and does not include on-site investigation.

The 1,185-acre study area is designed to encompass all alternatives under consideration (Figure 1). It encompasses two areas: the Sandy River Corridor Study Area (Sandy River SA), which includes potential permanent road alignments centered on Lolo Pass Road north of the Zigzag River. The Powerline Corridor Study Area (Powerline SA) includes potential temporary access alignments centered on a powerline corridor extending westward from the Lolo Pass Road to Brightwood, Oregon (T2S, R6E, Section 24, and T2S, R7E, Sections 19, 26-30, and 34).

### **METHODS**

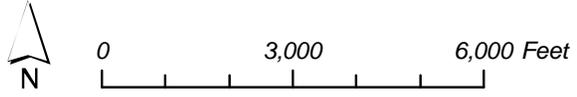
Reference materials were reviewed to provide information regarding the documented locations of wetlands, waters, and listed threatened or endangered species. The materials reviewed included:

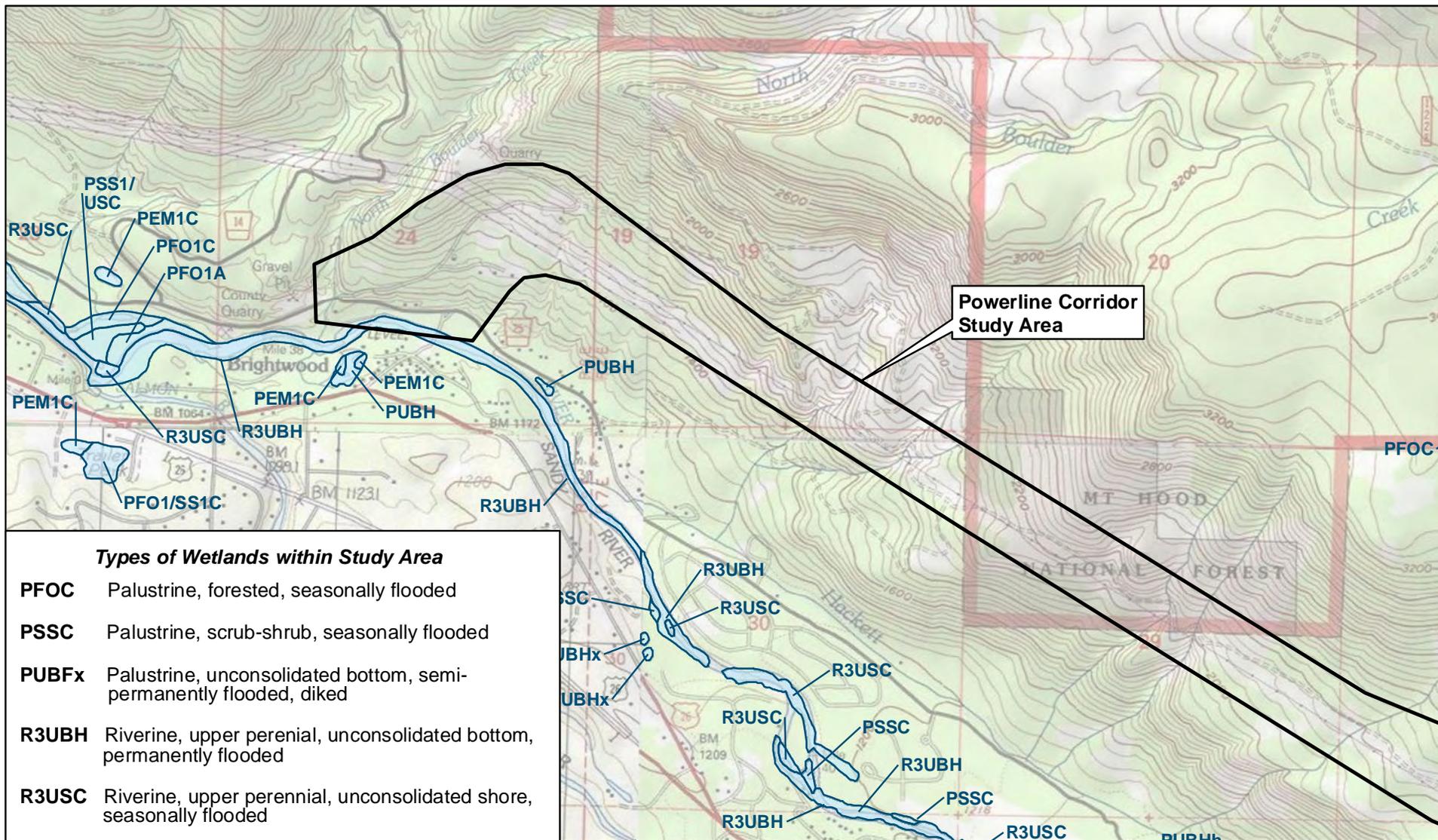
- Rhododendron, Brightwood, Salmon, and Hickman Butte Oregon 7.5 minute Quadrangle, U.S. Geological Survey 1997
- USFWS Information, Planning, and Conservation System 2014: <http://ecos.fws.gov/ipac/>
- Rhododendron, Brightwood, Salmon, and Hickman Butte Oregon National Wetland Inventory Quadrangles, US Fish and Wildlife Service, 1997.
- Natural Resources Conservation Service (NRCS). 2011. Soil Survey Geographic (SSURGO) database for Clackamas County Area, Oregon.



ESRI, ArcGIS Online, USA Topographic Maps:  
 Brightwood, Oregon. 1997, Hickman Butte, Oregon. 1997,  
 Salmon, Oregon. 1997 and Rhododendron, Oregon. 1997

**Figure 1**  
 Vicinity

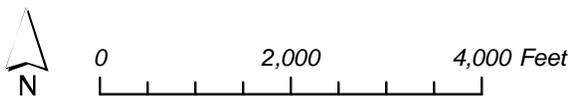


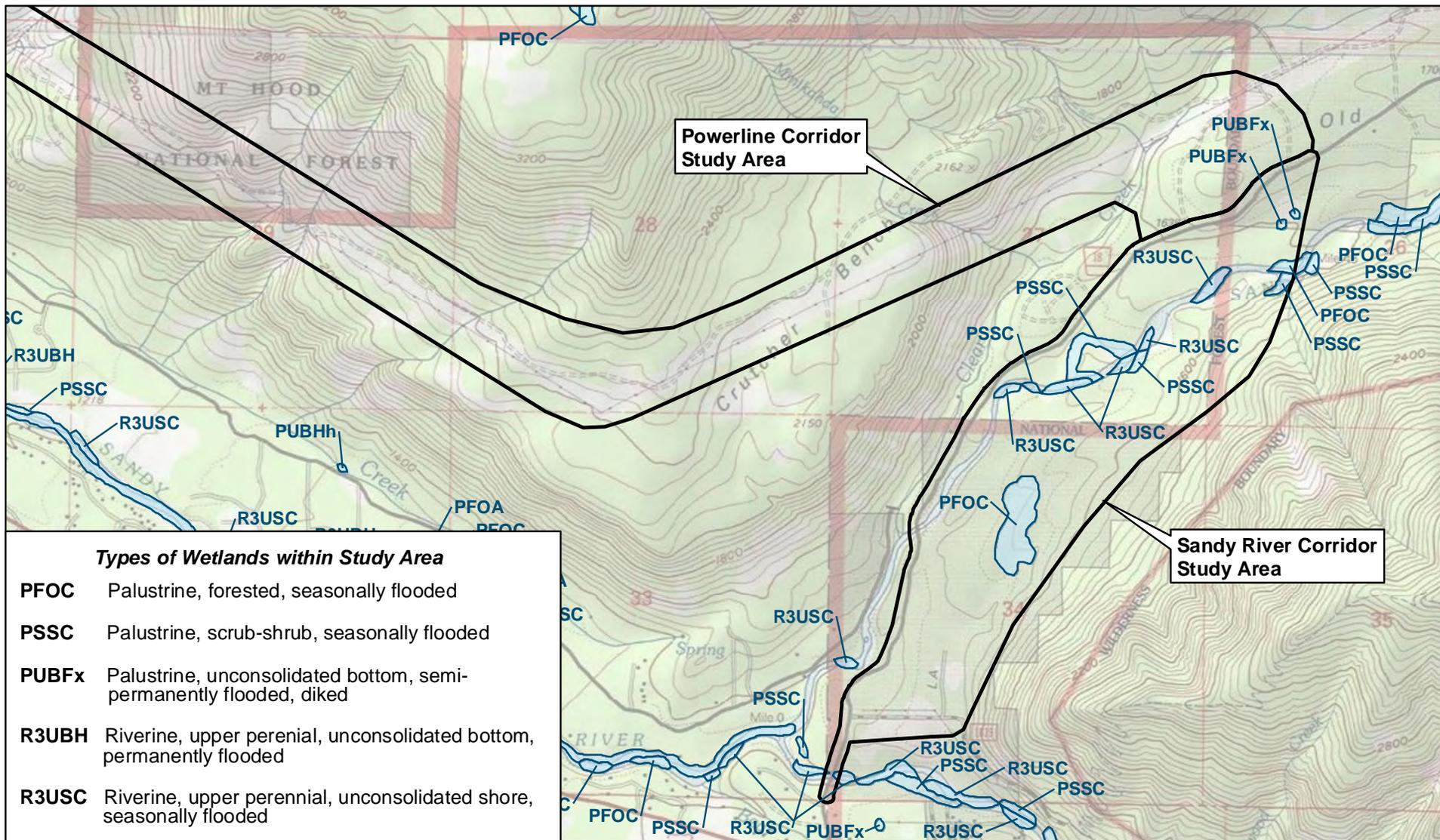


ESRI, ArcGIS Online, USA Topographic Maps:  
 Brightwood, Oregon. 1997, Hickman Butte, Oregon. 1997,  
 Salmon, Oregon. 1997 and Rhododendron, Oregon. 1997

US Fish and Wildlife Service. 2010. National Wetlands Inventory (1977 to present).  
 Branch of Habitat Assessment.

**Figure 2, Sheet 1**  
 National Wetlands Inventory

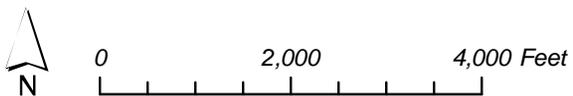


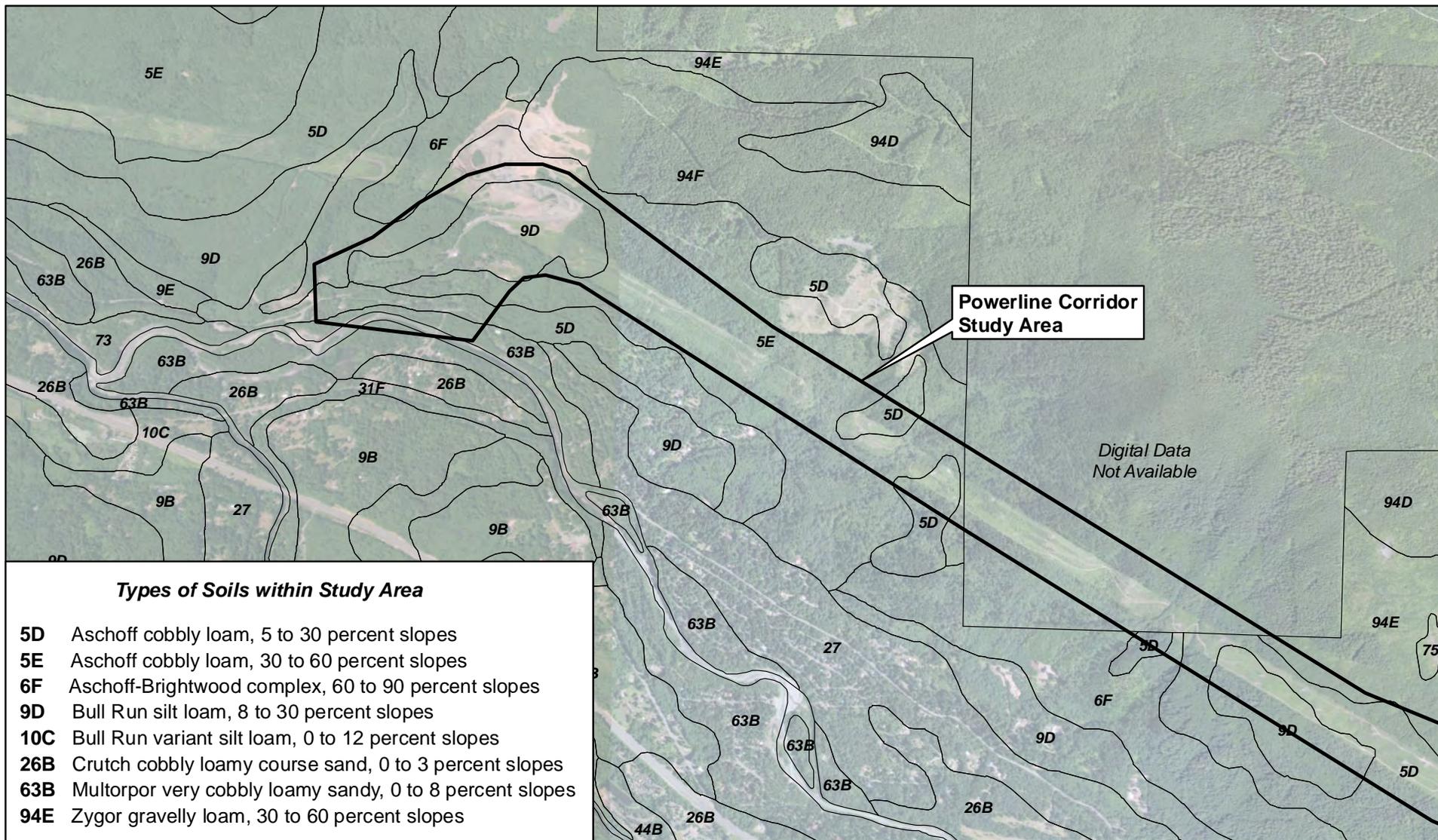


ESRI, ArcGIS Online, USA Topographic Maps:  
 Brightwood, Oregon. 1997, Hickman Butte, Oregon. 1997,  
 Salmon, Oregon. 1997 and Rhododendron, Oregon. 1997

US Fish and Wildlife Service. 2010. National Wetlands Inventory (1977 to present).  
 Branch of Habitat Assessment.

**Figure 2, Sheet 2**  
 National Wetlands Inventory

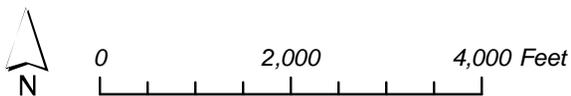


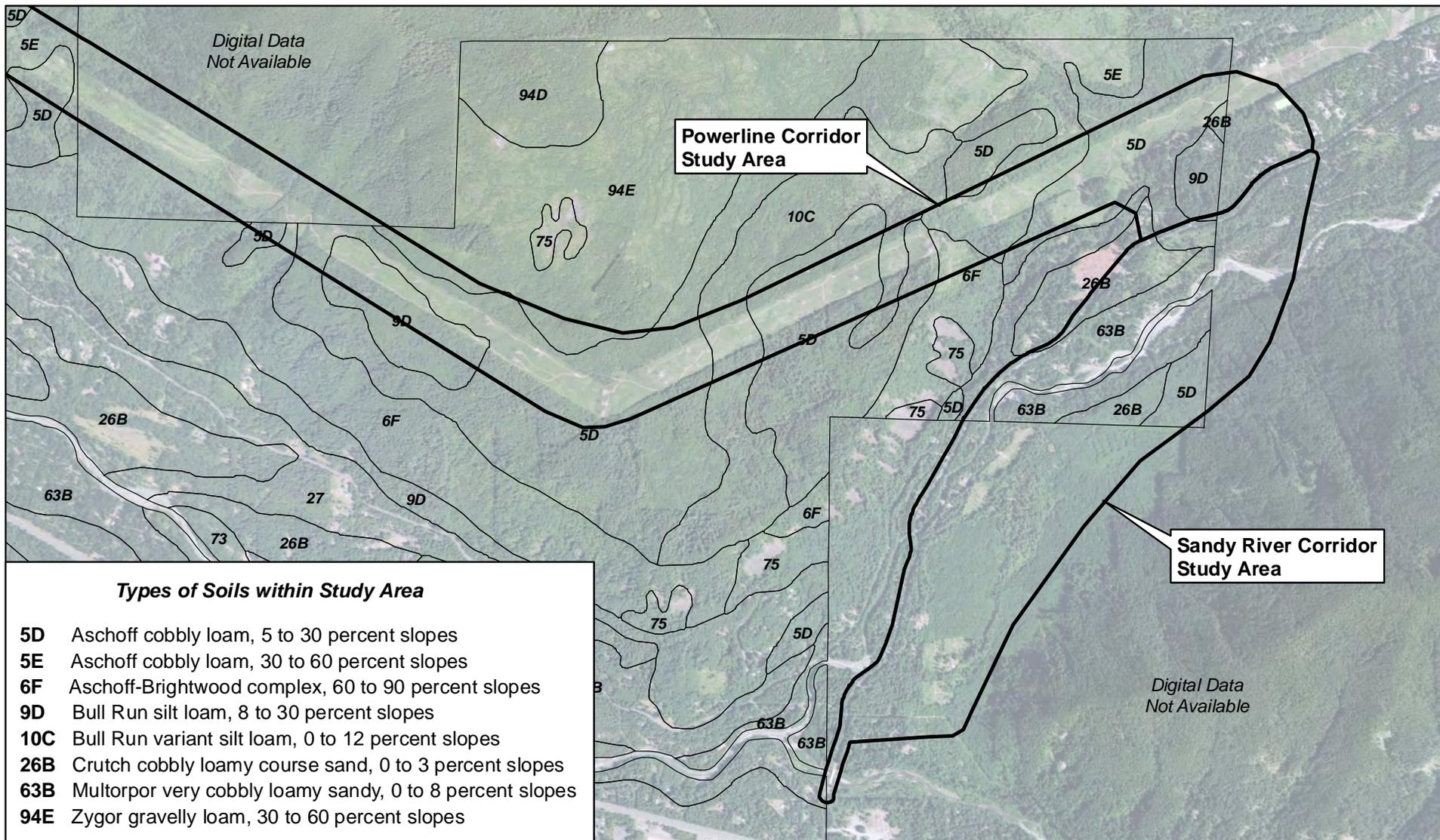


ESRI, ArcGIS Online, World Imagery. Microsoft. July 11, 2010.

Natural Resources Conservation Service (NRCS). 2011. Soil Survey Geographic (SSURGO) database for Clackamas County Area, Oregon.

**Figure 3, Sheet 1**  
Soil Survey

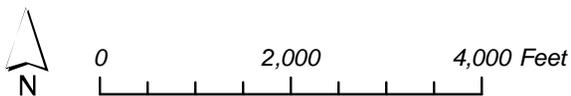


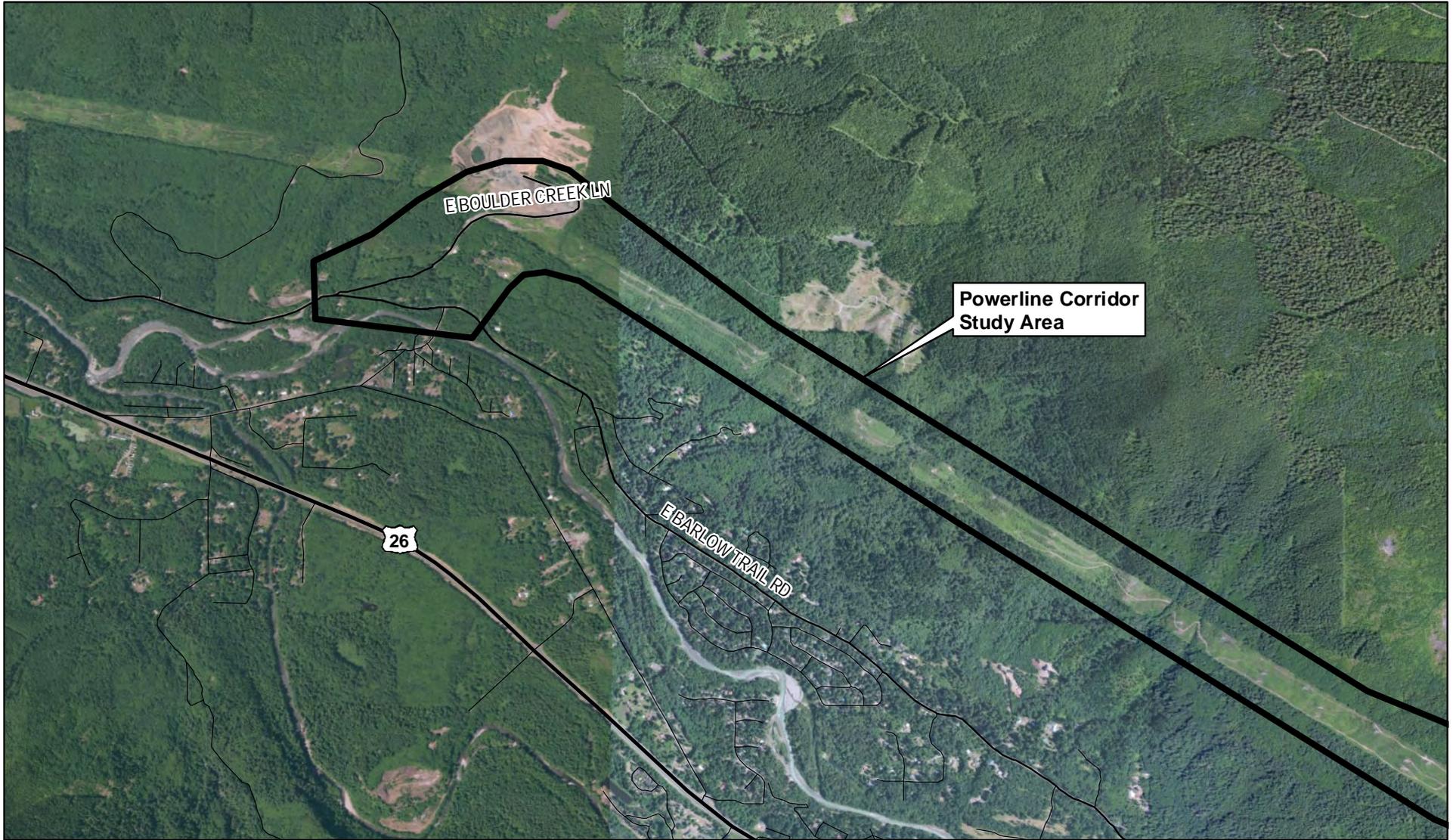


ESRI, ArcGIS Online, World Imagery. Microsoft. July 11, 2010.

Natural Resources Conservation Service (NRCS). 2011. Soil Survey Geographic (SSURGO) database for Clackamas County Area, Oregon.

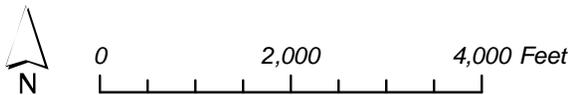
**Figure 3, Sheet 2**  
Soil Survey

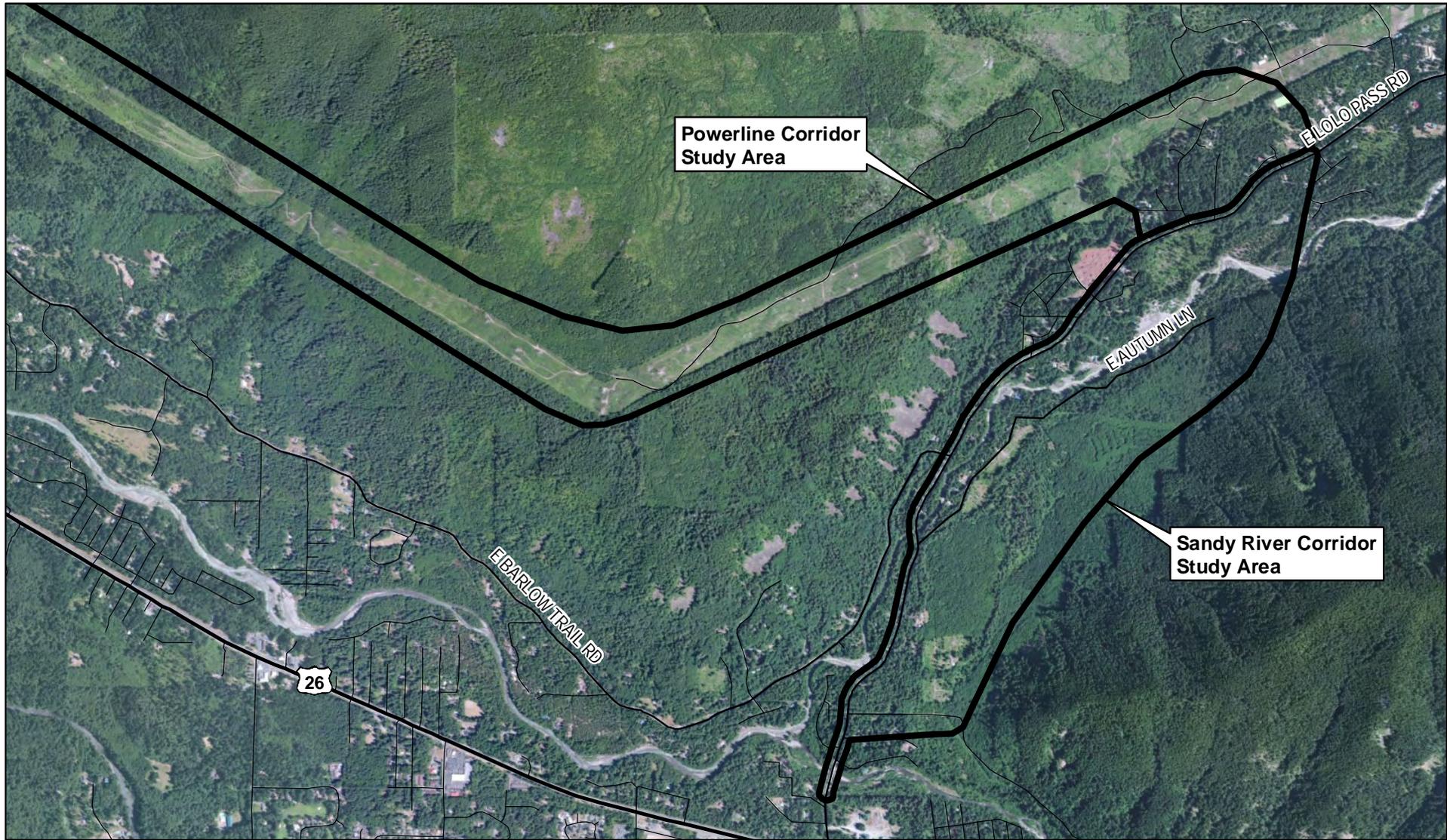




ESRI, ArcGIS Online, World Imagery. Microsoft. July 11, 2010.

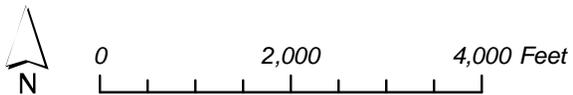
**Figure 4, Sheet 1**  
Aerial Photograph





ESRI, ArcGIS Online, World Imagery. Microsoft. July 11, 2010.

**Figure 4, Sheet 2**  
Aerial Photograph



- Oregon Biodiversity Information Center (ORBIC), Oregon State University 2014.
- ODFW 2014. Oregon Department of Fish and Wildlife Natural Resource Information Program (NRIMP), Fish Distribution Maps. <https://nrimp.dfw.state.or.us/nrimp/default.aspx?p=259>
- Stream Net interactive mapper <http://map.streamnet.org/website/bluesnetmapper/viewer.htm>
- NRCS hydric soils list 2014.  
[http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/partnership/ncss/?cid=nrcs142p2\\_053957](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/partnership/ncss/?cid=nrcs142p2_053957)

The USGS Quadrangle was examined to determine water features and topography of the site and adjacent properties that might influence on-site conditions. The National Wetlands Inventory (NWI) and Soil Survey were reviewed for occurrence of wetlands or hydric soils that indicate potential wetlands. ORBIC, NRIMP, and Stream Net were accessed online to identify known species and habitats in the area, including occurrences of threatened and endangered species. Although no field study was performed for this investigation, the author is familiar with the site and the vicinity.

## **RESULTS**

### **Streams and Wetlands**

The Sandy River SA begins at the Zigzag River and parallels the lowest reach of the Sandy River. Clear Creek parallels the Sandy River and is separated from it by Lolo Pass Road.

The powerline corridor study area touches the Sandy River at its west end, and the western tip of the powerline study area drains to North Boulder Creek, a tributary of the Sandy River (Figure 1). The corridor extends upstream along the Sandy River valley slope above Hackett Creek to cross seven streams: three unnamed Hackett Creek tributaries, Minikahda Creek, and three other unnamed tributaries to Clear Creek.

The wetlands shown on the NWI almost all coincide with or adjoin the Sandy River channel, and are likely to be included as part of the Sandy River for jurisdictional purposes (Figure 2). The three exceptions in the main study area are a large forested wetland to the east of Autumn Lane, and two small ponds west (uphill) of Lolo Pass Road. No wetlands are shown in the powerline corridor study area.

The Clackamas Soil Survey shows seven general soil types within the study area (Figure 3). None of them are listed as hydric (formed under wet conditions) by the Natural Resource Conservation Service (NRCS 2014). Therefore, soils mapping does not indicate that unmapped areas may contain wetlands. However, given the high rainfall totals in the area, the position of the Powerline SA on a steep slope below the Bull Run Watershed, and the position of the Sandy River SA at the base of steep forested slopes, unmapped wetlands fed by groundwater are likely to occur.

### **Threatened and Endangered Species Occurrence**

Based on existing information from sources listed above, federally listed and endangered fish under jurisdiction of NMFS are present in the study area as summarized in Table 1. Although several of these species are present downstream of the study area in Hickman Creek, resources do not indicate any presence in

the on-site Hickman Creek tributaries. The Sandy River and Clear Creek are designated as Critical Habitat for steelhead trout and Chinook salmon. Note that construction of new impervious surface anywhere in the project may trigger the Endangered Species Act documentation requirements because of potential downstream effects. It is likely that native resident cutthroat trout, sculpin, and possibly other non-listed fish are present in all perennial streams within the study area.

*Table 1: Threatened and Endangered NMFS Fish Species Occurrence Summary*

<b>Species (Status)</b>	<b>Sandy River</b>	<b>Clear Creek</b>	<b>Minikahda Creek</b>	<b>North Boulder Creek</b>
Lower Columbia River (LCR) winter steelhead (listed threatened)	X	X		X
LCR summer steelhead (listed threatened)	X			
LCR coho salmon (listed threatened)	X	X	X	X
LCR spring Chinook salmon (listed threatened)	X	X		X

Source: ODFW 2014.

The USFWS Information Planning and Conservation System identifies eight USFWS listed and proposed species that may be within the project area of potential impact. Information on potential occurrence of listed plants and wildlife has been obtained from ORBIC and is presented in Table 2. Portions of the study area lie within the Mount Hood National Forest (MHNF). For these areas, the US Forest Service will likely require studies to determine occurrence of additional species beyond those on the federal Threatened and Endangered Species list.

*Table 2: Threatened and Endangered USFWS Species Potential Occurrence Summary*

<b>Species (Status)</b>	<b>Actual Occurrence</b>
Northern spotted owl (listed threatened)	None within project footprint, but four occurrences within one mile of project areas
Marbled murrelet (listed threatened)	None, site is too far inland
Streaked horned lark (listed threatened)	None, no suitable sparse vegetation habitat in the API
Yellow billed cuckoo (prop osed threatened)	None, no suitable riparian habitat in the API
Bull trout (listed threatened)	None, no documented occurrence
Nelson’s checker-mallow (listed threatened)	None, no documented occurrence
Water howellia (listed threatened)	None, no documented occurrence
Willamette Daisy listed endangered)	None, no suitable prairie habitat in the API

## Appendix D

Geologic Reconnaissance and Preliminary Geotechnical  
Evaluation Memorandum, August 7, 2014



9750 SW Nimbus Avenue  
Beaverton, OR 97008-7172  
p | 503-641-3478 f | 503-644-8034

## MEMORANDUM

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**To:** C. Scott Richman, AICP, PMP / David Evans and Associates, Inc.

**Date:** August 7, 2014

**GRI Project No.:** 5588

**From:** Michael Zimmerman, GE, CEG and George Freitag, CEG

**Re:** Geologic Reconnaissance and Preliminary Geotechnical Evaluation  
Lolo Pass Road Access Alternatives Study  
OR CLACK 37005 (1)  
Task Order No. T-14-002, DTFH70-10-D-00019  
Clackamas County, Oregon

***DRAFT***

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As a subconsultant to David Evans and Associates, Inc. (DEA), and for the Western Federal Lands Highway Division, GRI is providing geotechnical and geologic consultation for a preliminary planning-level evaluation of access alternatives for E Lolo Pass Road in Clackamas County, Oregon. Flooding of the Sandy River in recent years has damaged the section of E Lolo Pass Road between E Barlow Trail Road and Michigan Avenue, requiring closures and extensive repairs to the road. The purpose of an alternative access will be to provide a route or new alignment that is less susceptible to damage and closures caused by flooding and erosion along the Sandy River. Our work to date has included participation in a kickoff meeting in April 2014, review of published geologic mapping of the area, review of aerial photographs of the site from the 1960's, and a ground-level reconnaissance by a geotechnical engineer and engineering geologist from GRI on July 16, 2014. This memorandum summarizes our work and provides preliminary conclusions regarding the significant geotechnical- and geologic-related issues associated with the design and construction of the two access alternatives under consideration.

Two access alternatives have been evaluated as part of this study: a new bridge accessed from the vicinity of the Autumn Lane alignment, and a bypass following the alignment of electrical transmission lines that ascent the ridge between E Snowden Road at the west end of the alignment and N Boulder Road adjacent the Mt. Hood Rock Products quarry at the west end of the alignment (power line alternative). The general location of both access alternatives is shown on the Geologic Hazard Map, Figure 1. The field reconnaissance portion of our work was limited to the Autumn Lane alternative. Therefore, our work for the power line alternative was limited to review of available published geologic mapping and topographic maps derived from publicly available airborne lidar (light detection and ranging) survey information from the Oregon Department of Geology and Mineral Industries (DOGAMI). Both access alternatives are discussed in further detail below.

### **Geologic Setting**

E Lolo Pass Road is located along the upper part of the Sandy River drainage, about 10 mi west of Mt. Hood. In the project area the Sandy River occupies a channel about 0.25 to 0.75 mi in width. The

channel is bounded by upland areas underlain by Quaternary and Tertiary volcanic rocks. The channel is underlain by granular materials (sand, gravel, cobbles, and boulders) from volcanic debris flow deposits, older consolidated alluvial terrace deposits, and Recent alluvial deposits in the active Sandy River.

### **Autumn Lane Access Alternative**

For this access alternative, a new bridge would cross the Sandy River in the vicinity of the east end of Autumn Lane. Geologic hazards mapped in the vicinity of the alignment for this alternative are shown on the Geologic Hazard Detail Map, Figure 2. The extent of debris flow deposits from the Old Maid Flats eruptive period of Mt. Hood (1780 to 1801 AD) are shown as debris flow (yellow area) on Figure 2 (Pierson et. al., 2009) . The upstream end of channel migration hazard completed by DOGAMI (English et. al., 2011) extends about a quarter mile upstream of the existing Lolo Pass Road bridge over the Sandy River and appears to correspond with the width of the area mapped as debris flow deposits. For purposes of our evaluation, the area mapped as covered by the debris flows along the Sandy River is considered to be the channel migration hazard area; although mapping by the Federal Emergency Management Agency (FEMA) indicates a significantly narrower floodplain for the purposes of flood insurance mapping. Our assessment of the potential for river meander is supported by evaluation of US Army Corps of Engineers aerial photographs from 1961 and 1964, lidar data from 2011, and our observations of changes in the river channel location that have occurred since 2011. In our opinion, the actively meandering river channel could relocate to any portion of the area mapped as debris flow within the design life of the proposed bridge. Therefore, we recommend considering a bridge length that will likely be longer than would be required to pass the design level flood. The channel migration zone at the bridge site and potential effects of approach embankments within the migration zone should be evaluated as part of the design of this project.

As shown on Figure 2, several alluvial fans are mapped at the base of the ridge located southeast of Autumn Lane. The portion of the alignment near the east end of Autumn Lane could be located on or near one of these alluvial fans. No active stream channel was observed on the alluvial fan at the time of our reconnaissance and further evaluation of the stream channel(s) will be needed as part of design for this access alternative. Considering the relatively small drainage basins collected by the streams that form these fan deposits, we anticipate that large-span culverts will likely be appropriate for these stream crossings.

The area where the Autumn Lane alternative would connect with Lolo Pass Road is mapped as Pleistocene to Holocene age landslide deposits (Sherrod and Scott, 1995). The origin of these deposits and the potential for recurrent landslide activity is not discussed in the published literature. We anticipate additional evaluation of the landslide debris area will be needed as the project progresses.

A geotechnical investigation will be needed to design the bridge over the Sandy River and the approach embankments. The primary geotechnical considerations for design of bridge foundations will be the characteristics of alluvial and debris flow sediments underlying the site and the depth and quality of the underlying rock. We anticipate that large cobbles and boulders are present within the sediments. Considering the constructability of foundations in this material and the possibility that the foundations will extend into the rock, we recommend considering small diameter drilled shaft foundations that can be drilled using down-hole hammer equipment, typically limited to diameters of about 30 in. A geotechnical investigation will be needed to evaluate the subsurface conditions for design of bridge foundations.

We recommend completing a preliminary geotechnical investigation to evaluate the depth of rock and characteristics of the sediments at the proposed bridge location. The information gathered by the preliminary geotechnical investigation will be useful in conceptual planning, preliminary design, and preliminary cost estimating for this access alternative. We recommend using sonic drilling methods to complete three borings, one on each the north and south sides of the river, and one in the area of landslide debris in the vicinity of the north bridge approach. We anticipate the boring located south of the river can be made in the Autumn Lane right-of-way. The boring north of the river will likely require access onto private property for the exploration to be reasonably close to the proposed bridge location. The boring in the vicinity of the north bridge approach can be located in Lolo Pass Road and should include installation of an inclinometer to monitor for movement within the landslide debris.

### **Power Line Access Alternative**

Our review of lidar survey information and published geologic mapping from DOGAMI indicates the general alignment of the power line alternative crosses over 2 mi of mapped landslide deposits (Burns and Watzig, 2014), as shown on Figure 2. The alignment crosses 11 significant drainage ravines. Exposed rock outcrops located uphill of the alignment and alluvial fan deposits mapped downhill of the alignment, suggest the stream crossings may be subject to fast moving debris flows carrying significant amounts of sediment and entrained woody debris. To accommodate potential debris flows, these ravine crossings will likely require bridges instead of culverts. From the west end, a roadway for this alternative would gain about 550 ft of elevation while crossing a hillside with slopes in excess of 35° (about 1.4H:1V). Significant cuts and fills would be required to construct a roadway across these steep side slopes. If this access alternative is selected, we anticipate that extensive geotechnical investigations will be needed to evaluate the risk of slope instability associated with these hillside cuts and fills.

### **Limitations**

This memorandum has been prepared to aid in the evaluation and conceptual planning of access alternatives for Lolo Pass Road. The information provided in this memorandum is preliminary and is intended for project planning and scoping purposes and is based on a limited ground-level reconnaissance and other sources of information described herein.

Please contact the undersigned if you have any questions.

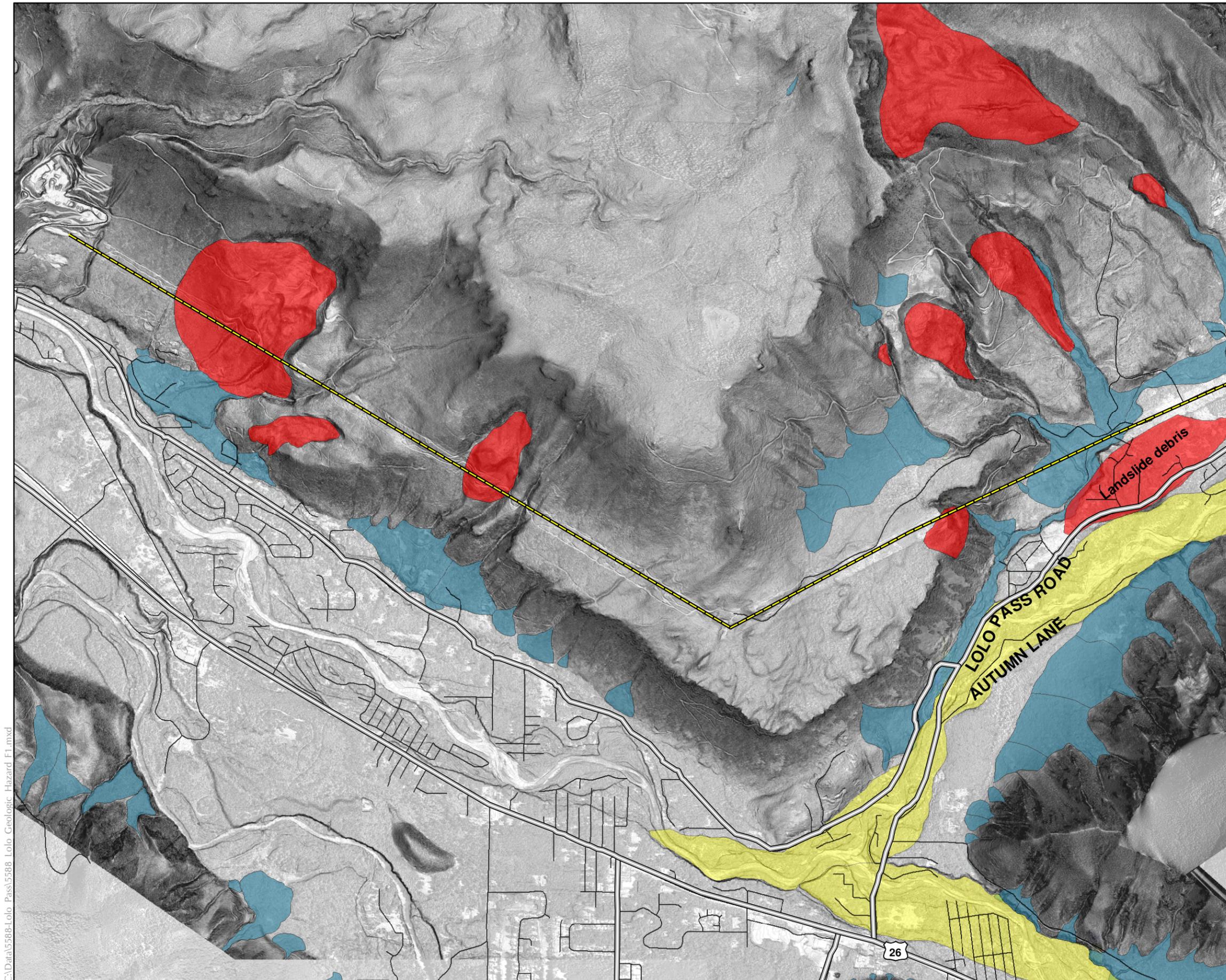
Submitted for GRI,

George A. Freitag, CEG  
Associate

Michael J. Zimmerman, PE, GE, CEG  
Senior Engineer / Geologist

## References:

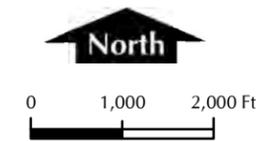
- Burns, W.J., and Watzig, R.J., 2014. Statewide Landslide Information Database for Oregon: Release 3.0., Oregon Department of Geology and Mineral Industries, SLIDO-3.
- English, J.T., Coe, D.E., and Chappell, R.D., 2011, Channel Migration Hazard Map for the Sandy River, Multnomah and Clackamas Counties, Oregon, Plate 12; Oregon Department of Geology and Mineral Industries, Open-File Report O-11-13
- Pierson, T.C., Scott, W.E., Vallance, J.W., and Pringle, P.T., 2009, Eruption-related Lahars and sedimentation response downstream of Mount Hood: Field guide to volcaniclastic deposits along the Sandy River, Oregon; The Geological Society of America, Field Guide 15.
- Sherrod, D.R., and Scott, W.E., 1995, Preliminary geologic map of the Mount Hood 30- by 60-minute quadrangle, northern Cascade Range, Oregon: U.S. Geological Survey Open-File report 95-219



- Alluvial Fan
- Landslide
- Debris Flow
- Power Line Alignment

Note: gray-toned areas are rock units or other areas not mapped as a recognized geologic hazard.

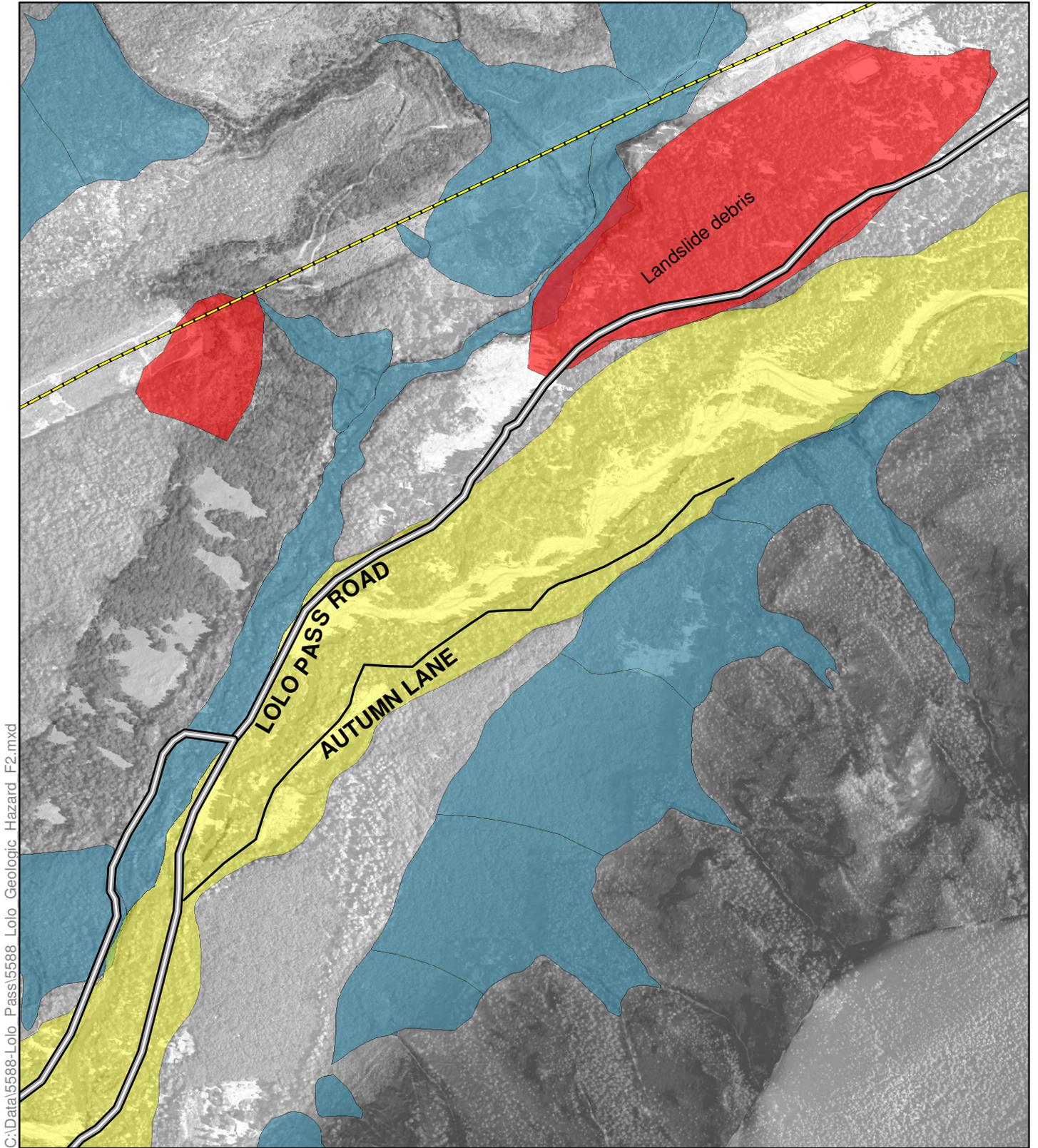
Data Source: Burns and Watzig, 2014, Statewide Landslide Information Layer for Oregon, release 3.0 (SLIDO-3.0)



**GRI** DAVID EVANS & ASSOCIATES, INC.  
LOLO PASS ROAD ACCESS ALTERNATIVES

## GEOLOGIC HAZARD MAP

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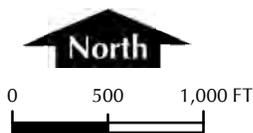


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-  Alluvial Fan
-  Landslide
-  Debris Flow
-  Power Line Alignment



DAVID EVANS & ASSOCIATES, INC.  
LOLO PASS ROAD ACCESS ALTERNATIVES



## GEOLOGIC HAZARD DETAIL MAP

# Appendix E

## Hazardous Materials Data



**Envirofacts**  
**FRS Facility Detail Report**



**USDA FS MT HOOD NF ZIGZAG RANGER DIST**

70220 E HWY 26  
ZIGZAG, OR 97049-8701  
EPA Registry Id: 110006114212

Facility Registry Service Links

- Search
- [FRS Facility Query](#)
- [FRS EZ Search](#)
- [Organization Search](#)
- [FRS Physical Data Model](#)
- [FRS Geospatial Model](#)
- [Contact Us](#)
- [Facility Registry Service \(FRS\) Home](#)



**Legend**

- ★ **Selected Facility**
- **EPA Facility of Interest**
- **State/Tribe Facility of Interest**

The facility locations displayed come from the FRS Spatial Coordinates tables. They are the best representative locations for the displayed facilities based on the accuracy of the collection method and quality assurance checks performed against each location. The North American Datum of 1983 is used to display all coordinates.

**Environmental Interests**

Information System	Information System ID	Environmental Interest Type	Data Source	Last Updated Date	Supplemental Environmental Interests
RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM	OR1122307654	CESQG (Y)	RCRAINFO	06/02/2014	
OREGON - DEPARTMENT OF ENVIRONMENTAL QUALITY	3802 <a href="#">EXIT Disclaimer</a>	STATE MASTER	OR-DEQ		LUST-03-92-0030 LEAKING STORAGE TANK HAZWASTE-1852 CESQG OR-UST-BBJFC LEAKING STORAGE TANK LUST-03-92-0019 LEAKING STORAGE TANK OR-LUST-03-92-0019 LEAKING STORAGE TANK OR-LUST-03-92-0030 LEAKING STORAGE TANK OR-UST-BBJFB LEAKING STORAGE TANK OR-HWMS-1852 SQG

**Additional EPA Reports:** [MyEnvironment](#) [Enforcement and Compliance](#) [Site Demographics](#) [Facility Coordinates Viewer](#) [Environmental Justice Map Viewer](#) [Watershed Report](#)

**Standard Industrial Classification Codes (SIC)**

**National Industry Classification System Codes (NAICS)**

Data Source	SIC Code	Description	Primary	Data Source	NAICS Code	Description	Primary
OR-DEQ	8510			OR-DEQ	115310	SUPPORT ACTIVITIES FOR FORESTRY.	
				OR-DEQ	011531		
OR-DEQ	0851	FORESTRY SERVICES		RCRAINFO	11531	SUPPORT ACTIVITIES FOR FORESTRY	

Facility Codes and Flags

Facility Mailing Addresses

<b>EPA Region:</b> 10	<b>Affiliation Type</b>	<b>Delivery Point</b>	<b>City Name</b>	<b>State</b>	<b>Postal Code</b>	<b>Information System</b>
<b>Duns Number:</b>						
<b>Congressional District Number:</b> 03	HWSC	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
<b>Legislative District Number:</b> OR	RESPONSIBLE PARTY	2955 NW DIVISION STREET	GRESHAM	OR	97030	OR-DEQ
<b>HUC Code/Watershed:</b> 17080001 / LOWER COLUMBIA-SANDY	OWNER	16400 CHAMPION WAY	SANDY	OR	97055	RCRAINFO
<b>US Mexico Border Indicator:</b>	MAILING ADDRESS	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
<b>Federal Facility:</b> FOREST SERVICE	REGULATORY CONTACT	70220 E HWY 26	ZIGZAG	OR	97049	RCRAINFO
<b>Tribal Land:</b> NO	FACILITY MAILING ADDRESS	70220 E HWY 26	ZIGZAG	OR	97049	RCRAINFO

Alternative Names

No Alternative Names returned.

Organizations

Affiliation Type	Name	DUNS Number	Information System	Mailing Address
OWNER	USDA FS MT HOOD NF HEADQUARTERS		RCRAINFO	<a href="#">View</a>
HWSC	USDA FS MT HOOD NF ZIGZAG RANGER DIST		OR-DEQ	<a href="#">View</a>
PERMITTEE	USDA FS MT HOOD NF ZIGZAG RANGER DIST		OR-DEQ	
HWLAO	USDA FS MT HOOD NATIONAL FOREST REGION 6		OR-DEQ	<a href="#">View</a>
HWLEO	USDA FS MT HOOD NF HEADQUARTERS		OR-DEQ	<a href="#">View</a>
HWFC	USDA FS MT HOOD NF ZIGZAG RANGER DIST		OR-DEQ	<a href="#">View</a>
RESPONSIBLE PARTY	MT HOOD NATIONAL FOREST		OR-DEQ	
HWMAI	USDA FS MT HOOD NF ZIGZAG RANGER DIST		OR-DEQ	<a href="#">View</a>
OWNER	USDA FS MT HOOD NF ZIGZAG RANGER DIST		OR-DEQ	
HWOP	USDA FS MT HOOD NATIONAL FOREST REGION 6		OR-DEQ	<a href="#">View</a>
HWFEE	USDA FS MT HOOD NF ZIGZAG RANGER DIST		OR-DEQ	<a href="#">View</a>
HWLAO	USDA FS MT HOOD NF HEADQUARTERS		OR-DEQ	<a href="#">View</a>
OPERATOR	USDA FS MT HOOD NF HEADQUARTERS		RCRAINFO	<a href="#">View</a>
HWOP	USDA FS MT HOOD NF HEADQUARTERS		OR-DEQ	<a href="#">View</a>
RESPONSIBLE PARTY	MT. HOOD NATIONAL FOREST		OR-DEQ	
LEGAL OWNER	USDA FS MT HOOD NF ZIGZAG RANGER DIST		OR-DEQ	

HWFC	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
HWMAI	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
HWOP	16400 CHAMPION WAY	SANDY	OR	97055	OR-DEQ
MAILING ADDRESS OF FACILITY	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
LEGAL OWNER	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
HWLEO	16400 CHAMPION WAY	SANDY	OR	97055	OR-DEQ
PERMITTEE	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
RESPONSIBLE PARTY	2955 NW Division	Gresham	OR	97030	OR-DEQ
HWOP	2955 NW DIVISION STREET	GRESHAM	OR	97030	OR-DEQ
OWNER	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
OPERATOR	16400 CHAMPION WAY	SANDY	OR	97055	RCRAINFO
HWFEE	70220 E HWY 26	ZIGZAG	OR	97049	OR-DEQ
HWLAO	2955 NW DIVISION STREET	GRESHAM	OR	97030	OR-DEQ
HWLAO	16400 CHAMPION WAY	SANDY	OR	97055	OR-DEQ

Contacts

Affiliation Type	Full Name	Office Phone	Information System	Mailing Address
OWNER	COLLEEN MADRID	(503) 622-3191	OR-DEQ	<a href="#">View</a>
HWSC	DIAZ LEONARD	(503) 622-3191 ext 602	OR-DEQ	<a href="#">View</a>
HWMAI	COLLEEN MADRID	(503) 622-3191	OR-DEQ	<a href="#">View</a>
LEGAL OWNER	COLLEEN MADRID	(503) 622-3191	OR-DEQ	<a href="#">View</a>
REGULATORY CONTACT	JERRY HERNANDEZ	(503) 622-3191	RCRAINFO	<a href="#">View</a>
HWFEE	DIAZ LEONARD	(503) 622-3191	OR-DEQ	<a href="#">View</a>
HWSC	COLLEEN MADRID	(503) 622-3191	OR-DEQ	<a href="#">View</a>
PERMITTEE	COLLEEN MADRID	(503) 622-3191	OR-DEQ	<a href="#">View</a>
RESPONSIBLE PARTY	HOA LAM	(503) 668-1696	OR-DEQ	<a href="#">View</a>
HWFC	DIAZ LEONARD	(503) 622-3191	OR-DEQ	<a href="#">View</a>
RESPONSIBLE PARTY	MICHAEL EDRINGTON		OR-DEQ	<a href="#">View</a>

Query executed on: AUG-14-2014



							do not discharge t*			
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SIC CODE	SIC Description	PRIMARY
4952	SEWERAGE SYSTEMS	Y

<sup>1</sup> Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.

<sup>2</sup> DEQ does not maintain air discharge permit information for Lane County.

**More Information on this location**

[Oregon DEQ Neighborhood Info \(by region/county\)](#)

[See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application](#)

[See county's scanned assessor maps through ORMAP](#)

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# Oregon DEQ Facility Profiler 2.0

[Help] [Close Window]



## Facility Summary Report

[Return to Site Listing](#) [Print Report](#)

### Maps



### Facility / Site Information for Location 14204

<b>Facility/Site Name:</b>	TURIN & SONS, INC., JIM	<b>Latitude:</b>	45° 23' 4.6"
<b>Address:</b>	62880 E BOULDER CREEK LANE	<b>Longitude:</b>	-122° 0' 32"
<b>City State Zip:</b>	BRIGHTWOOD OR 97011	<b>Location Accuracy:</b>	HIGH
		<b>Last Updated:</b>	7/16/2012 8:41:54 AM

### Aliases

BRIGHTWOOD QUARRY	WQSIG	JIM TURIN & SONS, INC.	WQSIG
MT. HOOD ASPHALT PRODUCTS, INC.	WQSIG	MT. HOOD ROCK PRODUCTS	WQSIG

### Geographic Features

<b>Township:</b> T2S-R6E-S24	<b>Congress Dist:</b> 3	<b>Forest Type:</b>	
<b>County:</b> CLACKAMAS	<b>OR Senate Dist:</b> 26	<b>Vegetation:</b>	Mixed conifer and broadleaf deciduous forest
<b>Watershed:</b> LOWER COLUMBIA/SANDY	<b>OR House Dist:</b> 52	<b>Agricultural Land:</b>	N/A
<b>Drinking Water Source:</b>	N/A		

### Oregon DEQ Program Information

#### [Water Quality Permits \(WQSIG\)](#)

File Number	Permit Number	Start date	Effective Date	Review Date	Permit Type	Permit SubType	Comments	Status	Detail Information <sup>1</sup>	Permit Status
107561	13472	12/23/1992	12/23/1992	12/03/2017	STORMWATER MINOR	NPDES General Permit - Industrial storm water discharges	GEN12A Storm Water: Sand, gravel, and other non-metallic mining	Active Renew no eff mod	<a href="#">SIS Detail Report</a>	<a href="#">Permit Status</a>

SIC CODE	SIC Description	PRIMARY
1429	OTHER CRUSHED & BROKEN STONE	Y
2951	PAVING MIXTURES AND BLOCKS	N

<sup>1</sup> Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.  
<sup>2</sup> DEQ does not maintain air discharge permit information for Lane County.

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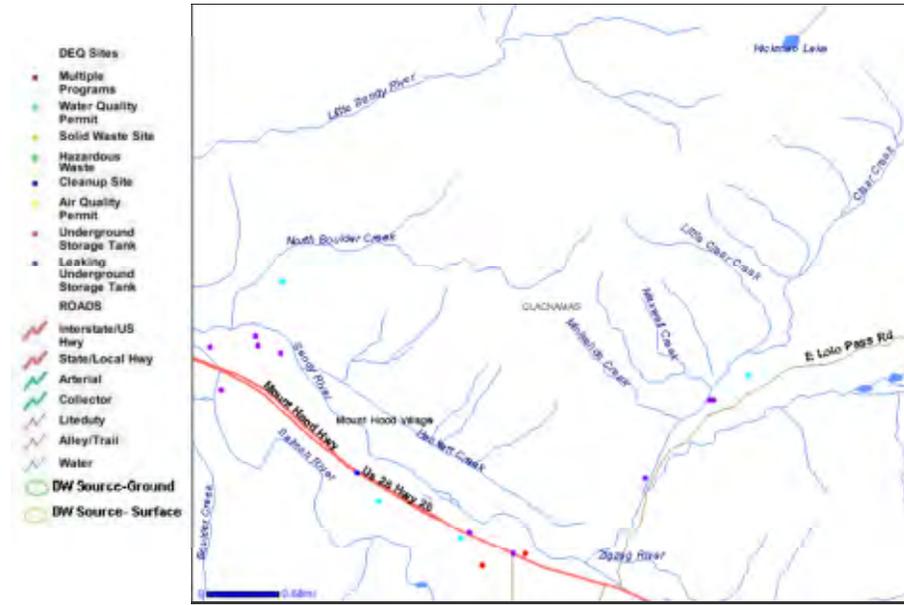






Image Dimensions (in Pixels): width 600 height 500

Update



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