APPENDIX 3B

DEFINITIONS AND METADATA FOR INVENTORY FEATURES

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I. ROAD FEATURES

A. SEGMENT #. A sequential number automatically assigned to road segment. Segments should be defined for each stretch of road where one or more of the attributes below change. The minimum length of road attribute that is recorded is 50 feet. If an attribute is not consistent for 50 feet, it is lumped in with neighboring values. For example, if the road has a surface type of native for most of the segment but changes to cinder surface for a 30-foot section, the road would still be classified as native. This spatial averaging allows the dominant type to be recorded without dwelling on the finest scale variability. When any of the road attributes change in value a new road segment is begun.

B. NAME

Road name if available.

C. PURPOSE

- **Facility Access**—A road or trail that PacifiCorp and/or the public has legal access rights to use for direct access to hydro operational facilities and for performing operation and maintenance.
- **Right-of-Way (ROW) Access**—A road that is required for transmission line access for operation and maintenance purposes.
- **Property Access**—A road or trail used to access PacifiCorp property for resource and land management.
- **Recreation Access**—A road or trail used for public and maintenance access to PacifiCorp's Klamath Hydroelectric Project (Project) recreation sites (camping, picnic, boat launch).
- **Scenic Vista**—A road, trail, and/or pullout area used by public for viewing area scenery.
- **River Access**—A road or trail used by public for river or reservoir access.
- **Thoroughfare**—A road or trail used by public or adjacent landowner for access across PacifiCorp Project property.
- **Other**—A road or trail that does not fit the definition for facility access, ROW, property access, recreation access, scenic vista, river access, or thoroughfare.

D. SURFACE

- **Paved**—A road with a bearing surface cover of asphalt or concrete.
- **Crushed Rock**—A road with a bearing surface composed of gravel, rock, or other aggregate material that forms a continuous mat overlaying

the natural ground. The aggregate forms a continuous mat, 1 inch or more in depth.

- **Cinder**—A road with bearing surface composed of cinder aggregate.
- **Native**—A road with a bearing surface composed of the natural ground of the region, with minor local exceptions.
- **Herbaceous Vegetation**—A road with a bearing surface composed of low-growing vegetation (e.g., grass) in sufficient amounts to prevent soil erosion. Vegetation cover over dirt is an example of when to record this surface condition.
- **Brush**—A road with a wearing surface composed of brush.
- **Trees**—A wearing surface where young trees less than 4 inches in height are growing.
- **Other**—A road with a wearing surface does not fit any of the above definitions or is unknown by the observer.

E. PERCENT SURFACE COVER

Most roads are basalt aggregate with >75 percent cover. Some roads have not been maintained and are bare of surfacing in some places. When cover becomes <10 percent of the original aggregate, or if there never was any surfacing, it is a native surfaced road.

F. INTERSECTIONS

Intersections are those point locations where a main road or trail intersects with another road or trail (road to road, road to OHV trail, road to hiking trail, or other). It is not imperative to capture this feature, but could be useful to identify roads that will require visiting.

G. CLOSED ROAD

- **Number**—This is an auto-increment number.
- **Closure Description**—This attribute defines how the road or trail is closed. It includes log or berms, downed trees, overgrown, planted barrier, ripped or subsoiled, trenched, guard rail, cable, and fencing.
- **Closure Efficiency**—This attribute defines whether the road closure is effective (fully effective, driven around, damaged, or missing)

H. ROAD HAZARD

- **Number**—This is an auto-increment number.
- **Type**—Comment field to define the type of hazard involved, such as cut failure, landslide potential, unstable tree(s), flooding, and extreme road conditions.

I. END OF ROAD

- **Description**—This attribute defines the end of the road as a point. This closes the road segment.

J. GATED ROAD

- **Number**—This is an auto-increment number.
- **Type**—This attribute defines four type of gates (security, entrance, grazing, PacifiCorp locked).
- **Material**—Describes the materials that make up a gate, e.g., steel, wood.
- **Condition**—The gate is either functional and can be opened and closed to allow vehicle passage, or is damaged and has deteriorated since it was installed (due to vandalism or normal wear).
- **Limit Access**—Can vehicles drive around the gate, yes or no?

K. ROAD SIGNS

- **Number**—This is an auto-increment number.
- **Type**—This attribute allows for the definition of road signs using text. There are too many types of signs to develop a menu for capturing each type. Examples include stop signs, directional signs, and railroad crossing signs.
- **Condition**—This attribute is used to capture whether the sign is intact, damaged, post-damaged, or both sign and post-damaged.

II. STREAM CROSSINGS

A. BRIDGE

- **Number**—This is an auto-increment number.
- **Name**—Stream name if available.
- **Bridge Length**—The dimension of a bridge measured along the center of the roadway, between backs of abutment headwalls or between ends of the bridge floor.
- **Bridge Width**—The clear width of a structure measured at right angles to the center of the roadway between the bottom of curbs or, when curbs are not used, between the inner faces of a parapet or railing.
- **Footing Type**—Supports at the end of the bridge used to retain the approach embankment and give support to the ends of the bridge (concrete, wood, steel, other).
- **Channel Type**—Identify the type of channel involved (natural stream, human-created ditch).
- **Deck Surface**—The driveable surface of the bridge (wood, concrete, earth, rock, steel, aluminum, other).
- **Water-Topped Bridge**—Evidence of debris or sediment on or along the bridge deposited from water flowing over the bridge.
- **Road Separation**—The portion of the embankment associated with footings or wingwalls that show signs of erosion from high water.
- **Channel Width**—Defines the average width in feet. Use range finder to take several measurements for determining average.

- **Angle to Channel**—Identifies the approximate angle at which the stream or drainage crosses the road. It is defined in degree categories.
- **Evidence of Blockage or Flooding**—Examine the upstream side of the road for accumulated sediment or piled organic debris. Examine the road tread and fillslope for evidence that water has overtopped the fill in the past.

B. CULVERTS

Notes:
To adequately describe the condition of a culvert pipe and the discharge area, it is necessary to examine both ends of the pipe carefully.

Begin at the inlet end and determine the material and diameter of the pipe. Examine the inlet for deeply penetrating rust inside. Bang on the pipe with a hammer if there is any doubt that it is in good condition. A dull hollow sound may indicate that there is a hole or weak spot under the road. Look through the pipe for daylight at the other end. If it is obstructed, determine how much it is occluded. Record if the pipe has been crushed in at the inlet end or if there is evidence of water flowing around the pipe and soaking into the road fill. As you cross the road, measure the length of the pipe to the nearest ten-foot interval. Round up to the next whole increment. Look for any signs of rust or failure at the downstream end of the pipe.

Examine the area where water exits the pipe and travels away from the road. Determine if the slope is planar, concave (valley-like), or convex (ridge-like) in cross section.

Examine the flow path below the pipe (discharge slope) for evidence of gully erosion or sediment deposition. If the flow dissipates into the forest floor and does not leave evidence of a channel or deposition, the flow path is described as forest floor. If the flow results in an incised v-shaped channel, the flow path is classified as a gully. If the flow stays channeled and then is captured by another nearby road ditch, it is described as a ditch flowpath. If the culvert discharges into a wetland as determined by saturated seasonally saturated soils or water loving plants, the wetland flow path is assigned. If the water enters a landslide or a channel, it is assigned that category.

If there is evidence that at times flow out of the pipe enters a gully or travels over the forest floor and enters a channel, the road segment is classified as connected to the channel hydrologically. If water is concentrated into a gully or a channel as it exits the culvert, follow the feature down the slope until you can be reasonably sure that the flow does not directly enter a channel. Evidence for this will include the end of the obvious flow path, deposition of sediment, flow diffusing through dense forest floor debris, or vegetation. If it can be determined that there is no evidence for water reaching the channel by an overland flow path, then the drain point is classified as not

connected. If it is not possible to follow the flow path all the way and there is a channel within a reasonable distance, then use the unknown category.

- **Number**—This is an auto-increment number.
- **Name**—Stream name if available or applicable.
- **Number of Pipes**—The total number (count) of culverts at each location.
- **Design Type**—The general shape of the culvert (round, arch, box, log, bottomless arch, other). Use "other" when the preceding types are not descriptive of the culvert.
- **Material Type**—The material used to construct the culvert (steel, ribbed steel plastic, aluminum, concrete, wood, other).
- **Condition**—Estimate of the percentage that the culvert is crushed and rusted and whether water is bypassing the culvert.
- **Length**—The distance along the culvert, measured from one opening to the other opening (including any abrupt changes in angle).
- **Diameter**—The opening size, measured through the center of an opening from top to bottom. Taken for oval or round culverts.
- **Inlet Fill Height**—The vertical distance from the top of the culvert to the road surface.
- **Outlet, H_2O Drop Height**—The vertical distance water drops from the culvert discharge to the ground water surface.
- **Outlet Pool Depth**—The depth of the pool caused by water erosion in feet.
- **Outlet Pool Length**—The length of the pool caused by water erosion in feet.
- **Discharge to**—To know what happens to the road drainage when it leaves the road network, it is necessary to examine the discharge point and in some cases walk a distance along the path that flowing water would take. Evidence of flow may be past sediment deposition, a gully, a channel, moisture-loving plants, organic debris that floated in to place, or scour of the soil surface. If the flow discharges onto the soil surface, it will be identified as **forest floor**. If the flow has repeatedly cut through the organic soil into the mineral soil, it is assigned **gully**. If the flow discharges into another roadside ditch on a road below the first, it is assigned **ditch.** If the flow discharges into a landslide that has been active since the road was in the present location, it is assigned **landslide.** If the flow discharges into a saturated area or standing water besides the road, it is assigned **wetland.** If the flow discharges into a stream, it is assigned **stream.**
- **Slope Shape**—This field describes the horizontal hillslope cross section below the culvert. A valley or swale has a concave slope, a ridge or nose has a convex cross section, and the zone between them has a planar cross section.

- **Slope Percent**—The angle, in degrees, from horizontal measured along the top of the culvert. If the culvert has multiple angles measure from the top of intake side to the top of the discharge side.
- **Fill Erosion**—If the fill slope of the road prism is being actively undercut at the pipe outlet, it is recorded as fill erosion. If there is evidence of sapping or washing out of at least 5 cubic feet of fill, then indicate yes in this field.
- **Percent Plugged**—The amount of sediment or debris in or at the opening of the inlet side of the culvert.
- **Water-Topped**—Evidence of debris or sediment on or along the road surface deposited from water flowing over the culvert or bridge.
- **Year-Round Flow**—Water flows through the culvert year-round.
- **Trash Rack Present**—A structure installed on the inlet side of the culvert that diverts debris from entering the culvert.
- **Stream Connection**—If careful examination shows that road-derived flow is most likely reaching the channel from the drainage point, it is assigned the status of **Connected**. Look for evidence such as a gully, transported leaves, and deposited sediment. If the slope is concave, it is more likely to be saturated during the snowmelt season and to allow water to flow across the soil surface. Think of the distance that the flow has to travel overland to reach the channel. If there is no evidence of flow reaching the channel, then it is **assigned**, not **connected**. If you really cannot determine if the surface flow path reaches the channel, the segment is assigned the value of **Unknown**.
- **Channel Type**—Identify the type of channel involved (natural stream, human-created ditch).
- **Channel Width**—Defines the average width in feet.
- **Angle to Channel**—Identifies the approximate angle at which the stream or drainage crosses the road. It is defined in degree categories.
- **Evidence of Blockage or Flooding**—Examine the upstream side of the road for accumulated sediment or piled organic debris. Examine the road tread and fillslope for evidence that water has overtopped the fill in the past.

C. FORD

- **Number—**This is an auto-increment number.
- **Foundation**—The surface material of the ford (rock, wood, asphalt/concrete, other).
- **Functional**—A ford is functional if it allows off-road vehicle passage.
- **Year round flow**—Does water flow over the ford year around, yes or no?
- **Channel Width**—Defines the average width in feet.

III. SOIL EROSION/POTENTIAL RESOURCE DAMAGE

A. ROAD EROSION PROBLEM

- **Number**—This is an auto-increment number.
- **Type**—This attribute will capture six types of erosion (stream crossing, stream lateral, streamflow diverted [onto road], seepage areas, nonengineered road drainage, and other).
- **Length**—Length of erosion feature in feet.
- **Comment**—Comment field if necessary.

B. POTENTIAL RESOURCE DAMAGE

- **Number**—This is an auto-increment number.
- **Type**—This type would include mud holes, braided roads, extremely rocky terrain, and any other feature.
- **Length**—Length of erosion feature in feet.
- **Comment**—Comment field if necessary to document linear areas where there is a high potential for erosion. The most important area is where the road traverses a steep hillside, cut and fill slopes are severe, and soil stability problems are noted. Another area would be where there is a high potential for unauthorized off-road vehicle use.

C. RUT

A sunken track or groove made by the passage of vehicles or by severe channel erosion.

- **Number**—This is an auto-increment number.
- **Depth**—Rut depth must be measured and recorded into one of three menu choices.
- **Length**—Length of rut in feet.

D. WATER PONDING

Standing water on a road, in closed depressions, that remains on the road for more than 48 hours.

- **Number**—This is an auto-increment number.
- **Length**—Length of pond in feet.
- **Comment**—Comment field if necessary.

E. SLIDE

Soil movement, associated with a road, where a mass of earth has dislodged and affected more than 20 percent of the road surface integrity and/or is within 400 yards of reservoir or perennial stream.

- **Number**—This is an auto-increment number.
- **Description**—Menu selection for either a cut or fill failure.
- **Length**—Length of slide in feet.
- **Comments**—Comment field if necessary.

IV. ROAD HYDROLOGICAL FEATURES/EROSION MITIGATION MEASURES

A. LEAD-OFF DITCH

A ditch that moves flows from the roadside ditch and leads it onto the hill slope. Also known in some areas as a daylight ditch, or a mitre drain.

B. WATERBAR

A waterbar is a water diversion feature usually cut into the road with a grader blade. Waterbars are typically 5 to 10 feet in road length and 1 to 4 feet deep. They are smaller than broad-based dips. They have the same descriptors that the other road drainage points have, with a few additional descriptors. Fabricated waterbars are usually wooden or rubber flow diversions across the road used to channel water to the ditch or hillslope.

- **Type**—Road material or fabricated material. Occasionally waterbars are not just soil or roadbed cutoffs, but can be wooden or rubber flow diversions.
- **Condition**—This attribute describes the things that can go wrong with a waterbar. If water flows over the bar and down the road, then the waterbar is damaged and does not get the flow that it was designed to get. Other types of problems include size (too small) and drainage of inboard ditches.

C. BROAD-BASED DIP (BBD)

A broad-based dip is a large grade reversal in the road that is either designed into the road grade or is there as a result of two hill slopes meeting. Dips are large enough that the entire truck should be inside the feature.

- **Type**—Grade reversal refers to a naturally occurring broad-based dip. Constructed occurs where the road has been designed to have a broad grade reversal in order to drain water from the road and ditch. Flat ditch describes a situation where the water ponds in the ditch because there was not enough grade to allow it to flow through.
- **Condition**—Puddles on road, wetland in ditch, saturated fill, and no problem.
- **Material**—Describes material at the surface in the BBD. The choices are aggregate, native soil, vegetation, or pavement.
- **Comment** is an optional field that can be used to describe a feature with a unique problem.

D. NONENGINEERED DRAINAGE

This type of feature describes a situation where the water leaves the ditch or road in an unplanned manner. This can occur when a pipe is plugged or when a rut diverts over a fillslope. Water flowing against a berm may erode through and escape over the hillslope to create a nonengineered drainage.

This drainage feature has the same attributes as all other similar features.

Condition—Refers to the causative mechanism, such as a blocked ditch, diverted wheel track, broken berm, or gully crossing the road.

E. SUMP

A sump is defined as a closed depression where water is intentionally sent to infiltrate. Sumps can occur where two roads join, or where the ground is very flat and little water accumulates. Sumps are designed to route water with no outlet (such as a holing pond or ditch). When a ditch is too flat to drain water, do not use a broad-based dip flat ditch.

Condition—Describes the potential problems with the feature, such as fill saturation or puddles on the road.

F. DIFFUSE DRAINAGE

Diffuse drainage describes a type of road that does not concentrate flow. An example is the classic out-sloped road. Water does not exit the road in a ditch or pipe, but in a series of small minor flow paths. This point drainage feature is used to describe a stretch of road that has no other way of relieving the water. Water that is not concentrated into a single channel is diffusely drained.