

Appendix I
Washington Department of Natural Resources
Lands Analysis

Appendix I

Washington Department of Natural Resources Lands Analysis

As described in Chapter 6, Washington EFSEC, Oregon DOE, and other state agencies have provided BPA with potentially applicable state substantive standards that they believe apply to the proposed project. Inclusion of these standards in the EIS helps BPA understand these standards and aids state agencies in their review of the proposed project. By identifying and considering these standards as early as possible, the proposed project can be designed to be consistent or compatible with these standards to the maximum extent practicable.

In addition to the incorporation of state standards into the EIS and project design, BPA recognizes that when a state agency owns property that BPA proposes to cross with its proposed transmission line and associated facilities, that agency may need to comply with certain state or local laws or regulations before it can agree to allow BPA use of their property. As discussed in Section 3.1 Land Use and Recreation of the EIS, the Washington Department of Natural Resources (DNR) is a state agency that manages property crossed by the project. To assist DNR in its compliance efforts for DNR lands potentially crossed by the proposed project, BPA has included this Appendix I to provide additional information, where available, for these lands.

Some of the information included in this appendix reflects the expected negotiation of a Washington Statewide Rights-of-Way Memorandum of Agreement (MOA) between BPA and DNR. This MOA will cover certain issues related to all DNR lands that are encumbered with BPA easements. It is the mutual goal of BPA and DNR to address BPA transmission line operations and maintenance compatibility with trust land management and to complete the MOA prior to December 31, 2011. It is expected that this MOA will, at a minimum, address the following elements:

- a. Integration of State and Federal Requirements;
- b. Danger trees;
- c. Vegetation management;
- d. Access road management, maintenance, repair, and cost sharing;
- e. Dispute resolution;
- f. Communications/notification;
- g. Liability;
- h. Situations where additional right-of-way and/or mitigation is needed for transmission operations, such as safety zones and vegetation removal for clear safe backlines;
- i. Third party use (authorized and unauthorized); and
- j. Safety.

This appendix also reflects two other agreements between BPA and DNR: an Appraisal Memorandum of Understanding (Appraisal MOU) and a Land Exchange Agreement. The Appraisal MOU was finalized on August 1, 2010 and describes the process BPA would use to appraise DNR lands crossed by the proposed project.

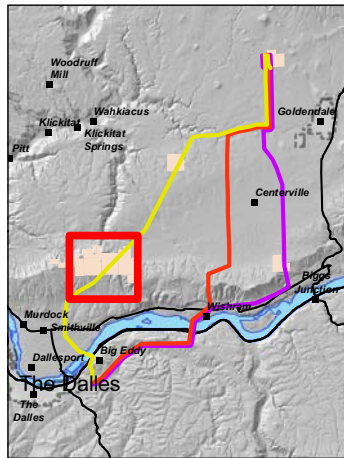
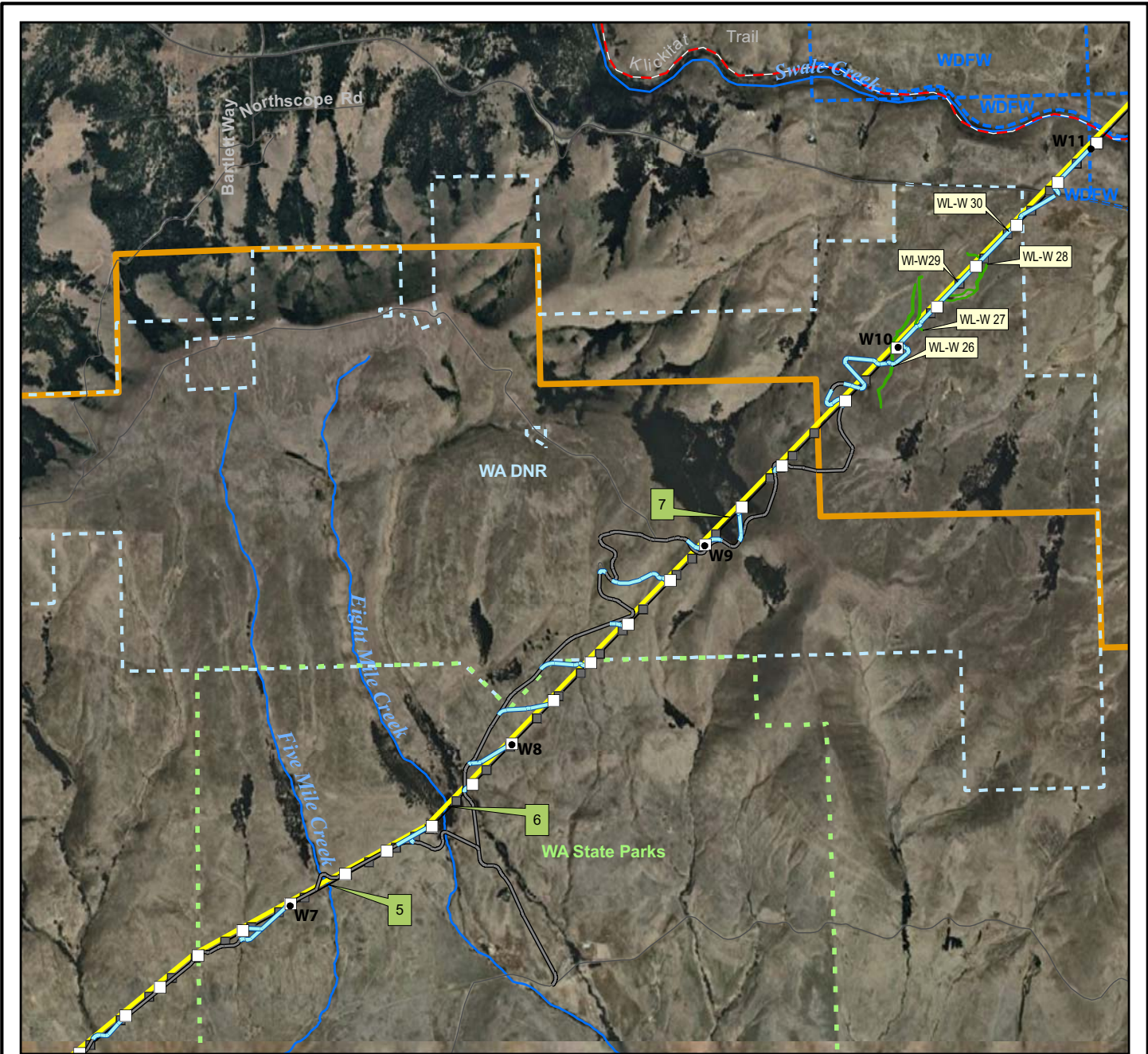
The following sections of this appendix provide more detailed information on DNR lands relevant to the proposed Big Eddy-Knight Transmission Project. Section I.1 describes the specific DNR properties that could be affected by the proposed project, and Section I.2 discusses potential impacts to these properties. Section I.3, at the end of this appendix, lists possible measures that could be undertaken to lessen or avoid these potential impacts.

I.1 DNR Land Parcels Potentially Impacted

In Klickitat County, DNR manages four parcels potentially crossed by the proposed project (see Table I-1 and Maps I-1 thru I-4). BPA’s preferred East Alternative with Substation Site 1 would impact Parcel 3 with the proposed line and Parcel 4 with a substation access road. Table I-2 identifies the project components potentially located on the four DNR parcels for all the action alternatives and the possible right-of-way needs. Table I-3 identifies the permanent footprint impacts due to towers and roads as well as the temporary disturbance areas (construction areas around towers, counterpoise and temporary roads).

Table I-1. DNR Land Parcels within the Project Area

Parcel	Township, Section, Range	Land Use	Alternative	Location (Line Mile)
Parcel 1	T03N, R14E, Sections 28, 32, 33	Recreation and Conservation (Columbia Hills Natural Area Preserve) total 3,600 acres	West	W8.5–10.5
Parcel 2	T04N, R14E, Section 36	Washington State Trust Lands – Leased Agriculture and Dispersed Recreation total 633 acres	West	W16–17
Parcel 3	T03N, R15E, Section 36	Washington State Trust Lands – Wind Power Production total 483 acres	East	E15
Parcel 4	T05N, R15E, Section 36	Washington State Trust Lands- Leased Agriculture and Dispersed Recreation total 544 acres	West, Middle, East, Substation 2	WM26, E28, Substation Site 2



Existing Facilities

- ▲ BPA Substation
- BPA Tower
- BPA Transmission Line
- + Railroad
- 🏠 House/Business (Within about 800' of the Alternative)
- ⊙ Wind Turbine
- 📏 Columbia River Gorge National Scenic Area

Proposed Facilities

- West Alternative
- Middle Alternative
- East Alternative
- Proposed Tower
- Line Mile Marker
- 📏 Proposed Knight Substation Site

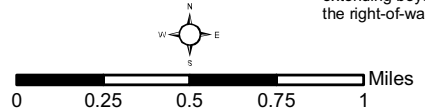
Proposed Access Roads

- New Road
- Existing County Road Upgrade
- Existing Access Road Upgrade
- Temporary Road

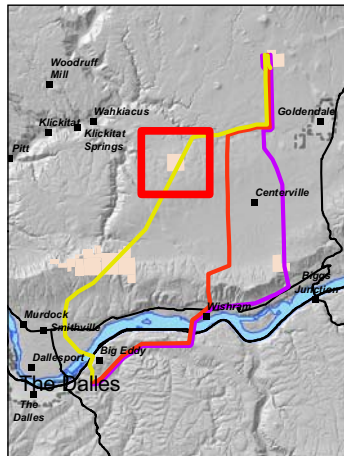
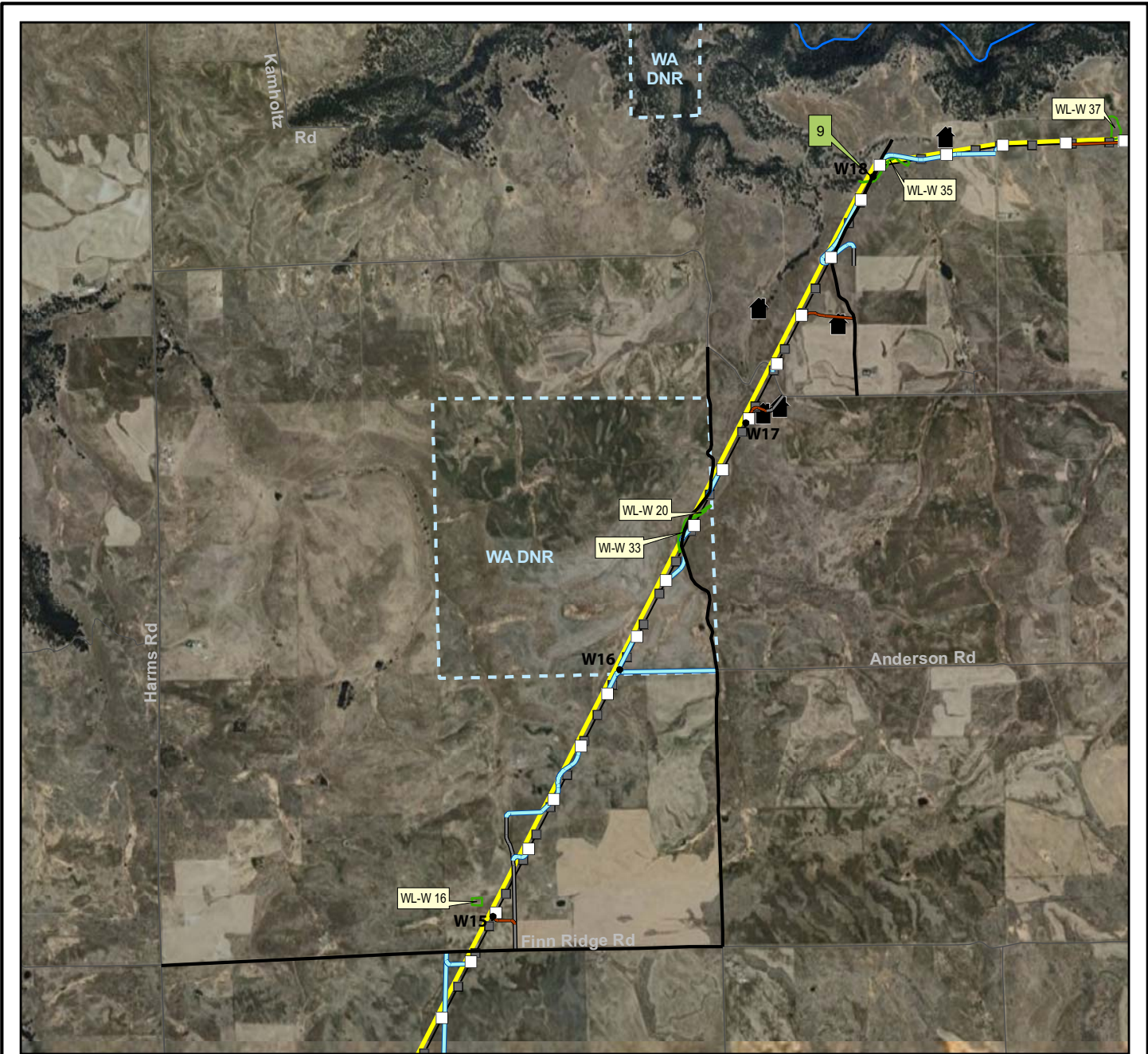
Wetland Survey

- 🟩 Confirmed Wetland*
- 🟪 Unverified Wetland*
- 🟨 Potentially Impacted Wetland
- 🟩 Wetland id
- 🟩 Woodland #

*Wetlands may be larger than depicted extending beyond the right-of-way.



Map I-1. DNR Parcel 1



Existing Facilities

- ▲ BPA Substation
- BPA Tower
- BPA Transmission Line
- + Railroad
- 🏠 House/Business (Within about 800' of the Alternative)
- ⊙ Wind Turbine
- 📏 Columbia River Gorge National Scenic Area

Proposed Facilities

- West Alternative
- Middle Alternative
- East Alternative
- Proposed Tower
- Line Mile Marker
- 📏 Proposed Knight Substation Site

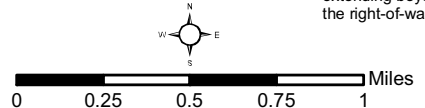
Proposed Access Roads

- New Road
- Existing County Road Upgrade
- Existing Access Road Upgrade
- Temporary Road

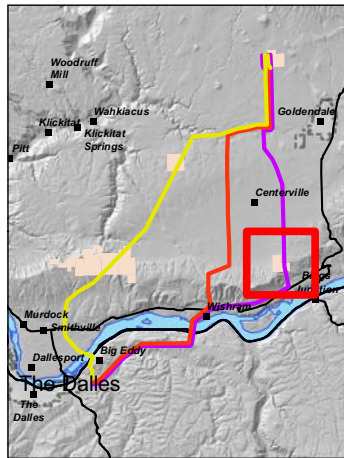
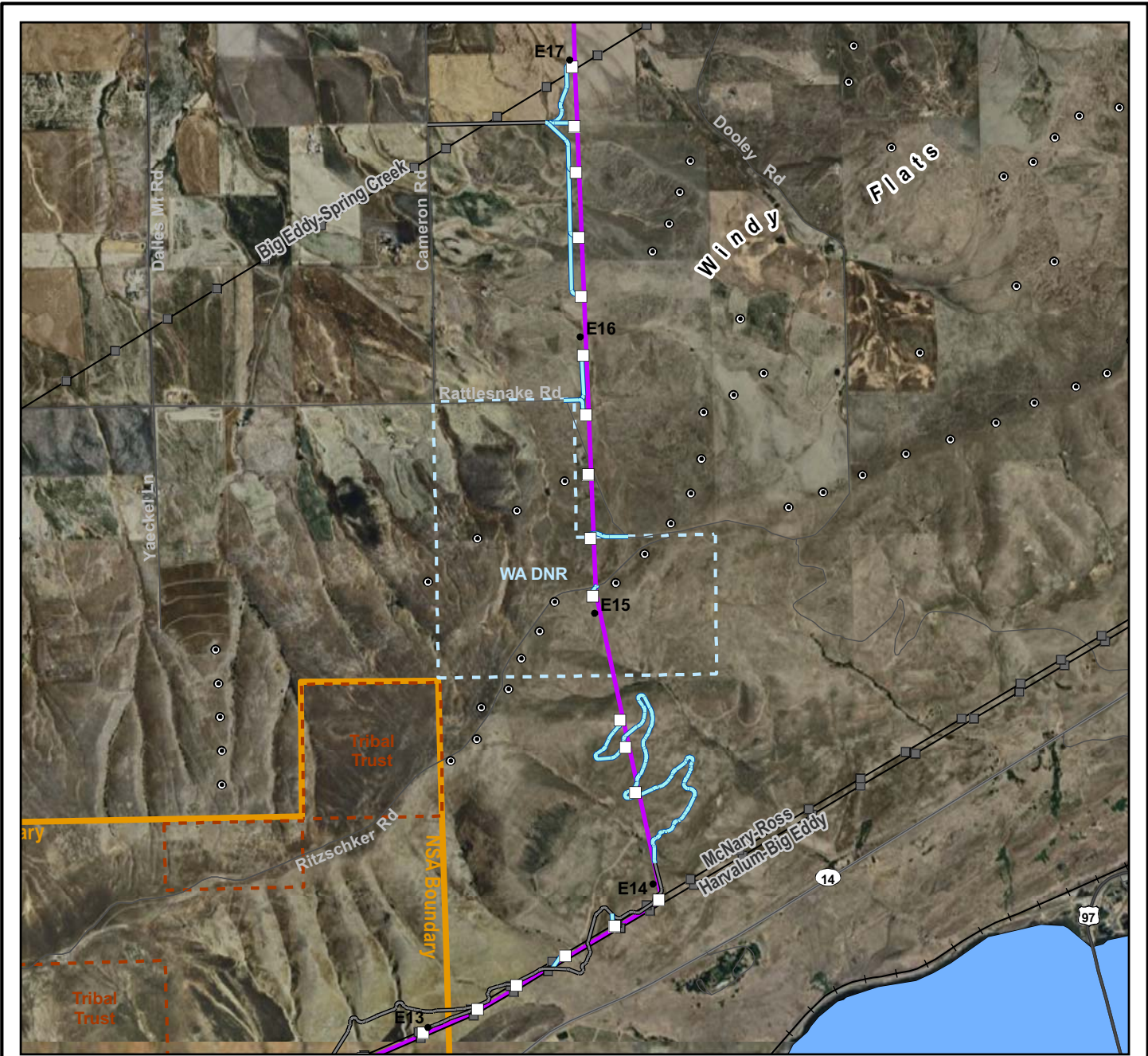
Wetland Survey

- 🟩 Confirmed Wetland*
- 🟪 Unverified Wetland*
- 🟨 Wetland id Potentially Impacted Wetland
- 🟩 Woodland #

*Wetlands may be larger than depicted extending beyond the right-of-way.



Map I-2. DNR Parcel 2



Existing Facilities

- ▲ BPA Substation
- BPA Tower
- BPA Transmission Line
- + Railroad
- 🏠 House/Business (Within about 800' of the Alternative)
- ⊙ Wind Turbine
- 📐 Columbia River Gorge National Scenic Area

Proposed Facilities

- West Alternative
- Middle Alternative
- East Alternative
- Proposed Tower
- Line Mile Marker
- 📐 Proposed Knight Substation Site

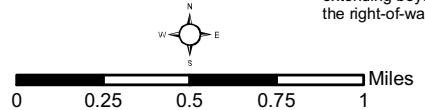
Proposed Access Roads

- New Road
- Existing County Road Upgrade
- Existing Access Road Upgrade
- Temporary Road

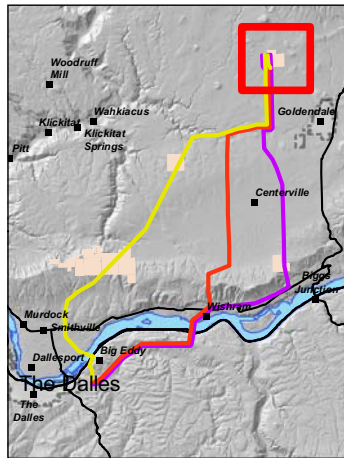
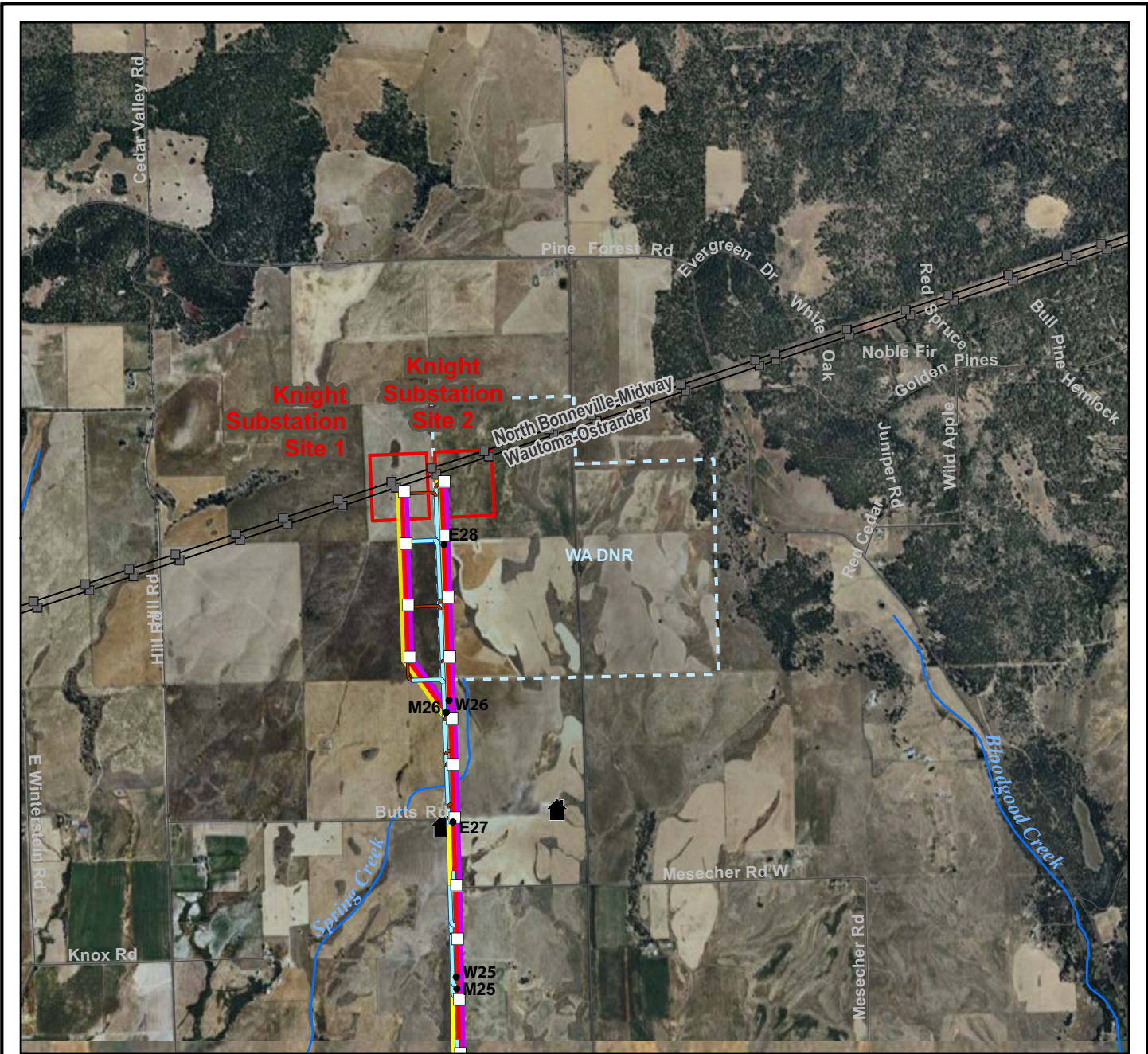
Wetland Survey

- 🟩 Confirmed Wetland*
- 🟪 Unverified Wetland*
- 🟨 Potentially Impacted Wetland
- 🟩 Wetland id
- 🟩 Woodland #

*Wetlands may be larger than depicted extending beyond the right-of-way.



Map I-3. DNR Parcel 3



Existing Facilities

- ▲ BPA Substation
- BPA Tower
- BPA Transmission Line
- + Railroad
- 🏠 House/Business (Within about 800' of the Alternative)
- ⊙ Wind Turbine
- 📐 Columbia River Gorge National Scenic Area

Proposed Facilities

- West Alternative
- Middle Alternative
- East Alternative
- Proposed Tower
- Line Mile Marker
- 📐 Proposed Knight Substation Site

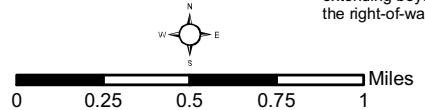
Proposed Access Roads

- New Road
- Existing County Road Upgrade
- Existing Access Road Upgrade
- Temporary Road

Wetland Survey

- 🟩 Confirmed Wetland*
- 🟪 Unverified Wetland*
- 🟨 Potentially Impacted Wetland
- 🟩 Wetland id
- 🟩 Woodland #

*Wetlands may be larger than depicted extending beyond the right-of-way.



Map I-4. DNR Parcel 4

Table I-2. Project Components Potentially Located on DNR Parcels

Parcel	Miles of Line	Number of New Towers	New Right-of-Way (acres)	Existing Right-of-Way (acres)	New Roads (miles)	Upgrade Existing Roads (miles)	Substation (acres)
Parcel 1	2	10	13–40	27	2	2	–
Parcel 2	0.8	3	5–14	9	0.7	0.8	–
Parcel 3	0.5	1	9	0	0.04	0	–
Parcel 4 with Substation	0.7	4	13	15	0.7	0	30
Parcel 4 without Substation	–	–	–	15	0.7	–	–

Table I-3. Impacts by DNR Parcel

Parcel	Permanent Impacts					Temporary Impacts		
	Towers (acres) ²	New Roads (acres)	Upgrade Existing Roads (acres)	Substation (acres)	Total Permanent Impacts (acres)	Towers (acres) ²	Temporary Roads (acres)	Total Temporary Impacts (acres)
Parcel 1	1–2	7	8	–	17	4–16	0	4–16
Parcel 2	0.4–0.5	3	3	–	6	1–5	0	1–5
Parcel 3	0.1	0.2	0	–	0.3	0.4	0	0.4
Parcel 4 with Substation	0.5–0.7	2	0	30	32–33	2	0.3	2
Parcel 4 without Substation	–	5	–	–	–	–	–	–

I.2 Resource Impacts

The following discussions focus on the environmental resources that DNR has stated requires additional information to aid the agency in its statutory and regulatory compliance efforts for DNR parcels potentially crossed by the proposed project. General resource impacts that occur due to the project are described in Chapter 3 of this EIS; the information below addresses the site specific impacts on the DNR parcels. Also, Chapter 3 of the EIS provides analysis for the environmental resources not specifically addressed in this appendix, including DNR lands.

I.2.1 Land Use and Recreation

The vicinity of the proposed project, including the general vicinity of the four parcels of DNR lands, is sparsely populated with development mainly limited to rural homes, ranches, and

farms. The four DNR parcels are located on gently rolling to moderately hilly plateaus. Parcel 1 is a dedicated preserve under the Washington Natural Area Preserves Act, for the preservation of high quality and rare natural areas, as well as threatened and endangered species as part of the Washington Natural Heritage Program (WNHP) (WNHP 2007, 2009b). While preservation is its primary mission, the preserve is also used for research, education, and recreation. Recreation in the preserve consists primarily of hiking, wildflower viewing, and wildlife observation along The Dalles Mountain Road. DNR Parcels 2, 3, and 4 are Washington State Trust Lands managed by DNR. Parcels 2 and 4 are leased for agriculture and allow for dispersed recreation (hunting, fishing, etc.), and Parcel 3 is leased for wind production as part of the Windy Flats Energy Production Area and may also be used for range.

Section 3.1 Land Use and Recreation of the EIS provides an analysis of the project's potential impacts on land use along the proposed project, including on the four DNR parcels potentially affected by the project, and identifies measures to lessen or avoid impacts that would also apply to the four DNR parcels.

Impacts to land use would include limitations of use within the right-of-way, removal of land from use due to tower footprints, roads, and Knight Substation, disruption of use due to the presence of the line through properties, and disturbance during maintenance and construction activities.

Use limitation within the right-of-way would include keeping the right-of-way clear of all structures, fire hazards, tall-growing vegetation and any other use that may interfere with the safe operation or maintenance of the line. Buildings could not be constructed within the right-of-way.

While BPA would obtain the right through its easements to keep the right-of-way clear of vegetation and structures, BPA could enter into agreements with DNR for low-growing vegetation that does not interfere with BPA's safe operation and maintenance of its transmission facilities. DNR would coordinate with BPA prior to planting to ensure that the use is safe, compatible and does not create an interference. Most crops could be grown safely under the transmission line. However, orchards, Christmas trees, tall-growing landscape or natural vegetation, and structure-supported crops (i.e., trellises) would require special consideration.

Many uses would not be restricted, but certain precautions would need to be taken. For example, no object should be raised higher than 14 feet above the ground within the right-of-way (i.e., when moving irrigation pipes, they should be kept low and parallel to the ground); ground elevation should not be altered (such as piling of dirt within the right-of-way); irrigation spray should not create a continuous stream onto the conductors or towers; fences should be grounded; and installing underground pipes or cables through the right-of-way needs to be coordinated with BPA so as not to interfere with transmission line grounding systems and tower footings. Vehicles and large equipment that do not exceed more than 14 feet in height, such as harvesting combines, cranes derrick and booms could be operated safely under the line where it passes over roads, driveways, parking lots, cultivated fields or grazing lands.

BPA does not restrict land uses outside the right-of-way. This is true of all lands adjacent to the proposed corridor including DNR lands. Land uses such as growing crops, grazing livestock, state and county roads, electric transmission lines, and outdoor recreational sports and activities would continue. Some temporary impacts may occur during construction of the transmission line as discussed in Section 3.1.2 of the EIS. Placement of the transmission line would not limit

development outside the right-of-way including agricultural use, residential development, wind power production, or solar energy or communication sites. Within Klickitat County, private lands crossed by the action alternatives are zoned rural center, open space and extensive agricultural use. Much of the area is in an energy overlay zone. DNR lands, as managed by the State of Washington, are not subject to local zoning regulations.

The land uses on the DNR parcels include non-irrigated crop land, rangeland (the wind production area appears as rangeland as it is multi use), and Conservation/Recreation. See Table I-4 for acreages of impacts to various land uses, prime farm land, and farmland of statewide importance.

Table I-4. Land Use Impacts and New Right-of-Way by DNR Parcel

Land Use	Permanent Impacts by Parcel (acres)				Temporary Impacts by Parcel (acres)				New Right-of-Way by Parcel (acres)			
	1	2	3	4	1	2	3	4	1	2	3	4
Non-Irrigated Cropland	0	0	0	32	0	1	0.4	0.04	0	0	0	13
Rangeland	0	4	0.3	1	0	0	0	2	0	4-13	9	0
Conservation/ Recreation	14-15	0	0	0	4-5	0	0	0	13-40	0	0	0
Totals by Type of Impact	14-15	4	0.3	33	4-5	1	0.4	2	13-40	4-13	9	13
Prime Farmland	0	0	0	31	0	0	0	1-2	0	0	0	10
Farmland of Statewide Importance	6	2	0.2	0.5	2-4	0.4-1.0	0.4	0.5-0.6	6-19	2-6	6	3

I.2.2 Geology and Soils

Section 3.4 Geology and Soils of the EIS provides an analysis of the potential impacts on geology and soils along the project (routing alternatives and substation sites), and identifies measures to lessen or avoid potential geologic hazards and soil impacts. The analysis in Section 3.4 includes a general assessment of geologic hazards for the four DNR parcels potentially affected by the proposed project, and the identified measures to lessen or avoid potential geologic hazards would also apply to the four DNR parcels. In addition, Map I-5 series of this appendix displays the liquefaction risks and faults found within the project area, including the four DNR parcels.

Additional geology and soils information is continuing to be obtained using geologic hazard assessments, including on-the-ground field assessments. The geologic hazard assessments have included the review of liquefaction hazard mapping, geologic maps for fault locations, and aerial photographs combined with surface condition assessments at proposed tower locations and surrounding terrain for landslide hazard assessment. Geological soil testing will be performed at representative tower locations to help determine appropriate tower footings for a given soil type or hazard. Geologic and soil hazard areas are avoided where possible, and where avoidance is not possible, towers and roads would be designed to address the applicable hazard.

Landslides. In Washington, landslide areas along the project occur along the Columbia Hills (see Map I-5). The West Alternative crosses a large inactive landslide on Washington Parks and DNR lands between line miles W7.6-8.4. Small landslides may also be associated with the headwaters of drainages on the north flank of the Columbia Hills near line mile W9.5.

Landslide areas along the East Alternative in Washington occur in the Wishram area and just south of the DNR Parcel 3.

As discussed in Section 3.4.2 of the EIS, because road development has the potential to cause erosion or landslides, road grades on all lands crossed by the proposed project would be varied depending on the erosion potential of the soil and roads would be rocked where needed for dust abatement, stability, load bearing, and seasons of use. Final design measures would take slopes, soil types, bedrock, the presence of bedrock hollows or inner gorges, and other factors into account based on site-specific information.

Seismic. Various faults are located along the project routes (see Map I-5). Earthquakes occurring in the Northwest could cause ground shaking or ground failure – landslides or liquefaction (severe settling of soil) – in large landslide areas, in floodplain sediments and alluvial fill in the Swale Creek Valley, and in floodplain sediments around Fifteenmile Creek in Oregon and the Little Klickitat River in Washington. All facilities would be built to applicable seismic standards and combined wind- and ice-loading tower design criteria typically exceed earthquake-induced loads.

Liquefaction. Liquefaction hazards occur where the combination of fine-grained cohesionless soils and high water table conditions occur. Generally, transmission towers are likely to survive settlement associated with liquefaction with only minor structural damage. It is BPA's policy to avoid placing towers in areas where liquefaction might occur, such as stream crossings.

Liquefaction hazards were identified where the Middle and East alternatives cross Swale Creek (see Map I-5). Test pits would be excavated at tower sites in these areas to further investigate subsurface conditions and verify no liquefaction hazard exists. If a potential liquefaction hazard is found, the liquefiable soils would most likely be excavated to bedrock and replaced with non-liquefiable backfill.

1.2.3 Vegetation

Section 3.3 of the EIS provides an analysis of the project's potential impacts on vegetation in the project vicinity for all routing alternatives, including on the four DNR parcels potentially affected by the proposed project, and identifies measures to lessen or avoid impacts that would also apply to the four DNR parcels. Table I-5 displays the potential impacts to vegetation at each of the four DNR parcels that could be affected by the proposed project.

Four special-status species associated with high-quality grasslands have mapped occurrences on Columbia Hills Natural Area Preserve Parcel 1; clustered lady's-slipper (*Cypripedium fasciculatum*), Douglas' draba (*Cusickiella douglasii*), hot-rock penstemon (*Penstemon deustus* var. *variabilis*), and obscure buttercup (*Ranunculus triternatus* (ORNHIC 2007 and WNHP 2009c). Vegetation surveys conducted of the proposed transmission line corridors in spring 2010 only found the obscure buttercup. Because of the unusual spring weather (early heat, then a late snow) it is assumed that the field surveys missed the plant flowering times of the other three special species grassland plants and their presence could not be verified.

Because both the park and preserve biologists have recorded their presence, it is assumed that all four of the special-status grassland type species occur in this area.

Table I-5. Vegetation Impacts and Right-of-Way by DNR Parcel

Parcel #:	Permanent Impacts (acres)				Temporary Impacts (acres)				New Right-of-Way (acres)			
	1	2	3	4	1	2	3	4	1	2	3	4
Vegetation Cover Types												
Shrub-Steppe	0	0	0	0	2	0	0	0	0	0	0	0
Grassland	13-14	0	0	0	0.04	0	0	0	12-36	0	0	0
Idaho Fescue-Houndstongue Hawkweed ¹	0	3-7	0	0	0	0	0	0	0	0	0	0
Disturbed Shrub-Steppe/Grassland	0	0.4-0.7	1-2	10.4	0	4	0.3	1	0-0.01	4-13	9	0

¹ Priority ecosystem associated with grasslands

As discussed in Section 3.3.2, the proposed project could result in the spread of noxious weeds, especially along newly constructed access roads. To control or contain noxious weeds on DNR parcels potentially crossed by the proposed project, BPA would undertake actions in coordination with DNR at four stages of the proposed project: pre-construction, construction, immediate post-construction, and maintenance.

Pre-Construction. The MOA between DNR and BPA and/or easement document for any DNR parcels affected would outline measures for weed control (see Table I-7 for Potential Measures on DNR Parcels). As part of BPA’s noxious weed management, BPA contracted with Klickitat County to conduct a noxious weed survey in spring 2010 along the proposed alternatives to help determine infestation locations and appropriate mitigation measures needed for construction. However, because BPA did not have permission to enter the DNR parcels, the inventory in those areas was conducted from public access where available. If noxious weeds are currently on the DNR property, BPA and DNR could decide to apply herbicides prior to construction to help reduce spread during construction. Construction specifications will contain provisions stating how the noxious weeds would be controlled or contained including provisions outlined in the MOA.

All proposed actions to control or eradicate noxious weeds would comply with the Carson-Foley Act (P.L. 90-583), the Federal Noxious Weed Act (P.L. 93-629), and other applicable State and Federal regulations.

Construction. During construction, BPA would implement noxious weed control measures specified in the construction specifications which would include establishing vehicle and equipment washing stations in strategic locations to reduce the possibility of seed being carried to areas that do not have infestations, as well as reseeding disturbed areas to limit noxious weed germination. To ensure that the desired level of noxious weed control is being carried out, the BPA field inspector and the land liaison representative would monitor the program. For DNR

land, BPA will coordinate these efforts with DNR as specified in the MOA or easement agreement.

Immediate Post-Construction. Upon completion of construction, the maintenance of the transmission line and its associated access roads and rights-of-way would become the responsibility of BPA Transmission Line Maintenance with the assistance of the BPA Regional Natural Resource Specialist. Before the line is released for future maintenance, a detailed post-construction field review would be conducted with DNR, the BPA field inspector, and the BPA Regional Natural Resource Specialist. Specific weed control measures would be agreed upon and responsibilities, including funding, assigned to the participating organization.

Maintenance. Over the long-term, vegetation (including noxious weeds) on DNR land would be managed by the BPA Regional Natural Resource Specialist along the right-of-way as guided by BPA's Transmission System Vegetation Management Program EIS, agreements made with DNR, and input from the Klickitat County weed board.

I.2.4 Water Resources, Wetlands, and Fish

Sections 3.5 and 3.7 of the EIS provides an analysis of the project's potential impacts on water resources, wetlands, and fish in the project vicinity for all three routing alternatives, including on the four DNR parcels potentially affected by the proposed project, and identifies measures to lessen or avoid impacts that would also apply to the four DNR parcels.

There are no perennial water bodies or floodplains located on the four DNR parcels where the proposed transmission line would cross. Proposed access roads would not cross drainages on any DNR parcels and no culverts would be installed.

Wetlands are found on Parcels 1 and 2. On Parcel 1, about 3.2 acres in five different wetlands could be permanently impacted by fill (dirt, rock, or concrete) required for tower footings and upgrading or building new access roads (see Section 3.5, Table 3-19); on Parcel 2 about 1.0 acre in two different wetlands could be permanently impacted. Impacts would vary depending on wetland quality (or "functional level"). Wetlands along Parcel 1 were ranked low or were not ranked because the wetland function could not be assessed and wetlands in Parcel 2 were ranked moderate. There would be no impacts to wetlands on Parcels 3 or 4.

As discussed in Section 3.5.1, if project-generated sediment were to reach an intermittent stream, it would have little effect, if any, and would likely be indiscernible from existing conditions within a few hundred feet. As there are no drainages on DNR parcels, there would be no impacts to fish.

I.2.5 Cultural Resources

Section 3.8 of the EIS provides an analysis of the project's potential impacts on cultural resources in the project vicinity for all three routing alternatives, including on the four DNR parcels potentially affected by the proposed project, and identifies measures to lessen or avoid impacts that would also apply to the four DNR parcels.

Cultural resource surveys were not conducted on DNR lands due to the lack of permission to enter the properties. Additional surveys of the alternatives, including DNR lands, will be conducted winter/spring 2011. Cultural resources will be avoided where possible and mitigation

measures have been identified to reduce or eliminate adverse impacts (see Table 3.8.2). BPA will coordinate with DNR to avoid and minimize impacts to cultural resources.

I.2.6 Socioeconomics

Section 3.9 of the EIS provides an analysis of the project's potential impacts on socioeconomics and public facilities in the project vicinity for all three routing alternatives, including on the four DNR parcels potentially affected by the proposed project, and identifies measures to lessen or avoid impacts that would also apply to the DNR parcels.

Several of the DNR parcels are Washington State Trust Lands managed by DNR. The State Trust Lands are held in trust by the state and leased to private farmers either on a cash rent or sharecrop basis (McKay 2010), or to a wind developer (i.e., Windy Flats). The primary beneficiaries of State Trust Lands are public schools (kindergarten through 12th grade), which receive over 78 percent of the funds. In 2009, over 5.6 million acres were in State Trust Lands, and provided over \$192 million in state revenues (DNR 2010).

As discussed above in Section I.2.2, Land Use and Recreation, DNR Parcels 2, 3, and 4 are Washington State Trust Lands managed by DNR. Parcel 2 is leased for range land and Parcel 4 is leased for range and crop production. Parcel 3 is leased for wind production as part of the Windy Flats Energy Production Area and may also be used for range.

As shown in Table I-4, permanent removal of land from use from construction of transmission tower footings and new access roads on DNR land used for grazing leases would be 4 acres (Parcel 2), 0.3 acres (Parcel 3) and 1 acre (Parcel 4). Parcel 4 is also used for crop production in the area of Substation Site 2, which would permanently remove 30 acres from use. These totals represent a relatively small portion of the DNR parcels (see Section I-1 for total parcel acreages).

It is estimated that cash rents for range land are about \$2/acre-year, while crop land rents are between \$30 and \$40 per acre, per year (acre-year). Sharecrop returns to DNR range from 30 to 35 percent of the crop, which results in \$10 to \$70 per acre-year,

Based on the cash rents and sharecrop returns, the amount of DNR revenue lost to towers and access roads is estimated to be \$12 per year for Parcel 2 (West Alternative) and \$0.60 per year for Parcel 3 (based on the impacts to range land; East Alternative). If any of the alternatives connect to Substation Site 2, they would impact additional State Trust Lands by about \$210 per year.

Crops lost to temporary construction activity would result in about \$273 annually during construction for the action alternatives; this amount would be compensated in addition to the purchase of the property or easement. If any of the land is held in CRP, federal payments made to the state would be affected if all or a portion of the land had to be taken out of CRP. Placement of transmission lines would not necessarily affect CRP status and no loss in value from construction activities would be expected for CRP land. Because the East Alternative would be routed to avoid conflicts with existing wind turbines already developed on Parcel 3, there would be no additional wind development revenue loss expected.

I.2.7 Transportation

Section 3.10 of the EIS provides an analysis of the project's potential impacts on transportation in the project vicinity for all three routing alternatives, including on the four DNR parcels potentially affected by the proposed project, and identifies measures to lessen or avoid impacts that would also apply to the four DNR parcels.

Table I-2 displays the proposed miles and acres of new access roads and those needing improvement located on the four DNR parcels that could be affected by the proposed project. Table I-6 displays the general characteristics of access road easements proposed to be located on the four DNR parcels that could be affected by the proposed project. This table identifies the type, length, and width of the proposed easements and what type of use is expected (joint or BPA exclusive use).

During construction, unavoidable transportation impacts would consist of minor delays and interruptions to local traffic, with a relatively low increase in daily traffic volume on highways. Operation and maintenance traffic over the life of the line would be only a few maintenance vehicles once a year, and helicopters twice a year.

A discussion of BPA's access road system for the proposed project is included in Section 2.3.4, Access Roads, of the EIS. This discussion includes a general description of the width, location, type of road improvement, and construction equipment that would be used. Use of temporary roads within agricultural fields is also discussed. For the DNR parcels, BPA would acquire rights (easements for line access roads and fee title for substation access roads), and develop and maintain permanent access suitable for travel by wheeled vehicles to each transmission line structure site, substation or other transmission facility. Existing public and private roads and transmission line rights-of-way would be used for access where reasonably possible. See Section 3.1 Land Use and Recreation for a discussion about possible unauthorized access and use of BPA roads.

As part of BPA's Transmission Engineering Manual, BPA has an Access Road Planning and Design Manual (BPA, 1987). This comprehensive manual includes BPA's access road policy and standards regarding the design and construction of access roads that also would be used for proposed access roads on and adjacent to the four DNR parcels.

Environmental, engineering, economic, and maintenance factors are considered in locating and designing access roads. Access road planning, as described in the BPA Manual, takes into account many factors including seasonal constraints for construction, steep slopes, present and potential land uses, soil conditions, soil erosion potential, water quality impacts, visual impacts, and impacts to cultural resources. The BPA Manual also describes erosion and sediment control methods that are implemented. Erosion control is a very important factor in planning, designing, constructing and maintaining access roads. Erosion must be controlled during and after construction to prevent road damage, to avoid undue increases in stream turbidity and sedimentation, and soil deposition outside of the road right-of-way. Well designed and constructed erosion control measures would reduce road maintenance costs and provide a reliable road in the event of emergency work on the transmission line. Drainage structures including culverts, intercepting dips, water bars, and gravel surfacing are elements of erosion control, as is seeding.

Access road planning and design are important elements of transmission project development and to be effective must begin at the earliest stage of project planning. Well developed access

road plans and designs minimize construction and maintenance costs, environmental impacts, and costly delays because of late changes in access road routing. Access road plans and designs are developed using landowner, environmental, construction, and maintenance input. For the DNR parcels, access road plans and designs would also be coordinated with the appropriate DNR engineer.

Table I-6. Proposed Access Roads located on DNR Parcels

DNR Parcel	Legal Description	Land Use	Type of Easement	Length of Easement (feet)	Width of Easement (feet)	Anticipated Road Use
Parcel 1	Sec 28 T3N R14E	Columbia Hills Preserve	Permanent Road	2,040	50	BPA Use - Road AZH-10-AR-3
Parcel 1	Sec 28 T3N R14E		Permanent Road	1,620	50	BPA Use - Road AZH-11-AR-1
Parcel 1	Sec 32 T3N R14E		Permanent Road	360	50	BPA Use - Road AZH-9-AR-2
Parcel 1	Sec 32 T3N R14E		Permanent Road	1,375	50	BPA Use - Road AZH-9-AR-3
Parcel 1	Sec 32 T3N R14E		Permanent Road	970	50	BPA Use - Road AZH-9-AR-4
Parcel 1	Sec 32 T3N R14E		Permanent Road	1,545	50	BPA Use - Road AZH-9-AR-5
Parcel 1	Sec 32 T3N R14E		Permanent Road	1,775	50	BPA Use - Road AZH-10-AR-1
Parcel 1	Sec 32 T3N R14E		Permanent Road	1,025	50	BPA Use - Road AZH-10-AR-2
Parcel 1	Sec 33 T3N R14E		Permanent Road	1,925	50	BPA Use - Road AZH-10-AR-2
Parcel 1	Sec 32 T3N R14E		Existing Road	None: Existing Road (Stacker Mt Microwave Rd)	5,810	60
Parcel 2	Sec 36 T4N R14E	Agriculture	Permanent Road	330	50	BPA Use - AZH-16-AR-2P1
Parcel 2	Sec 36 T4N R14E		Permanent Road	1,580	50	BPA Use - AZH-16-AR-2P2
Parcel 2	Sec 36 T4N R14E		Permanent Road	700	50	BPA Use - AZH-16-AR-3
Parcel 2	Sec 36 T4N R14E		Permanent Road	670	50	BPA Use - AZH-17-AR-1
Parcel 2	Sec 36 T4N R14E		Permanent Road	350	50	BPA Use - W17-AR-2
Parcel 2	Sec 36 T4N R14E	Existing Road	None: Existing Road (Ahola Rd)	4,390	60	Joint Use - Ahola Rd

DNR Parcel	Legal Description	Land Use	Type of Easement	Length of Easement (feet)	Width of Easement (feet)	Anticipated Road Use
Parcel 3	Sec 36 T3N R15E	Windy Flats	Permanent Road	3,035	50	BPA Use - Road AZE-15-AR-4
Parcel 3	Sec 36 T3N R15E		Permanent Road	420	50	BPA Use - Road AZE-15-AR-5
Parcel 3	Sec 36 T3N R15E		Permanent Road	895	50	BPA Use - Road AZE-16-AR-1
Parcel 3	Sec 36 T3N R15E	Existing Road	None: Existing Road (Haystack Butte Road)	1,800	60	Joint Use - Road HAST-SAR-P9 (Haystack Butte Rd)
Parcel 4	Sec 36 T5N R15E	Agriculture	Permanent Easement (Route of Travel)	2,625	50	BPA Use - Tower access E 28/4
Parcel 4	Sec 36 T5N R15E	Agriculture ¹	Permanent Road	2,685	50	BPA Use - Knight-SAR-1
Parcel 4	Sec 36 T5N R15E	Agriculture ²	Permanent Road	3,900	50	BPA Use - Knight Substation Access

¹ This road would lead to Knight Substation Site 1.

² This road would lead to Knight Substation Site 2.

I.3 Potential Measures on DNR lands

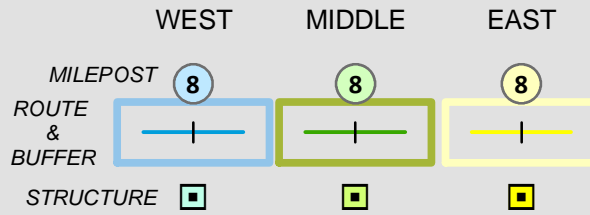
In addition to mitigation measures identified in Chapter 3 of the EIS, the measures outlined in Table I-7 could be implemented to further reduce or avoid potential impacts on DNR lands.

Table I-7. Potential Measures on DNR Parcels

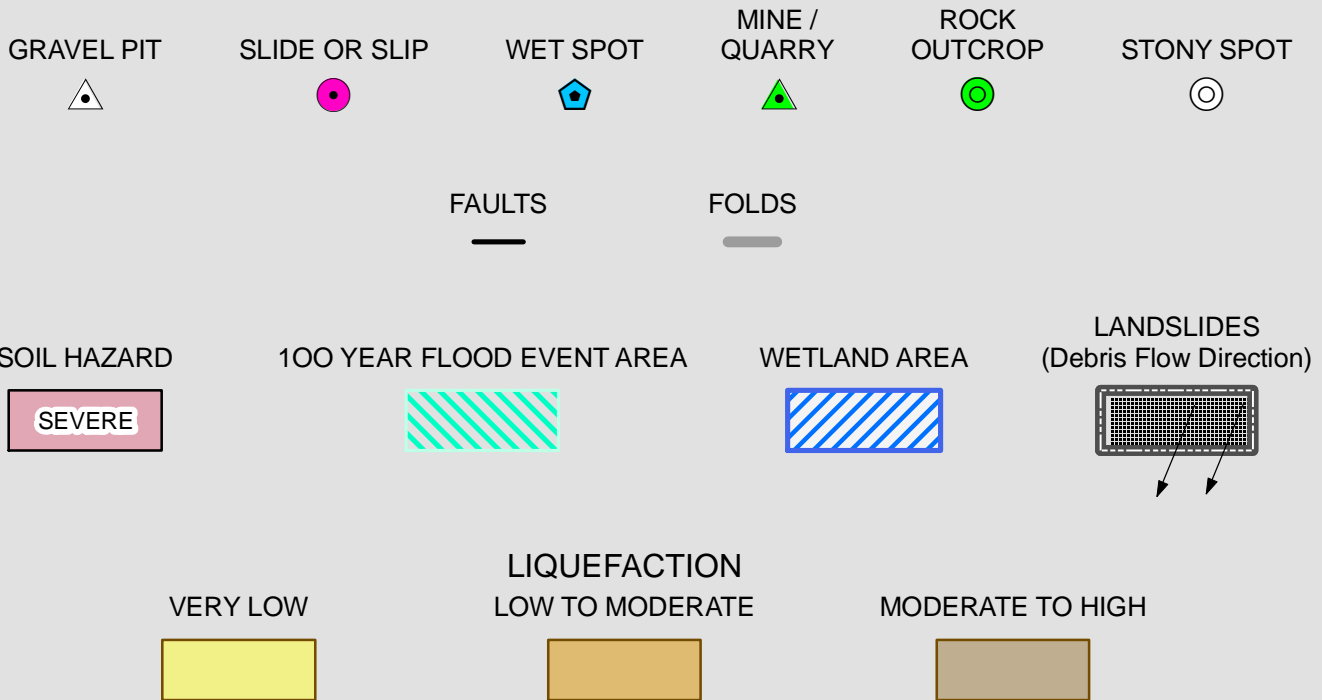
Measure	Implementation
Implement the MOA with DNR that reduces noxious, invasive and undesirable species and works towards compatible and native species vegetation on DNR lands. The MOA also will provide coordination between DNR and BPA for the use of herbicides on lands where DNR uses herbicides and minimizes the use of herbicides on lands where DNR does not use herbicides.	Washington Statewide Rights-of-Way MOA/DNR Easement Document
Implement the MOA with DNR to jointly maintain mutually beneficial roads that ensures payments by the parties for their joint use and their need for a permanent transportation system.	Washington Statewide Rights-of-Way MOA/DNR Easement Document
Commit to coordinating road design with DNR.	Washington Statewide Rights-of-Way MOA/DNR Easement Document
Coordinate with DNR regarding the 1989 DNR Agricultural and Grazing lands Policy Plan and related Resource Management Plans for individual parcels during construction and maintenance of the line and access roads over DNR trust lands.	Washington Statewide Rights-of-Way MOA
Implement the Appraisal MOU with DNR to pay fair market value for impacts to trust lands.	Appraisal MOU

Measure	Implementation
Utilize the Appraisal MOU with DNR to assess the value for any reduction in CRP acreage due to construction of access roads or towers.	Appraisal MOU
Work with DNR concerning a possible cooperative agreement for the control of unauthorized public access and use on state lands that could result from the proposed project. The agreement could address various provisions related to unauthorized access, such as additional measures to be taken to discourage unauthorized use of the project corridor and associated access roads, periodic inspection for unauthorized access and any resulting damage, and repair of any damage from unauthorized access. BPA will strive to design the corridor to prevent trespass and provide signs that discourage unauthorized use of the corridor.	Washington Statewide Rights-of-Way MOA (see McNary-John Day Maintenance and Operations Agreement) /DNR Easement Document
Mark the easement corridor in strategic locations on DNR land so that BPA, contractors, adjacent landowners and the public can clearly recognize when they are within the corridor to prevent uncompensated corridor expansion, vegetation management conflicts, and to reduce trespass.	Washington Statewide Rights-of-Way MOA (see McNary-John Day Maintenance and Operations Agreement) /DNR Easement Document
Develop a mutually agreeable fire prevention and suppression plan with DNR that addresses managing and controlling the risks associated with wildland fire due to construction, operation, and maintenance of the transmission line.	Washington Statewide Rights-of-Way MOA (see McNary-John Day Maintenance and Operations Agreement) /DNR Easement Document

LEGEND



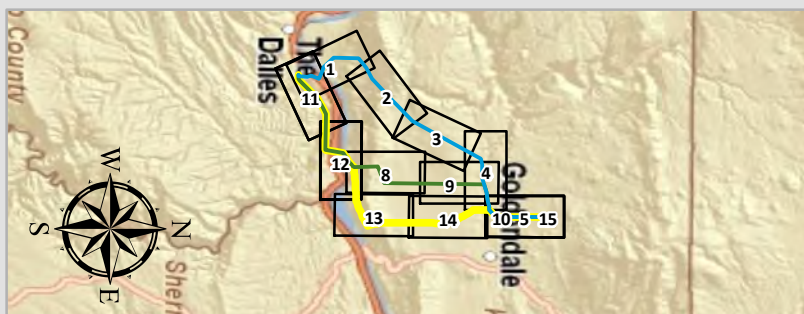
POTENTIAL HAZARDS



POTENTIAL HAZARD KEY BY MILEPOST

Gray = Not Evaluated On This Sheet Red = Potential Hazard Present Within Corridor White = Potential Hazard Not Observed

	7	6	5	4	3	2	1	0
LANDSLIDES	Gray	Gray	Gray	Gray	Gray	Gray	Gray	Gray
SEVERE EROSION	Gray	Gray	Red	Red	Red	Gray	Gray	Red
LIQUEFACTION	Gray	Red	Red	Gray	Gray	Red	Red	Red
SOIL / ROCK NOTE	Gray	Gray	Gray	Red	Red	Red	Gray	Gray
FAULT	Gray	Red	Gray	Gray	Gray	Red	Gray	Gray
WET/ FL	Gray	Gray	Red	Red	Gray	Gray	Red	Red



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Transmission Line Project

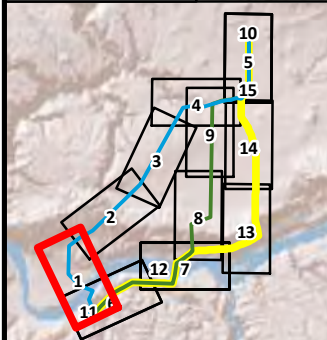
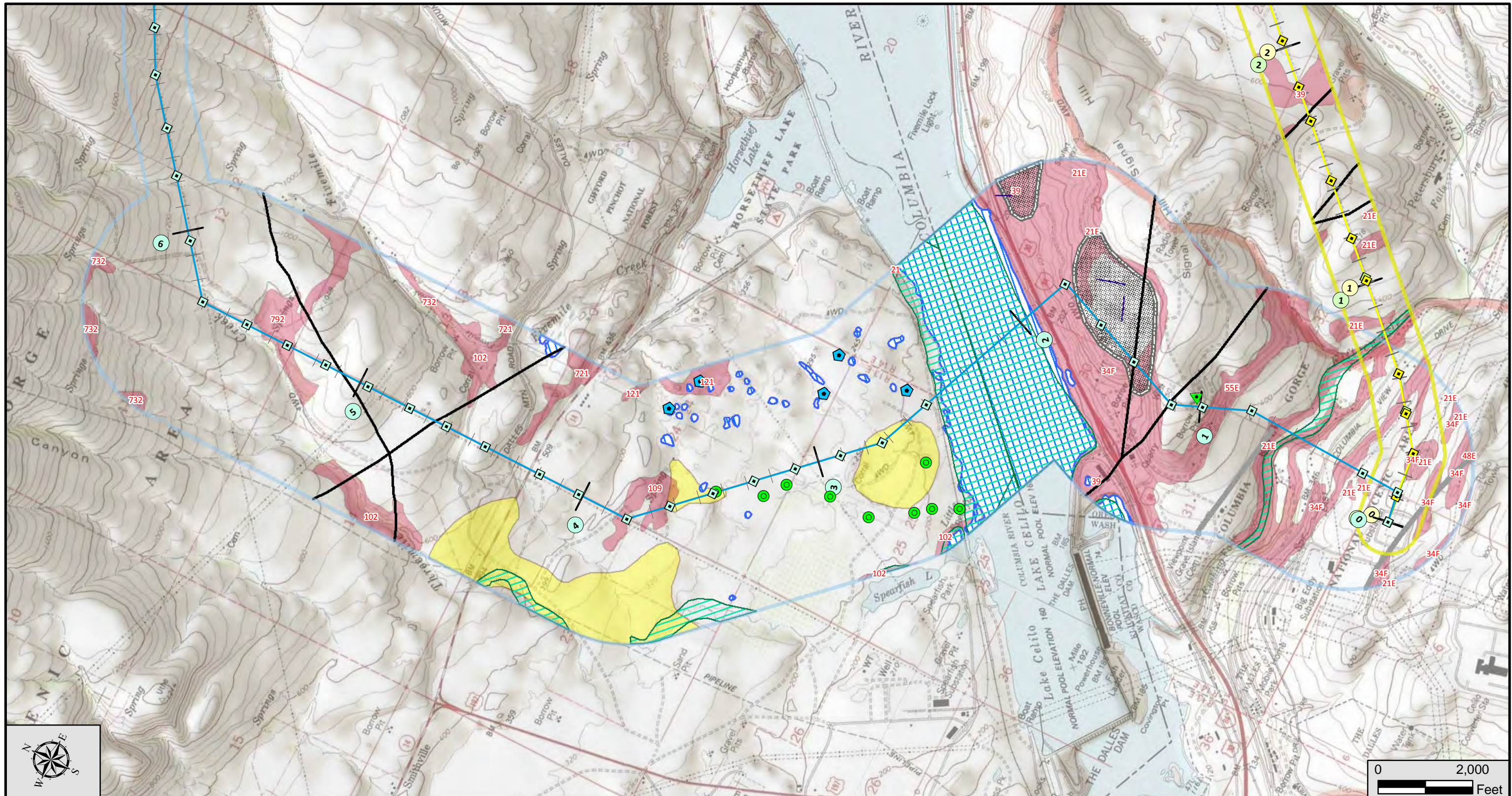
POTENTIAL HAZARDS STRIP MAP LEGEND

April 2010

21-1-21287-001

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Map I-5



	7	6	5	4	3	2	1	0
LANDSLIDES								
SEVERE SOIL								
LIQUEFACTION								
SOIL / ROCK NOTE								
FAULT								
WET/ FL								

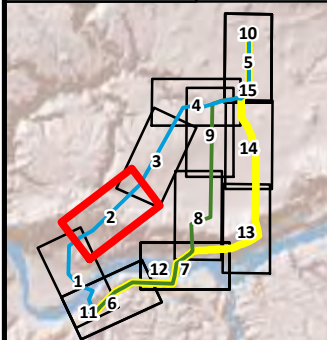
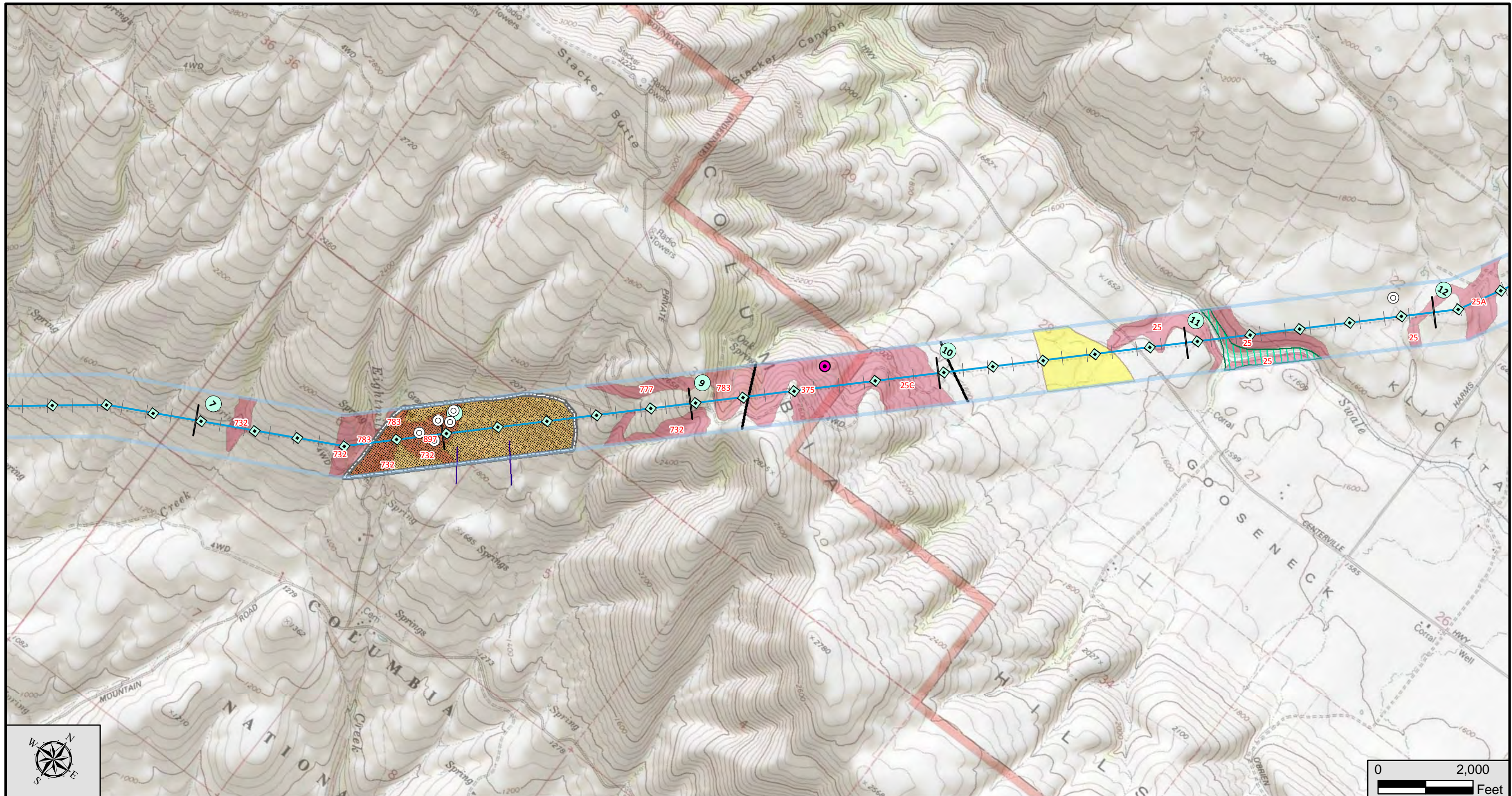
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Transmission Line Project

**HYDROLOGIC STRIP MAP
WEST
ROUTE**

April 2010 21-1-21287-001

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
Sheet 1 of 15



	6	7	8	9	10	11	12	13
LANDSLIDES			█	█	█			
SEVERE SOIL		█	█	█	█	█	█	
LIQUEFACTION						█	█	
SOIL / ROCK NOTE			█	█			█	
FAULT				█	█			
WET/ FL						█	█	

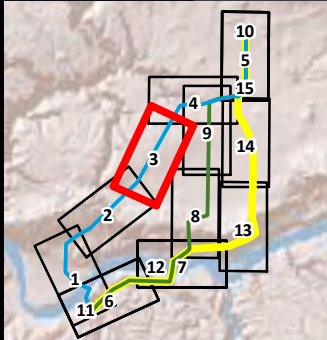
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Big Eddy - Knight 500 kv
Transmission Line Project

**HYDROLOGIC STRIP MAP
WEST
ROUTE**

April 2010 21-1-21287-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
Sheet 2 of 15



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LANDSLIDES		█						
SEVERE SOIL		█	█	█	█	█	█	
LIQUEFACTION								
SOIL / ROCK NOTE		█		█	█			
FAULT			█					
WET/ FL		█			█	█		

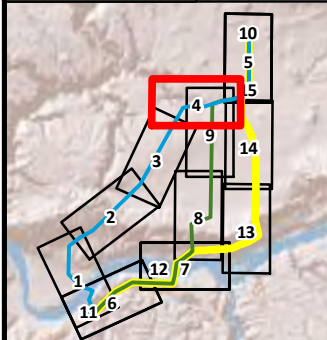
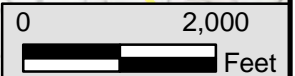
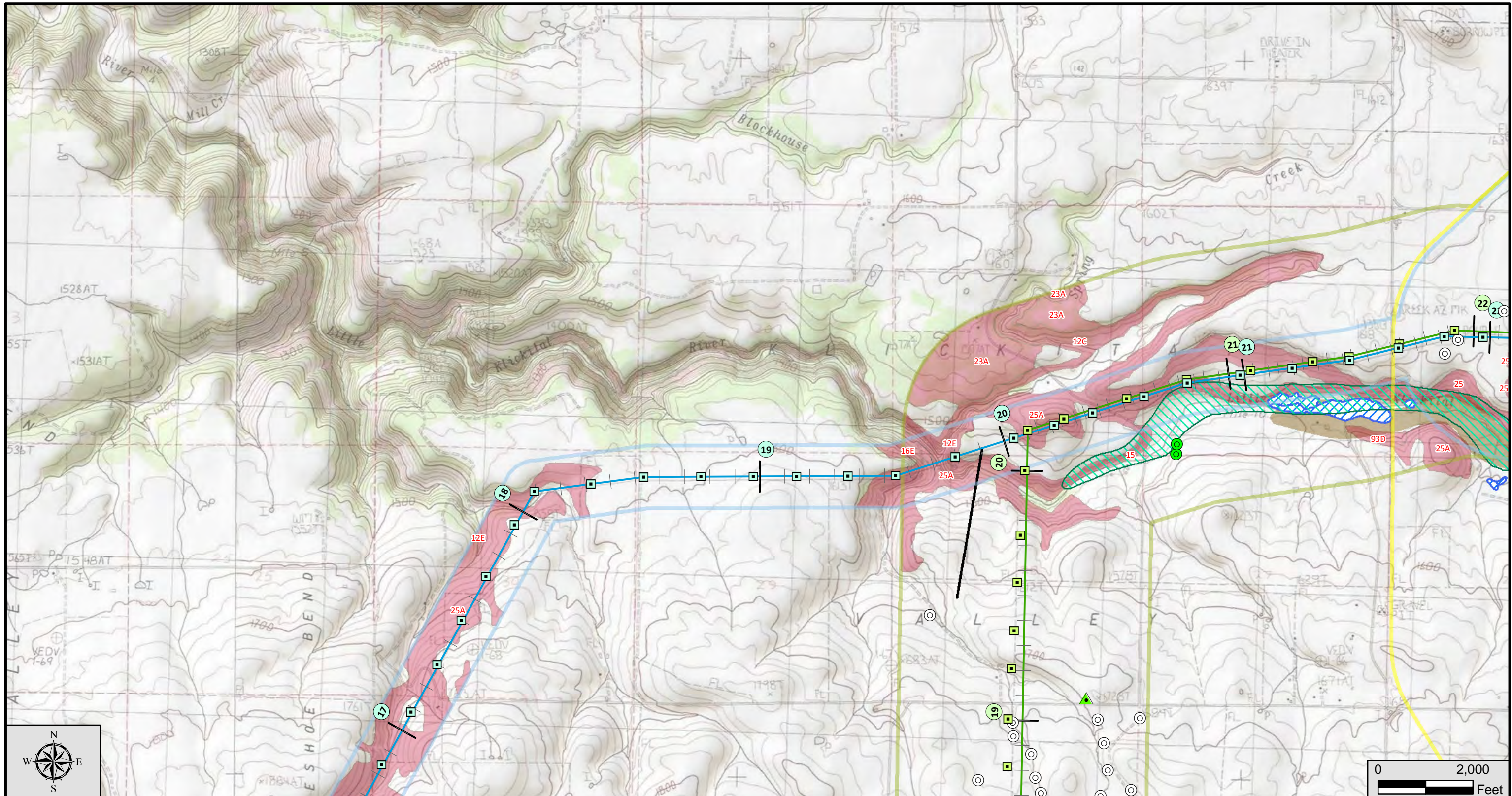
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 Big Eddy - Knight 500 kv
 Transmission Line Project

**HYDROLOGIC STRIP MAP
 WEST
 ROUTE**

April 2010 21-1-21287-001

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
 Sheet 3 of 15



	16	17	18	19	20	21	22	23
LANDSLIDES								
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LIQUEFACTION								
SOIL / ROCK NOTE						█		
FAULT				█	█			
WET/ FL					█	█	█	

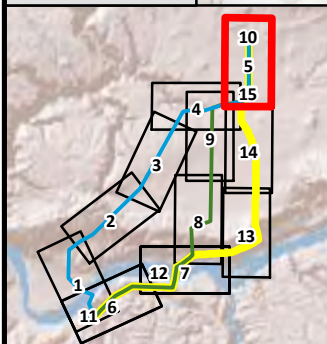
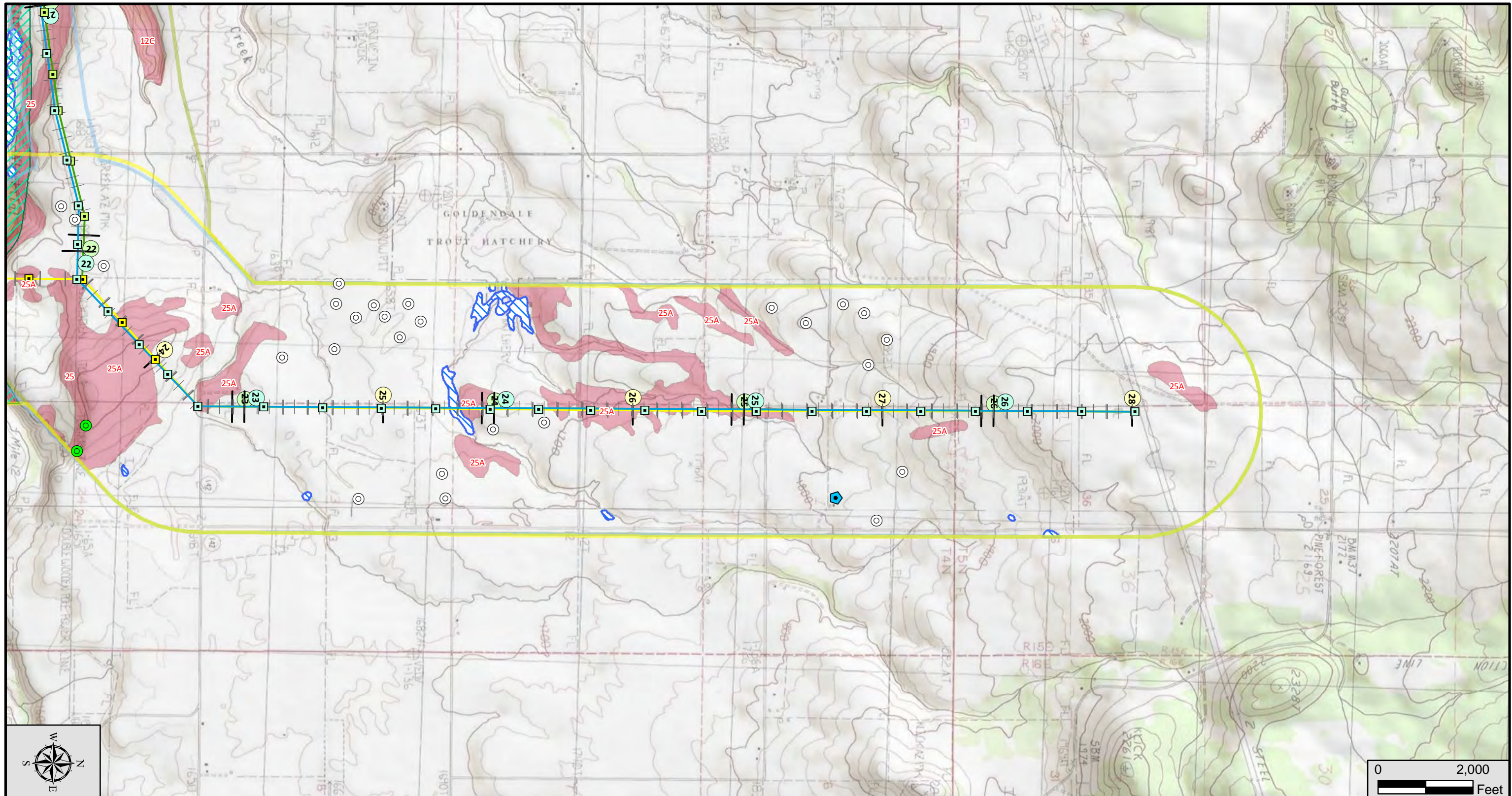
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Transmission Line Project

**HYDROLOGIC STRIP MAP
WEST
ROUTE**

April 2010 21-1-21287-001

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
Sheet 4 of 15

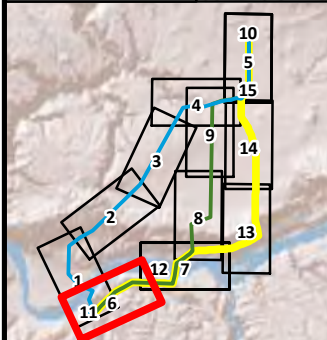


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LIQUEFACTION		█	█				
SOIL / ROCK NOTE		█	█	█	█	█	
FAULT							
WET/ FL			█	█	█	█	

Bonneville Power Administration
 Big Eddy - Knight 500 kv
 Transmission Line Project

**HYDROLOGIC STRIP MAP
 WEST
 ROUTE**

April 2010 21-1-21287-001



	0	1	2	3	4	5	6	7
LANDSLIDES								
SEVERE SOIL	█	█	█	█	█	█	█	█
LIQUEFACTION								
SOIL / ROCK NOTE								
FAULT		█	█	█				
WET/ FL		█		█	█	█	█	█

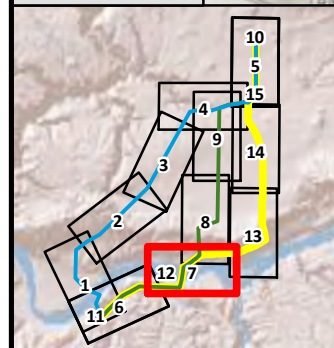
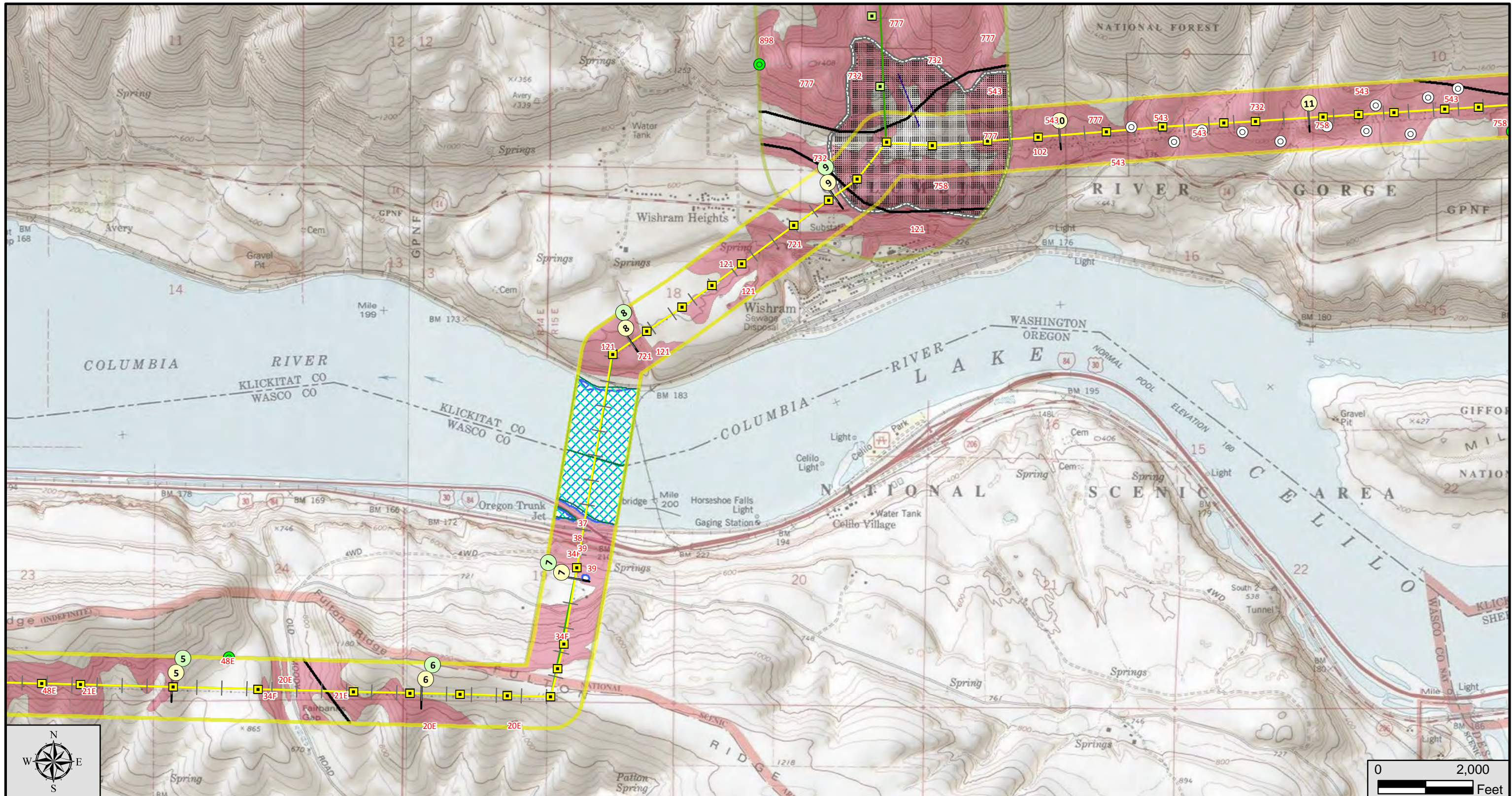
Bonneville Power Administration
Big Eddy - Knight 500 kv
Transmission Line Project

**HYDROLOGIC STRIP MAP
MIDDLE
ROUTE**

April 2010 21-1-21287-001

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
Sheet 6 of 15



	4	5	6	7	8	9	10	11
LANDSLIDES								
SEVERE SOIL								
LIQUEFACTION								
SOIL / ROCK NOTE								
FAULT								
WET/ FL								

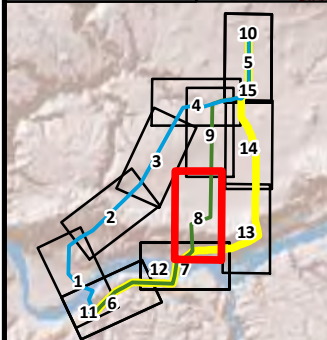
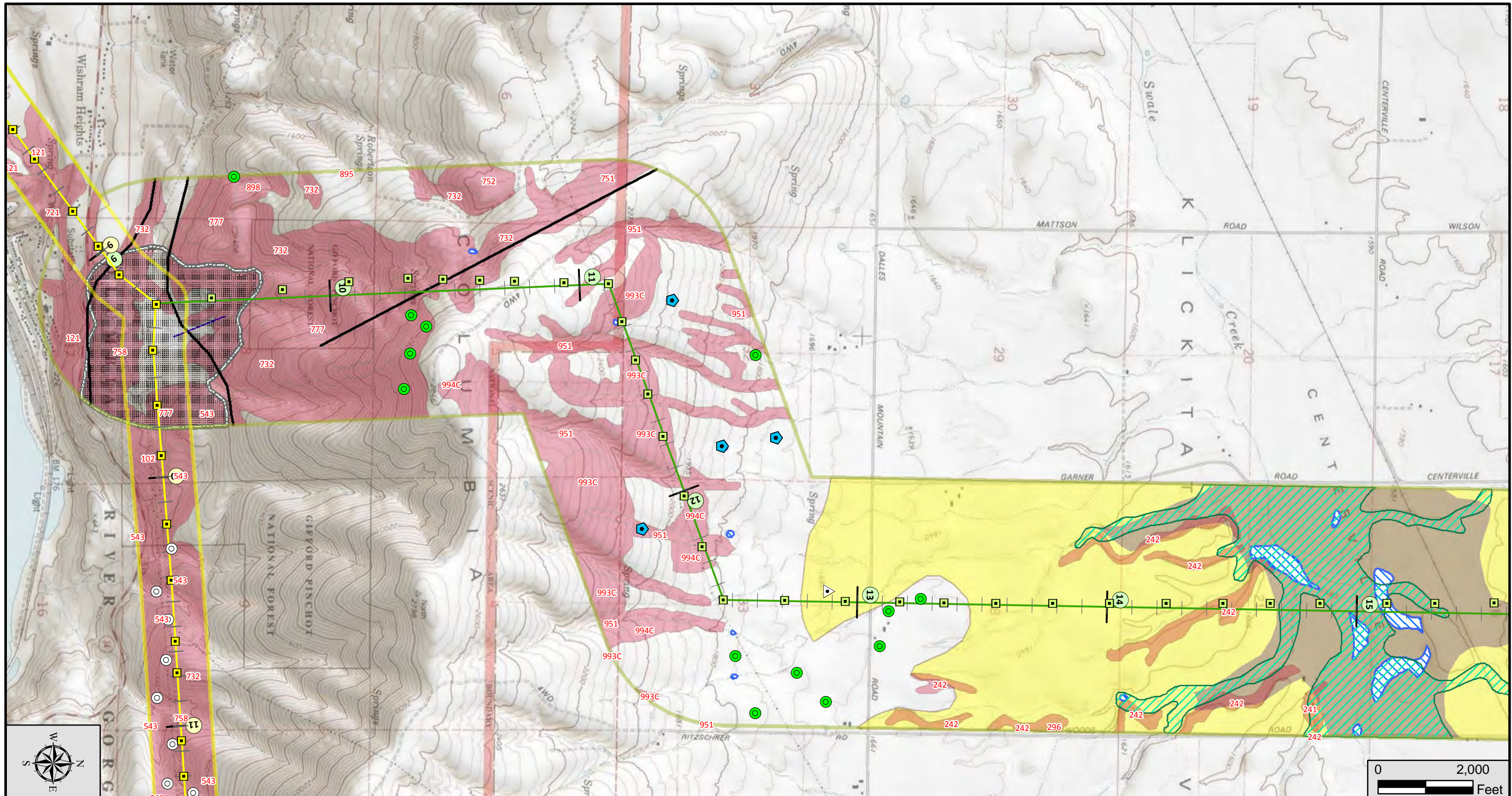
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 Big Eddy - Knight 500 kv
 Transmission Line Project

**HYDROLOGIC STRIP MAP
 MIDDLE
 ROUTE**

April 2010 21-1-21287-001

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
 Sheet 7 of 15



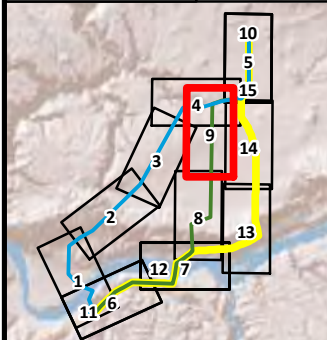
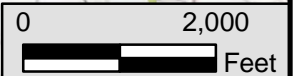
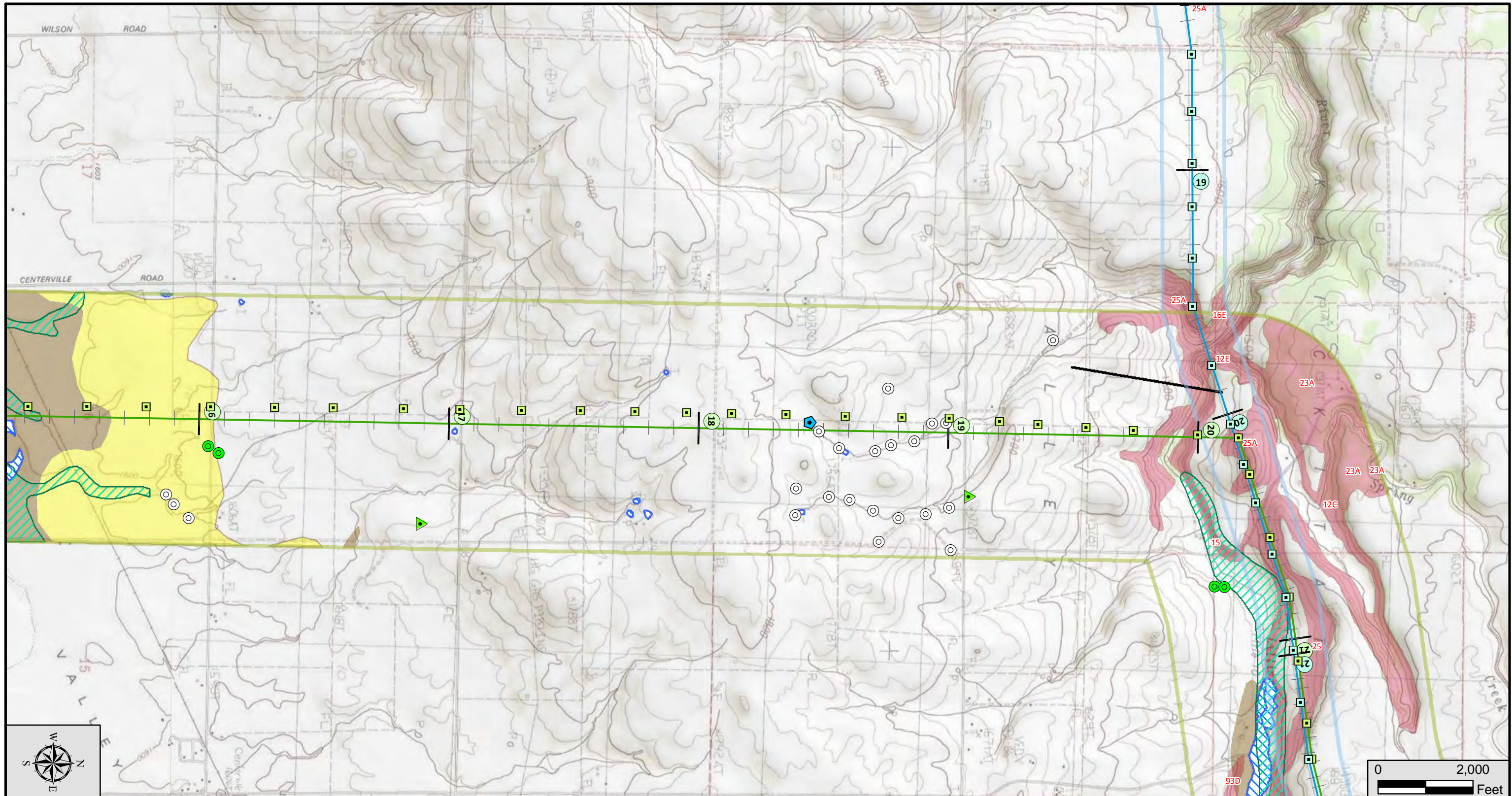
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LIQUEFACTION					█	█	█	█
SOIL / ROCK NOTE	█		█	█	█	█		
FAULT	█	█	█	█	█	█		
WET/ FL		█		█	█		█	█

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Big Eddy - Knight 500 kv
Transmission Line Project

**HYDROLOGIC STRIP MAP
MIDDLE
ROUTE**

April 2010 21-1-21287-001

SHANNON & WILSON, INC. Map I-5
Sheet 8 of 15
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS



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LANDSLIDES								
SEVERE SOIL								
LIQUEFACTION								
SOIL / ROCK NOTE								
FAULT								
WET/ FL								

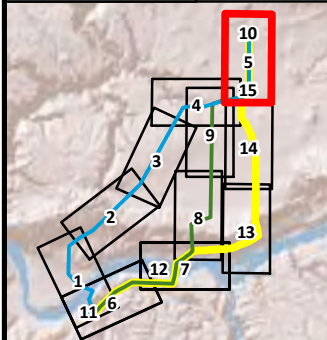
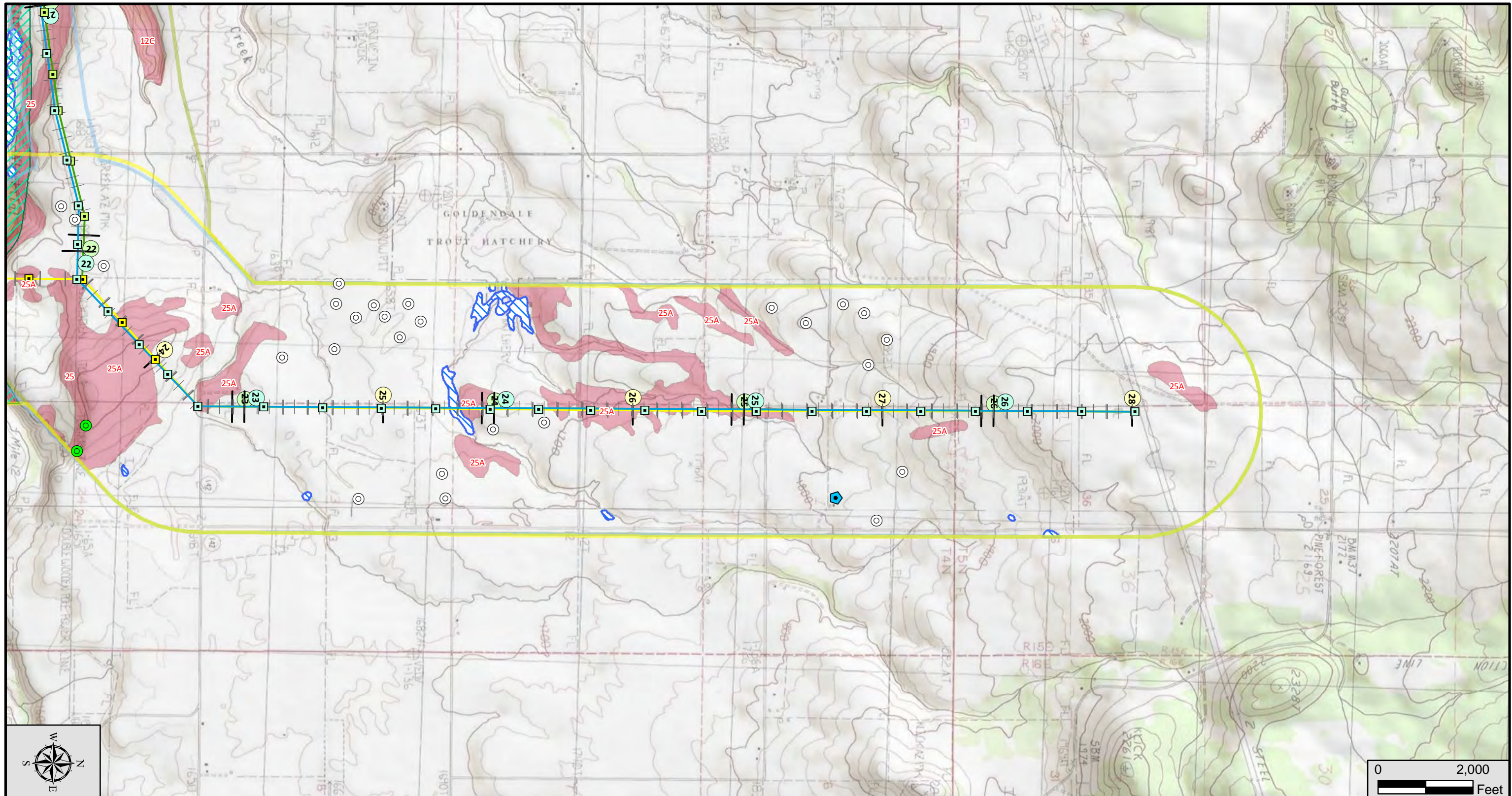
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Big Eddy - Knight 500 kv
Transmission Line Project

**HYDROLOGIC STRIP MAP
MIDDLE
ROUTE**

April 2010 21-1-21287-001

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
Sheet 9 of 15

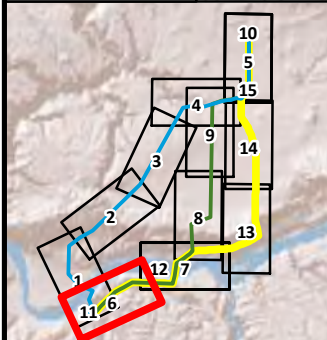


	21	22	23	24	25	26	27	7
LANDSLIDES								
SEVERE SOIL		█	█	█	█	█	█	
LIQUEFACTION		█	█	█				
SOIL / ROCK NOTE		█	█	█	█	█		
FAULT								
WET/ FL			█	█	█	█		

Bonneville Power Administration
 Big Eddy - Knight 500 kv
 Transmission Line Project

**HYDROLOGIC STRIP MAP
 MIDDLE
 ROUTE**

April 2010 21-1-21287-001



	0	1	2	3	4	5	6	7
LANDSLIDES								
SEVERE SOIL	█	█	█	█	█	█	█	█
LIQUEFACTION								
SOIL / ROCK NOTE								
FAULT		█	█	█				
WET/ FL		█		█	█	█	█	█

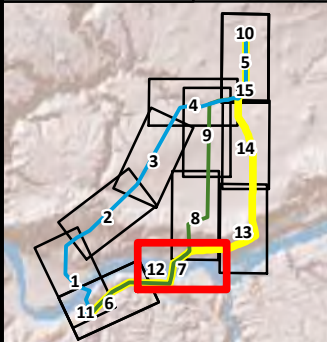
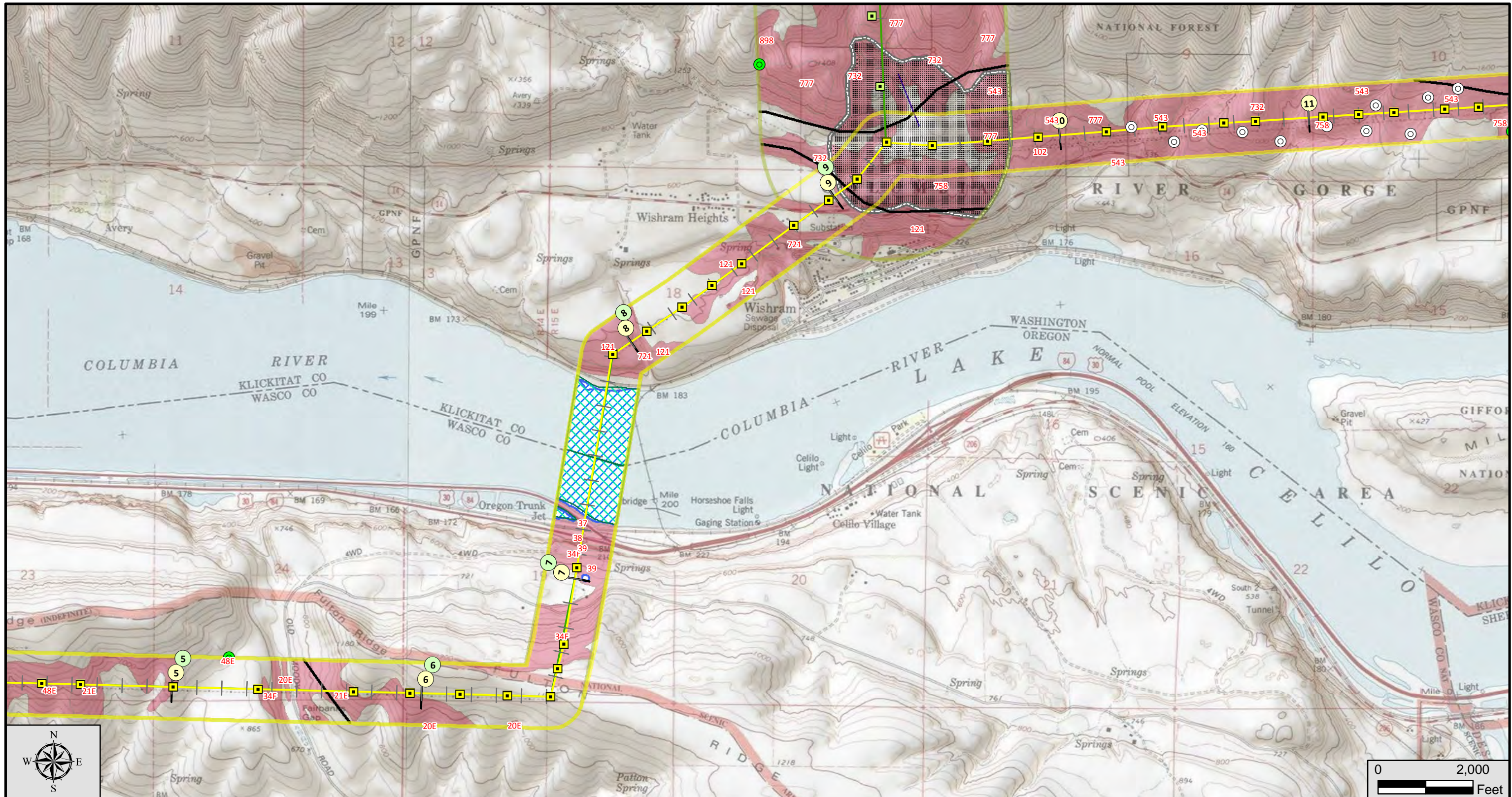
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Big Eddy - Knight 500 kv
Transmission Line Project

**HYDROLOGIC STRIP MAP
EAST
ROUTE**

April 2010 21-1-21287-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
Sheet 11 of 15



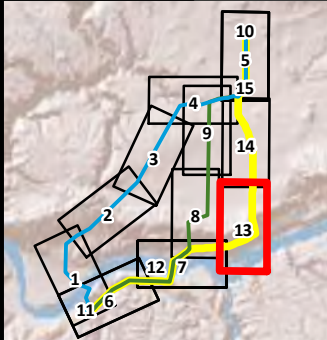
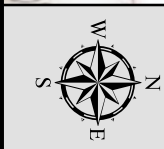
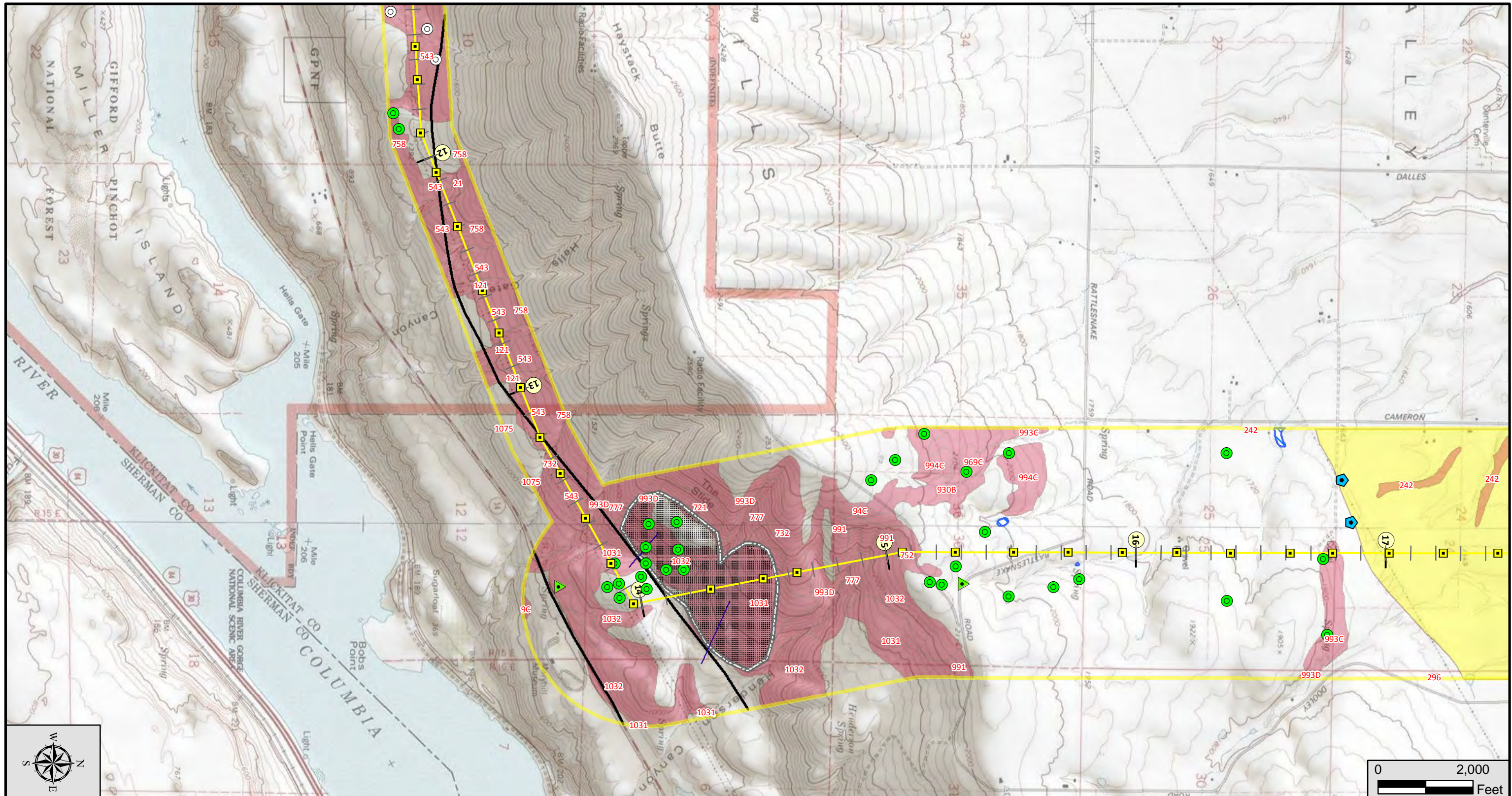
	4	5	6	7	8	9	10	11
LANDSLIDES								
SEVERE SOIL								
LIQUEFACTION								
SOIL / ROCK NOTE								
FAULT								
WET/ FL								

Bonneville Power Administration
 Big Eddy - Knight 500 kv
 Transmission Line Project

**HYDROLOGIC STRIP MAP
 EAST
 ROUTE**

April 2010 21-1-21287-001

SHANNON & WILSON, INC. Map I-5
Sheet 12 of 15
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS



	11	12	13	14	15	16	17	18
LANDSLIDES								
SEVERE SOIL								
LIQUEFACTION								
SOIL / ROCK NOTE								
FAULT								
WET/ FL								

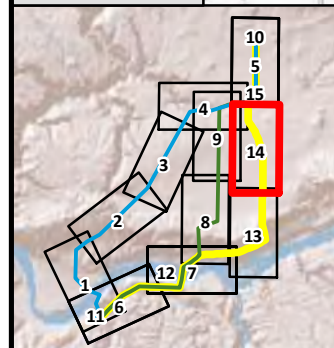
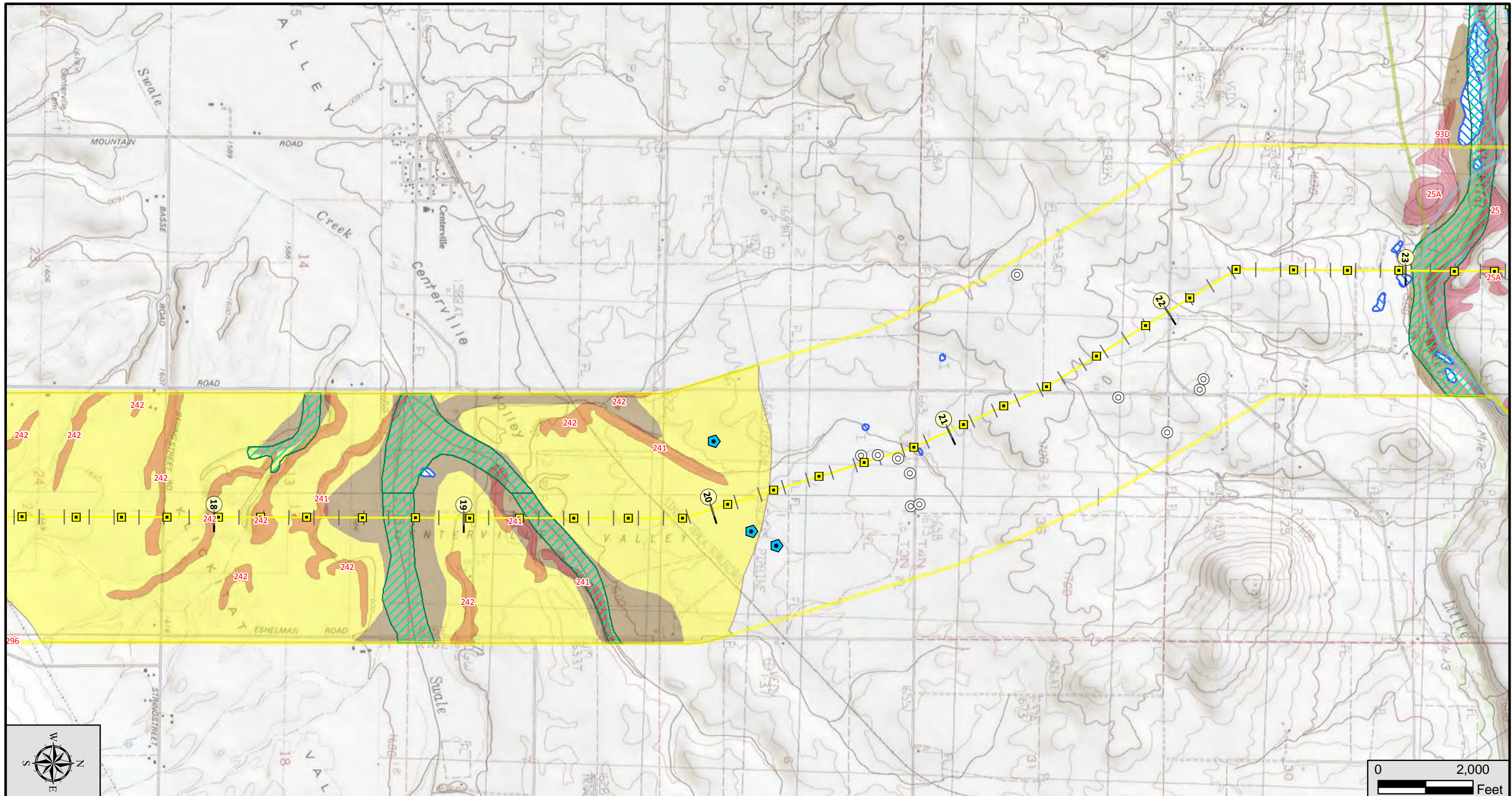
Bonneville Power Administration
Big Eddy - Knight 500 kv
Transmission Line Project

**HYDROLOGIC STRIP MAP
EAST
ROUTE**

April 2010 21-1-21287-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
Sheet 13 of 15



	17	18	19	20	21	22	23	24
LANDSLIDES								
SEVERE SOIL		█	█	█	█	█	█	
LIQUEFACTION		█	█	█	█	█	█	
SOIL / ROCK NOTE				█	█	█	█	
FAULT								
WET/ FL		█	█	█	█	█	█	

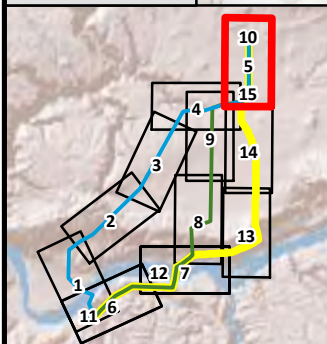
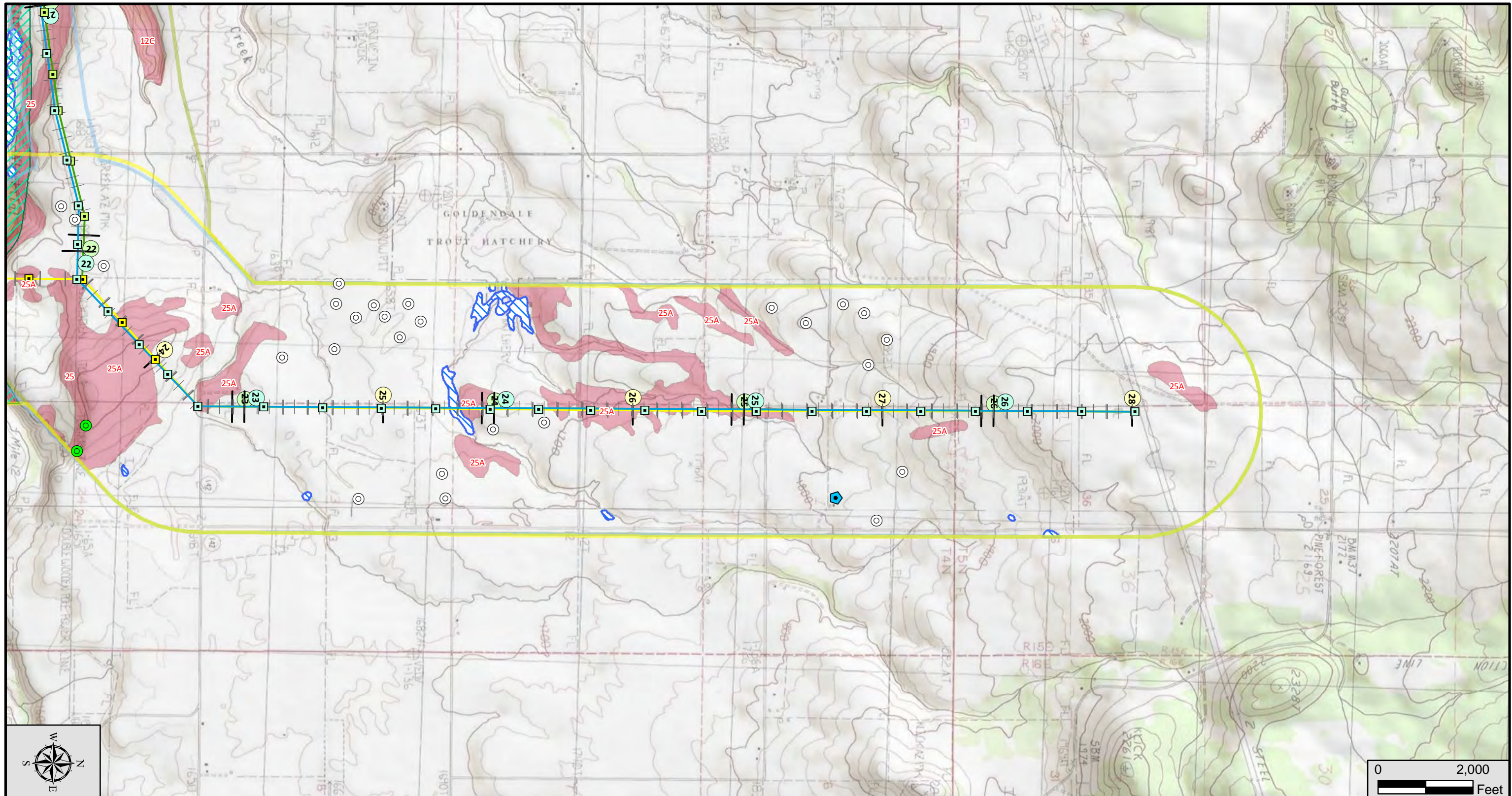
Bonneville Power Administration
Big Eddy - Knight 500 kv
Transmission Line Project

**HYDROLOGIC STRIP MAP
EAST
ROUTE**

April 2010 21-1-21287-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Map I-5
Sheet 14 of 15



	23	24	25	26	27	28	29
LANDSLIDES							
SEVERE SOIL		█	█	█	█	█	█
LIQUEFACTION							
SOIL / ROCK NOTE		█	█	█	█	█	
FAULT							
WET/ FL		█	█	█	█	█	

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**HYDROLOGIC STRIP MAP
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