BIOLOGICAL ASSESSMENT

(continued)

APPENDIX U

Pacific Connector's Hydrostatic Test Plan

Pacific Connector Gas Pipeline, LP

Hydrostatic Test Plan

Pacific Connector Gas Pipeline Project

October 2018

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1.0 INTRODUCTION

In accordance with DOT 49 CFR Part 192, Pacific Connector Gas Pipeline, LP (PCGP) will strength test (or hydrostatic test) the pipeline system (in sections) after it has been lowered into the pipe trench and backfilled. The purpose of the hydrostatic test is to verify the manufacturing and construction integrity of the pipeline before placing it in service to flow natural gas. Should a leak or break occur during the hydrostatic test, the pipeline will be repaired and retested to ensure the required specifications are achieved. Once a segment of pipe has been successfully tested, cleaned, and dried the pipe will be joined to the adjacent pipeline segment. The physical capacity of the pipeline to hold hydrostatic test water is approximately 64.3 million gallons or about 197 acre feet. The actual volume to be used is significantly reduced below the total pipe capacity through the re-use of water by cascading test water from segment to segment as practically achievable. Figure 1 in Attachment D provides an overview of the Project alignment, test segment locations, potential hydrostatic test sources, and the basins crossed by the Project as described in this Plan.

2.0 GENERAL HYDROSTATIC TESTING PROCESS

2.1 Contractor Responsibility

The construction contractor is responsible for implementing PCGP's hydrostatic test design, drawings, and specifications. The contractor is also responsible for following applicable environmental stipulations, right-of-way restrictions and completing the necessary hydrostatic test documentation as required in the construction contract. The construction contractor will then provide PCGP with a specific hydrostatic test plan and schedule detailing the specific methods for cleaning, filling, pressurizing, proof testing, dewatering, and drying of the pipeline during the testing process. The contractor is also responsible to provide all of the necessary equipment, instrumentation, qualified personnel and materials necessary to complete the hydrostatic test plan. PCGP will review and approve the contractor's hydrostatic test plan and provide final acceptance of the test.

2.2 Cleaning

As part of the construction process and prior to hydrostatic testing, the pipeline is lowered into the trench and prepared for cleaning. The majority of the pipe should be backfilled and compacted with the exception of valve sites and test header break locations which are left open to access the pipeline during the hydrostatic test process. Pig launchers and receivers are welded onto the test segment and a series of cleaning pigs are pushed through the pipeline with compressed air. All debris removed from the pipeline during the cleaning process is disposed of at an authorized waste disposal facility or other appropriate locations if approved by the landowner. Once the cleaning pig runs are complete, the pig launcher and receiver are removed from the pipeline test segment, and the hydrostatic test headers are welded into place to allow the test segment to be filled with water and tested.

2.3 Filling

Once the contractor has cleaned the pipeline test segment, the contractor uses hoses/hard piping to fill the pipeline with clean test water (see Sections 3.0 and 7.2). Water is pumped via hose from the approved water source site(s) or from the previous test segment into the new test segment. Depending on the proximity of the source water location to the test segment, water trucks may be used to transport the water. All fill lines and water pumps are rated to sustain the hydrostatic test procedures. Water is pumped into the test segment behind fill pigs to completely fill the test segment with water and to minimize potential air entrainment during the filling process. Fill plugs/pigs are pushed in a controlled manner with pressure during the filling process from one end of the test segment and are received at the other end to ensure all air is removed from the pipeline prior to testing.

2.4 Pressurizing

Calibrated temperature recorders, pressure recorders, and deadweight testers are connected to the hydrostatic test headers to document the test. The contractor secures the test area to prevent all unauthorized personnel from being in the area. Once the test segment is completely filled with water, the fill pump is removed, the pressure pump is connected, and the pipeline test segment pressurization begins. The test pressure is brought to 500 psig and held until the pressure and temperatures are stabilized. All connections are checked for leaks. Providing there are no leaks, the pressure pump raises the internal pipe pressure slowly to 80% of the required test pressure at the low point of the test section. Once the pressure and temperatures stabilize, the stroke count is started and continued until the internal pipe pressure reaches the required test pressure.

2.5 8-Hour Test

The hydrostatic test pressure is maintained on the test section for the duration of the test, which is anticipated to last 8-hours. During the first two hours of the pressure test the time, pipe temperature, ambient temperature, and dead weight pressure readings are recorded. After the second hour, the same readings are taken every half hour for the remainder of the test. Acceptance of the hydrostatic test is done by PCGP's Chief Construction Inspector. If a leak is encountered during the hydrostatic test, the test is stopped, the leak is located, and the pipe is excavated to repair the leak. If at any time during the 8-hour hydrostatic test, the test pressure falls below the minimum test pressure, the test will be unacceptable and test section shall be re-pressurized and the entire test started again.

2.6 Dewatering

At the end of the 8-hour test, the contractor lowers the pipeline pressure by slowing venting water. The water that is vented may be cascaded into the next test section, or into a dewatering structure, or into a frac tank for further testing pending the location and need in the hydrostatic test plan. Test water is only released for land application at previously approved locations through an approved dewatering structure. Where water is being released in an upland area, the contractor is responsible for taking water samples, if required, for analysis. Once the samples have been analyzed and meet the permit requirements, the water may be released through an approved dewatering structure in an upland area according to the conditions stipulated in the Oregon Department of Environmental Quality (ODEQ) Water Pollution Control Facility (WPCF) permit.

2.7 Drying

Once the hydrostatic test has been approved and the water removed from the pipeline, the contractor will use dry compressed air to push a series of drying pigs through the pipeline. Pigs will be run until the pipeline is dried to a specified dew point.

2.8 Tie-Ins

Following the pipeline drying, the test segments are welded together. The welds are x-rayed and the pipeline is prepared for service.

3.0 SOURCE WATER

Water for hydrostatic testing will be obtained from commercial or municipal sources, private supply wells, or surface water right owners (see Table 1). Hydrostatic test water for the compressor station will be obtained from nearby municipalities. If water for hydrostatic testing is acquired from public surface water sources, PCGP will obtain all necessary appropriations and withdrawal permits through the Oregon Water Resources Department (OWRD). As part of the application process, OWRD provides the application(s) to ODEQ and the Oregon Department of Fish and Wildlife (ODFW) for review. These agencies comment if there are concerns regarding the impacts the withdrawal(s) may have on water quality, or other beneficial uses, and/or fish and wildlife species and their habitat, respectively. OWRD also provides public notice of the application(s) and encourages comments. OWRD then completes its review and issues the permit(s) or denies the application(s). Private owners will be contacted to discuss water acquisition during landowner negotiations in the year prior to construction.

As required by ODFW, pumps used to withdraw surface water will be screened according to ODFW and NOAA Fisheries' screening criteria to prevent entrainment of aquatic species[1]. When pumping water from a source location, the pump head will be submerged and maintained on average at the center of the water column so as to prevent sucking in sediments and/or algae lying at the water level surface or sediments (i.e. heavy metals) resting on the bed of the waterbody. The targeted ramping rate will be managed such that there is no significant decrease of river flows. Estimated ramping rates will be submitted to ODFW as part of the ODWR permitting process. Attachment F provides the estimated ramping rates for the proposed water withdrawal volumes associated with the proposed waterbody sources listed in Table 1. The only substance that would be added to the hydrostatic test water would be chlorine to prevent the potential transfer of aquatic invasive species, which was a concern for the BLM and Forest Service, as described in Section 7.0.

[1] https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5366394.pdf and https://www.oregon.gov/owrd/pubs/docs/forms/pumpcert_fishscreen.pdf

Table 1
Potential Hydrostatic Source Locations

County	MP	Primary Source *Alternate Source*	Owner	Estimated Withdrawal Requirement *(Longest Test Segment Volume plus pre-test water for HDD/Direct pipe [1])* (acre feet)	Test Section	Spread	ESA Species
South Coast Basin - Coos Bay Frontal Pacific Ocean (1710030403) - Fifth Field Watershed							
Coos	0.00 *1.31*	Coos Bay - North Bend Water Board (North Spit Pump House MP 0.00) *Fire Hydrant at base of Hwy 101 MP 1.31*	Coos Bay - North Bend Water Board	1,938,000 (5.95)	1 -2	Early Works	N/A (municipal water)
Coos	11.08R	Coos River	Oregon Department of Water Resources	2,825,000 (8.67)	3-6	1	In Coos River: • Southern DPS Green Sturgeon • Oregon Coast ESU Coho Salmon
South Coast Basin – E. F. Coquille River (1710030503) - Fifth Field Watershed							
Coos	*29.64*	*East Fork Coquille River*	*Oregon Department of Water Resources*		*3-6*	*1*	*In EF Coquille River:* *• Oregon Coast ESU Coho Salmon*
Coos	29.64	East Fork Coquille River	Oregon Department of Water Resources	2,458,000 (7.54)	7-10	2	In EF Coquille River: • Oregon Coast ESU Coho Salmon
South Coast Basin - M. F. Coquille River (1710030501) - Fifth Field Watershed							
Douglas	*50.28*	*Middle Fork Coquille River*	*Oregon Department of Water Resources*		*7-10*	*2*	*In MF Coquille River:* *• None*
Umpqua Basin - Olalla Creek-Lookingglass Creek (1710030212) - Fifth Field Watershed							
Douglas	*57.30 (TEWA 55.90)*	*Water Impoundment* / *Ben Irving Reservoir*	*Douglas County Public Works/ Looking Glass Olalla Water District/ Winston-Dillard Water District*		*11-12*	*3*	*In Ben Irving Reservoir/Berry Creek:* *• Oregon Coast ESU Coho Salmon*
Douglas	*58.79*	*Looking Glass Olalla Water District (Olalla Creek Crossing)*	*Looking Glass Olalla Water District*		*11-12*	*3*	*In Olalla Creek:* *• Oregon Coast ESU Coho Salmon*

County	MP	Primary Source / *Alternate Source*	Owner	Estimated Withdrawal Requirement *(Longest Test Segment Volume plus pre-test water for HDD/Direct pipe [1])* (acre feet)	Test Section	Spread	ESA Species
Umpqua Basin - Clark Branch-South Umpqua River (1710030211) - Fifth Field Watershed							
Douglas	71.25	S. Umpqua River Crossing #1	Oregon Department of Water Resources	4,042,000 (12.40)	11-12	3	In S. Umpqua River: • Oregon Coast ESU Coho Salmon
Douglas	71.25	S. Umpqua River Crossing #1	Oregon Department of Water Resources	2,878,000 (8.83)	13-17	4	In S. Umpqua River: • Oregon Coast ESU Coho Salmon
Umpqua Basin - Days Creek-South Umpqua River (1710030205) - Fifth Field Watershed							
Douglas	*94.73*	*S. Umpqua River Crossing #2*	*Oregon Department of Water Resources*	*2,878,000 (8.83)*	*13-17*		*In S. Umpqua River: • Oregon Coast ESU Coho Salmon*
Douglas	94.73	S. Umpqua River Crossing #2	Oregon Department of Water Resources	2,535,000 (7.78)	18-20	5a	In S. Umpqua River: • Oregon Coast ESU Coho Salmon
Rogue Basin - Shady Cove-Rogue River (1710030707) - Fifth Field Watershed							
Jackson	122.80	Rogue River Crossing	Oregon Department of Water Resources	2,872,000 (8.81)	21-24	5b	In Rogue River: • SONCC ESU Coho Salmon
Rogue Basin - Little Butte Creek (1710030708) - Fifth Field Watershed							
Jackson	141.00	Star Lake	Frances Jensen – Star Ranch (JK-542.000RT)	3,060,000 (9.39)	25-27	6	In Star Lake: • None
Jackson	*133.38*	*Medford Aqueduct*	*Eagle Point Irrigation*		*25-27*		In Medford Aqueduct: • None
Klamath Basin -Lake Ewauna-Klamath River (1801020412)							
Klamath	199.20	Klamath River	Oregon Department of Water Resources	4,817,000 (14.78)	28-32	7	In Klamath River: • Lost River Sucker • Shortnose Sucker
Klamath Basin -Mills Creek–Lost River (1801020409)							
Klamath	*212.0*	*Lost River*	*Oregon Department of Water Resources*		*28-32*	*7*	In Lost River: • Lost River Sucker • Shortnose Sucker
			Total	**N/A [2]**			

[1] The volumes in the table represent the estimated withdrawal volume from a potential hydrostatic test source, and, in some cases, alternate sources are identified for the same test segment(s) because water withdrawals would be based on conditions at the time of construction.

[2] Totaling the potential withdrawal volumes is not applicable because, as stated in footnote #1, multiple (alternate) sources have been identified for the same test segments. Without cascading (not proposed), the physical volume for all individual test segments would be approximately 64.3 million gallons, or about 40.2 acre feet. With the use of cascading, which is proposed, the minimum test water volume to be withdrawn would be approximately 25,832,000 gallons or 79.28 acre feet across all sources, an approximate 43 percent reduction in water use. The actual volume will be within this range and is expected to be at the lower end of the range.

4.0 DEWATERING

The pipeline will be tested in approximately 32 sections, each with varying lengths and water volume requirements (see Table 2). The required test pressure ranges, pipe strength (wall thickness and pipe grade), topography (specifically elevation changes), available access and work areas to stage testing equipment, and the availability of test water are used to determine the length of each test segment. During the test, it may be necessary to release some volume of water at each of the section breaks; however, PCGP will conserve water as much as practical and minimize dewatering, where feasible, by cascading, or transferring, water between test sections. If the volume of water required to test the successive segment(s) is less than the preceding test segment, the extra test water may be stored in the previously tested segments or portable tanks and then pumped to subsequent segments for testing as necessary to minimize water withdrawals and potential water hauling requirements. After testing of the segment or series of segments is complete, the hydrostatic test water will be released to an upland area within the basin from which it was withdrawn. The hydrostatic test would be dewatered through a filter bag or straw bale structure to remove particulates and prevent the potential for sediment transport and ground surface erosion (see Attachment A). PCGP does not propose to release hydrostatic test water outside the basin from which it was withdrawn (i.e., South Coast, Umpqua, Rogue, or Klamath). It is expected that the volume of water to be released within a basin would be the largest volume of water associated with the longest test segment within the basin for each construction spread. Table 2 provides the volume of water for each test segment and footnotes the total volumes for each basin for each spread, which are listed below:

- South Coast Basin – 6,097,000 gallons (7.80 ac/ft)
- Umpqua Basin – 9,274,000 gallons (12.17 ac/ft)
- Rogue Basin – 5,768,000 gallons (3.39 ac/ft)
- Klamath Basin – 4,693,000 (14.40 ac/ft)
  Total = 25,832,000 (79.28 ac/ft)

At some locations it may be necessary to locate the dewatering structures outside the construction right-of-way, as allowed under FERC Procedures (IV. A. 1.), to direct water away from the disturbed right-of-way areas. In these locations, small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. No soil disturbance will occur. A rubber-tired or track hoe will be utilized to lay the dewater line and to remove the saturated straw bales or filter bags upon completion of hydrostatic dewatering.

The hydrostatic test dewater locations are shown on the maps provided in Attachment D. The hydrostatic test design was developed from alignment and elevation surveys and detailed pipe design. The design will be provided to construction contractors, once selected. Potential stream flow effects (or ramping rates) from hydrostatic test dewatering are not expected because water will be released to an upland area and through an energy dissipation dewatering structure to promote infiltration into the ground and will not occur within 150 feet of any sensitive wetland (i.e., non-agricultural wetland) or waterbody, where feasible. Further, BMPs, as described in Section 7.0, will be implemented to control dewatering to minimize potential increases in stream flow.

Table 2
Potential Hydrostatic Dewatering (Test Header) Locations within the Construction Right-of-Way

Test Segment	Oregon Plan Watershed Basin	HUC (10-digit) (Begin MP)	HUC (10-digit) (Ending MP)	Begin MP [1]	End MP	Section Length [2] (feet)	Volume [3, 4] (gallons) (acre feet)	Potential Water Source (Primary Sources Are in Bold / Alternates are Un-Bolded)	Jurisdiction (Ending MP)	Milepost (MP) Waterbodies Closest to Dewatering Locations [5] (Reach Code)	Distance to Waterbodies [5] (feet)	End Latitude End Longitude
Spread - E.W.												
1	South Coast	Coos Bay Frontal Pacific Ocean 1710030403	Coos Bay Frontal Pacific Ocean 1710030403	0.00	1.31	6,917	366,000 (1.12)	MP 0.00 - North Spit Pump House (Coos Bay) **MP 1.31 - Fire Hydrant on West side of Hwy 101 Bridge**	Private	MP 0.00 Tributary to Coos Bay (17100304022002)	500	43.432966 Begin -124.238834 Begin
										MP 0.00 Coos Bay	850	
										MP 1.31 Coos Bay/ Coos River (17100304006491)	650	43.422047 End -124.221637 End
2	South Coast	Coos Bay Frontal Pacific Ocean 1710030403	Coos Bay Frontal Pacific Ocean 1710030403	1.31	8.35R	17,383	1,181,000 (3.62)		Private	MP 8.4 BR Tributary to Willanch Slough (17100304000413)	240	43.405267 -124.159758
										MP 8.4BR Willanch Slough (17100304001393)	480	
Spread 1												
3	South Coast	Coos Bay Frontal Pacific Ocean 1710030403	Coos Bay Frontal Pacific Ocean 1710030403	8.35R	11.04R	19,154	751,000 (2.30)	**MP 11.08R - Coos River** MP 29.64 - East Fork Coquille River	Private	MP 11.04BR Coos River (17100304000093)	350	43.375797 -124.141648
										MP 11.04BR Tributary to Coos River (17100304015694)	50	
4	South Coast	Coos Bay Frontal Pacific Ocean 1710030403	Coos Bay Frontal Pacific Ocean 1710030403	11.04R	19.62BR	45,302	2,395,000 [4] (7.35)		BLM-Coos	No Water Release at MP 19.62BR.		
5	South Coast	Coos Bay Frontal Pacific Ocean 1710030403	N.F. Coquille River 1710030504	19.62BR	23.95	21,701	1,147,000 (3.52)		Private	23.95 Tributaries to N. Fork Coquille (17100305012274, 17100305012275,)	300-800	43.209046 -124.061842
6	South Coast	N.F. Coquille River 1710030504	E. F. Coquille River 1710030503	23.95	29.54	48,101	2,543,000 (7.80)		Private	MP 29.54 East Fork Coquille River (17100305000286)	500	43.1561 -123.994802
Spread 2												
7	South Coast	E. F. Coquille River 1710030503	M. F. Coquille River 1710030501	29.54	37.15	40,181	2,215,000 (6.80)	**MP 29.64 - East Fork Coquille River** MP 50.28 - Middle Fork Coquille River	BLM-Coos	No Water Release at MP 37.15.		
8	South Coast	M. F. Coquille River 1710030501	M. F. Coquille River 1710030501	37.15	38.90	9,240	489,000 (1.50)		BLM-Coos	No Water Release at MP 38.90.		
9	South Coast	M. F. Coquille River 1710030501	M. F. Coquille River 1710030501	38.90	47.40	44,880	2,373,000 (7.28)		Private	MP 47.40 Deep Creek (17100305022950, 17100305005863)	400-500	43.051877 -123.737828
										MP 47.40 Trib. To Reed Creek (17100305022461)	300	
10	South Coast	M. F. Coquille River 1710030501	M. F. Coquille River 1710030501	47.40	51.58 (50.23)[6]	22,070	1,167,000 (3.58)		Private	MP 50.23 Middle Fork Coquille River (17100305000232)	300	43.055668 -123.682629
										MP 51.58 Tributary to Jim Belieu Creek (17100305022641)	1380	43.050645 -123.658768
Spread 3												
11	Umpqua	M. F. Coquille River 1710030501	Olalla Creek- Lookingglass Creek 1710030212	51.58 (50.23)[6]	57.76	32,630	1,725,000 (5.29)	MP 57.30 - Ben Irving Reservoir MP 58.79 - Ollala Creek	Private	MP 57.76 Trib. To Olalla Creek (17100302002221)	570	43.066609 -123.551655

Test Segment	Oregon Plan Watershed Basin	HUC (10-digit) (Begin MP)	HUC (10-digit) (Ending MP)	Begin MP [1]	End MP	Section Length [2] (feet)	Volume [3, 4] (gallons) (acre feet)	Potential Water Source (Primary Sources Are in Bold / Alternates are Un-Bolded)	Jurisdiction (Ending MP)	Milepost (MP) Waterbodies Closest to Dewatering Locations [5] (Reach Code)	Distance to Waterbodies [5] (feet)	End Latitude End Longitude
								MP 71.25 - South Umpqua River		MP 57.76 Olalla Creek (17100302000048)	900	
12	Umpqua	Olalla Creek-Lookingglass Creek 1710030212	Clark Branch-South Umpqua River 17100302011	57.76	71.37	75,029	3,967,000 [4] (12.17)		Private	MP 71.37 Tributaries to South Umpqua River (17100302006366)	100	43.052768 -123.328794
										MP 71.37 South Umpqua River (17100302000086)	500	
Spread 4												
13	Umpqua	Clark Branch-South Umpqua River 17100302011	Myrtle Creek 1710030210	71.37	81.30	52,430	2,772,000 (8.51)	**MP 71.25 - South Umpqua River** Additional Potential Sources: South Myrtle Creek	Private	81.30 South Myrtle Creek (17100302008796)	500	43.034704 -123.187105
14	Umpqua	Myrtle Creek 1710030210	Days Creek-South Umpqua River 1710030205	81.30	88.63	38,702	2,046,000 (6.27)	**MP 71.25 - South Umpqua River** MP 94.70 - South Umpqua River	Private	MP 88.63 Days Creek (171003020000511)	325	42.987597 -123.100547
15	Umpqua	Days Creek-South Umpqua River 1710030205	Days Creek-South Umpqua River 1710030205	88.63	89.30	3,538	187,000 (0.57)		Private	No Water Release at MP 89.30.		
16	Umpqua	Days Creek-South Umpqua River 1710030205	Days Creek-South Umpqua River 1710030205	89.30	92.00	14,256	754,000 (2.31)		Private	No Water Release at MP 92.00.		
17	Umpqua	Days Creek-South Umpqua River 1710030205	Days Creek-South Umpqua River 1710030205	92.00	94.65	13,992	740,000 (2.27)		Private	MP 94.65 Trib. to South Umpqua River (17100302036587)	460	42.933586 -123.040408
										MP 94.65 South Umpqua River (17100302011455)	1000	
Spread 5												
18	Umpqua	Days Creek-South Umpqua River 1710030205	Days Creek-South Umpqua River 1710030205	94.65	96.20	8,184	433,000 (1.33)	**MP 94.70 - South Umpqua River**	Private	MP 96.20 Tributary To Lick Creek (17100302036576, 17100302036782)	300-600	42.914216 -123.029303
										MP 96.20 Tributary To East Fork Stouts Creek (17100302037851, 17100302037373)	300-450	
19	Umpqua	Days Creek-South Umpqua River 1710030205	Days Creek-South Umpqua River 1710030205	96.20	101.15	26,136	1,382,000 (4.24)		Private	MP 101.15 East Fork Stouts Creek (17100302000619)	830	42.865092 -123.001491
										MP 101.15 Trib. to E. F. Stouts Creek (17100302037549)	800	
										MP 101.15 Tributary to Hatchet Creek (17100302036849, 17100302036895)	370-775	
20	Umpqua	Days Creek-South Umpqua River 1710030205	Upper Cow Creek 1710030206	101.15	110.23	47,942	2,535,000 (7.78)	**MP 94.70 - South Umpqua River**	USFS-Umpqua	No Water Release at MP 110.23.		
21	Umpqua Rogue (MP 110.23)	Upper Cow Creek 1710030206	Trail Creek 1710030706	110.23	114.70	23,602	1,248,000 (3.83)	**MP 122.80 - Rogue River**	Private	MP 114.70 Tributary to Wall Creek (17100307010304, 17100307020372, 17100307018181)	850-1000	42.733301 -122.876871

Test Segment	Oregon Plan Watershed Basin	HUC (10-digit) (Begin MP)	HUC (10-digit) (Ending MP)	Begin MP [1]	End MP	Section Length [2] (feet)	Volume [3, 4] (gallons) (acre feet)	Potential Water Source (Primary Sources Are in Bold / Alternates are Un-Bolded)	Jurisdiction (Ending MP)	Milepost (MP) Waterbodies Closest to Dewatering Locations [5] (Reach Code)	Distance to Waterbodies [5] (feet)	End Latitude End Longitude
										MP 114.70 Tributary to West Fork Trail Creek (17100307008733, 17100307008734, 17100307013978)	540-650	
22	Rogue	Trail Creek 1710030706	Trail Creek 1710030706	114.70	118.23	18,638	986,000 (3.03)	**MP 122.80 - Rogue River** Additional Potential Sources: South Myrtle Creek and Indian Lake (Segment 22)	Private	MP 118.23 Tributary to Buck Rock Creek (17100307015562, 17100307009117, 17100307014926)	800-1000	42.688283 -122.852207
										MP 118.23 Tributary to West Fork Trail Creek (17100307010045, 17100307020541, 17100307018799)	1000-1150	
23	Rogue	Trail Creek 1710030706	Shady Cove-Rogue River 1710030707	118.23	122.80	24,130	1,276,000 (3.92)		Private	No Water Release at MP 122.80.		
24	Rogue	Shady Cove-Rogue River 1710030707	Big Butte Creek 1710030704	122.80	132.50	51,216	2,708,000 (8.31)		Private	MP 132.50 Trib. to Quartz Creek (17100307003292)	250	42.577342 -122.680434
Spread 6												
25	Rogue	Big Butte Creek 1710030704	Little Butte Creek 1710030708	132.50	141.00	44,880	2,373,000 (7.28)	**MP 141.00 - Star Lake** MP 133.4 - Medford Aquifer (if this is used, will have to cut in another test)	BLM-Medford	MP 141.00 Tributary to Salt Creek (17100307004267, 17100307014303)	650-1000	42.485451 -122.610284
26	Rogue	Little Butte Creek 1710030708	Little Butte Creek 1710030708	141.00	151.44	55,123	2,915,000 (8.95)		BLM-Medford	MP 151.44 Tributary to North Fork Little Butte Creek (17100307010462, 17100307013836, 17100307013832)	500-770	42.379242 -122.525296
										MP 151.44 Tributary to South Fork Little Butte Creek (17100307015744, 17100307016676)	400-475	
27	Rogue	Little Butte Creek 1710030708	Little Butte Creek 1710030708	151.44	162.00	55,757	3,060,000 [4] (3.39)		USFS-Rogue River	No Water Release at MP 162.00.		
Spread 7												
28	Rogue	Little Butte Creek 1710030708	Spencer Creek 1801020601	162.00	179.00	89,760	4,635,000 (14.22)	**MP 199.2 - Klamath River** MP 212.00 - Lost River	Private	MP 179.00 Tributary to Clover Creek (18010206005432)	1000	42.230473 -122.084719
	Klamath (MP 167.58)						4,635,000 (14.22)			MP 179.00 Tributary to Clover Creek (18010206003627)	550	
29	Klamath	Spencer Creek 1801020601	Lake Ewauna / Upper Klamath River 1801020412	179.00	191.39	65,419	3,459,000 (10.62)		Private	MP 191.39 Tributary to Klamath River (18010204013935)	600	42.135675 -121.905079
30	Klamath	Lake Ewauna / Upper Klamath River 1801020412	Lake Ewauna / Upper Klamath River 1801020412	191.39	199.20	41,237	2,236,000 (6.86)		Private	No Water Release at MP 199.20.		
31	Klamath	Lake Ewauna / Upper Klamath River 1801020412	Mills Creek - Lost River 1801020409	199.20	212.00	67,584	3,518,000 (10.80)		Private	MP 212.00 Lost River (18010204004545)	250	42.057325 -121.637374

Test Segment	Oregon Plan Watershed Basin	HUC (10-digit) (Begin MP)	HUC (10-digit) (Ending MP)	Begin MP [1]	End MP	Section Length [2] (feet)	Volume [3, 4] (gallons) (acre feet)	Potential Water Source (Primary Sources Are in Bold / Alternates are Un-Bolded)	Jurisdiction (Ending MP)	Milepost (MP) Waterbodies Closest to Dewatering Locations [5] (Reach Code)	Distance to Waterbodies [5] (feet)	End Latitude End Longitude
32	Klamath	Mills Creek - Lost River 1801020409	Mills Creek - Lost River 1801020409	212.00	228.81	88,757	4,693,000 [4] (14.40)		Private	MP 228.81 T Canal (18010204015324)	2500	42.035247 -121.373198
						Total [7]	**64,275,000 (197.25)**					
Trenchless Crossings (HDD & Direct Pipe)												
Coos Bay West HDD	South Coast	Coos Bay Frontal Pacific Ocean 1710030403	Coos Bay Frontal Pacific Ocean 1710030403	MPs 0.15 to 1.10 Release: TEWA 1.09-W		5,192	277,488 [7] (0.85)	MP 0.00 - North Spit Pump House (Coos Bay) **MP 1.31 - Fire Hydrant on West side of Hwy 101 Bridge**	Private	MP 1.09 Coos Bay (17100304006491)	500	43.442502 -124.225453
Coos Bay East HDD	South Coast	Coos Bay Frontal Pacific Ocean 1710030403	Coos Bay Frontal Pacific Ocean 1710030403	MPs 1.46 to 3.1 Release: TEWA 1.09-W		8,972	479,512 [7] (1.47)		Private			
Coos River HDD	South Coast	Coos Bay Frontal Pacific Ocean 1710030403	Coos Bay Frontal Pacific Ocean 1710030403	MPs 11R to 11.3BR Release: TEWA 11.27-W		1,602	85,000 [7] (0.26)	**MP 11.08R - Coos River** MP 29.64 - East Fork Coquille River	Private	MP 11.27R Trib. to Coos River (17100304000783)	240	43.3371332 -124.139012
MP 25 Powerline HDD	South Coast	N.F. Coquille River 1710030504	N.F. Coquille River 1710030504	MPs 24.95 to 25.8 Release: TEWA 24.55-N		3,550	191,000 [7] (0.59)		Private	MP 24.55 Trib. to Cherry Creek (17100305012612)	560	43.202472 -124.047765
S. Umpqua #1 Direct Pipe	Umpqua	Clark Branch-South Umpqua River 17100302011	Clark Branch-South Umpqua River 17100302011	MPs 71.1 to 71.37 Release: TEWA 71.01-N		1,381	75,000 [7] (0.23)	**MP 71.25 - South Umpqua River**	Private	MP 71.37 Trib. to South Umpqua River (17100302006216)	185	43.054123 -123.337544
Rogue River HDD	Rogue	Shady Cove-Rogue River 1710030707	Shady Cove-Rogue River 1710030707	MPs 122.2 to 122.8 Release: TEWA 121-95-W		3,050	164,000 [7] (0.50)	**MP 122.80 - Rogue River**	Private	MP 122.2 Trib. to Rogue River (17100307012513)	330	42.645617 -122.828899
Klamath River HDD	Klamath	Lake Ewauna / Upper Klamath River 1801020412	Lake Ewauna / Upper Klamath River 1801020412	MPs 199.2 to 199.65 Release: TEWA 198.72-N		2,300	124,000 [7] (0.38)	**MP 199.2 - Klamath River**	Private	MP 199.2 Klamath River (18010204002564)	670	42.17182 -121.810408

[1] Mileposts were not calculated from engineering stationing. " R" and "BR" represent a revised milepost location based on the incorporation of reroutes into the Proposed Route.
[2] Section length is calculated directly from engineering footage.
[3] Section volumes were calculated using section length directly from engineering footage.
[4] Water will be cascaded between test sections, where practical, to minimize test water volume requirements, withdrawals, and potential water hauling. It is expected that the largest volume of water to be released would be associated with the longest test segment within a basin.
[5] Waterbodies were determined from USGS National Hydrography Dataset water course data(http://nhd.usgs.gov/). Distances are between the test break/header location (at MPs provided in this column) to the closest water course regardless of flow characteristics (*i.e.*, perennial, intermittent, or ephemeral); dewatering structures for the test break/header locations will be located a minimum of 150 feet from waterbodies/wetlands.
[6] MP 50.23 is an alternative test break/hydrostatic test water release location for this test segment
[7] Without cascading (not proposed), the maximum test volume for all individual test segments would be 64,275,000 gallons. With the use of cascading, which is proposed, the minimum test water volume to be withdrawn would be 25,832,000 gallons. The actual volume will be within this range and is expected to be at the lower end of the range. (Volumes of water needed to pre-test the pipe for the HDD and Direct Pipe crossings would be within the stated range.)

Typical dewatering rates can range from several hundred gallons per minute to several thousand gallons per minute and are dependent on the following, which will be reviewed by the contractor and EI to determine the appropriate dewatering rate prior to construction:

- Length of test section (volume);
- Profile of test section (head);
- Position of dewatering site relative to streams, drainages, roads, housing, cropland;
- Topography (slope);
- Land use (vegetation); and
- Soil type (ability to absorb).

The pipeline test segment(s) will be dewatered once the hydrostatic test has been successfully completed. Dewatering pigs driven by compressed air will be utilized to remove the water. The volumes and rates of dewatering will be determined at the time of construction based on site-specific conditions and released at a rate to prevent scour and erosion (see Section 7.3). Prior to dewatering, water quality will be tested and monitored according to permit conditions to ensure test water meets upland application requirements; however, since the pipe will be internally coated and cleaned prior to filling, the water quality is not expected to differ significantly from the quality of the fill water used. Dewatering to land will follow specific procedures developed to minimize water quality impacts and localized erosion and will comply with hydrostatic test permits and approvals (see Section 7.3). In the unlikely event a testing parameter does not meet the release requirements/limits, PCGP would implement appropriate treatment methods to ensure that the limits are satisfied.

PCGP will implement FERC's Wetland and Waterbody Procedures regarding hydrostatic testing as well as any conditions specified in the ODEQ WPCF permit. PCGP will follow FERC's Wetland and Waterbody Procedures (Section VII. C.4.) and will locate all hydrostatic test manifolds/dewatering structures at least 150 feet outside of wetlands and riparian areas to the maximum extent practicable based on engineering test constraints to ensure that water infiltrates into the ground and does not flow into wetlands or waterbodies (see Section 7.3).

5.0 HORIZONTAL DIRECTIONAL DRILL (HDD)/DIRECT PIPE HYDROSTATIC TESTING

Each HDD and Direct Pipe crossing require pre-installation and post-installation hydrostatic testing. Should a leak or break occur, the pipeline would be repaired and retested to ensure the required specifications are met. HDD segment testing requires a small volume of water due to the relatively short section of pipe involved. The volumes are accounted for in Table 2 and the release locations are shown on the maps in Appendix D.

6.0 TEST FAILURE

As experienced by PCGP on previous pipeline projects and as reported by Kirkwood and Cosham (2000), hydrostatic test failure on new pipeline construction is extremely rare due to modern steel and construction techniques that include better controls, non-destructive testing (e.g., X-Ray or ultrasonic testing), and inspection of the whole pipeline fabrication process. In the unlikely event a failure occurs during hydrostatic testing, water may be released at the point of the failure. The quantity of water released at the point of failure is dependent on the nature and location of the failure; typically a test failure is the result of a small pin-hole leak with little water loss. During testing, the contractor's testing engineers and PCGP's inspectors will monitor the testing results for pressure drops. PCGP's EIs will monitor the length of the test section if a failure occurs to mitigate potential effects from a water release and will implement appropriate BMPs to minimize erosion or sedimentation into sensitive areas. Extra straw bales, silt fencing, stakes, fabric, and other appropriate erosion control devices will be available during the hydrostatic testing process and will be utilized as necessary to control any released water that may seep to the surface and into a sensitive area. As stated above, the water used for the test will be from surface water or municipal sources, permitted as necessary for appropriations and no additives (other than potentially chlorine, see Section 7.2.4) will be included in the water for the testing. If a discharge to surface waters occurred from a hydrostatic test, the appropriate agency would be notified if required by permit conditions. Should a leak or break occur during the hydrostatic test, the pipeline will be repaired and retested to ensure the required specifications are met.

7.0 POTENTIAL EFFECTS AND BEST MANAGEMENT PRACTICES

The measures outlined below are to ensure the protection of aquatic and terrestrial resources at water withdrawal and dewatering locations.

7.1 Schedule

It is projected that pipeline construction would be completed in late summer to early fall of the pipeline construction season which will also minimize potential adverse impacts to terrestrial and aquatic ecosystems. The pipeline must be tested immediately following completion of construction so that any failures could be repaired and retested. Also, the hydrostatic test must be completed prior to introducing natural gas into the pipeline system and putting it in-service. Intentionally delaying hydrostatic testing after construction activities until late fall or winter would result in unnecessarily extending the entire construction duration of the project, extending the length the construction contractor remains on-site, continued right-of-way and access disturbance as well as delaying final cleanup and restoration of the right-of-way. Winter testing would be particularly problematic in that much of the right-of-way would be under snow and in wet/muddy condition.

7.2 Water Withdrawal

Water withdrawal requirements for each identified water source are noted in Table 1 in Section 3.0. The construction contractor will filter all water removed from the source locations to ensure clean “debris free” water is used for the hydrostatic testing of the pipeline. There is a potential for transfer of water-borne aquatic pathogens, forest pathogens, and invasive species between watershed drainages. This section outlines the steps PCGP will follow to prevent the potential inter-drainage transfer of pathogens and invasive species of concern of the federal and state agencies.

7.2.1 Waterbody Source Testing

During development of this Plan, PCGP included commitments to test all non-municipal waterbody sources to determine if there is a presence of water-borne aquatic and forest pathogens. The intent of the proposed waterbody testing program was to prevent the potential transfer of these pathogens and invasive species from one watershed to another. However, during a consultation meeting with the federal land-managing agencies and the Center for Lakes and Reservoirs and Aquatic Bioinvasion Research and Policy Institute (Portland State University) on November 19, 2009, it was determined that testing was not a definitive tool to establish the absence of a potential invasive species or forest pathogens in non-municipal source waters. As suggested by Mark Sytsma with Aquatic Bioinvasion Research and Policy

Institute, water testing would only confirm the absence of a potential invasive species in the sample aliquot and therefore would not confirm the potential presence of an invasive species within the entire waterbody source. Because of the lack of certainty in sampling and testing results and the impracticality of testing the entire volume of hydrostatic test water that would be required for the project, it was concluded that PCGP should assume that all non-municipal test water sources could contain a potential invasive species and that water treatment methods should be implemented to prevent the potential spread of aquatic invasive species or forest pathogens.

7.2.2 Invasive Species and Pathogens

Below is a list of invasive species and pathogens that are currently of concern that potentially may occur within identified water sources that have been targeted for treatment in non-municipal test water sources. Attachment B provides current information on the presence of these species in the project area.

- Scotch broom
- Himalayan blackberry
- Yellow starthistle
- Port-Orford-cedar root disease
- Sudden Oak Death
- Quagga mussel
- Zebra mussel
- New Zealand mud snail[2]
- Brackish water snail
- Whirling disease
- Didymo
- Blue-green algae (Cyanobacteria)
- Chytrid fungus
- Freshwater mold
- Other terrestrial and aquatic non-native, noxious weed fragments and seeds that may be identified at the time of construction
- Other forest and fish pathogens that may be identified at the time of construction.

7.2.3 Bio-Invasive Research

Prior to water withdrawal, PCGP will review United States Geological Survey (USGS) biological research division data, as well as other pertinent presence data sources as referenced in Attachment B, to determine where known locations of invasive species and pathogen infestations exist along the project area and at proposed water source locations. Attachment B provides documentation of the presence of the aquatic invasive species and pathogens in Oregon.

PCGP has evaluated the locations where the potential exists for Port-Orford-cedar root disease based on Oregon Department of Forestry statewide forest health survey data currently available between 2012 and 2016[3] (www.oregon.gov/ODF/ForestBenefits/Pages/ForestHealth.aspx). Based on this data, Port-Orford-cedar root disease is most prevalent in the project area

[2] Including *Assiminea parasitological within Coos Bay estuary which is very similar to New Zealand mudsnail (Boatner, 2018)*
[3] As of August 2018, survey data from ODF is available up to 2016. (www.oregon.gov/ODF/ForestBenefits/Pages/ForestHealth.aspx) is only available up to 2016.

watersheds between about MPs 0.00 and 42.62. The proposed water source for hydrostatic testing between MPs 0.00 and 8.35R (see Table 1) would come from a treated municipal source (i.e., Coos Bay – North Bend Water Board). Therefore, the risk of spreading Port-Orford-cedar root disease or any other invasive species or pathogens from hydrostatic test dewatering from this source is avoided.

Other potential water sources for hydrostatic testing include Coos River located in the Coos Bay Frontal Pacific Ocean watershed; East Fork Coquille River located in the E. F. Coquille River watershed; and the Middle Fork Coquille River located in the Middle Fork Coquille watershed, which are crossed by the project between MPs 8.35R and 53.15. According to the Oregon Department of Forestry annual survey data between 2012 and 2016[3], the proposed hydrostatic test water withdrawal location on the Middle Fork Coquille River is located above Port-Orford-cedar root disease infestations in the Middle Fork Coquille watershed. Ben Irving Reservoir and Olalla Creek, potential hydrostatic test water sources in the Olalla Creek-Lookingglass Creek Watershed, which are crossed by the project between MPs 53.15 and 62.41, do not have recorded infestations of Port-Orford-cedar root disease nor does any other watershed east of MP 62.41 (based on Oregon Department of Forestry survey data 2012 through 2016[3]). Therefore, the potential for transmission of this pathogen should be low, especially with the proposed treatment BMPs outlined in Section 7.2.4, which include chlorine treatment, an effective treatment method for Port-Orford-cedar root disease (see Attachment B).

As noted in Attachment B, currently there are no quagga or zebra mussels known to occur in Oregon. Although both New Zealand mud snails and brackish water snails are known to occur in the Coos Bay Estuary, hydrostatic test water sources for the project between MPs 0.00 and 8.35R (Test Segments 1 and 2) would be from a municipal source and would not occur from the bay, preventing the potential spread or transfer of these invasive species. The Coos River in the lower estuary of Coos Bay is a proposed hydrostatic test source for test segments 3-6 between MPs 8.35R and 29.54 (see Tables 1 and 2) and has known occurrences of New Zealand mud snails and Brackish water snail. The potential for transmission of these snails is low with the proposed treatment BMPs outlined in Section 7.2.4, which include water filtration with upland discharge and no direct discharge to waterbodies; these are effective treatment methods for these snails (see Attachment B).

Whirling disease (*Myxobolus cerebralis*) in Oregon has only been identified outside the project area localized in tributaries of the Grande Ronde system in northeastern Oregon and in Clear Creek on the Clackamas River system in northwestern Oregon (Oregon Department of Fish and Wildlife. 2018 Invasive Species Compendium). Therefore, transmission of this disease is currently not a concern. Further, the potential risk of transferring or spreading this disease is low because the principle vector for the spread of whirling disease is contaminated fish parts, and according to BLM (2009), this disease is typically not spread through water withdrawal activities. The proposed treatment BMPs outlined in Section 7.2.4 are designed to minimize the potential pathways through which this disease is known to spread.

Currently in Oregon there have been no nuisance blooms of didymo (EDDMapS, 2018 and Draheim, 2009). Blue-green algae (Cyanobacteria) blooms are commonly found in many freshwater systems across the world and also occur in many lakes, rivers and reservoirs in Oregon. The Oregon Human Authority (2018) monitors harmful algae blooms across Oregon, and PCGP would monitor these health advisories[4] prior to water withdrawal to prevent potential transfer of high levels of toxins. To date there have been no health advisories posted for any of

[4] https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/RECREATION/HARMFULALGAEBLOOMS/Pages/index.aspx

the proposed hydrostatic test water sources posted by the Oregon Department of Human Services (2018). A permanent advisory has been established for pools of water in bedrock along the South Umpqua River banks. Hydrostatic test water would be withdrawn from the main channel of the flowing river and not from the small stagnant pools in the rocks; therefore, the potential for transmission from this source would be low. Further, the proposed treatment BMPs outlined in Section 7.2.4, including water filtration, chlorine treatment, and upland discharge with no direct discharge to waterbodies, are effective treatment methods for Cyanobacteria (see Attachment B) and would avoid the potential transmission of Cyanobacteria, if present.

As noted in Attachment B, both chytrid fungus and freshwater mold (Saprolegnia) likely occur in the project area, but specific locations are not known from the literature PCGP has reviewed. The proposed water treatment BMPs outlined in Section 7.2.4 are intended to minimize the potential spread of these species, if present.

7.2.4 Waterbody Source Best Management Practices

PCGP will implement the following BMPs to avoid the potential spread of the aquatic invasive species and pathogens of concern:

- If determined to be feasible for hydrostatic testing requirements, return all water back to its source watershed after use; however, cascading water from one test section to another to minimize water withdrawal requirements may make it impractical to release water within the same fifth field watershed where the water was withdrawn. Pacific Connector will return or release all water from the same basin from which it was withdrawn (i.e., South Coast, Umpqua, Rogue or Klamath).

- Because of the BLM, Forest Service, and Reclamation concern regarding the potential for the spread of aquatic invasive species and pathogens, if hydrostatic test water cannot be returned to the same fifth field watershed from where it was withdrawn, PCGP would employ an effective and practical water treatment method described below. The hydrostatic test water would be treated after it is withdrawn and prior to hydrostatic testing.

PCGP researched various water treatment methods to disinfect non-municipal surface water sources that might harbor potential aquatic invasive species and pathogens. The potential treatment methods considered were previously identified and discussed with the land-managing agencies during the development of this Plan and included: various filtrations/screening treatment methods, UV treatment, Acrolein and Chlorine treatment. It was noted during the agency conversations that only chlorine has been approved for use as treatment for disinfection purposes on BLM-managed lands. The Forest Service also noted that a Pesticide Use Proposal would need to be prepared prior to the use of any chemical to treat/disinfect water on NFS lands. A Pesticide Use Proposal form is provided in Appendix 3 of the Integrated Pest Management Plan which is included as Appendix N to the POD.

The use of ultraviolet irradiation (UV) was initially considered as a potential treatment method because it is used extensively in municipal and industrial water treatment applications and is well known to be effective against a wide range of microganisms, including viruses and cysts (Oram, B. 2018). However, it was concluded during the consultation meeting held on November 19, 2009, that because there is limited information available regarding the rate/dose and effectiveness of UV treatment on the various invasive species and pathogens (OSU, 2009; EPA, 1999; and Bettina, et al., 2000) that potential UV treatment methods would not be considered further at this time. UV treatment was not effective on chytrid fungus (Johnson et al., 2003). Currently, UV disinfection treatment technologies are being employed in some marine ballast water treatment applications (Raunek K. 2017). PCGP may consider this treatment technology in the future if additional information is available regarding its effectiveness on the aquatic invasives and pathogens of concern and if it is a cost effective and efficient treatment method.

PCGP also concluded during the consultation meeting held on November 19, 2009, that while Acrolein (Magnacide H Aquatic Herbicide) is a registered aquatic herbicide for the control of invasive aquatic plants in canals, this potential treatment method would be dropped from further consideration because of its extreme toxicity to humans and fish species (Baker Hughes, 2009 and EPA, 2009). Baker Hughes, the manufacturer of Magnacide H Aquatic Herbicide, provides that fish are very sensitive to this herbicide and that fish are killed at concentrations less than those required for aquatic weed control and that as a rule, MAGNACIDE H Herbicide should not be used where fish are considered a resource (Baker Hughes, 2009).

Chlorine, an oxidizing agent, is approved for use in drinking water and is effective in disinfecting a number of aquatic invasive species. Chlorine is one of the most widely used drinking water disinfectants in the United States (including Oregon) (Center for Disease Control and Prevention, 2018; Oregon Health Authority, 2018c). Chlorine guidelines have been established to treat waterborne diseases such as cholera, typhoid, and dysentery. Chlorine also eliminates slime bacteria, molds, and algae that commonly grow in water supply reservoirs, on the walls of water mains, and in storage tanks. To disinfect drinking water, chlorine is applied as either elemental chlorine (chlorine gas) or through the use of chlorinating chemicals such as calcium hypochlorite (tablets or granules) or solutions of sodium hypochlorite (liquid bleach or Clorox®) (World Chlorine Council, 2018). On federal lands, Clorox® bleach is registered for Port-Orford-cedar root disease management activities (Forest Service and BLM, 2003 and Forest Service, 2004). Diluted bleach solutions are used to disinfect equipment, shoes, and boots when working in areas infested with Sudden Oak Death (California Oak Mortality Task Force, 2006) and to treat irrigation water in nurseries that grow *Phytophthora*-susceptible plants (for Port-Orford-cedar root disease and Sudden Oak Death) (OSU, 2009). Because of chlorine's use as a disinfectant for drinking water and vehicles and equipment potentially contaminated with various aquatic invasive and pathogens (see Attachment B), it was determined during the November 19, 2009 consultation meeting that chlorine treatment should be considered as a practical water treatment method for all non-municipal surface water sources that would be utilized for hydrostatic testing purposes.

Best Management Practices to Treat Non-Municipal Surface Water Sources Used for Hydrostatic Testing

PCGP would implement a three-step BMP treatment process to prevent the potential spread of invasive species and forest pathogens from non-municipal surface water sources used during hydrostatic testing. The hydrostatic test water treatment process would incorporate screening/filtration during water withdrawal, chlorine treatment, and upland dewatering at least 150 feet from sensitive wetlands (i.e., non-agricultural wetlands) or waterbodies, where feasible, with no dewatering to these features. Further, all hydrostatic dewatering locations would be monitored after construction to ensure noxious weeds have not established. Any weed populations would be treated as described in the Integrated Pest Management Plan (see Appendix N to the POD). This hydrostatic test water treatment process has been developed based on the invasive species and pathogens of concern and the management information available for their control (see Attachment B). A summary of and rationale for the proposed treatment process is described below:

1. **Screening/filtering.** Hydrostatic test water withdrawal from non-municipal surface water sources would be screened during the initial intake process. The screening/filtration process would meet NOAA[5] and ODFW[6] criteria to prevent the entrainment of small fish. These screening requirements would prevent the potential transfer of the noted noxious weeds of concern listed in Section 7.2.2 and Attachment B as the maximum screen mesh size (i.e., 2.38 mm) required by NOAA and ODFW is smaller than the smallest seed size documented for these weeds in Attachment B (i.e., 1/8 inch or about 3mm for seeds of yellow starthistle). Therefore, the screening/filtering requirements should prevent the potential transfer of noxious weed seeds and other weed propagules (i.e., rhizomes, roots, stems) from hydrostatic test dewatering.

   There are other types of industrial screening technologies that exceed ODFW and NOAA fish screening criteria that PCGP would also employ to further remove solids and organics from non-municipal surface water sources. These types of filters include media or sand filters, bag filters[7], or various types of cartridge or screen filters[7]. These filters can remove solids and organic materials from water significantly smaller than 1 millimeter in size with some types having a submicron filter rating or capacity. However, smaller filtering capacities (i.e., < 100-200 ųm) may not be practical because of required hydrostatic testing pumping requirements. Depending on the filter technology selected, any potential disposal, cleaning, or backwashing of the filters would be conducted in a manner to prevent contamination of surface waters. Further, any necessary disposal of filtered materials or medium would occur to an approved disposal area or landfill.

   Although currently there are no known infestations of quagga or zebra mussels in Oregon, micro filtration has been shown to be effective in preventing the potential spread of these mussels, as well as New Zealand mud snails downstream of research facilities (Cope, et al. 2002) or into hatcheries (Oplinger et al. 2009).

   The principle vector for the spread of whirling disease is contaminated fish parts, and according to BLM (2009), this disease is typically not spread through water withdrawal activities. Although spores may reside in organics and mud (BLM, 2009), as noted in Section 3.0, when pumping water from a source location, the pump head will be submerged and maintained on average at the center of the water column so as to prevent sucking in organic materials, sediments and/or algae lying on the surface or in sediments resting on the bed of the waterbody. Therefore, PCGP's proposed screening procedures, upland discharge with no direct to release to waterbodies should prevent the potential transfer of this disease. Furthermore, as indicated in Attachment B, this disease has not been detected in the Project area.

2. **Chlorine Treatment.** As shown in Attachment B, chlorine disinfection is effective for most aquatic invasive species and forest pathogens of concern. However, most of the disinfection guidelines in the literature are for preventative treatments used on equipment, boats, boots/waders, etc. that may be infected from working or recreating in waters; they are not developed for treating entire waterbody sources. According to Oregon State University (2009), chlorine injection (Sodium hypochlorite) at a maximum concentration of 2 ppm for a contact time of at least 10 minutes is used to treat irrigation

[5] https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5366394.pdf
[6] https://www.oregon.gov/owrd/pubs/docs/forms/pumpcert_fishscreen.pdf
[7] https://www.rainforrent.com/Products/Filtration/

water in nurseries to kill *Phytophthora (*Port-Orford-cedar root disease and Sudden Oak Death*)*.

For treating potentially contaminated materials and equipment, chlorine treatments as low as 0.5 ppm have also been shown to be an effective control on *Dreissenia* spp. mussels (quagga and zebra mussels) (Utah Division of Wildlife Resources, 2009; Brooks, 1993). Although higher concentrations of chlorine (i.e., 1 percent solutions) are recommended for disinfecting equipment or flushing tanks to prevent the potential spread of whirling disease, a type of zooplankton (BLM, 2009), ballast water research indicates most zooplankton are killed with filtration and chlorine treatments of 0.5 ppm (USGS, 2006). Chlorine treatments of 0.5 ppm and above have been shown to be effective in destructing cyclic peptides (toxin) of cyanobacteria, a blue-green algae (Hoeger, et. al., 2002). According to the World Health Organization (1999), chlorine is used mainly for control of algae in water treatment works but is also known to have been employed in reservoir situations. The effective dose rates are dependent on the chlorine demand of the water, but most algae are reported to be controlled by residuals of free chlorine between 0.25 and 2.0 mg/L. According to the Oregon Health Authority (2018c), the residual chlorine used in most disinfected water systems typically ranges between 0.5-1.0 mg/L, with the maximum residual disinfectant level limit being 4.0 mg/L (Oregon Health Authority, 2018d).

Using bleach to disinfect field equipment of chytrid fungus requires a minimum exposure of 10 minutes using a concentration of 0.4 percent sodium hypochlorite (Johnson, et al, 2003). Chlorine treatment is expected to be effective on Saprolegnia, a freshwater mold, known primarily to be problematic in fish hatcheries. Oregon Health Authority (2018b) requires chlorinated water systems to provide a minimum free chlorine residual of 0.2 mg/L with a detention time of 30 minutes before reaching the first point of use.

Proposed Treatment Dose. Based on the various chlorine treatments methods for the various aquatic invasive species and pathogens that potentially may occur within identified water sources, PCGP proposes to use a treatment of 2 ppm or 2 mg/L of free chlorine residual with a detention time of 30 minutes to treat all non-municipal surface waters that would be used as a water source for hydrostatic testing purposes. Higher chlorine treatment concentrations (i.e., 1 percent solutions), such as those suggested to treat potential contaminated equipment for whirling disease (zooplankton), are not proposed because, as noted by the BLM (2009), the principle vector for the spread of whirling disease is contaminated fish parts, not water withdrawal activities. Further, as noted by the USGS (2006), filtration and 0.5 ppm chlorine is shown to be effective in killing most zooplankton in ballast water research. The higher chlorine concentrations recommended to decontaminate equipment for didymo (1 minute of 2 percent bleach) are also not proposed because currently there are no nuisance blooms reported in Oregon (Draheim, 2009) and all dewatering of hydrostatic test water would occur to an upland area at least 150 feet from sensitive wetlands (i.e., non-agricultural wetlands) and waterbodies, where feasible, with no discharge to these features.

3. **Upland Dewatering.** During the hydrostatic testing process, all hydrostatic test water will be released to an upland area through a dewatering device such as a straw bale structure or sediment bag, in a manner to promote inflation. All dewatering devices will be at least 150 feet from sensitive wetlands (i.e., non-agricultural wetlands) and waterbodies, where feasible, and dewatering will not occur to these features, as described in Section 7.3 below. The hydrostatic test dewatering BMPs are important

measures to prevent the potential spread of aquatic invasives. As noted in Section 7.3 below, chlorinated water would be released according to the Oregon Department of Environmental Quality criteria to prevent water quality impacts, potential effects to aquatic species, and to minimize potential impacts to sensitive areas. Additionally, as described in Section 8.0 below, all dewatering locations will be monitored after construction for potential noxious weed establishment and treated if necessary.

After hydrostatic test water withdrawal, all equipment used in the withdrawal process would be cleaned and sanitized to prevent the potential spread of aquatic invasives and pathogens from the use of this equipment in other waterbody sources. Attachment C provides equipment cleaning and sanitization procedures.

These hydrostatic test water treatment BMPs are intended to ensure the prevention of invasive species and pathogen transfer between watershed drainages. The final design of the treatment BMPs will be completed once PCGP has finalized the design of the pipeline and prepared the preliminary hydrostatic test plan and has selected the construction contractors for the project. Prior to implementing the final BMP treatment design, PCGP would notify and receive appropriate approvals from federal land-managing agencies and state agencies.

7.2.5 Temperature and Flow Effects

Based on data from the USGS National Water Information System, anticipated average flow rate of the Rogue River near the proposed crossing location (near Dodge Bridge) is 1330 cubic feet per second (cfs). Anticipated withdrawal volumes from the Rogue for hydrostatic testing will be approximately 300 - 800 gallons per minute (gpm) (0.67 - 1.78 cfs) which will have an immeasurable impact on the flow rate and temperature of the crossing at the time (average daily temperatures ranges from 68-71.6 degrees Fahrenheit). Attachment E provides a thermal effects analysis for all of the potential hydrostatic test water sources.

Considering that water is essentially a non-compressible material, temperature increases from pressurization during hydrostatic testing is negligible. During the hydrostatic testing phase of the project, the pipeline will already be buried and is therefore not exposed to potential solar heating, except for a small area (approximately 200 feet) at either end of the test segment where the hydrostatic test headers are located. Therefore, the test water is at ground temperature and the potential to increase water temperatures during hydrostatic testing is inconsequential.

Where water source locations are proposed, PCGP's Environmental Inspectors (EIs) will monitor withdrawal procedures and screening requirements to ensure that aquatic biota within the streams are not adversely affected.

7.3 Dewatering – Land Application

Hydrostatic test water will be released at a rate to prevent scour, erosion, and sediment migration to sensitive resources such as wetlands and waterbodies. The test water will be released into a dewatering device such as a straw bale structure or sediment bag to minimize possible peak flow effects by dissipating the energy of the test water flow, filter the test water to avoid sedimentation, and by allowing release of the test water as sheet flow onto the ground (see Attachment A - Drawing 3430.34-X-0012 (Sheets 1-3) and Drawing 3430.34-X-0013 (Sheets 2 of 3 and 3 of 3)). The dewatering will occur to an appropriately sized dewatering structure based on the expected quantity of water. Hydrostatic test water will be released in upland areas through a dewatering structure prior to entering the ground at least 150 feet from sensitive wetlands (i.e., non-agricultural wetlands) and waterbodies, where feasible. The hydrostatic test water will not be allowed to discharge to these features.

The hydrostatic test dewatering will be conducted utilizing dewatering structures that dissipate the velocity of the release and filter out any potentially-present dirt, grit or oxidation that would be present collectively as total suspended solids (see Attachment A). All bales used to construct straw bale structures will be certified weed free. On federally managed lands, straw bales are required to consist of an annual variety of straw such as annual wheat, rye, or rice straw. The dewatering structures will be placed in upland locations that are topographically appropriate to allow the flow to “pool” and dewater uniformly through the structure to promote infiltration of the water. The water is not released at any appreciable pressure regardless of site location as the test pressure is bled off prior to dewatering the test segment. Flow rates to the dewatering structure can be controlled using the dewatering valve to ensure flows do not exceed the carrying capacity of the structure(s). Additionally, dewatering rates/volumes can be controlled by releasing the water into a central tank and then pumping the water to multiple dewatering structures concurrently or successively (one then the other) to promote infiltration, minimize overland flow, and to prevent overland flow to waterbodies (see Attachment A - Drawing 3430.34-X-0012 [Sheets 1-3] and Drawing 3430.34-X-0013 [Sheets 2 of 3 and 3 of 3]). PCGP’s EIs will be responsible for monitoring dewatering activities (rate and quantity) and making appropriate adjustments to facilitate proper infiltration through the dewatering structures to stay in compliance with permit conditions. PCGP’s EIs will also monitor the structures to prevent any potential failures or “break outs” from occurring to the structure during dewatering activities by adding additional straw bales, fabric, or stakes as needed. The success rate of straw bale structures is solely dependent on the construction, inspection, monitoring, and maintenance of each structure. PCGP’s EIs will ensure all structures meet the performance standard of 100%.

If chlorinated municipal water or non-municipal treated water (see Section 7.2.3 above) is used, dewatering will be treated, if necessary, according to Oregon Department of Environmental Quality criteria to prevent water quality impacts, potential effects to aquatic species, and to minimize potential impacts to sensitive areas. It is not expected that contamination of the hydrostatic test water with oil and grease will occur during hydrostatic testing because the test will be conducted on a new pipeline system constructed with new pipe. PCGP’s EIs will also ensure that all threaded valves and fittings that may be used on the hydrostatic test headers are cleaned of potential incidental oil and grease before the hydrostatic operations are conducted to minimize the potential for oil and grease contact from these potential incidental sources. Straw bales have been effective in removing oil and grease from test water (Tallon et al., 1992).

In addition, the EIs will ensure that turbid water is not discharged to waters of the state. If an inadvertent discharge to a surface water occurs, the dewatering operations would be immediately halted and modified to ensure that the discharge to surface water is stopped and/or minimized and water quality standards are not exceeded.

Permission to release the hydrostatic test water through land application will be applied for through the ODEQ WPCF process.

8.0 MONITORING

After project construction, PCGP’s operations personnel will be responsible for inspecting the right-of-way for a period of three to five years in areas where noxious weeds were identified prior to construction and were previously mapped to ensure that potential infestations do not reestablish and spread. Monitoring will also occur in areas along the right-of-way where equipment cleaning stations and hydrostatic dewatering sites were located to ensure that infestations at these locations do not occur. If necessary, PCGP will contract with local weed control boards, qualified biologists, or agronomists to conduct these operations. All areas of the right-of-way will be monitored by PCGP's staff over the operational life of the pipeline. PCGP will fulfill easement obligations with all landowners crossed by the project during the life of the project including weed control. As stated in Section 3.0 in the Integrated Pest Management Plan (Appendix N to the POD), herbicides may be used to control weeds, if necessary, based on integrated weed management principles and landowner requirements.

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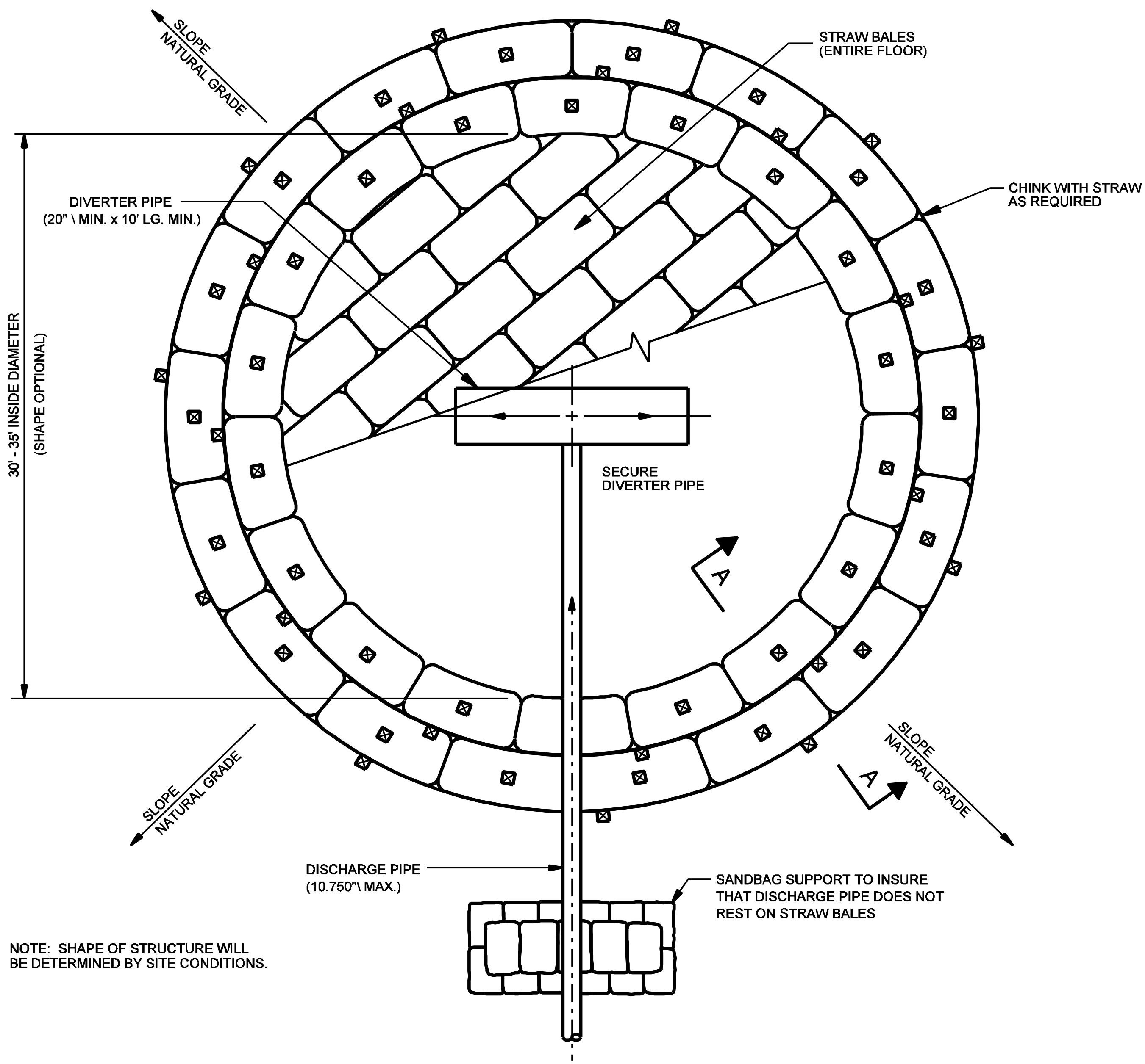
Attachment A

Hydrostatic Test Dewatering Structure Typicals

Drawing 3430.34-X-0012 (Sheets 1-3) and Drawing 3430.34-X-0013 (Sheets 1 of 3 and 3 of 3)



HYDROSTATIC TEST DEWATERING STRUCTURE

TEMPORARY EROSION CONTROL MEASURE

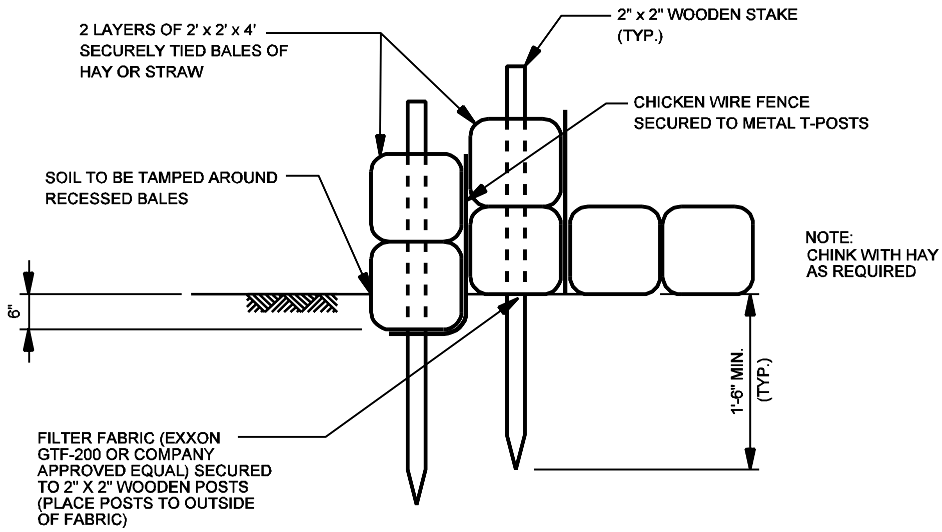
DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
TYPICAL HYDROSTATIC TEST
DEWATERING STRUCTURE
HDW

Pacific Connector
GAS PIPELINE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.

DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0012 6/13/2007 O:\Oregon_gas\Mapping\Typicals\BMP_03.dgn	SHEET 1 OF 3



SECTION A-A

NOTE:
STAKES SECURING FILTER FABRIC AND CHICKEN WIRE FENCE ARE NOT SHOWN FOR CLARITY

NOTES:

1. STRUCTURE SHALL BE PLACED ON A LEVEL WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND ANY WORK AREAS.
2. FLOW RATES THROUGH DISCHARGE AND DIVERTER PIPES SHALL BE SUCH THAT STRUCTURE WILL NOT OVERFLOW.
3. WHERE CONDITIONS WARRANT A 30' x 30' RECTANGULAR STRUCTURE MAY BE SUBSTITUTED FOR THE CIRCULAR CONFIGURATION SHOWN.
4. DIMENSIONS SHOWN ARE THE MINIMUM ACCEPTABLE VALUES AND MAY BE VARIED DEPENDING UPON SPECIFIC LOCATION.
5. CONTRACTOR SHALL USE CERTIFIED NOXIOUS WEED FREE HAY OR STRAW FOR STRUCTURE.

HYDROSTATIC TEST DEWATERING STRUCTURE

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
TYPICAL HYDROSTATIC TEST
DEWATERING STRUCTURE
HDW

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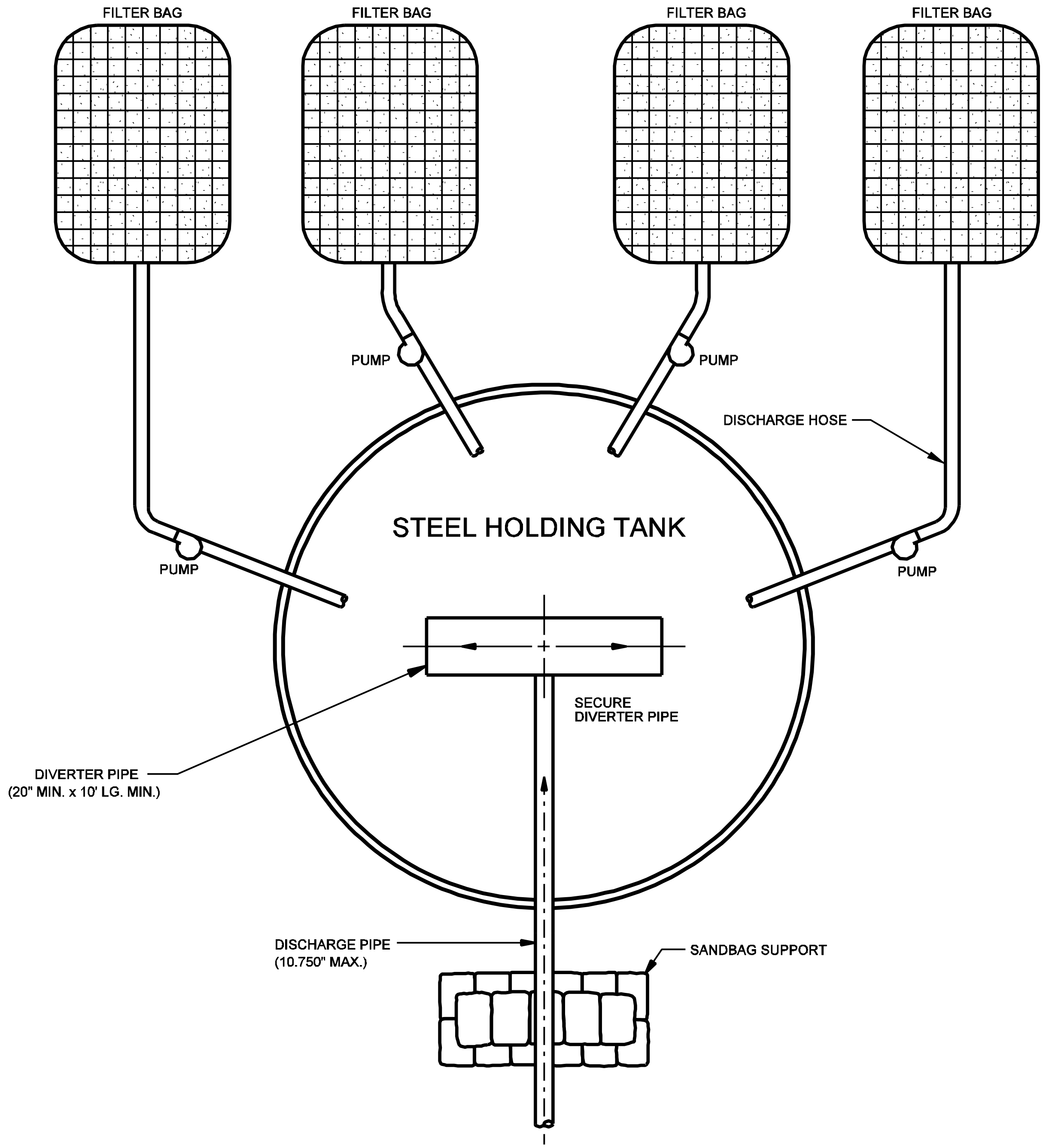

HYDROSTATIC TEST DEWATERING STRUCTURE

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
TYPICAL HYDROSTATIC TEST
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HDW

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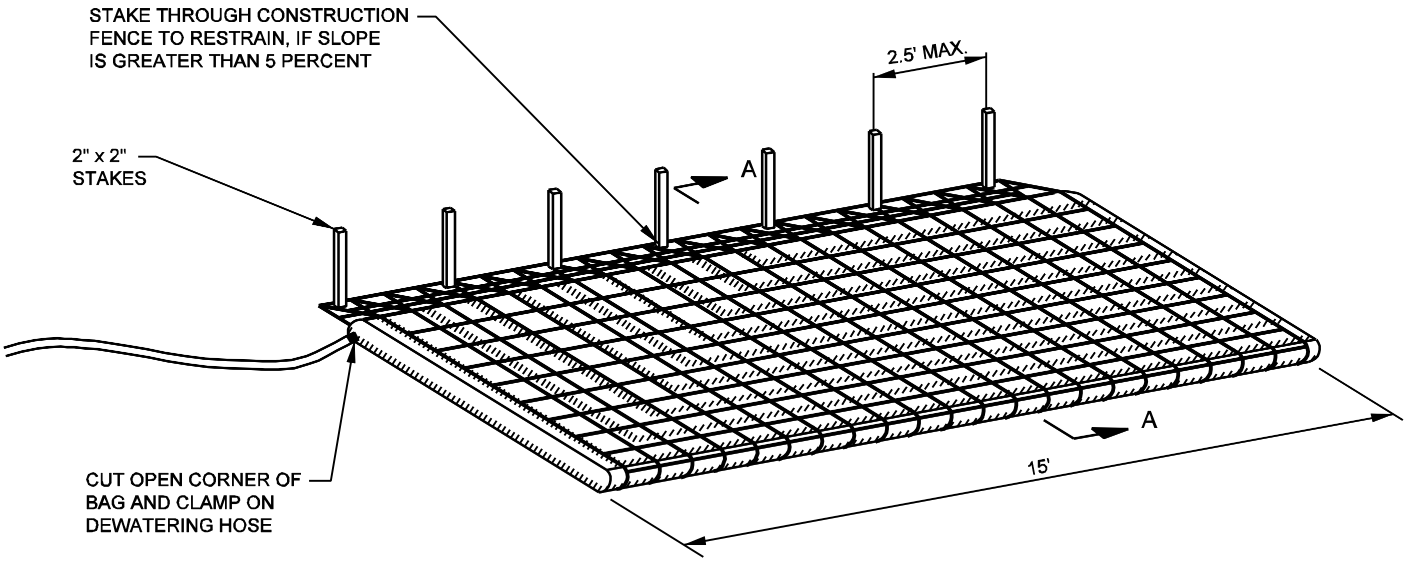

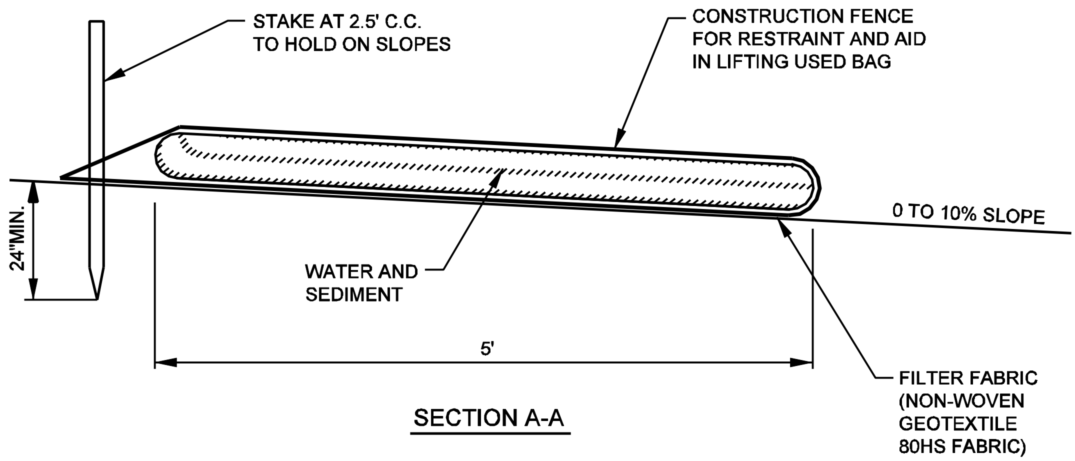

SECTION A-A

NOTES:

1. FILTER BAG SHALL BE PLACED ON A GENTLY SLOPING OR LEVEL, WELL GRADED VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM DEVICE, ANY WORK AREAS, WATERBODIES OR WETLANDS.
2. THE FILTER BAG MUST BE STAKED IN PLACE AND SECURED TO THE PUMP DISCHARGE LINE.
3. FILTER BAG SHALL NOT BE USED FOR DISCHARGE FLOWS GREATER THAN 300 GPM.
4. DEVICE SHALL BE REMOVED AND DISPOSED OF AFTER BAG IS FILLED WITH SEDIMENT. SEDIMENT FROM BAG SHALL BE SPREAD IN AN UPLAND AREA.

TRENCH DEWATERING

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
TYPICAL
TRENCH DEWATERING
TDW

SM
Pacific Connector
GAS PIPELINE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.

DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
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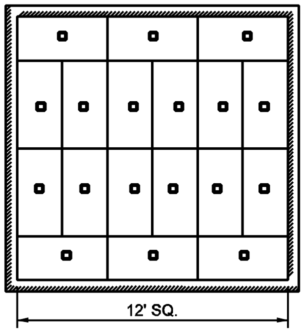
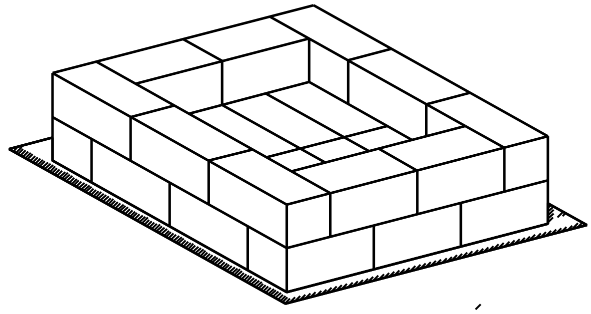


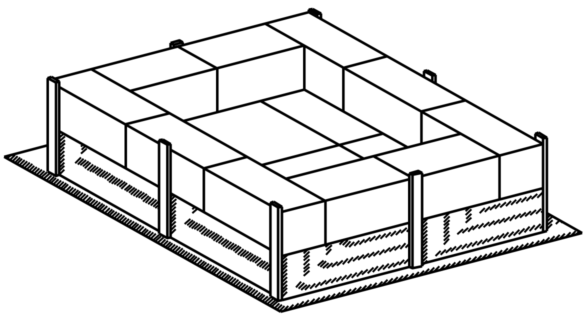
STEP 1

ARRANGE HAY BALES OVER FILTER FABRIC ON LEVEL LAND TIGHTLY PACKED AS SHOWN TO COVER AN AREA APPROXIMATELY 12' x 12'. SECURE EACH HAYBALE IN PLACE BY DRIVING REBAR OR A WOODEN STAKE THROUGH EACH OF THE HAY BALES



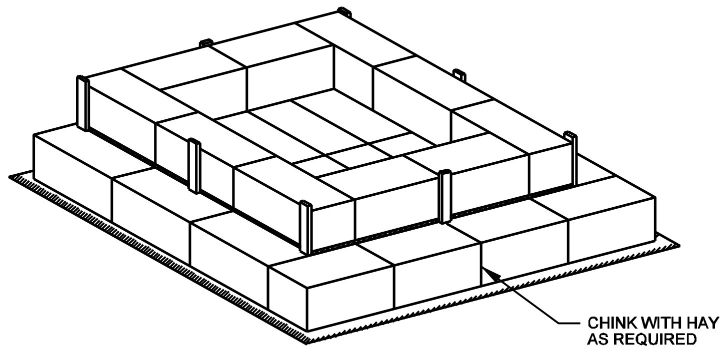
STEP 2

INSTALL ANOTHER LAYER OF HAY BALES ON THE OUTER EDGE AS SHOWN



STEP 3

INSTALL FILTER FABRIC ALL AROUND HAY BALE STRUCTURE AS SHOWN



STEP 4

INSTALL ANOTHER LAYER OF HAY BALES ON THE OUTSIDE OF THE FILTER FABRIC AND SECURE IN PLACE BY DRIVING REBAR OR A WOODEN STAKE THROUGH EACH OF THE OUTER HAY BALES

NOTES:

1. WHERE POSSIBLE STRUCTURE SHALL BE PLACED ON A LEVEL, WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND ANY WORK AREAS, WATERBODIES OR WETLANDS.
2. THIS MEASURE SHALL BE REMOVED UPON COMPLETION OF THE PROJECT. REMOVAL IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION. MATERIAL FROM BALES MAY BE SCATTERED ON RIGHT-OF-WAY.
3. CONTRACTOR SHALL USE CERTIFIED NOXIOUS WEED FREE HAY OR STRAW FOR STRUCTURE.

TRENCH DEWATERING

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
TYPICAL
TRENCH DEWATERING
TDW

Pacific Connector GAS PIPELINE SM

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APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0013	SHEET 3 OF 3

6/13/2007
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Attachment B

Potential Treatment Matrix

Potential Treatment Matrix

Invasive Species (*Scientific Name*)	Occurrence in the Project Area	Individual Size	Effectiveness of Potential Treatment Methods		
			Filter Intake (NOAA/ODFW Criteria) with Discharge to Upland Straw Bale Structure for Infiltration. Implement Integrated Pest Management BMPs	**Chlorine Treatment**	**Secondary Filtration: Media, Bag or Cartridge (filter limits to 100 µm- required pumping rate will limit filter size).**
Weeds					
Scotch broom (*Cytisus scoparius*)	Yes-Coos, Douglas & Jackson counties (PCGP, 2018 & ODA, 2018)	Plant produces a 2-5 cm long pea-pod-like fruit (Peterson and Prasad 1998). Seed size 5 mm diameter (Myers, J.H, and D. Bazely, 2003),	Yes	No data	Yes
Himalayan blackberry (*Rubus discolor*)	Yes- All Project counties (PCGP, 2018 & ODA, 2018)	Fruit: up to 0.8 in (2 cm) long, with large succulent drupelets (California Invasive Plant Council)	Yes	No data	Yes
Yellow starthistle (*Centaurea solstitialis*)	Yes- All Project counties (PCGP, 2018 & ODA, 2018)	Seeds 1/8 inch long; Fruits 2-4 mm long (California Invasive Plant Council)	Yes	No data	Yes
Forest Pathogens					
Port Orford cedar root disease (*Phytophthora lateralis*)	Yes – Coos County; three locations in Douglas County distant from project area & outside crossed watersheds (ODF, 2018)	Zoospores form cysts, 10–12 µm diameter which germinate to produce hyphae; resting spores 50 µm diameter (CAB International, 1998). (note: 1 µm = 1 x 10-6 m)	No	Yes Treatments for cleaning equipment/potentially contaminated materials: Clorox® Ultra Institutional (1 gallon of Clorox® to each 1,000 gallons of water) (BLM, 2003) Chlorine injection to treat irrigation water to kill *Phytophthora*. Sodium hypochlorite is injected, at a maximum concentration of 2 ppm, for a contact time of at least 10 minutes (Oregon State University, 2009). In California, the registration rate for the treatment of drafted water with Ultra Clorox in areas of Phytophthora is 1 gallon infestation of Ultra Clorox Bleach per 10,000 gallons of water (California Oak Mortality Task Force, 2006).	Sand filtration is suggested to use with other treatments but typical nursery irrigation pumping rates/volumes limit use (i.e., 250-300 GPM per acre) (Oregon State University, 2009). Sand filtration is effective at reducing chlorine demand by removing organics from source waters, which improves treatment.
Sudden Oak Death (*Phytophthora ramorum*)	Outside project area in Curry County (USDA, 2018 & California Oak Mortality Task Force, 2018)	Sporangia are oval-shaped, 30-90 µm (Global Invasive Species Database, 2009)	No	Yes Chlorine injection to treat irrigation water to kill *Phytophthora*. Sodium hypochlorite is injected, at a maximum concentration of 2 ppm, for a contact time of at least 10 minutes (Oregon State University, 2009). In California, the treatment of drafted water with Ultra Clorox is similar to the recommended water treatment for *P. lateralis*, which causes Port-Orford Cedar Root Disease. The registration rate is 1 gallon of Ultra Clorox Bleach per 10,000 gallons of water (California Oak Mortality Task Force, 2018)	Sand filtration is suggested to use with other treatments but typical nursery irrigation pumping rates/volumes limit use (i.e., 250-300 GPM per acre) (Oregon State University, 2009). Sand filtration is effective at reducing chlorine demand by removing organics from source waters, which improves treatment.
Aquatic Invasives					
Mollusks					
Quagga Mussels (*Dreissena rostriformis bugensis)*	None in OR (USGS, 2018)	Microscopic to about two inches long (U.S. Fish & Wildlife Service, 2007). Dreissena mussel larvae (planktonic veligers) are approximately 40µm in length for one to two weeks. Within two to five weeks, the larvae become too large (200 µm) and heavy to freely swim and settle out of the water column (Nichols and Black, 1994).	Yes – (i.e., upland discharge, no direct discharge to waterbodies). Current Risk = low	Yes Treatment to disinfect contaminated equipment with a bleach rinse ranging between 0.5 mg/L to 250 mg/L (Cope et al., 2003 & Utah Division of Wildlife Resources, 2009) and 3 oz of bleach to 5 gallons of water for 1hr (U.S. Fish & Wildlife Service, 2007)	No data but expected to be similar to effectiveness for zebra mussels

Invasive Species (*Scientific Name*)	Occurrence in the Project Area	Individual Size	Effectiveness of Potential Treatment Methods: Filter Intake (NOAA/ODFW Criteria) with Discharge to Upland Straw Bale Structure for Infiltration. Implement Integrated Pest Management BMPs	Effectiveness of Potential Treatment Methods: Chlorine Treatment	Effectiveness of Potential Treatment Methods: Secondary Filtration: Media, Bag or Cartridge (filter limits to 100 µm- required pumping rate will limit filter size).
Zebra Mussels (*Dreissena polymorpha)*	None in OR (USGS, 2018)	Microscopic to about two inches long. Dreissena mussel larvae (planktonic veligers) are approximately 40µm in length for one to two weeks. Within two to five weeks the larvae become too large (200 µm) and heavy to freely swim and settle out of the water column (Nichols and Black, 1994).	Yes (i.e., upland discharge, no direct discharge to waterbodies)	Yes Treatment rates to prevent fouling of water intakes was 0.5 ppm for 24 hours (Brooks, 1993) Treatment to disinfect contaminated equipment with a bleach rinse ranging between 0.5 mg/L to 250 mg/L and 3 oz of bleach to 5 gallons of water for 1hr (Cope et al., 2003; U.S. Fish & Wildlife Service, 2007; Cope, et al. 2002 & Utah Division of Wildlife Resources, 2009)	Yes - Containment procedures commonly used at facilities conducting zebra mussel research have included filtration or disinfectant treatments to remove or kill potential zebra mussels before water is discharged. Filtration of outflow water through small mesh bags (100 µm or smaller), chlorine treatment tanks and sand filters (Cope, et al., 2002)
New Zealand mud snails (*Potamopyrgus antipodarum*)	Yes –Coos Bay Estuary & Lower Coos River (USGS, 2018 & Montana State University, 2009)	Sexually mature females (3-6 months old); size from 3 mm long in western Montana & Idaho; average length 4-5 mm in western US, maximum 11 mm in New Zealand. Embryos born live with 3 mm shell length (US Army Corps of Engineers)	Yes (i.e., upland discharge, no direct discharge to waterbodies)	Not Effective (BLM, 2009) Ely (2009) indicated that chlorine bleach solutions were not effective on adult snails and provided a recommendation of 1 tablespoon bleach /gallon water (i.e., 0.5 oz/gallon) for cleaning equipment for zebra and quagga mussels as a minimum.	Yes - According to Oplinger et al (2009), filtration of incoming water to a hatchery is a controlling option for New Zealand mud snails. Hydrocyclones have been successfully used to remove drifting New Zealand mud snails from hatchery inflow and noted that media filters (e.g., sand) and membrane filters could also be used.
Brackish water snail *(Assiminea parasitologica)*	Yes – Including Coos Bay Estuary (Laferriere, et al., 2010 & Carlton, J., 2008)	Mature snails up to 4-6 mm (Carlton, J., 2008).	Yes (i.e., upland discharge, no direct discharge to waterbodies)	No data, but assumed to be effective based on results with Quagga and Zebra mussels.	No data but expected to be similar to effectiveness for zebra mussels
Zooplankton					
(Whirling Disease - *Myxobolus cerebralis*)	Present in Oregon, outside the Project area in localized tributaries in northeastern and northwester part of the state (Oregon Department of Fish and Wildlife. 2018 and Invasive Species Compendium. 2018)	Microscopic myxozoan; myxospores produced in salmonids are 7-10 µm long; infectious triactinomyxon spores are 150 µm long with three tails each 200 µm long (US Army Corps of Engineers)	Yes (i.e., upland discharge, no direct discharge to waterbodies)	Yes The principle vector for spread of whirling disease is contaminated fish parts; it is not typically spread through fire water withdrawal activities. Avoiding and removing organics (the spores reside in mud), power washing, and flushing will greatly reduce or eliminate spores on external gear surfaces. 10 minutes with 1 percent bleach (e.g., Clorox – 6 percent sodium hypochlorite (NaClO)) is recommended for washing equipment or flushing tanks (BLM, 2009). Whirling disease and New Zealand mud snails are the most difficult organisms to kill. Treatment for these species will be effective for all other species as well. Ballast water research results from experiments with filtration and chlorine are most promising: 0.5 ppm chlorine with filtration killed most of the zooplankton (USGS, 2006)	Expected to be effective since, as noted by (BLM, 2009), the principle vector for spread of whirling disease is contaminated fish parts.

Invasive Species (*Scientific Name*)	Occurrence in the Project Area	Individual Size	Effectiveness of Potential Treatment Methods: Filter Intake (NOAA/ODFW Criteria) with Discharge to Upland Straw Bale Structure for Infiltration. Implement Integrated Pest Management BMPs	Effectiveness of Potential Treatment Methods: Chlorine Treatment	Effectiveness of Potential Treatment Methods: Secondary Filtration: Media, Bag or Cartridge (filter limits to 100 µm- required pumping rate will limit filter size).
Algae					
Didymo (*Didymosphenia geminate*)	No nuisance blooms in Oregon reported (EEDMaps, 2018 & Draheim, 2009)	Cell ≈70 µm (Spaulding and Elwell, 2007)	Yes (i.e., upland discharge, no direct discharge to waterbodies)	Yes Decontaminate equipment for 1 minute in 2 percent bleach solution (BLM, 2009 & Spaulding and Elwell, 2007). Also indicated that the treatment for whirling disease may apply to this species (BLM, 2009)	No data
Cyanobacteria - blue-green algae	Yes – Cyanobacteria are commonly found in many freshwater systems across the world and blooms occur in many lakes, rivers, and reservoirs across Oregon. Although, a permeant advisory has been for designated for pools of water in bedrock along the South Umpqua River banks. Hydrostatic test water would be withdrawn from the main channel of the flowing river and not from small stagnant pools in the rocks. (Oregon Human Authority, 2018a).	Anabaena spp. akinetes cells 6-13 microns (µm) diameter, 20-50 µm long; heterocysts are 7-9 µm diameter, 6-10 µm long, for example (Washington State Department of Health, 2009)	Yes (i.e., upland discharge, no direct discharge to waterbodies) Pacific Connector would also review Oregon Human Authority 2018a health advisories to ensure harmful algae bloom have not been posted for proposed water sources.	Yes To be effective, a residual of ≥ 0.5 Cl_2 mg/l with at least a 30-minute contact time is required to destruct cyanobacteria cyclic peptides (toxin) (Hoeger, et. al., 2002). Chlorine is used mainly for control of algae in water treatment works but is also known to have been employed in reservoir situations. The effective dose rates are dependent on the chlorine demand of the water, but most algae are reported to be controlled by free chlorine residual rates between 0.25 and 2.0 mg/L (WHO, 1999).	Not effective (Bettina, et al., 2000)
Fungi/Mold (Oomycota)					
Chytrid fungus (*Batrachochytrium dendrobatidis*)	Yes (Olson et al., 2013, Pearl et. al., 2009)	Disease-causing zoospores are 3- 5 µm with a single flagellum 19-20 µm long; zoosporangian ~30 µm across (Johnson and Speare, 2003)	Yes (i.e., upland discharge, no direct discharge to waterbodies)	Yes Bleach, was rapidly effective for disinfecting equipment at concentrations of 1 percent sodium hypochlorite and above. At 0.4 percent, it required a minimum exposure time of 10 minutes to kill Chytrid fungus. (Johnson et al., 2003) Spraying down equipment with 409 cleaner and then letting it dry in the sun also effectively kills the spores (Utah Division of Wildlife Resources, 2009)	No data
Water Mold (*Saprolegnia*)	Likely (Kiesecker, et al., 2001, Petrisko, et. al., 2008) Aquatic fungi (Saprolegniales) are ubiquitous in natural waters supplies of fish hatcheries (Schreck et al., 1993)	5 – 100 (µm) Spores, Oospore Mycellum and Zoosporangia (Mayer Kent, 2000)	Yes (i.e., upland discharge, no direct discharge to waterbodies)	Yes Chlorine guidelines have been established to treat waterborne diseases such as cholera, typhoid, and dysentery. Chlorine also eliminates slime bacteria, molds, and algae that commonly grow in water supply reservoirs, on the walls of water mains, and in storage tanks (World Chlorine Council, 2018). Oregon Health Authority (2018b) requires chlorinated water systems to administer a minimum free chlorine residual of 0.2 mg/L with a detention time of 30 minutes before reaching the first point of use in the system	No data

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Attachment C

Hydrostatic Test Water Withdrawal Equipment Cleaning and Sanitizing Procedures

Cleaning and Sanitizing Procedures[1]

1) All hydrostatic test water withdrawal equipment and waterbody crossing equipment or materials that come into contact with raw water (non-municipal surface water) should be sanitized. Aquatic invasive species and pathogens can be transported in tanks, buckets, hoses, screens, bilges, flume pipe(s) and any other construction equipment or materials that hold water or aquatic plant or substrate materials including waders and work boots.

2) Drying alone may be effective in some situations, depending upon the target species, types of equipment, temperature, and relative humidity; however, precautionary cleaning and/or sanitization should be performed.

3) Clean and/or sanitize all equipment and materials before moving from one location to another or when moving between watersheds. Cleaning and sanitizing equipment, as described here, will be necessary before use as well as after use if equipment has been obtained from a source where sanitizing history is unknown.

4) Pacific Connector's Environmental Inspector (EI) will establish sanitation areas where there is no potential for runoff into storm drains, waterways, or sensitive habitats. The EI will ensure that wash water will not contaminate another water source.

5) Hand remove all visible plant parts, soil, and other materials from external surfaces of equipment and gear. Powerwash all accessible surfaces with clean, hot water (140°F, and 3,000 psi of pressure, if possible). Hot water powerwash should be conducted in a slow and methodical manner. Lower temperatures will require more contact time to achieve desired results for decontamination. For species like quagga or zebra mussel, contact time should be 5-10 seconds at 140°F Use 120°F hot water and longer contact time for hoses, fan belts, etc. (Elwell and Phillips, 2016). Powerwashing with hot water will greatly reduce the likelihood that aquatic invasive species are present, and chemical sanitation of external surfaces would not be necessary (BLM, 2009). Work boots should be brushed and cleaned and waders should be frozen for 24 hrs and dried completely before using them in another waterbody (Boatner, 2019).

6) Intake hoses, pumps, screens, and tanks can become contaminated with infected water or by sucking the organisms up from the bottom of a stream or pond. Disinfect tanks after each incident, and disinfect tanks before use if previous sanitation of the equipment has not occurred or is unknown. Set up a portable disinfection tank (e.g. fold-a-tank, 55-gallon barrel, 5-gallon bucket, etc., depending on the cleaning capacity needed) using a 1 to 2 percent bleach solution.

   Pump cleaning solution through portable pumps for 10 minutes. Pump the solution through the hose and then rinse with water. Discharge used cleaning solution back into the disinfection tank for re-use. Alternatively, use a 5% cleaning solution of quaternary ammonium compound. This is a common cleaning agent used in homes, swimming pools, and hospitals, and is safe when used at the recommended concentration (BLM, 2009).

Disposal

Use caution when disposing of the used cleaning solution and follow all federal, state, and local regulations. Do not dump cleaning solution into any stream or lake or on areas where it can migrate into any stormdrain, waterbody, or sensitive habitat. Chlorinated water may be released according to ODEQ criteria. Small quantities may be disposed of down sanitary drains into a municipal sewer system. Larger quantities may need to be transported to a municipal wastewater treatment facility.

[1] Developed from:

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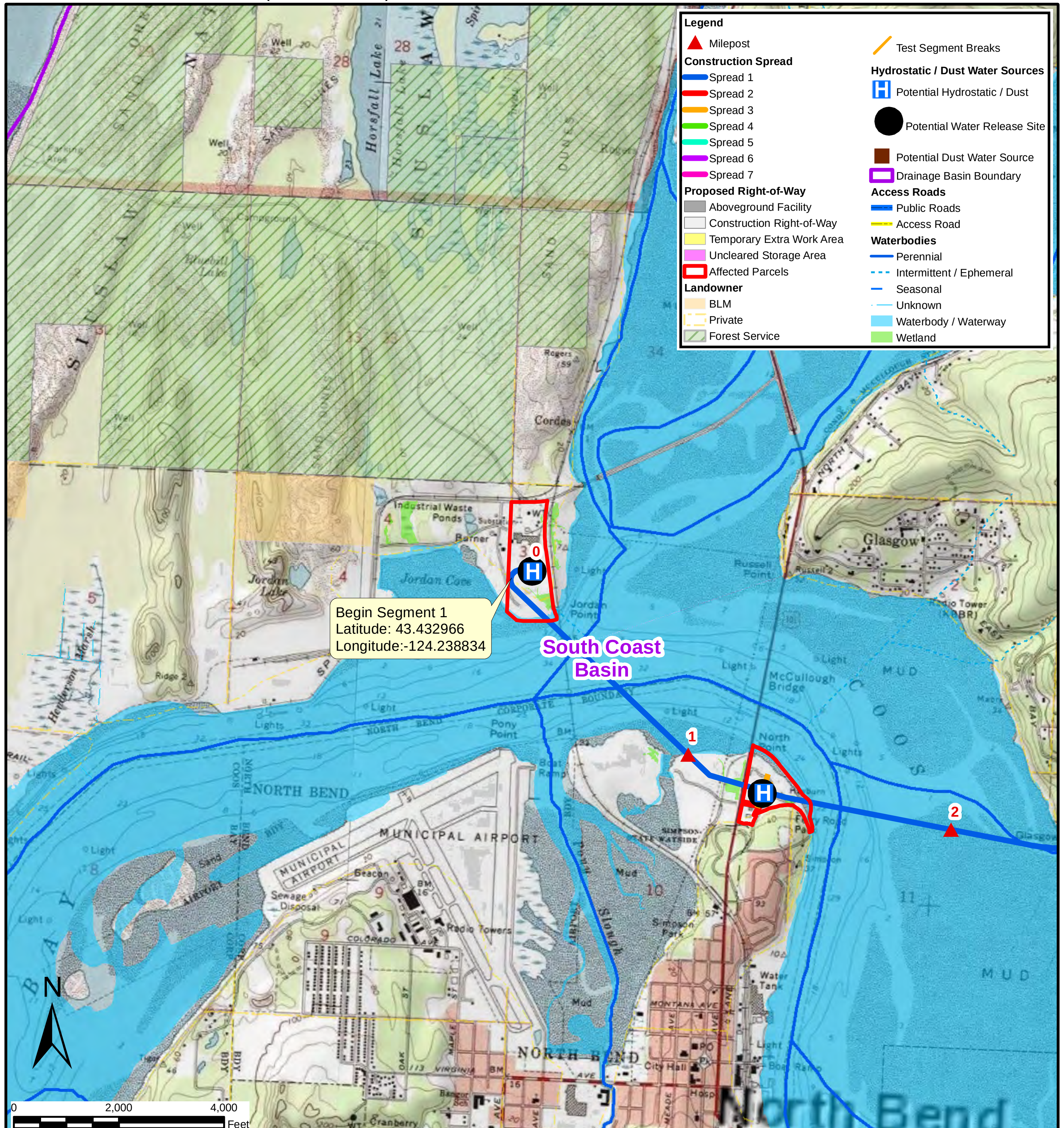
Attachment D

Maps

Figure 1
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE PROJECT, LP
HYDROSTATIC TEST PLAN OVERVIEW
Fire Hydrant
North Spit Pump House (Coos Bay)
Segment 1 End Segment 2 Begin
Segment 2 End Segment 3 Begin
MP10R
Coos River
Segment 3 End Segment 4 Begin
MP20BR
Segment 4 End Segment 5 Begin
Coos County
Segment 5 End Segment 6 Begin
MP30
East Fork Coquille River
Segment 6 End Segment 7 Begin
Segment 7 End Segment 8 Begin
Segment 8 End Segment 9 Begin
MP40
MP50
Segment 9 End Segment 10 Begin
Middle Fork Coquille River
Segment 10 End Segment 11 Begin
MP60
Ben Irving Reservoir
Ollala Creek
MP70
Segment 11 End Segment 12 Begin
Segment 12 End Segment 13 Begin
South Umpqua River Crossing #1
Douglas County
MP80
Segment 13 End Segment 14 Begin
Segment 14 End Segment 15 Begin
Segment 15 End Segment 16 Begin
Segment 16 End Segment 17 Begin
MP90
South Umpqua River Crossing #2
Segment 17 End Segment 18 Begin
MP100
Segment 18 End Segment 19 Begin
Segment 19 End Segment 20 Begin
MP110
Segment 20 End Segment 21 Begin
Segment 21 End Segment 22 Begin
Segment 22 End Segment 23 Begin
MP120
Segment 23 End Segment 24 Begin
Rogue River
MP130
Segment 24 End Segment 25 Begin
Medford Aquifer
MP140
Star Lake
Segment 25 End Segment 26 Begin
Jackson County
MP150
MP160
Segment 26 End Segment 27 Begin
Segment 27 End Segment 28 Begin
MP170
MP180
Segment 28 End Segment 29 Begin
Segment 30 End Segment 31 Begin
Klamath River
MP190
MP200
Segment 29 End Segment 30 Begin
Segment 31 End Segment 32 Begin
MP210
MP220
Lost River
Segment 32 End
Lane County
Willamette
Deschutes
Umpqua
Goose and Summer Lakes
Lake County
Klamath County
Klamath
Rogue
South Coast
Josephine County
Curry County
Siskiyou County
Modoc County
Milepost
Hydrostatic / Dust Water Sources
Water Release Locations
Test Segment Breaks
1
2
3
4
5
6
7
Pipe Route / Spread
Spread 1
Spread 2
Spread 3
Spread 4
Spread 5
Spread 6
Spread 7
Basin Boundaries
Forest Service
National Park Service
Pacific Connector GAS PIPELINE
Drawing Number: 3430_3-0001
Rev 2 - 8/6/2018
Edge Environmental, Inc.
0 2.5 5 10 15 20 Miles



DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 1 BEGIN
MP 0.00
S-3, T-25-S, R-13-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 1	SHEET 1 OF 2

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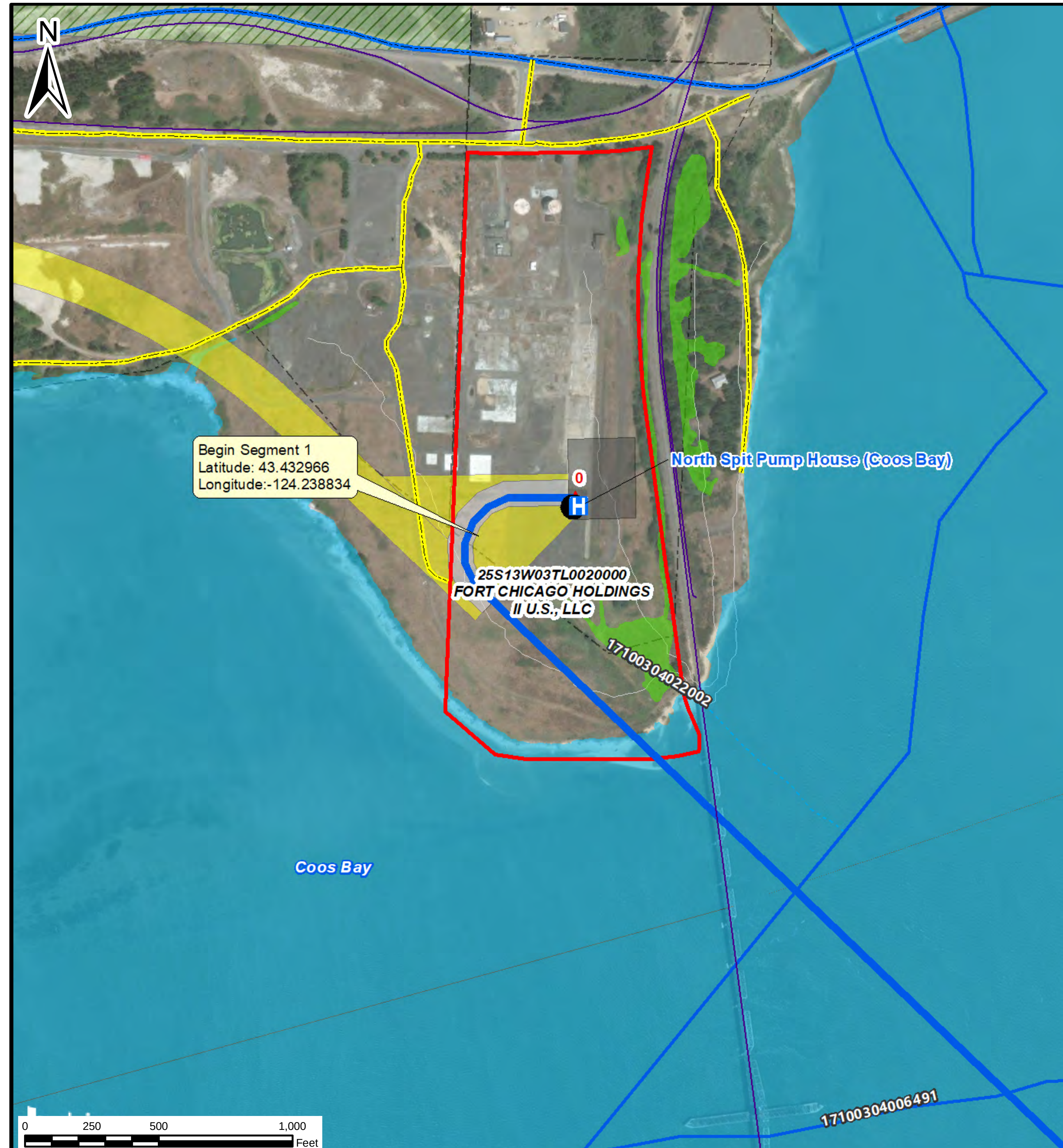

DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 1 BEGIN
MP 0.00
S-3, T-25-S, R-13-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 1	SHEET 2 OF 2

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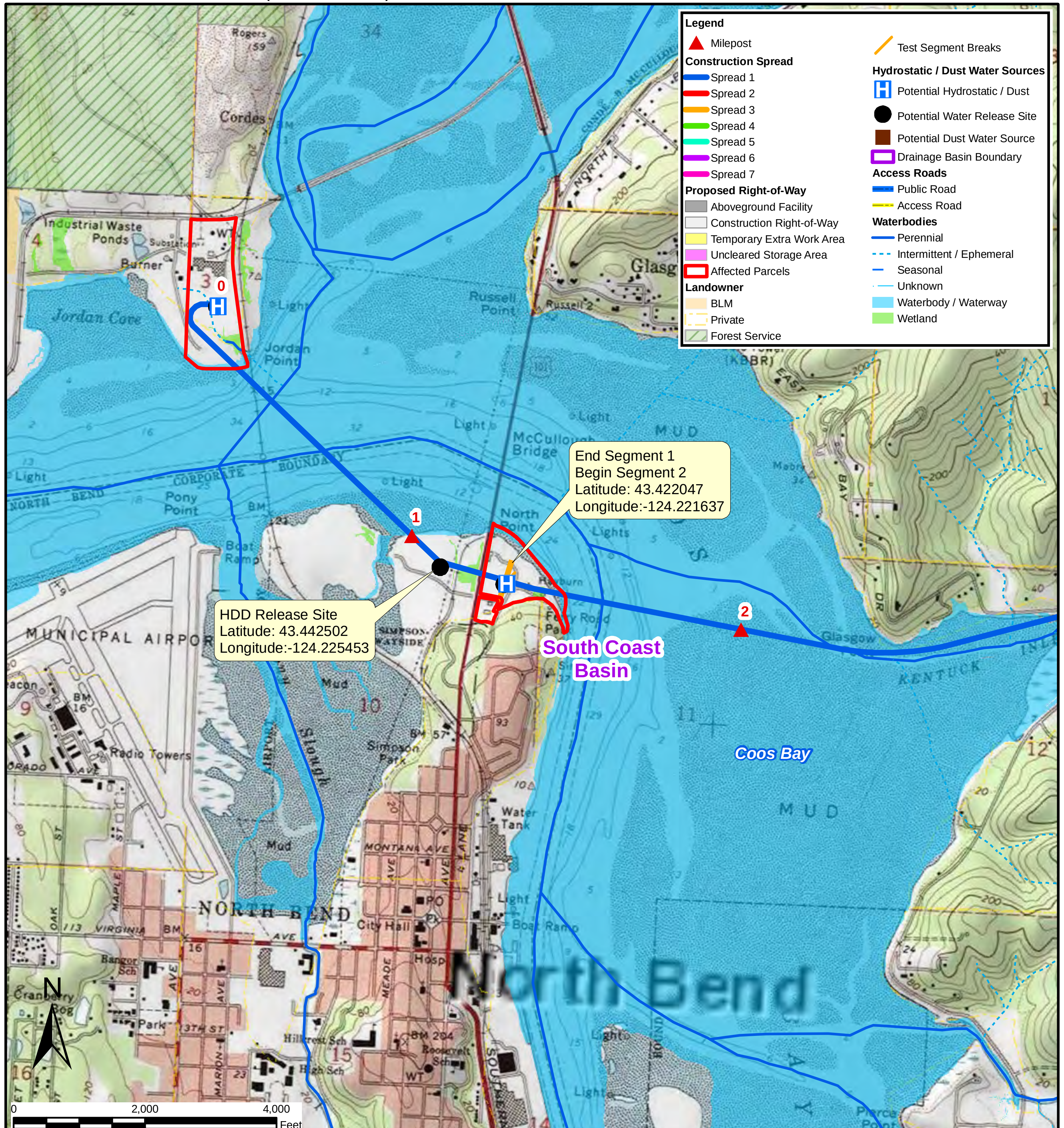

DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 1 END / 2 BEGIN
MP 1.31
S-10, T-25-S, R-13-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 1 / 2	SHEET 1 OF 2

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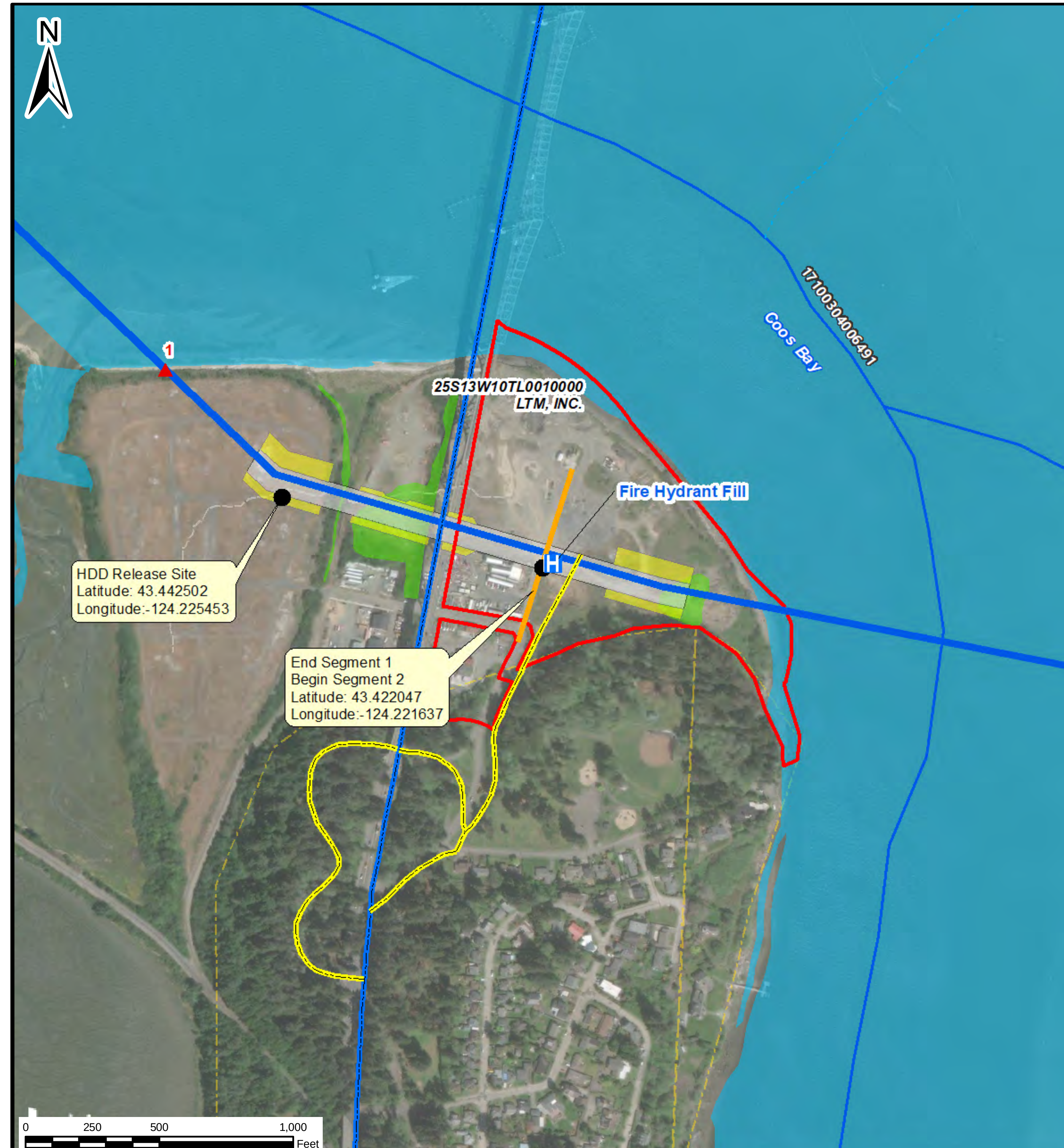


DRAWING NO.	REFERENCE TITLE

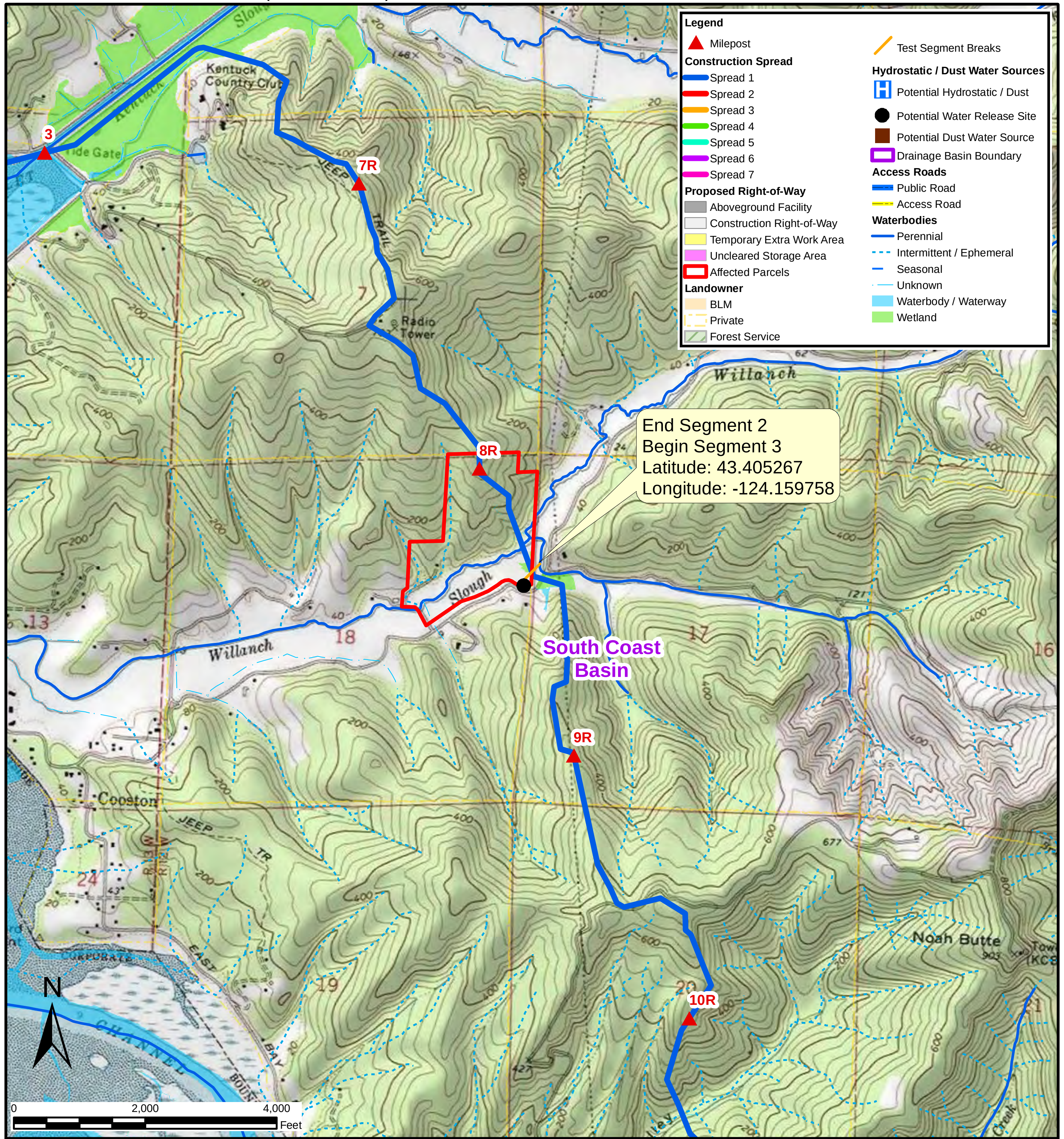
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 1 END / 2 BEGIN
MP 1.31
S-10, T-25-S, R-13-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 1 / 2	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 1 and 2.mxd



DRAWING NO.	REFERENCE TITLE

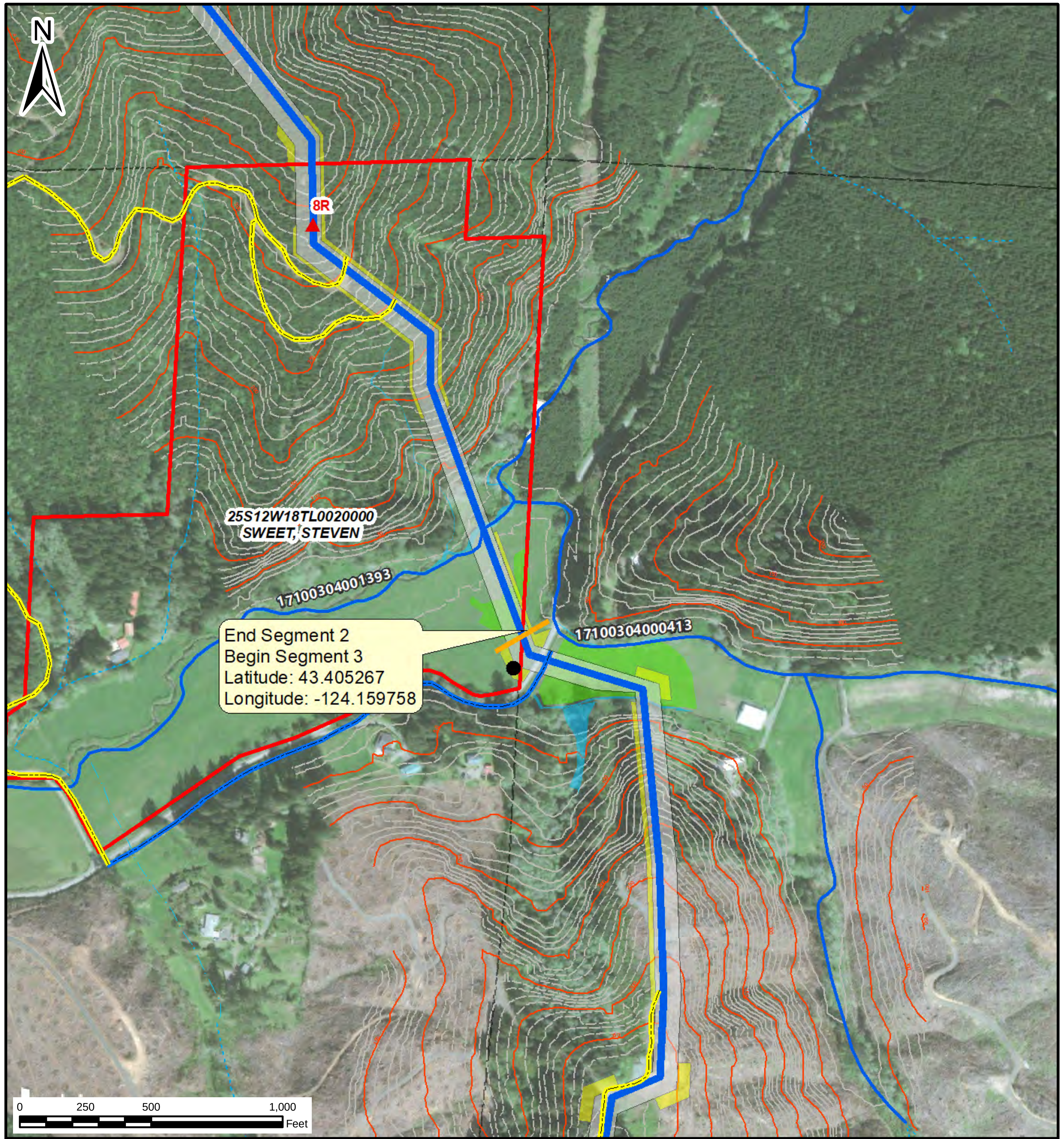
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 2 END / 3 BEGIN
MP 8.35R
S-18, T-25-S, R-12-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 2 / 3	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 2 and 3.mxd



DRAWING NO.	REFERENCE TITLE

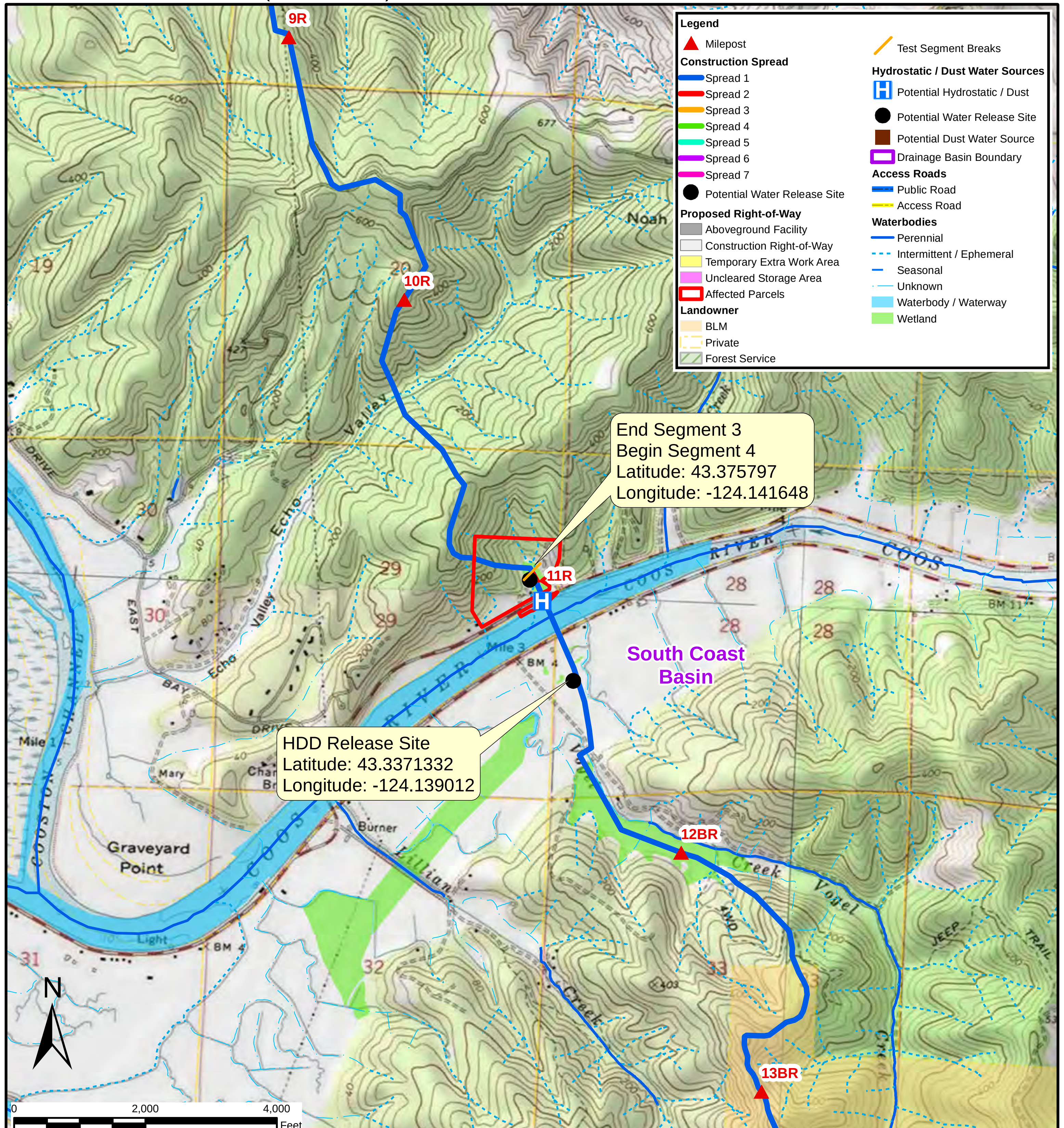
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 2 END / 3 BEGIN
MP 8.35R
S-18, T-25-S, R-12-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 2 / 3	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 2 and 3.mxd



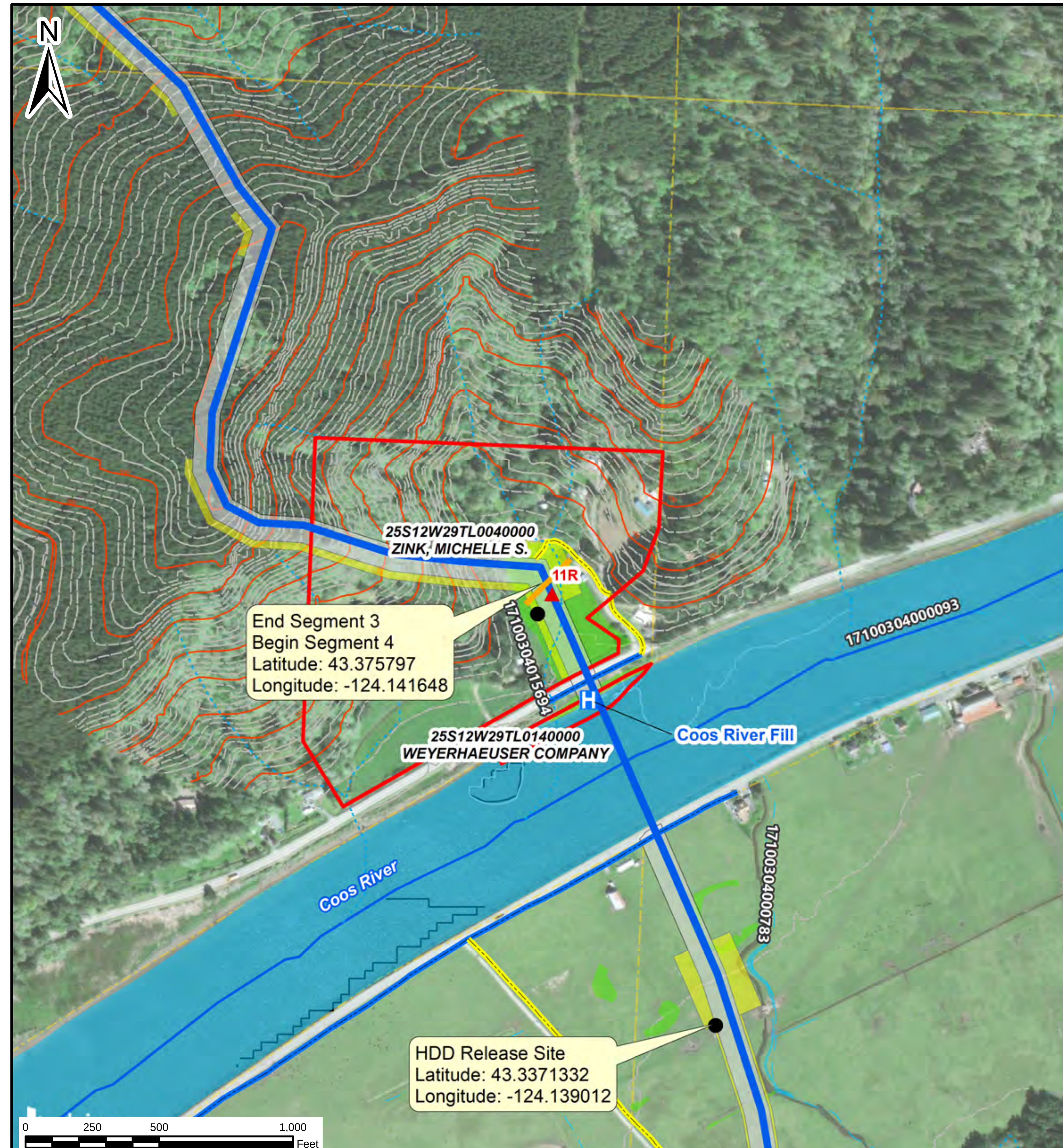
DRAWING NO. | REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 3 END / 4 BEGIN
MP 11.04R
S-29, T-25-S, R-12-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.	DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
							CHK BY:	DATE:	ISSUED FOR CONST:	
							APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 3 / 4	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 3 and 4.mxd



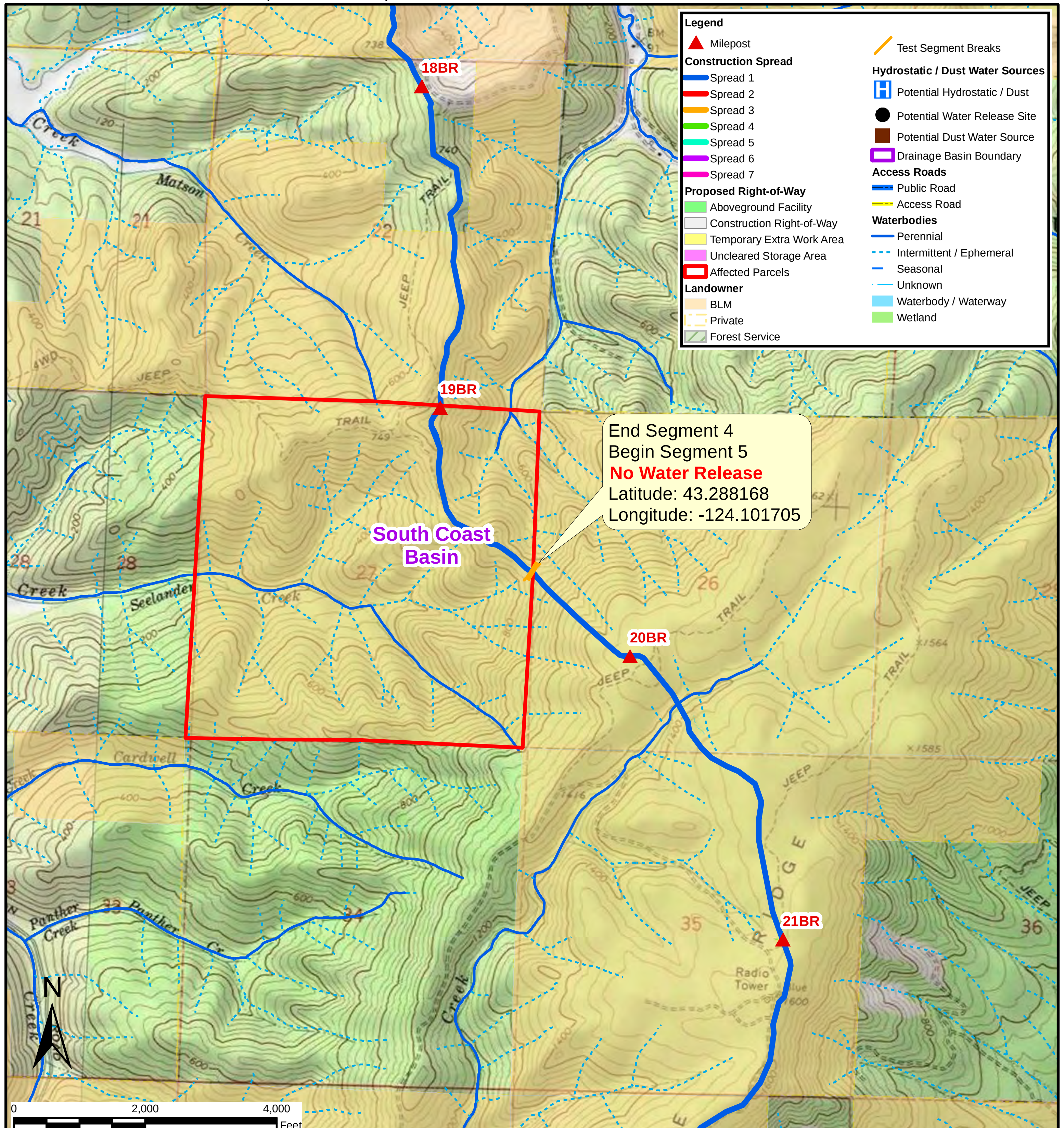
DRAWING NO. | REFERENCE TITLE

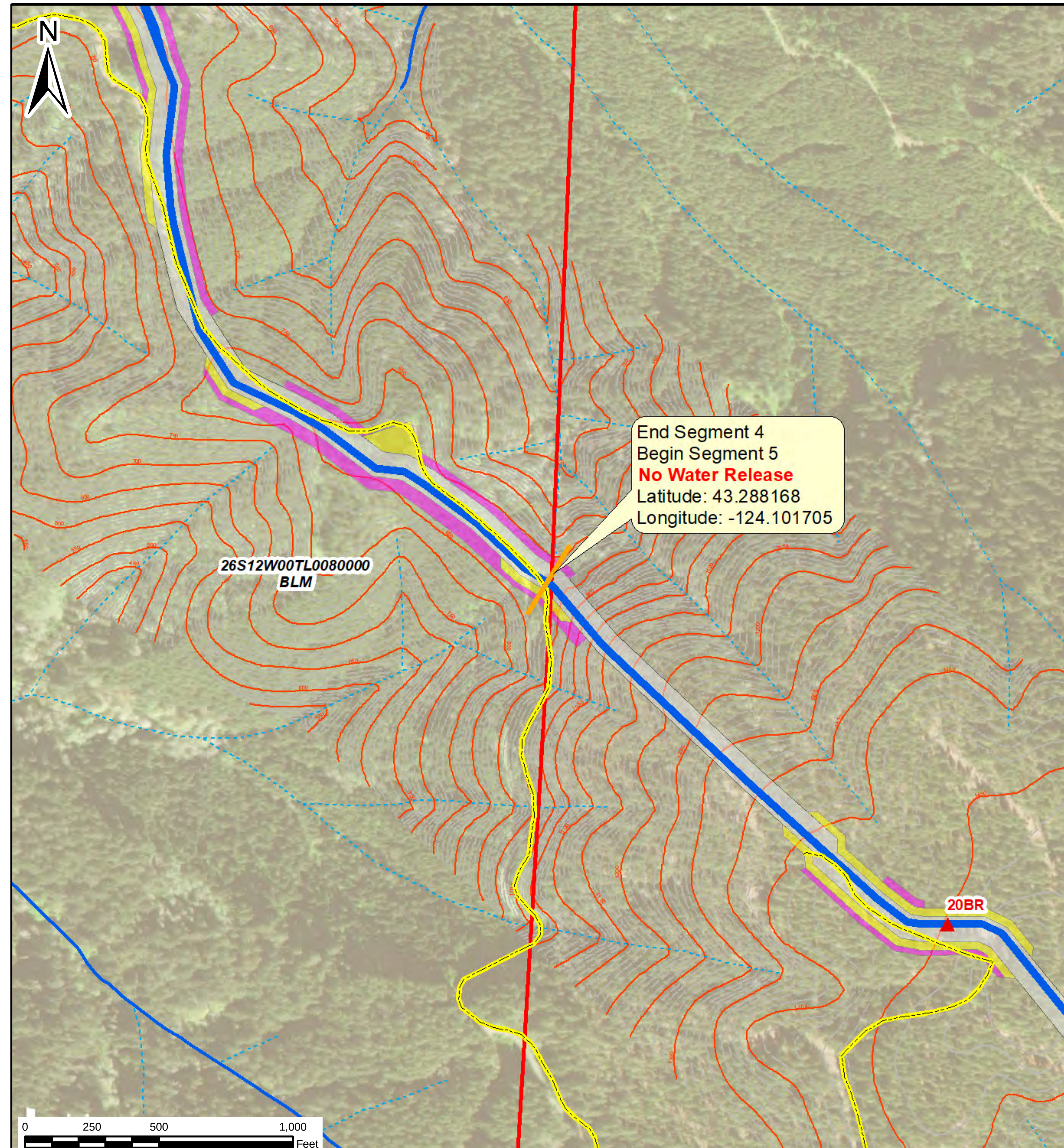
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 3 END / 4 BEGIN
MP 11.04R
S-29, T-25-S, R-12-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.	DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
							CHK BY:	DATE:	ISSUED FOR CONST:	
							APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 3 / 4	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 3 and 4.mxd





DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 4 END / 5 BEGIN
MP 19.62BR
S-27, T-26-S, R-12-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 4 / 5	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 4 and 5.mxd

DRAWING NO.	REFERENCE TITLE

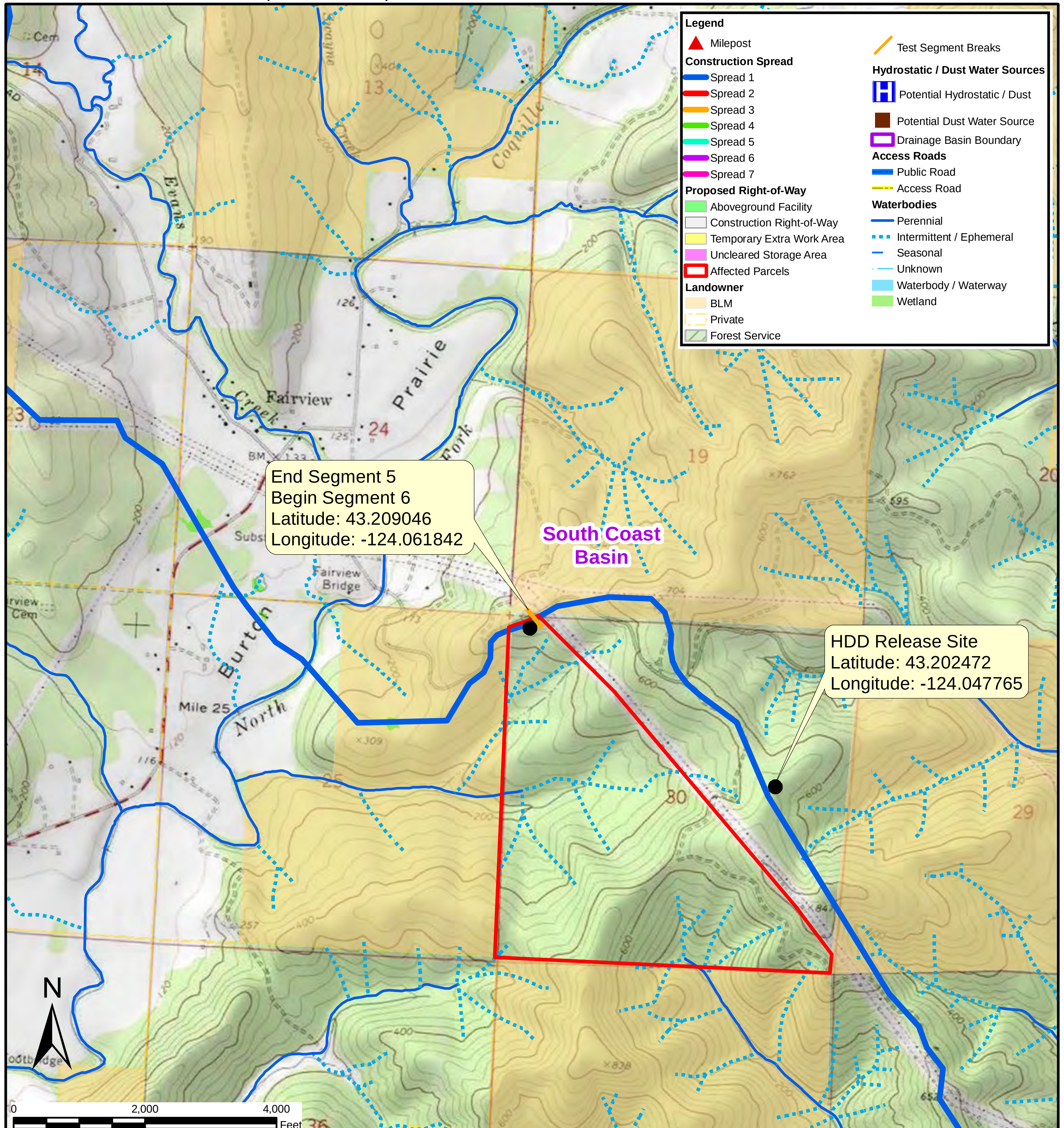
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 4 END / 5 BEGIN
MP 19.62BR
S-27, T-26-S, R-12-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 4 / 5	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 4 and 5.mxd



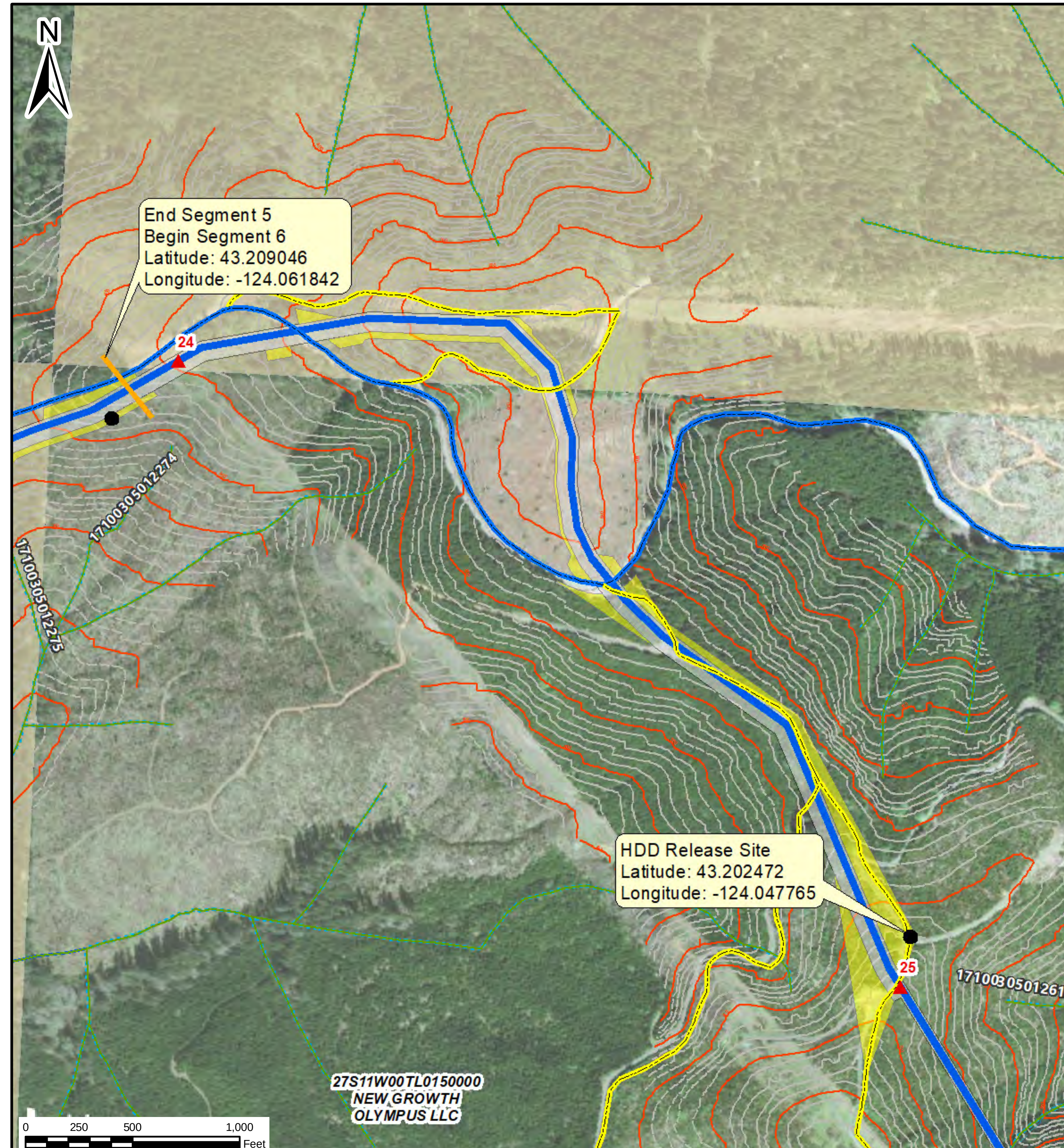
DRAWING NO. | REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 5 END / 6 BEGIN
MP 23.95
S-30, T-27-S, R-11-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.	DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
							CHK BY:	DATE:	ISSUED FOR CONST:	
							APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 5 / 6	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 5 and 6.mxd



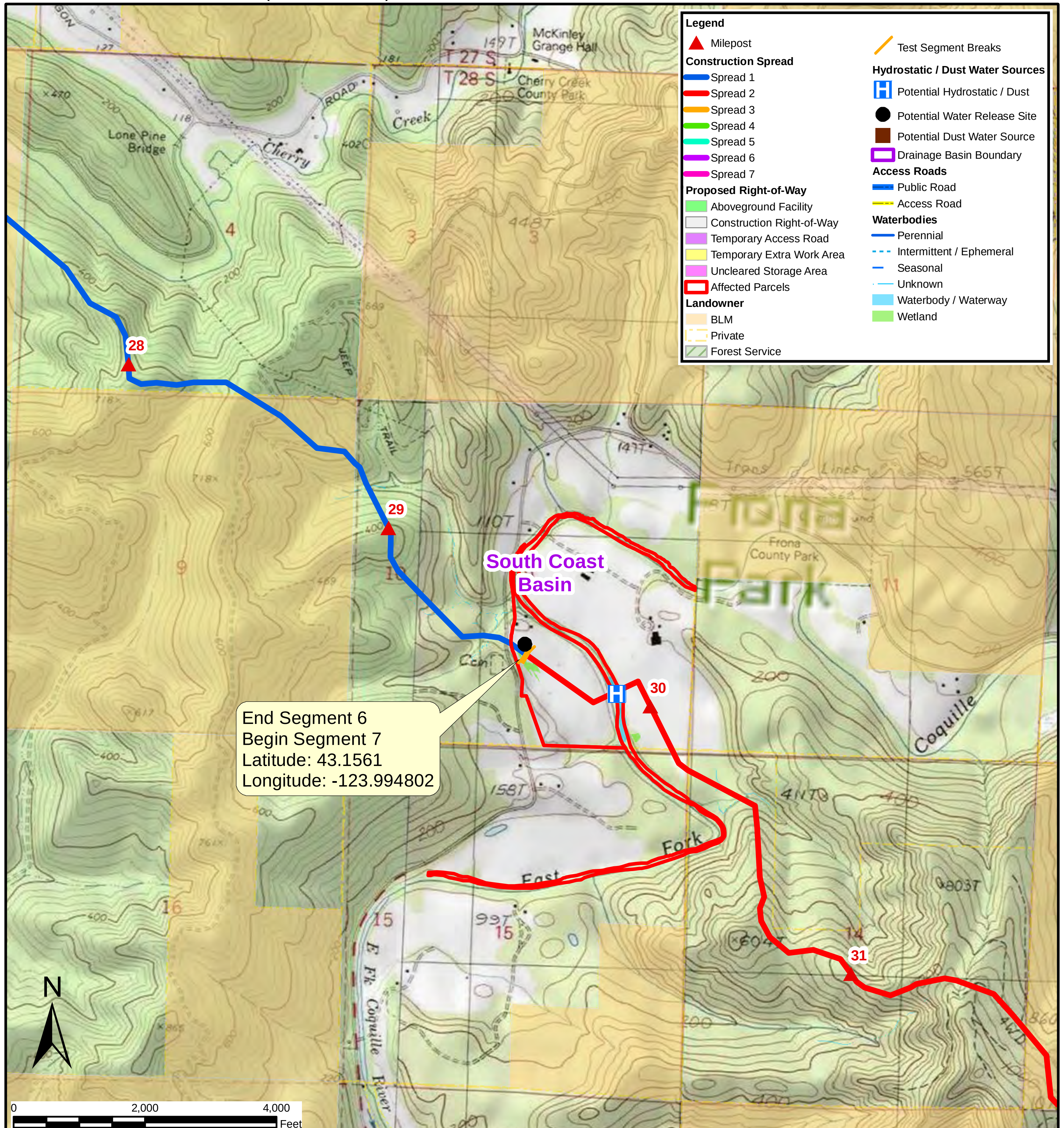
DRAWING NO. | REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 5 END / 6 BEGIN
MP 23.95
S-30, T-27-S, R-11-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.	DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 625
							CHK BY:	DATE:	ISSUED FOR CONST:	
							APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 5 / 6	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 5 and 6.mxd



DRAWING NO.	REFERENCE TITLE

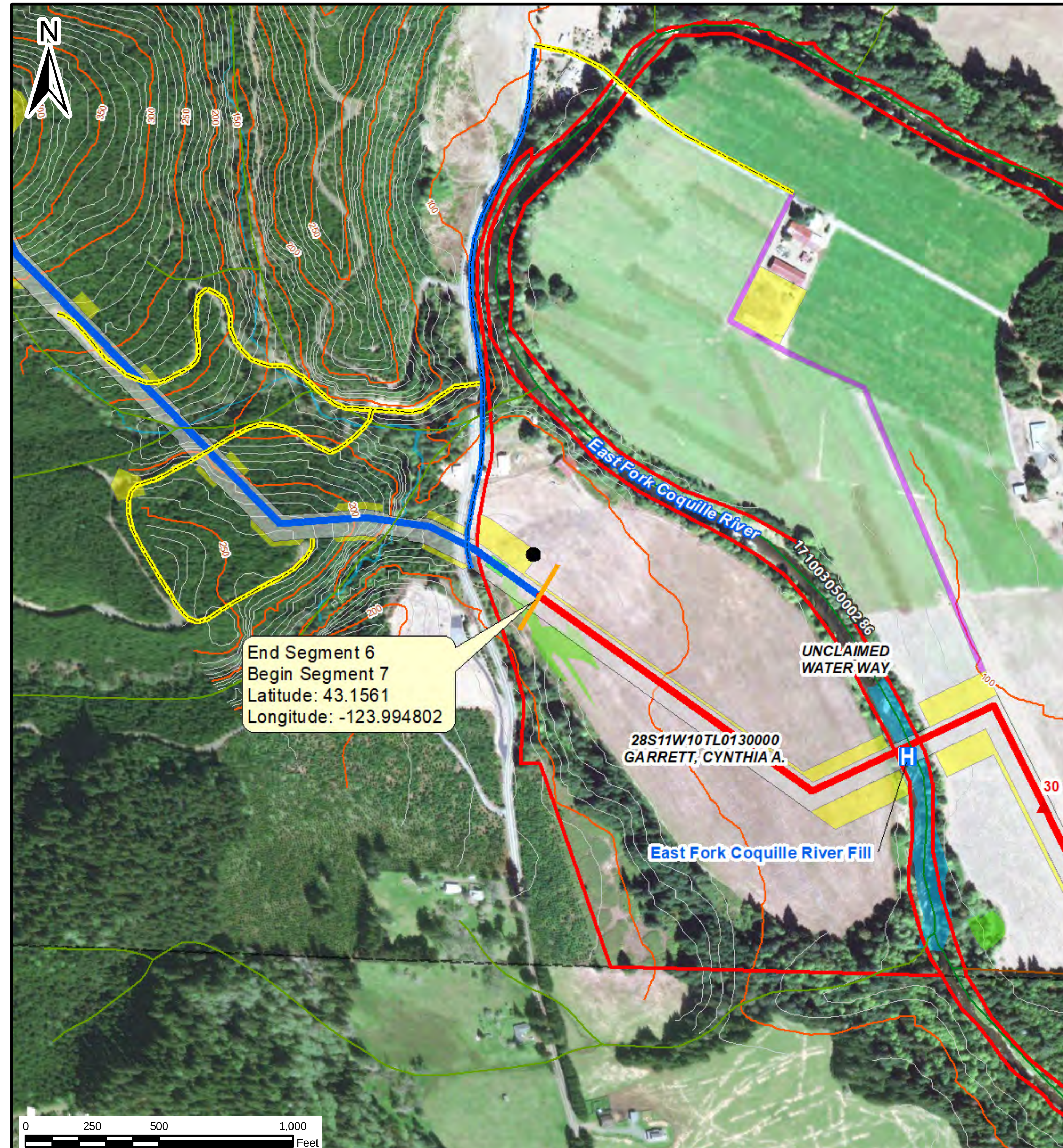
NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 6 END / 7 BEGIN
MP 29.54
S-10, T-28-S, R-11-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 6 / 7	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 6 and 7.mxd



DRAWING NO.	REFERENCE TITLE

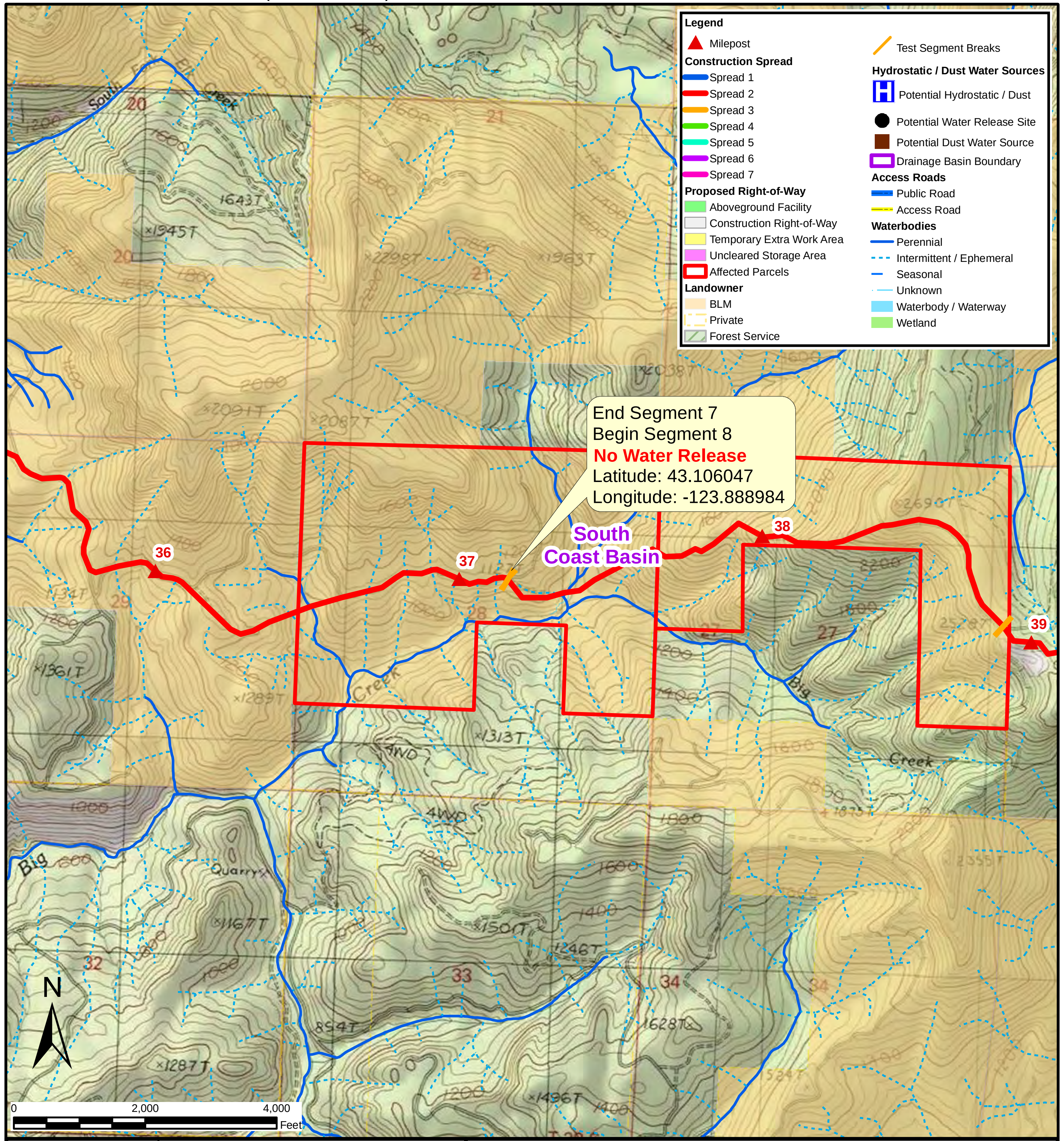
NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 6 END / 7 BEGIN
MP 29.54
S-10, T-28-S, R-11-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 6 / 7	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 6 and 7.mxd



DRAWING NO.	REFERENCE TITLE

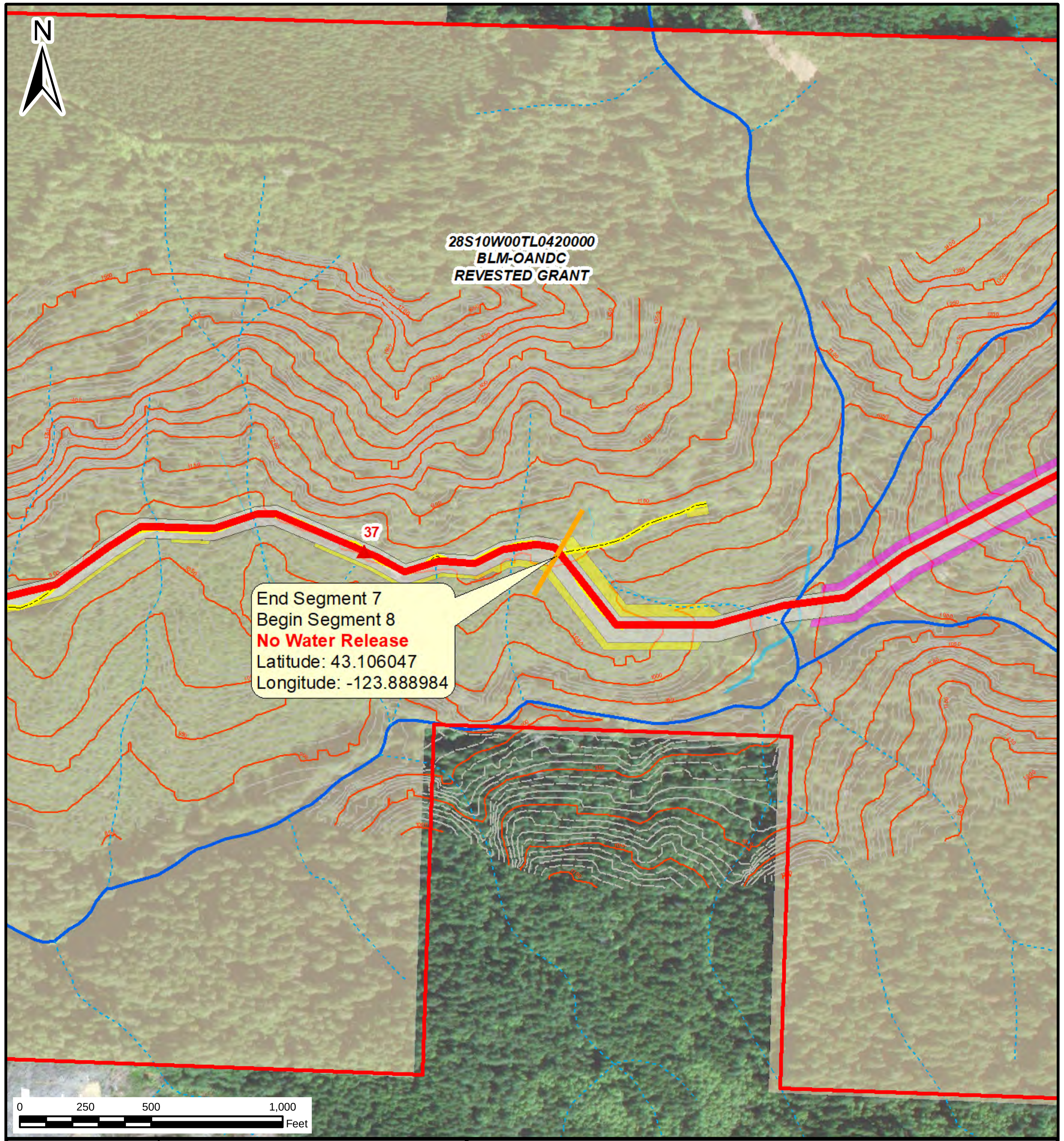
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 7 END/ 8 BEGIN
MP 37.15
S-28, T-28-S, R-10-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 7 / 8	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 7 and 8.mxd



DRAWING NO.	REFERENCE TITLE

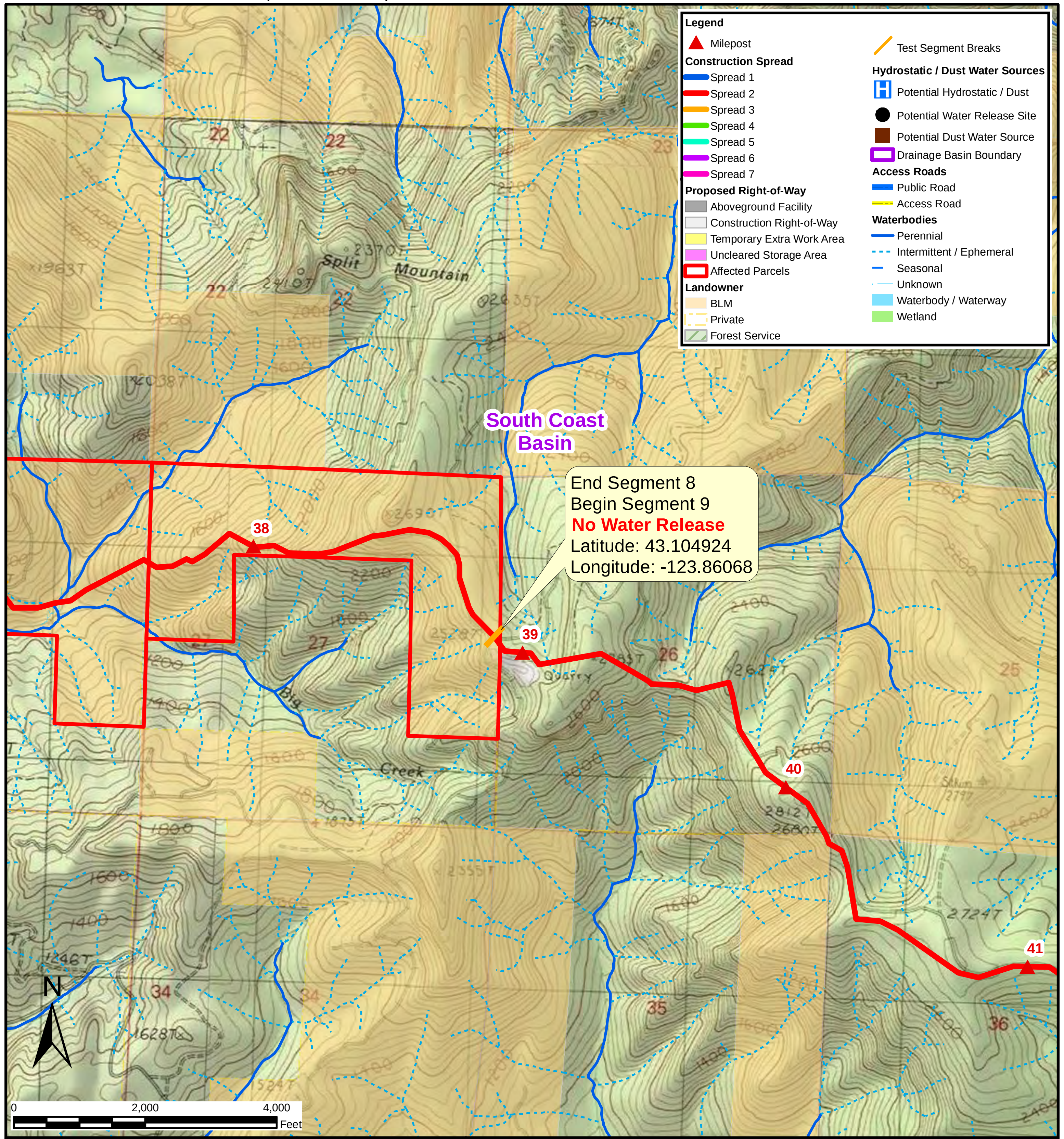
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 7 END/ 8 BEGIN
MP 37.15
S-28, T-28-S, R-10-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 7 / 8	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 7 and 8.mxd



DRAWING NO.	REFERENCE TITLE

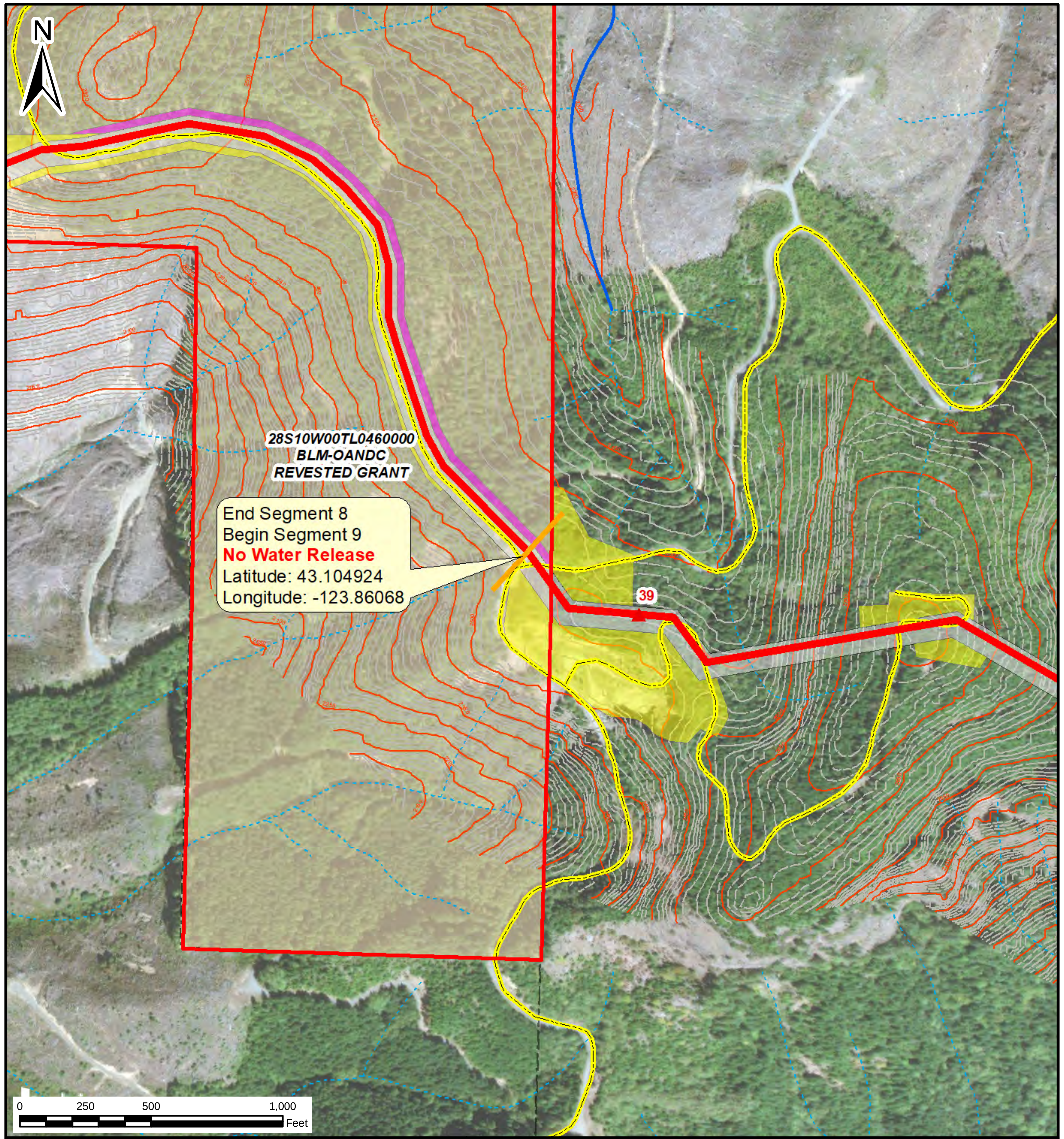
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 8 END / 9 BEGIN
MP 38.90
S-27, T-28-S, R-10-W
COOS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 8 / 9	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 8 and 9.mxd



DRAWING NO.	REFERENCE TITLE

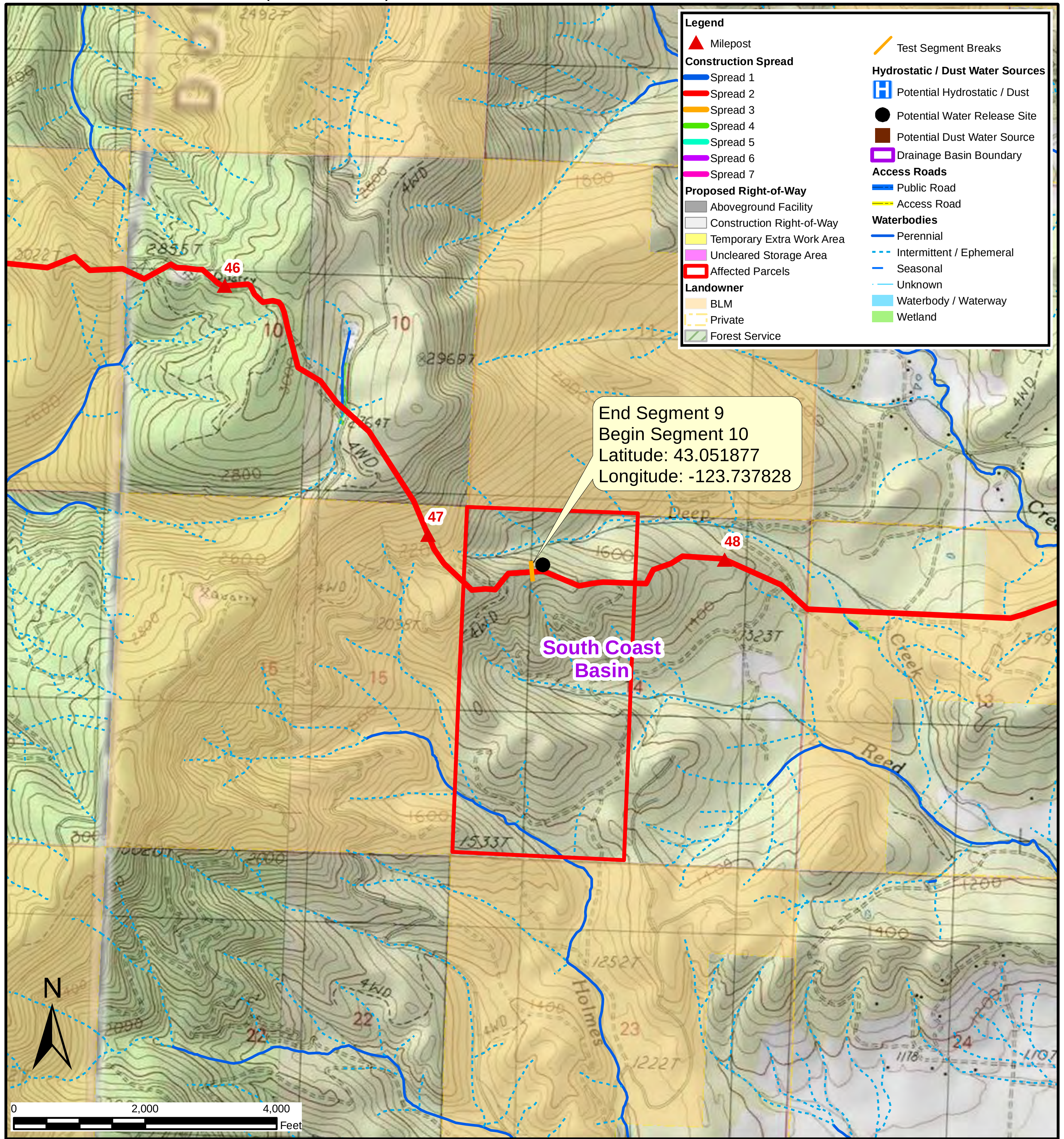
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 8 END / 9 BEGIN
MP 38.90
S-27, T-28-S, R-10-W
COOS COUNTY, OREGON

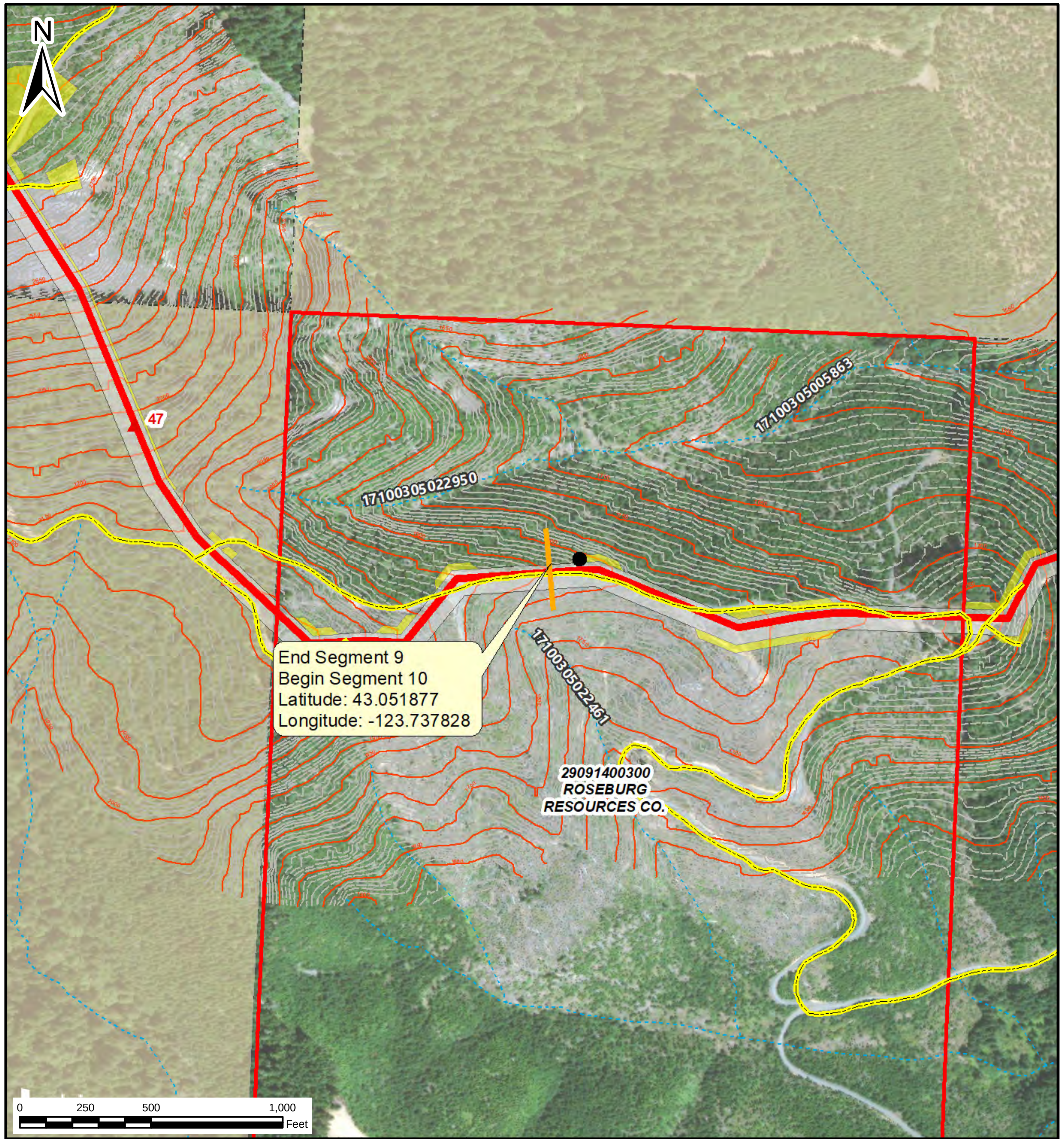
Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 8 / 9	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 8 and 9.mxd





DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 9 END / 10 BEGIN
MP 47.40
S-14, T-29-S, R-9-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 9 / 10	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 9 and 10.mxd

DRAWING NO.	REFERENCE TITLE

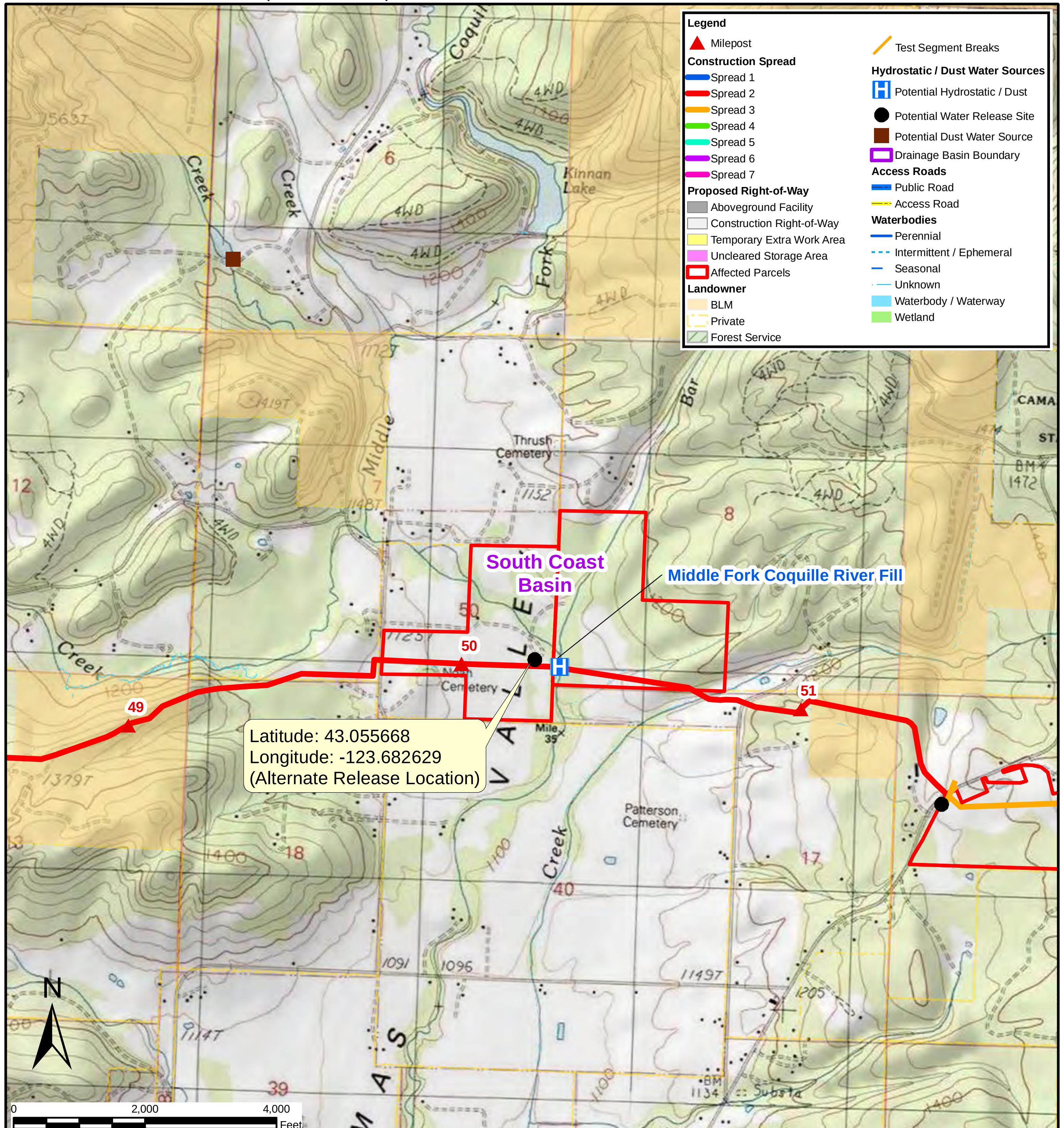
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 9 END / 10 BEGIN
MP 47.40
S-14, T-29-S, R-9-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 9 / 10	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 9 and 10.mxd



DRAWING NO.	REFERENCE TITLE

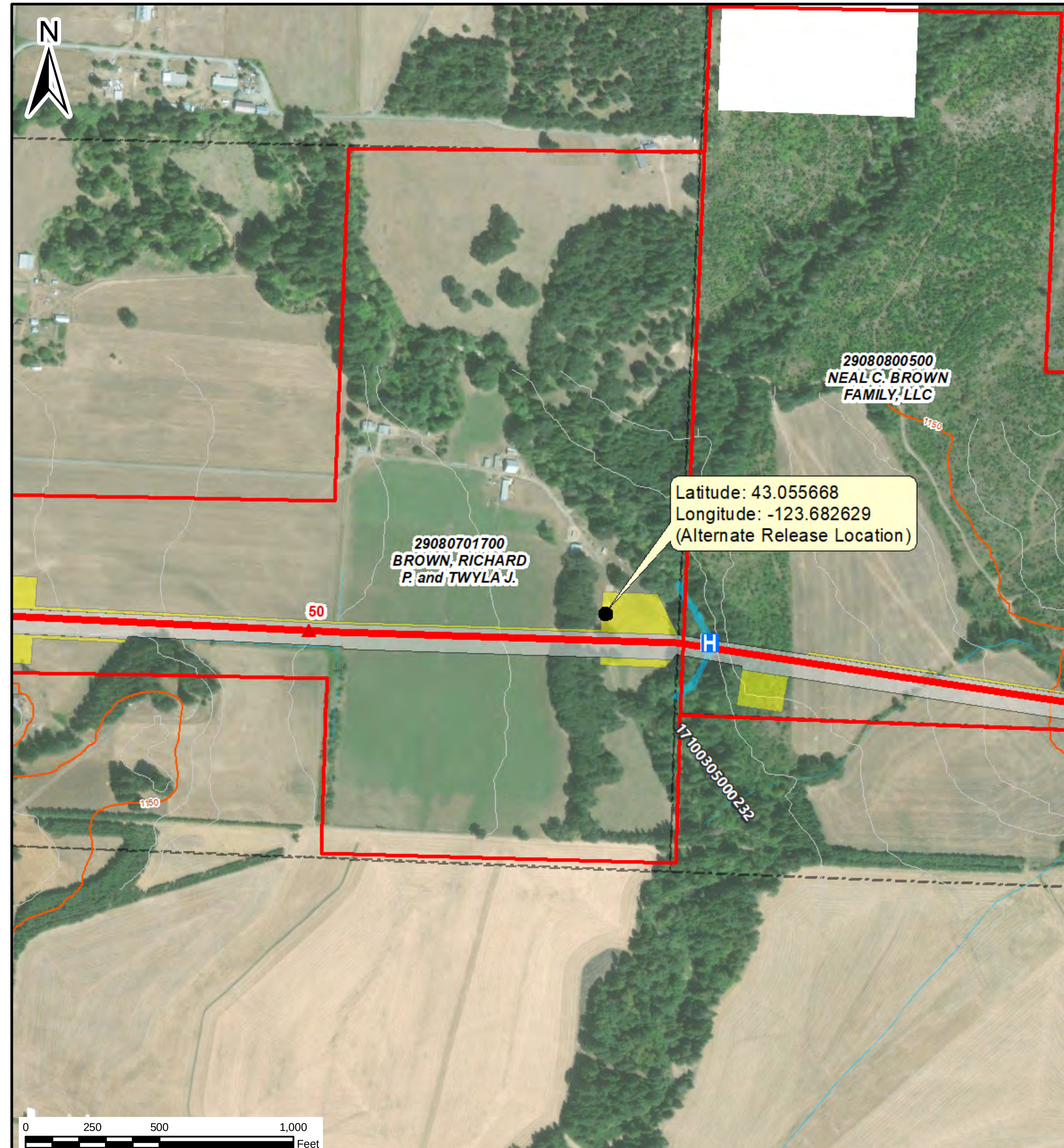
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 10 END / 11 BEGIN
MP 50.23
S-16, T-29-S, R-8-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 10 / 11A	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 10 and 11A.mxd



DRAWING NO.	REFERENCE TITLE

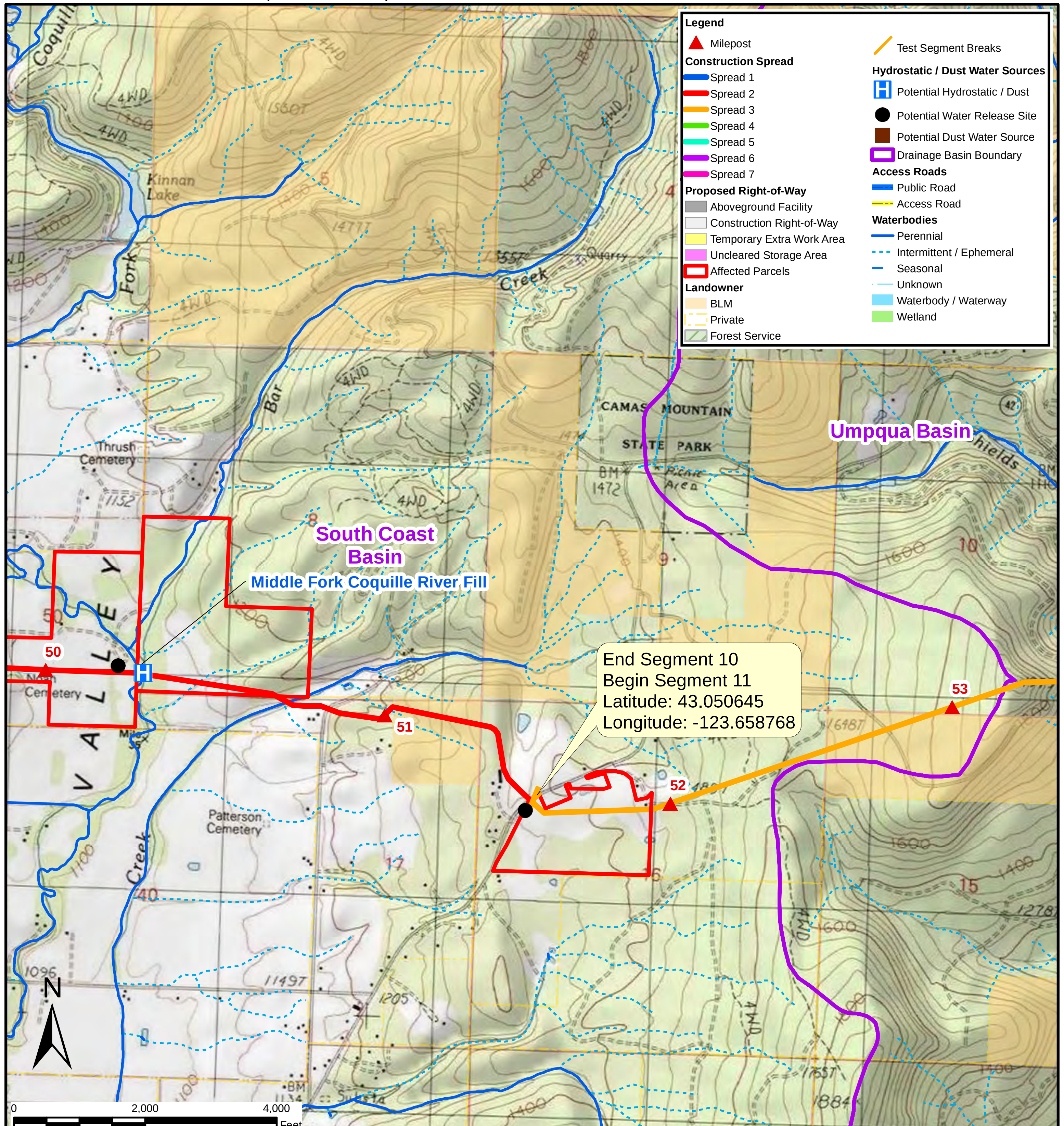
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 10 END / 11 BEGIN
MP 50.23
S-16, T-29-S, R-8-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 10 / 11A	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 10 and 11A.mxd



DRAWING NO.	REFERENCE TITLE

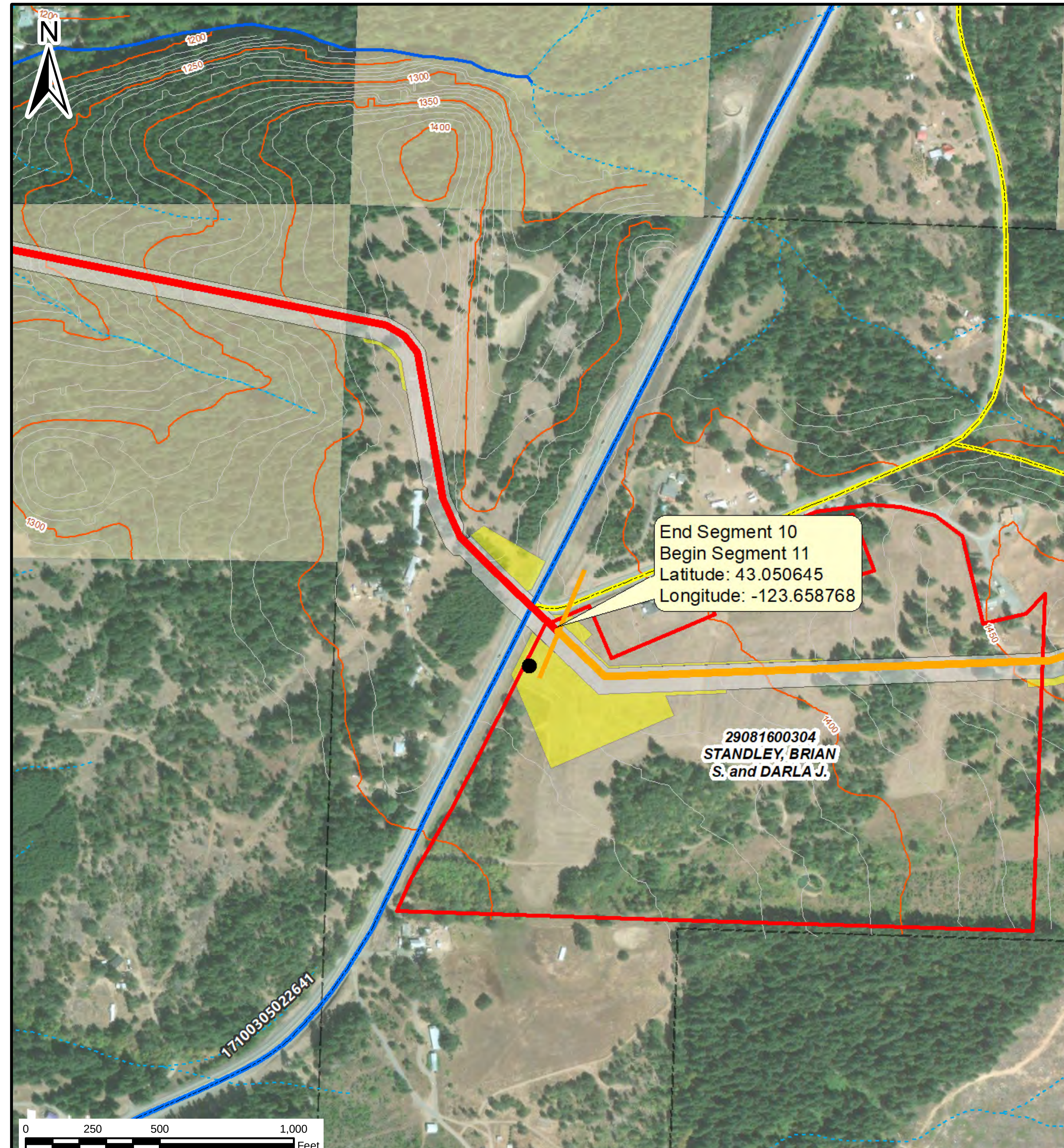
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 10 END / 11 BEGIN
MP 51.58
S-16, T-29-S, R-8-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 10 / 11B	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 10 and 11B.mxd



DRAWING NO.	REFERENCE TITLE

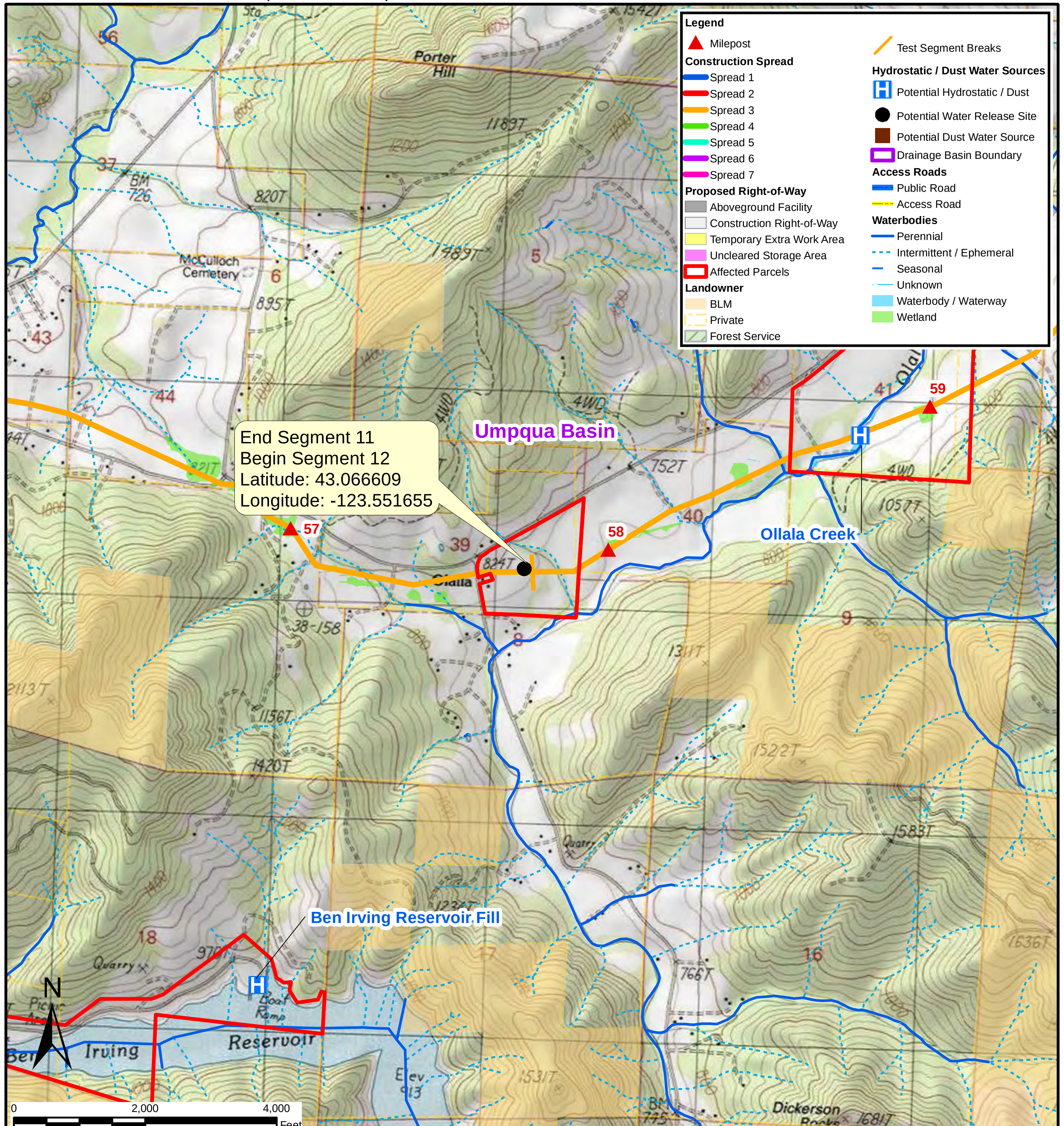
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 10 END / 11 BEGIN
MP 51.58
S-16, T-29-S, R-8-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 10 / 11B	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 10 and 11B.mxd



DRAWING NO.	REFERENCE TITLE

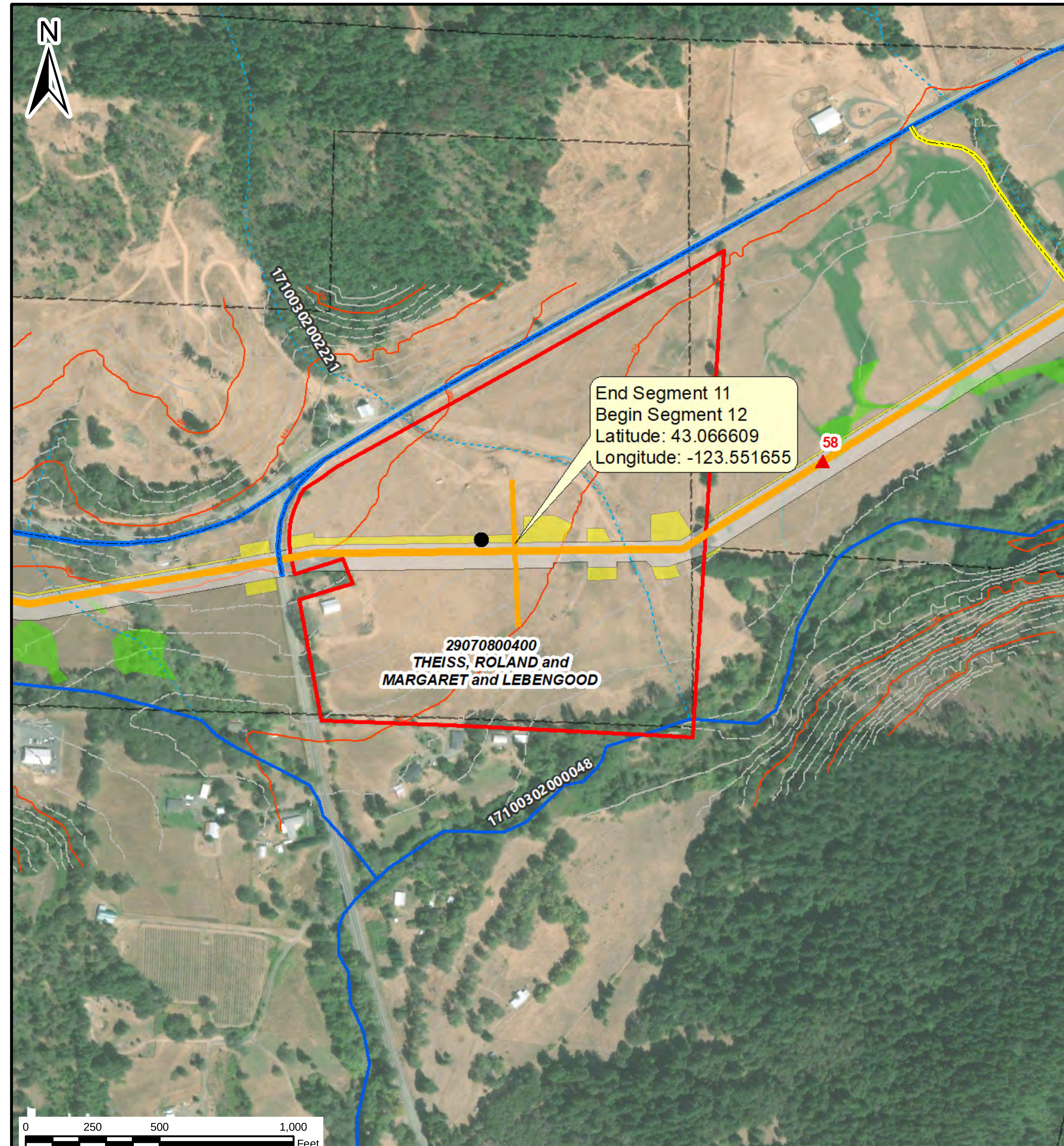
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 11 END / 12 BEGIN
MP 57.76
S-8, T-29-S, R-7-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 11 / 12	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 11 and 12.mxd



DRAWING NO.	REFERENCE TITLE

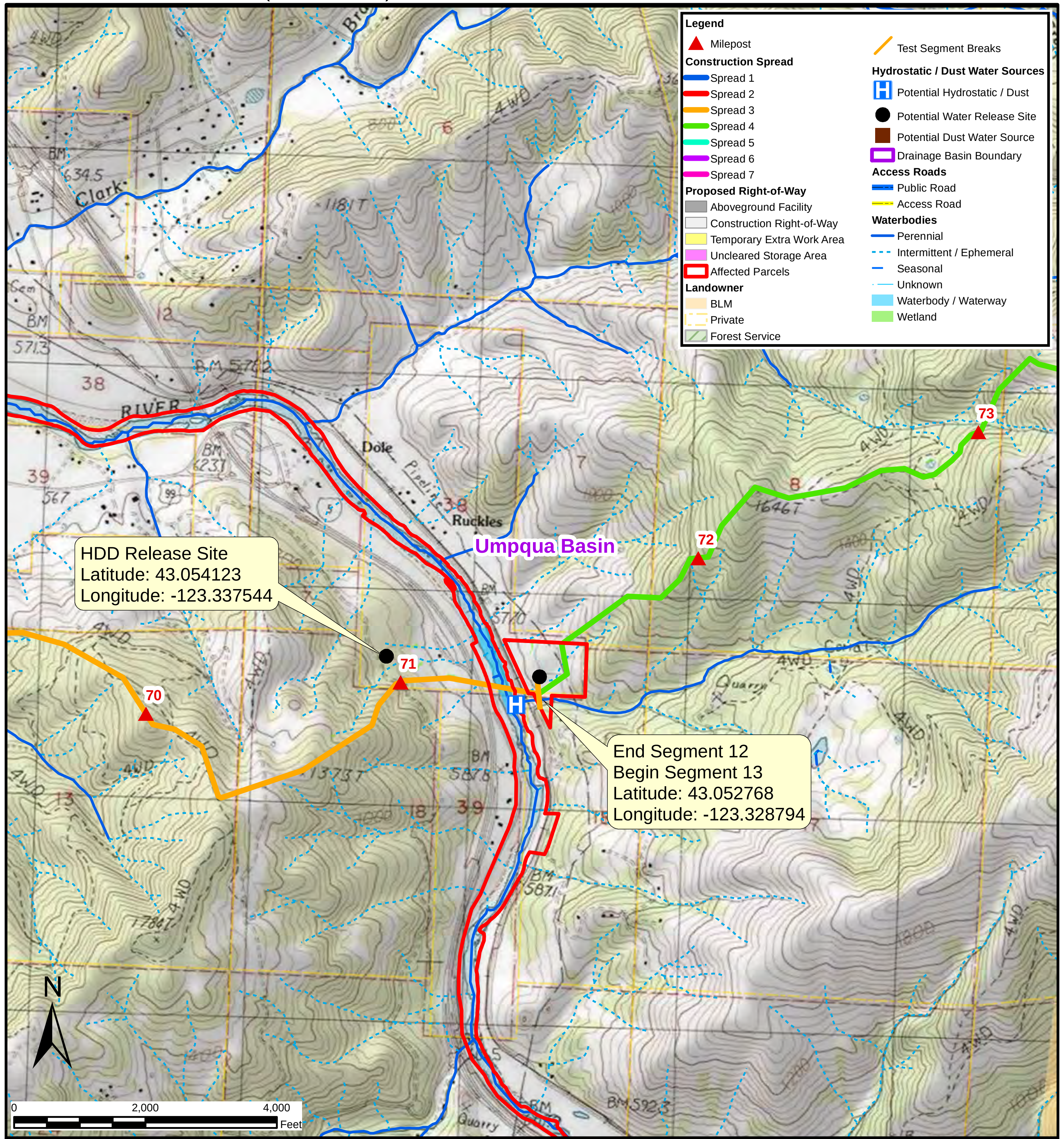
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 11 END / 12 BEGIN
MP 57.76
S-8, T-29-S, R-7-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 11 / 12	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 11 and 12.mxd



DRAWING NO.	REFERENCE TITLE

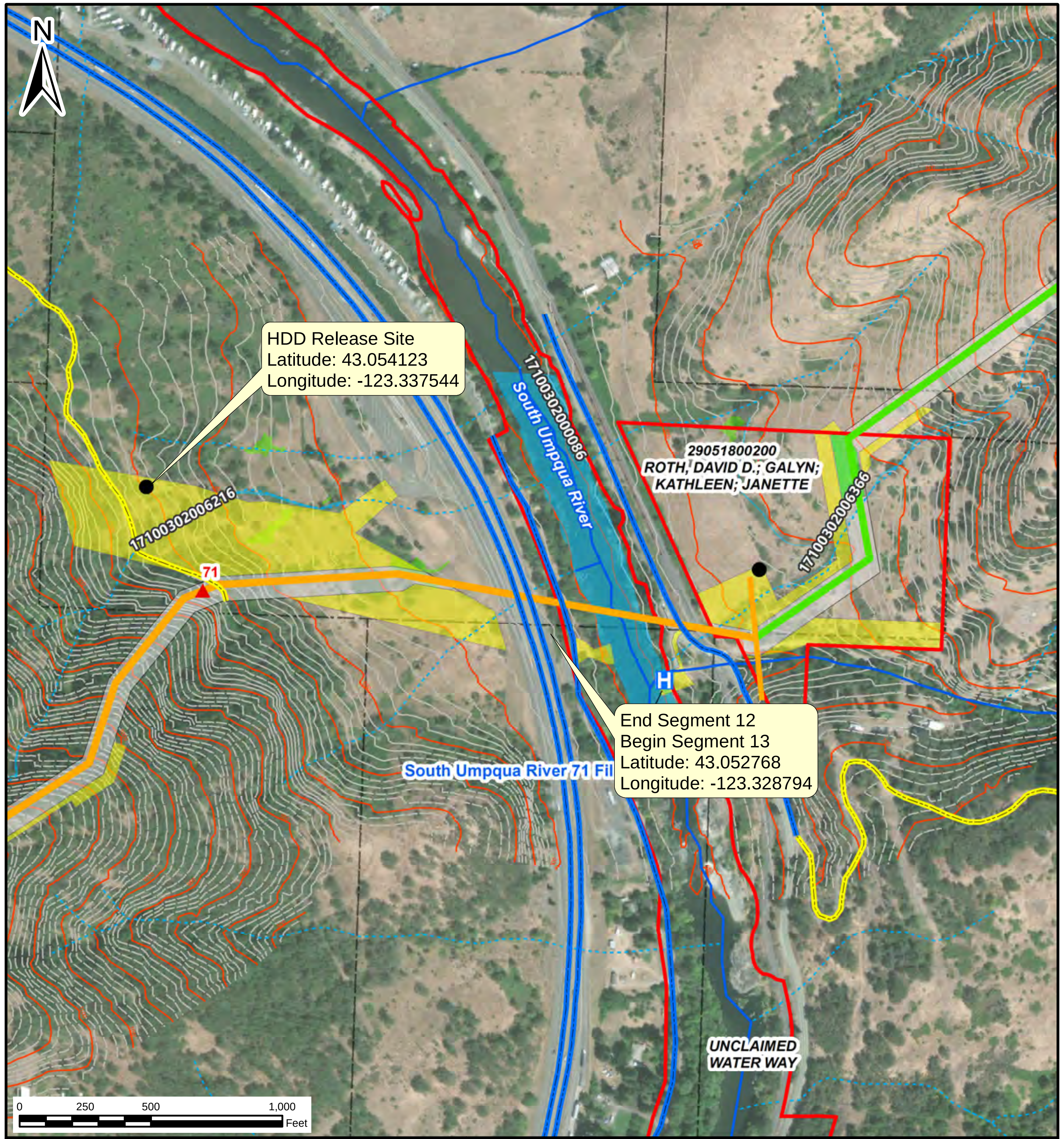
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 12 END / 13 BEGIN
MP 71.37
S-18, T-29-S, R-5-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 12 / 13	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 12 and 13.mxd



DRAWING NO.	REFERENCE TITLE

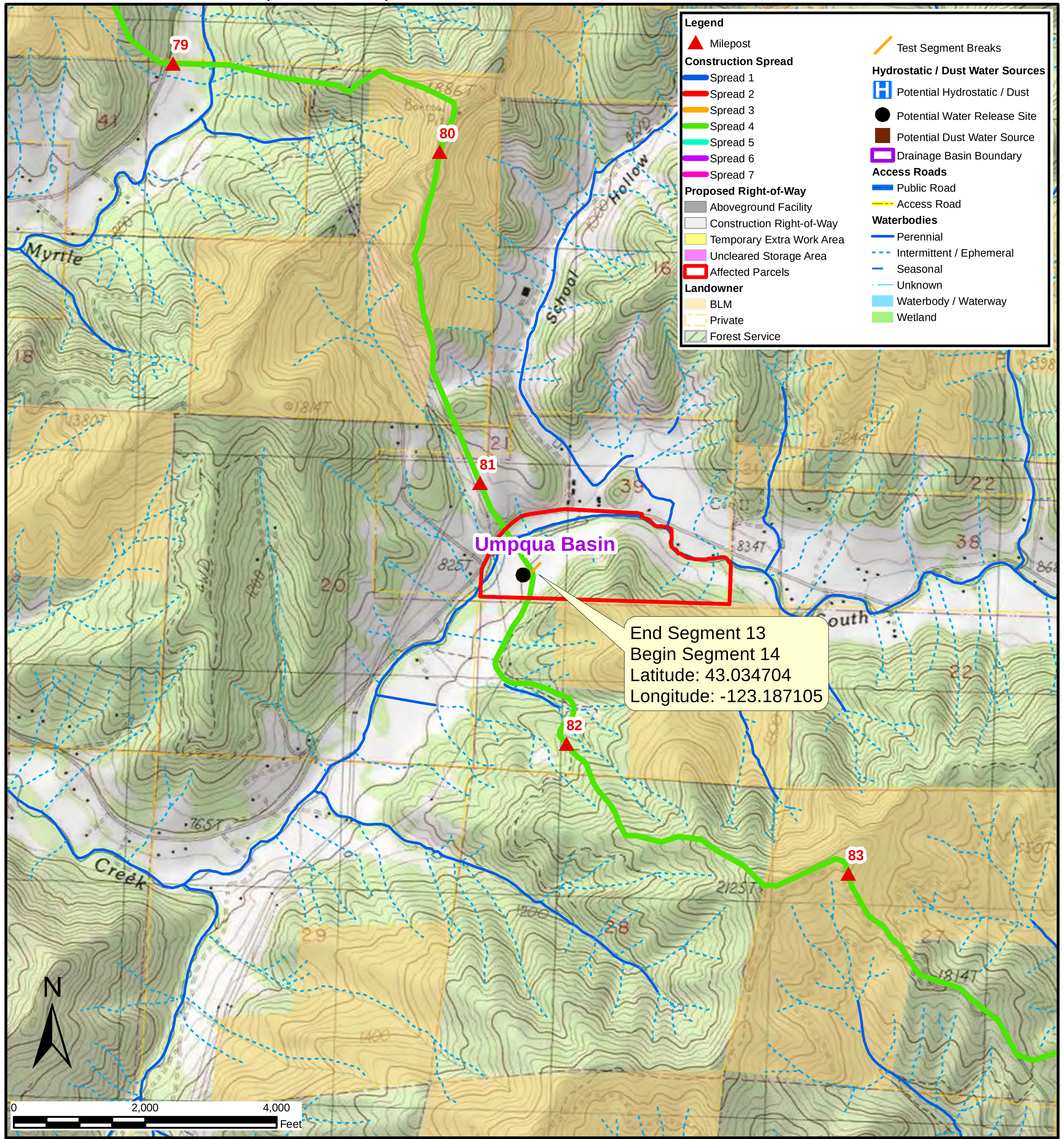
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 12 END / 13 BEGIN
MP 71.37
S-18, T-29-S, R-5-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 12 / 13	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 12 and 13.mxd



DRAWING NO.	REFERENCE TITLE

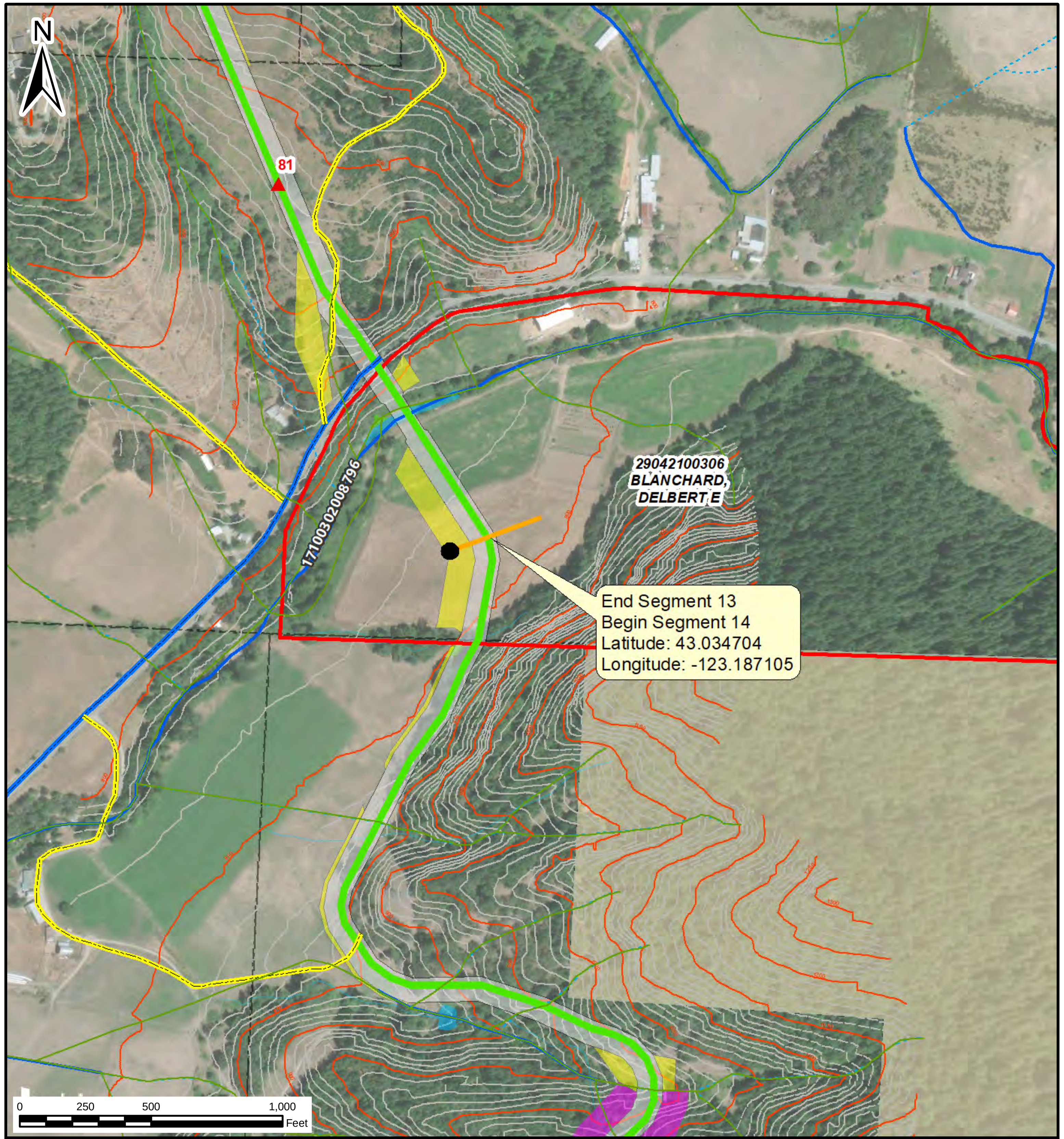
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 13 END / 14 BEGIN
MP 81.30
S-21, T-29-S, R-4-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 13 / 14	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 13 and 14.mxd



DRAWING NO.	REFERENCE TITLE

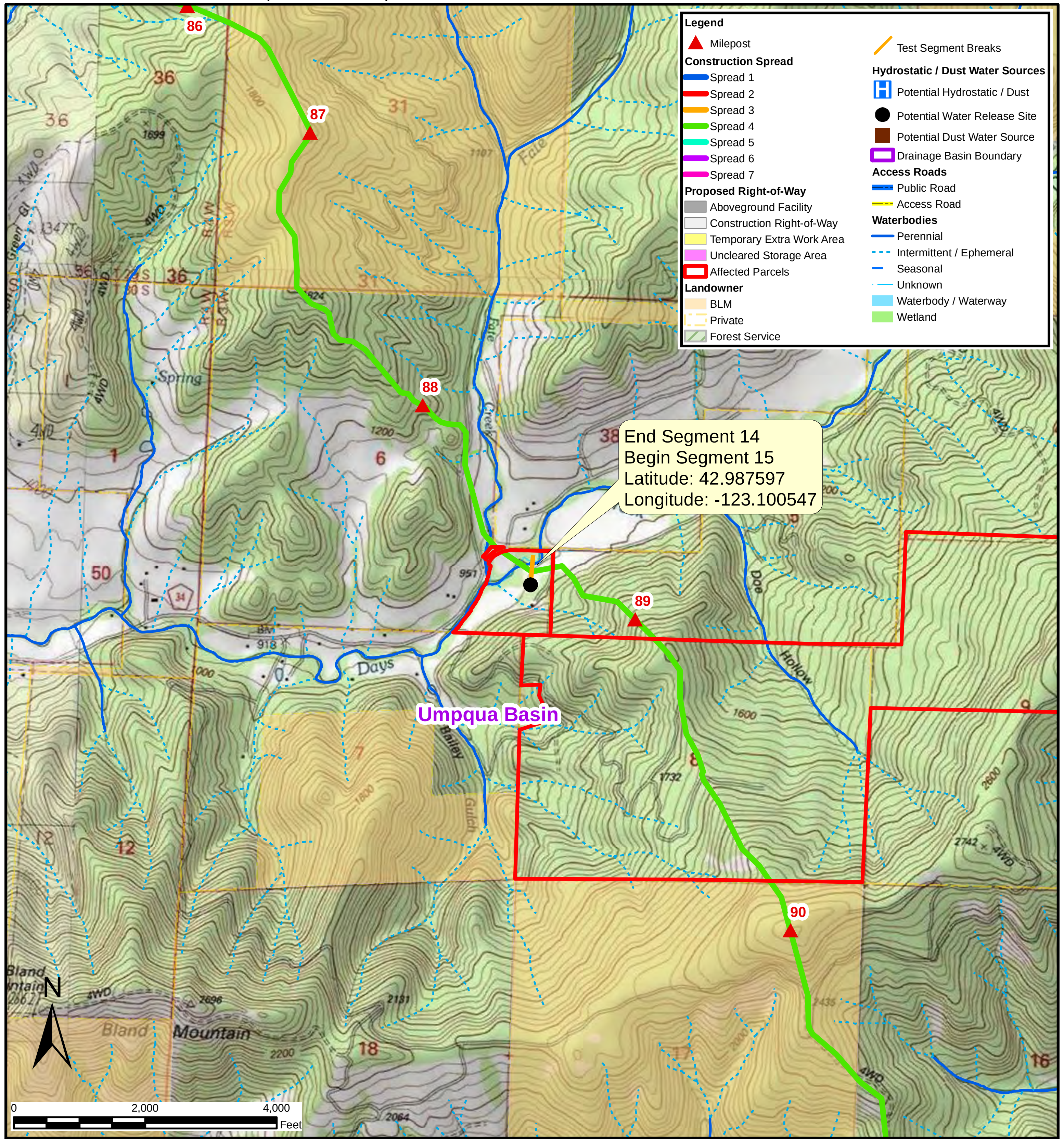
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 13 END / 14 BEGIN
MP 81.30
S-21, T-29-S, R-4-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 13 / 14	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 13 and 14.mxd



DRAWING NO.	REFERENCE TITLE

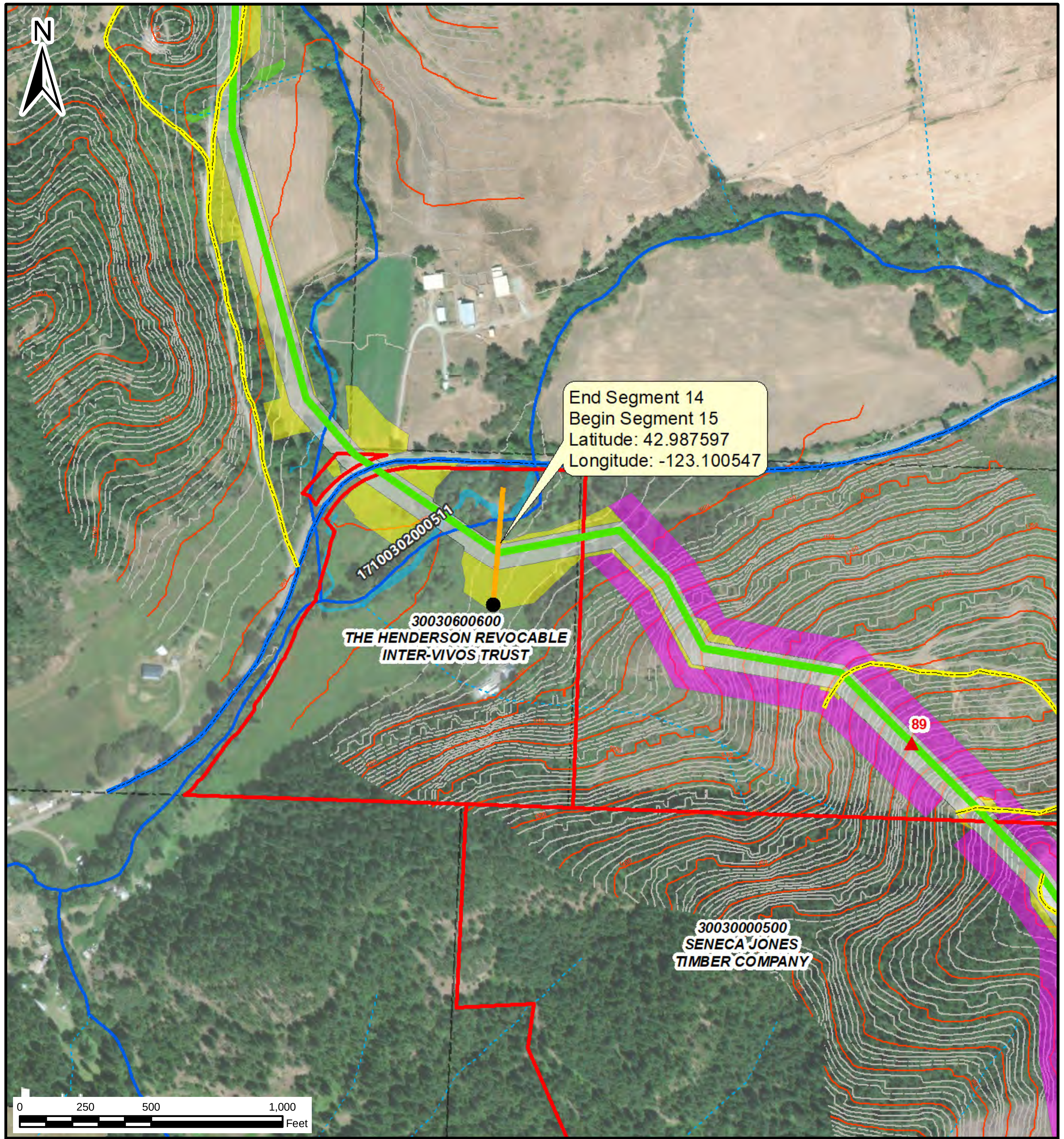
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 14 END / 15 BEGIN
MP 88.63
S-, T-30-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 14 / 15	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 14 and 15.mxd



DRAWING NO.	REFERENCE TITLE

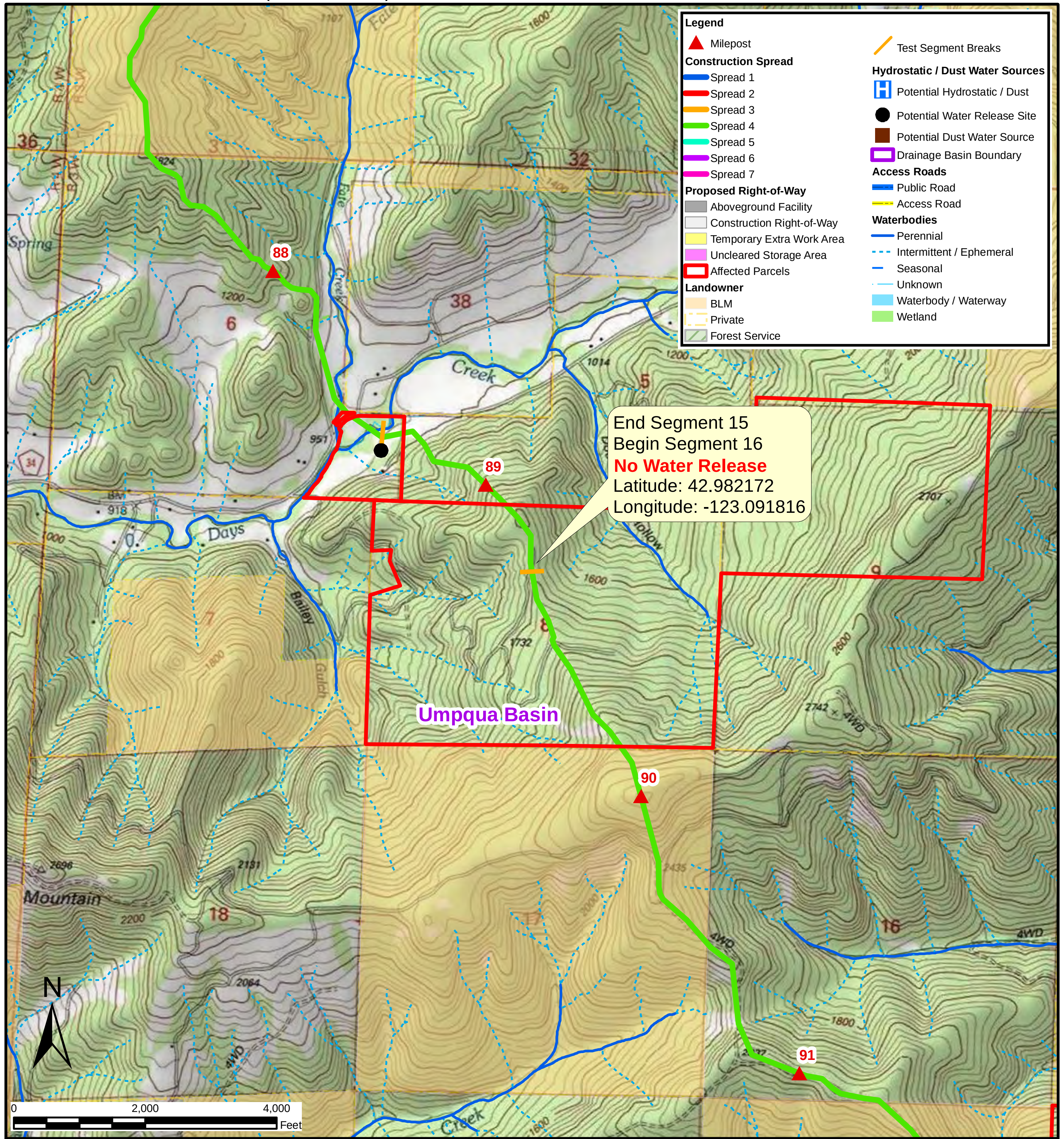
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 14 END / 15 BEGIN
MP 88.63
S-, T-30-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 14 / 15	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 14 and 15.mxd



DRAWING NO.	REFERENCE TITLE

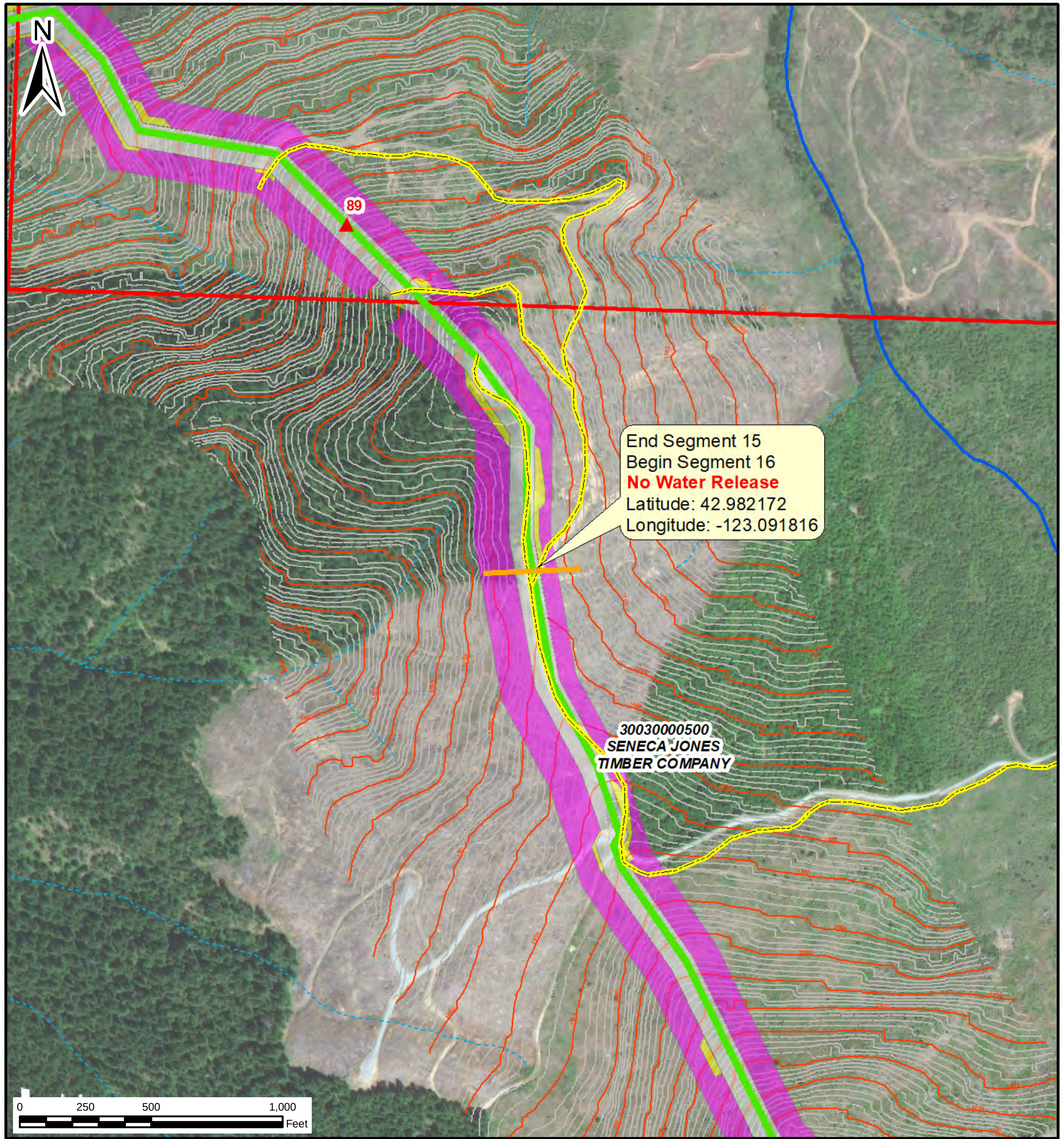
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 15 END / 16 BEGIN
MP 89.30
S-8, T-30-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 15 / 16	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 15 and 16.mxd



DRAWING NO.	REFERENCE TITLE

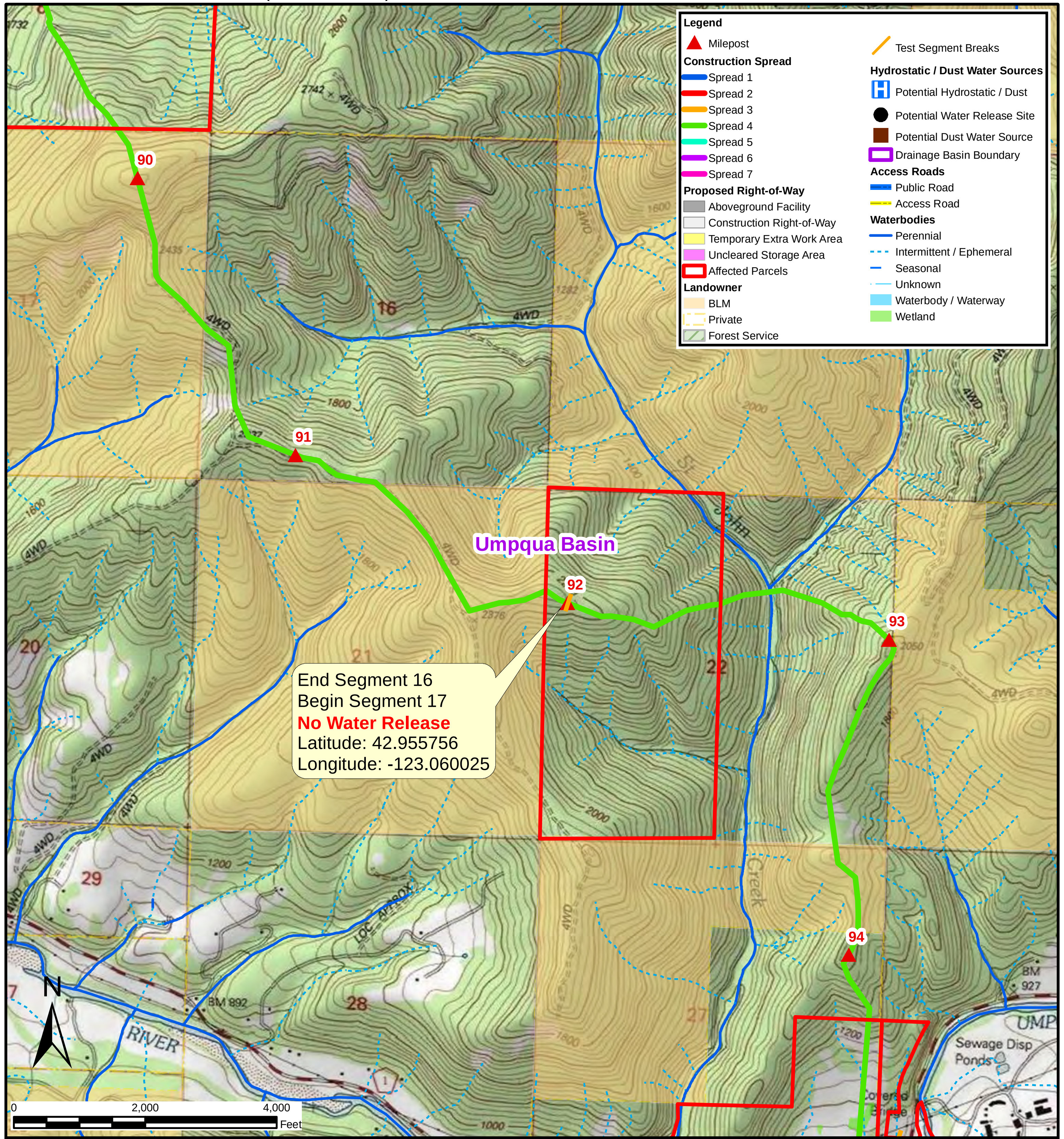
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 15 END / 16 BEGIN
MP 89.30
S-8, T-30-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 15 / 16	SHEET 2 OF 2

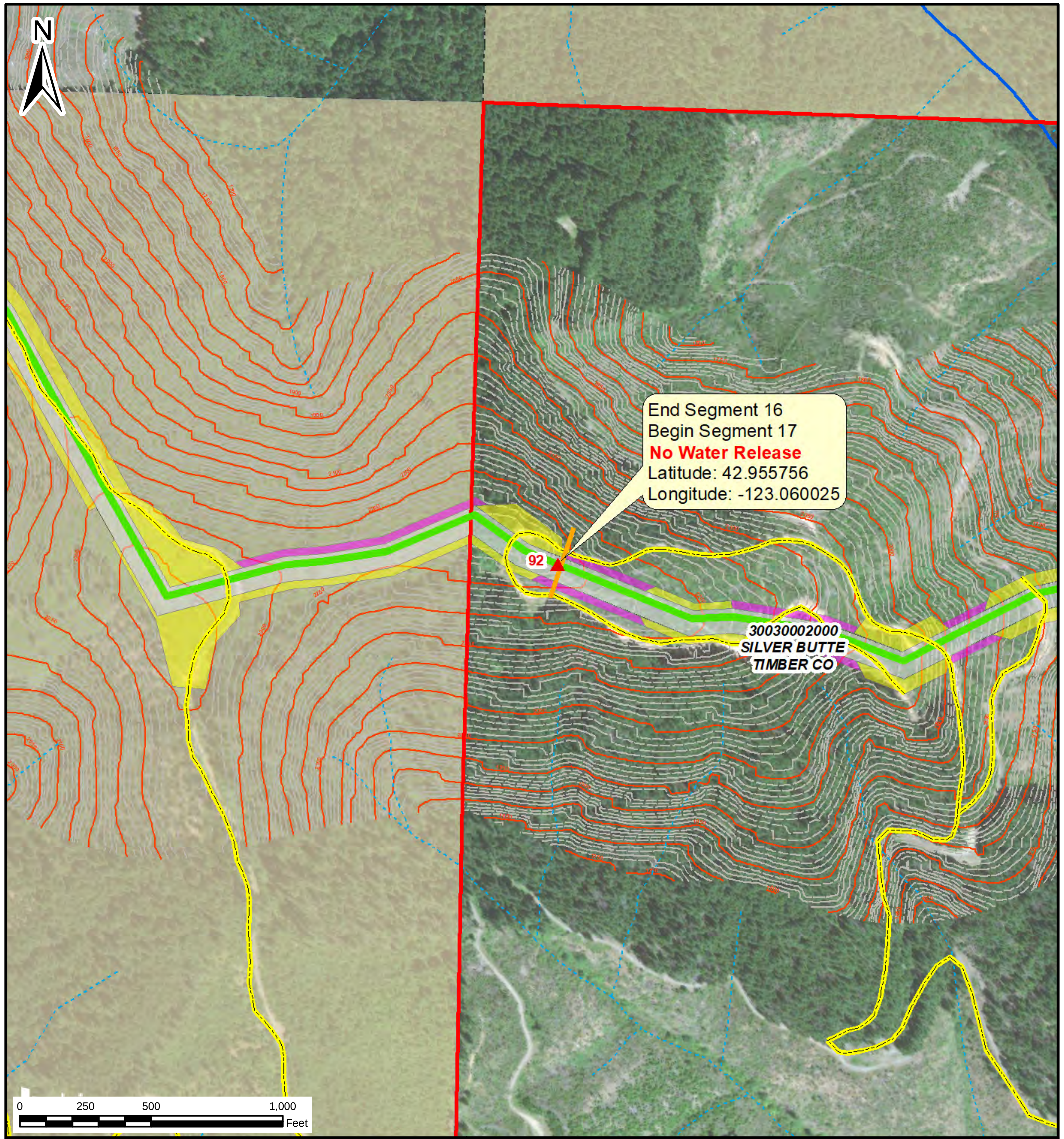
Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 15 and 16.mxd



DRAWING NO.	REFERENCE TITLE	PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP 36" PACIFIC CONNECTOR GAS PIPELINE HYDROSTATIC TEST SEGMENT 16 END / 17 BEGIN MP 92.00 S-22, T-30-S, R-3-W DOUGLAS COUNTY, OREGON

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.	DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
							CHK BY:	DATE:	ISSUED FOR CONST:	
							APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 16 / 17	SHEET 1 OF 2

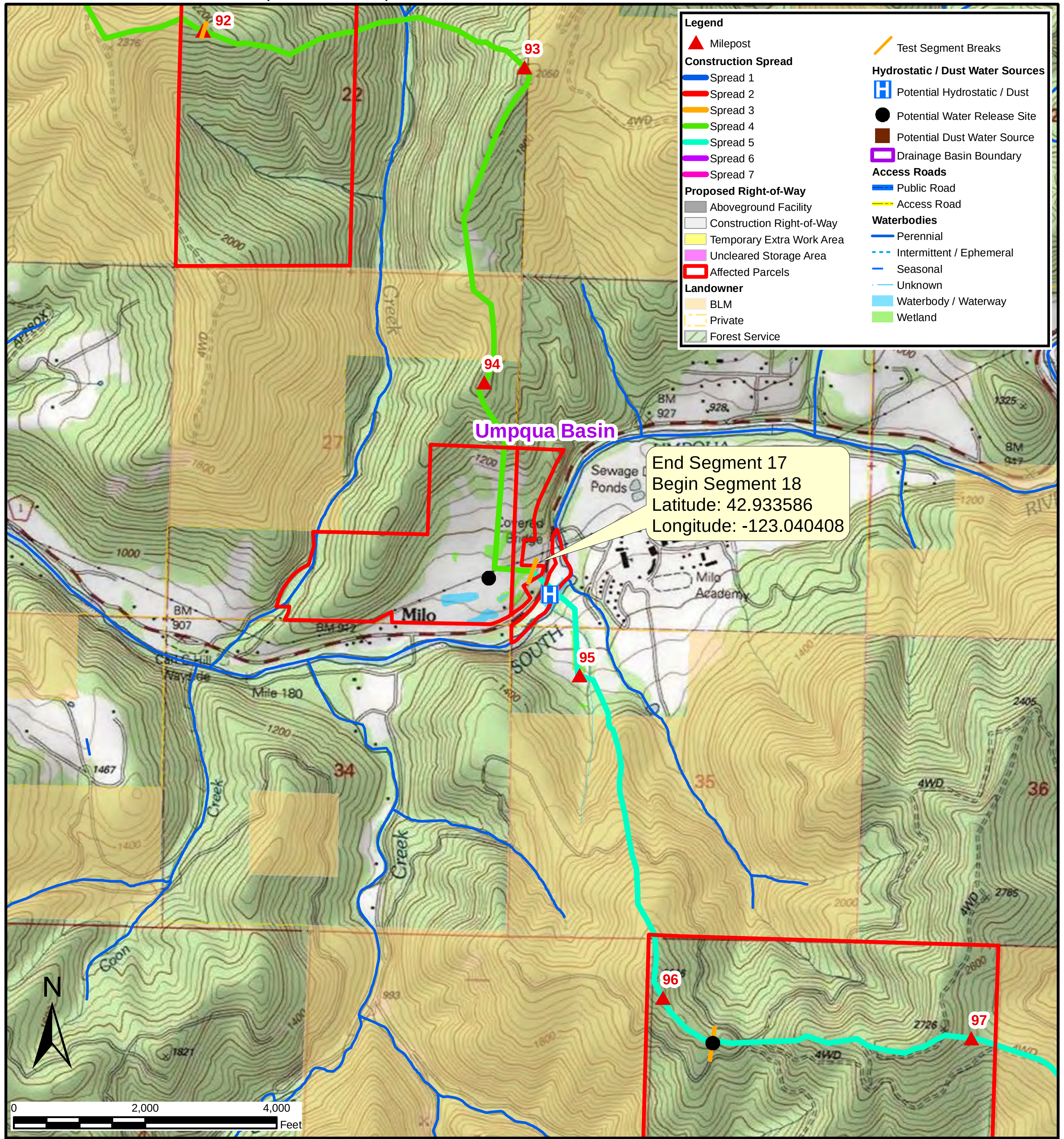
Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 16 and 17.mxd



DRAWING NO.	REFERENCE TITLE	PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP 36" PACIFIC CONNECTOR GAS PIPELINE HYDROSTATIC TEST SEGMENT 16 END / 17 BEGIN MP 92.00 S-22, T-30-S, R-3-W DOUGLAS COUNTY, OREGON

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.	DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
							CHK BY:	DATE:	ISSUED FOR CONST:	
							APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 16 / 17	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 16 and 17.mxd



DRAWING NO.	REFERENCE TITLE

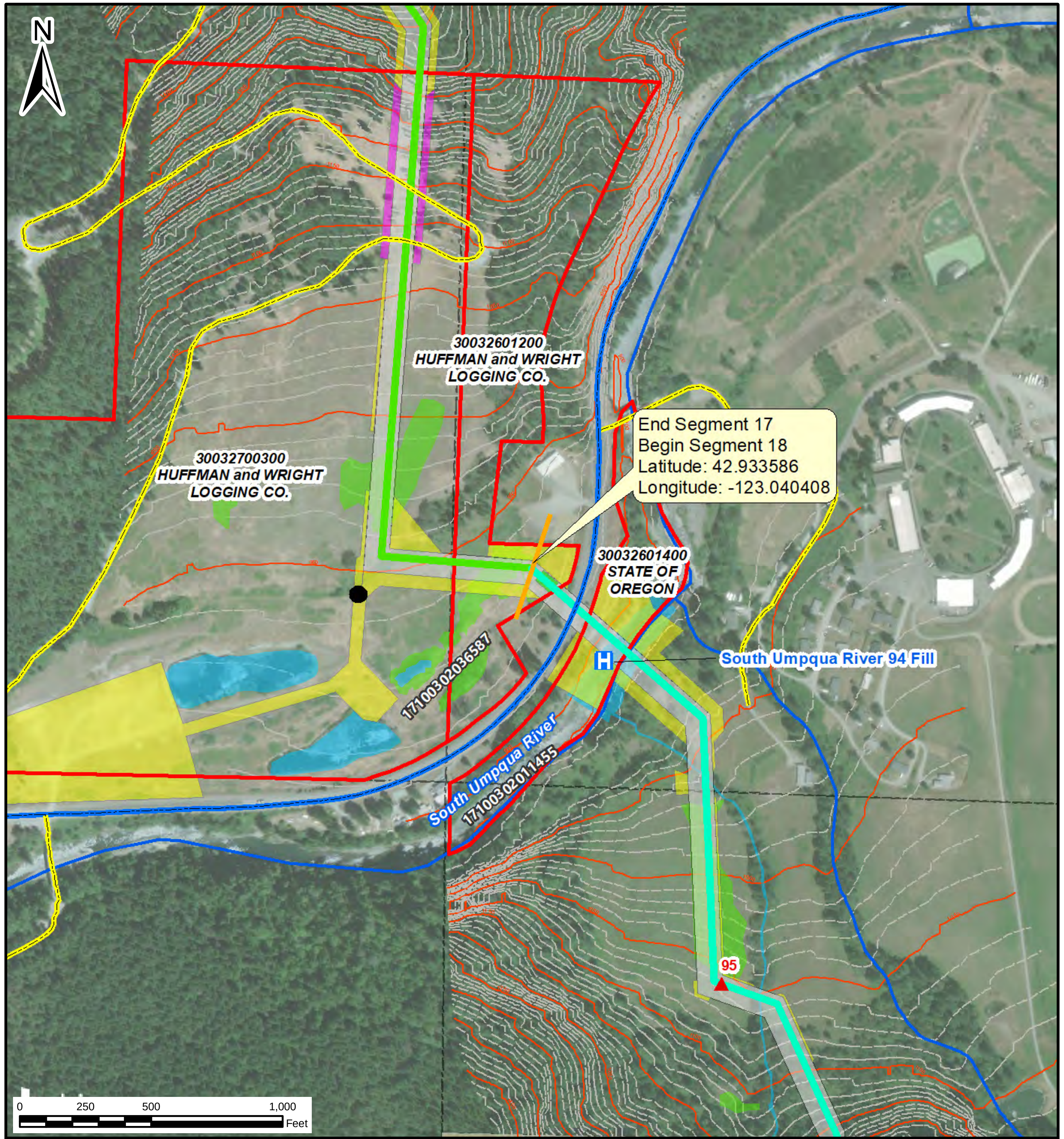
NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 17 END / 18 BEGIN
MP 94.65
S-26, T-30-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 17 / 18	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 17 and 18.mxd



DRAWING NO.	REFERENCE TITLE

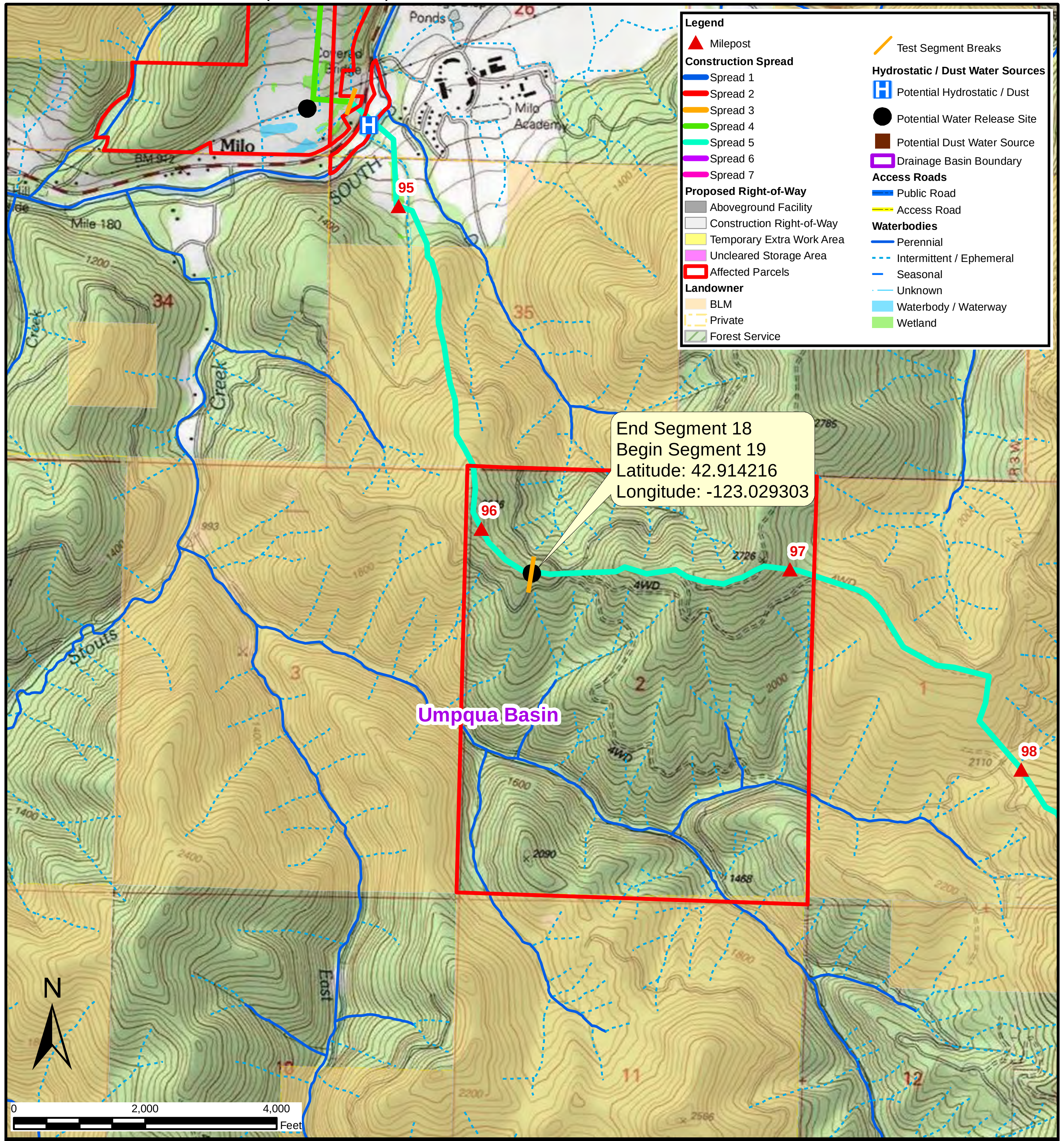
NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 17 END / 18 BEGIN
MP 94.65
S-26, T-30-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 17 / 18	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 17 and 18.mxd



DRAWING NO.	REFERENCE TITLE

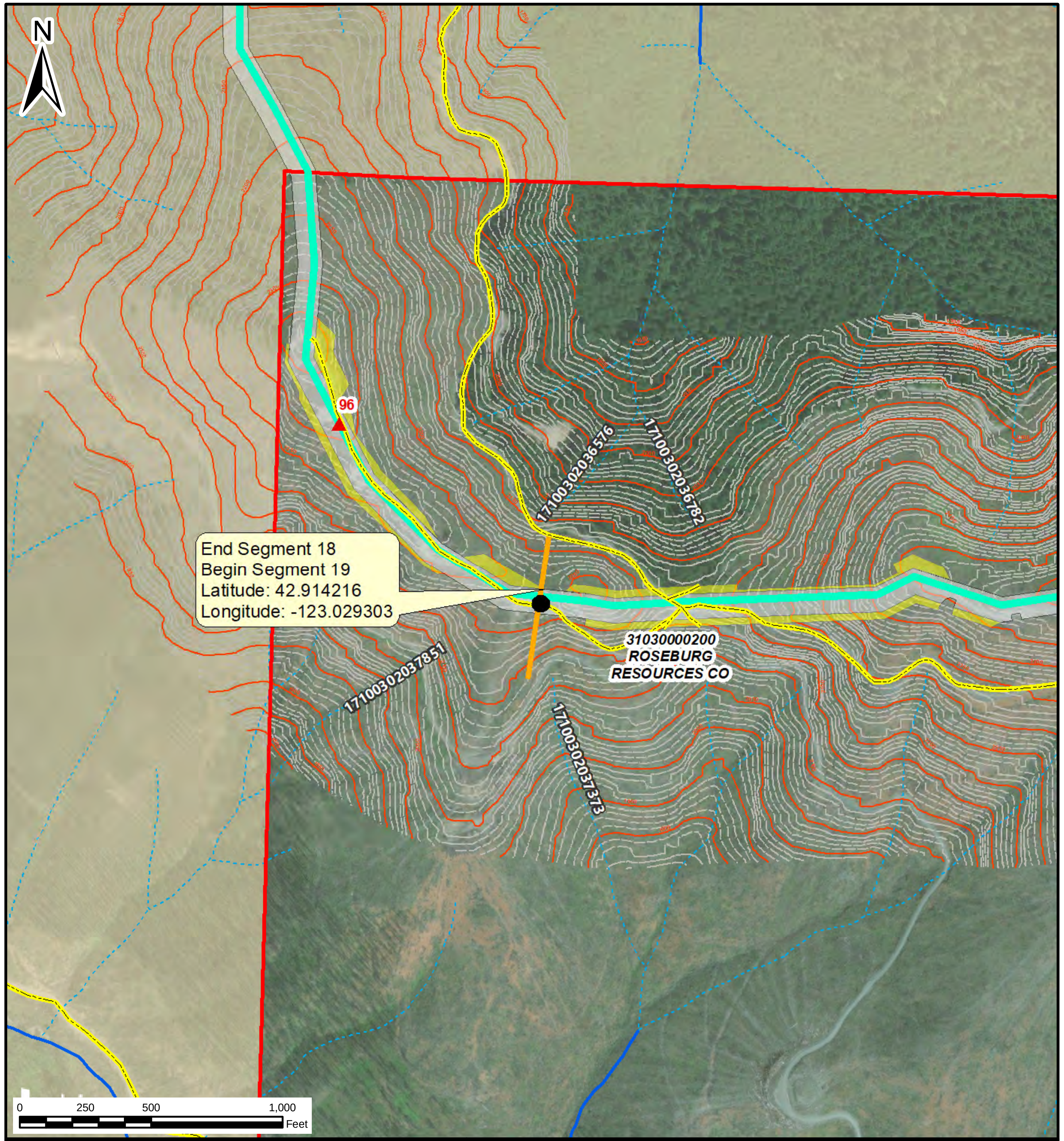
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 18 END / 19 BEGIN
MP 96.20
S-2, T-31-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 18 / 19	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 18 and 19.mxd



DRAWING NO.	REFERENCE TITLE

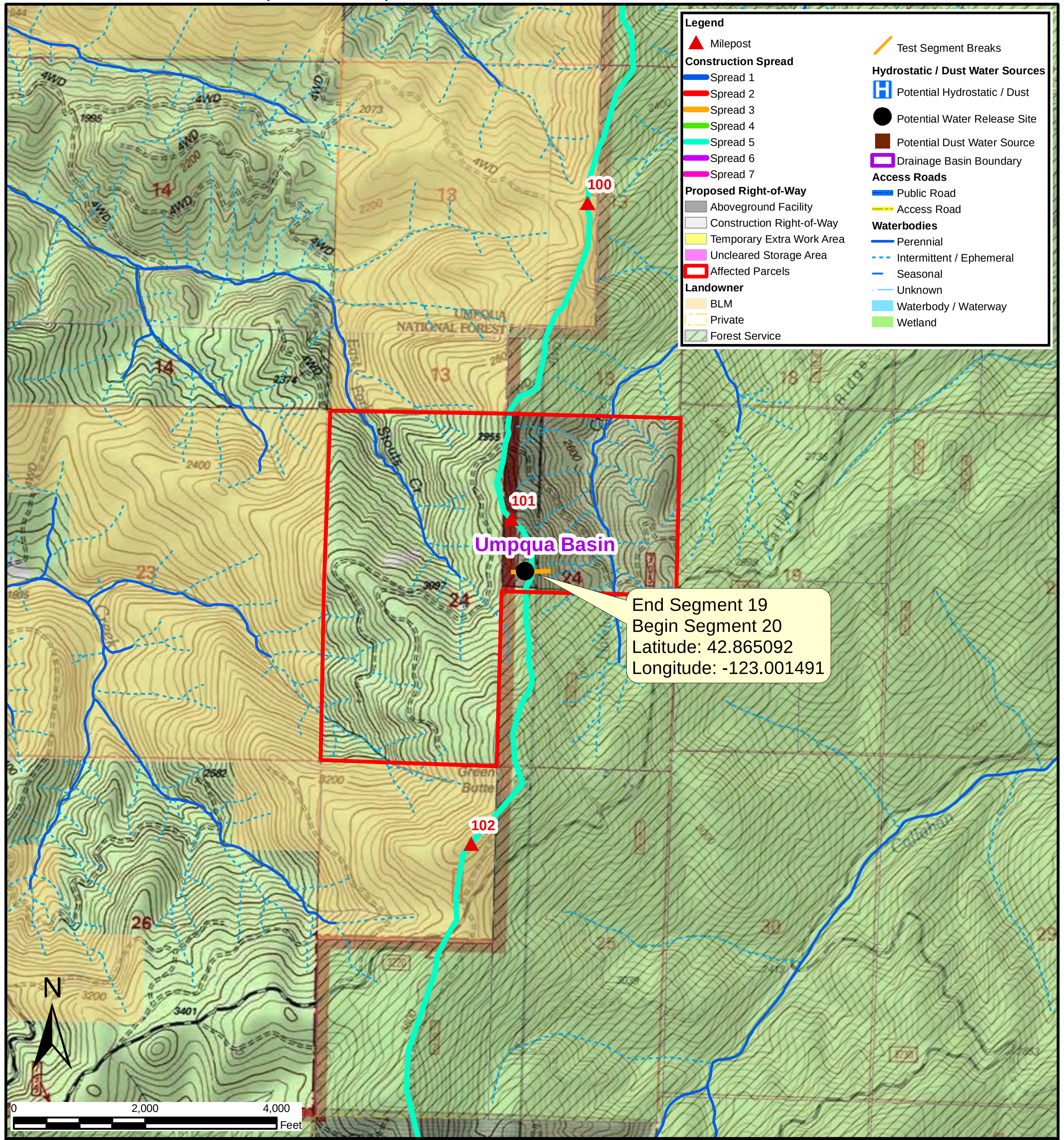
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 18 END / 19 BEGIN
MP 96.20
S-2, T-31-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 18 / 19	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 18 and 19.mxd



DRAWING NO.	REFERENCE TITLE

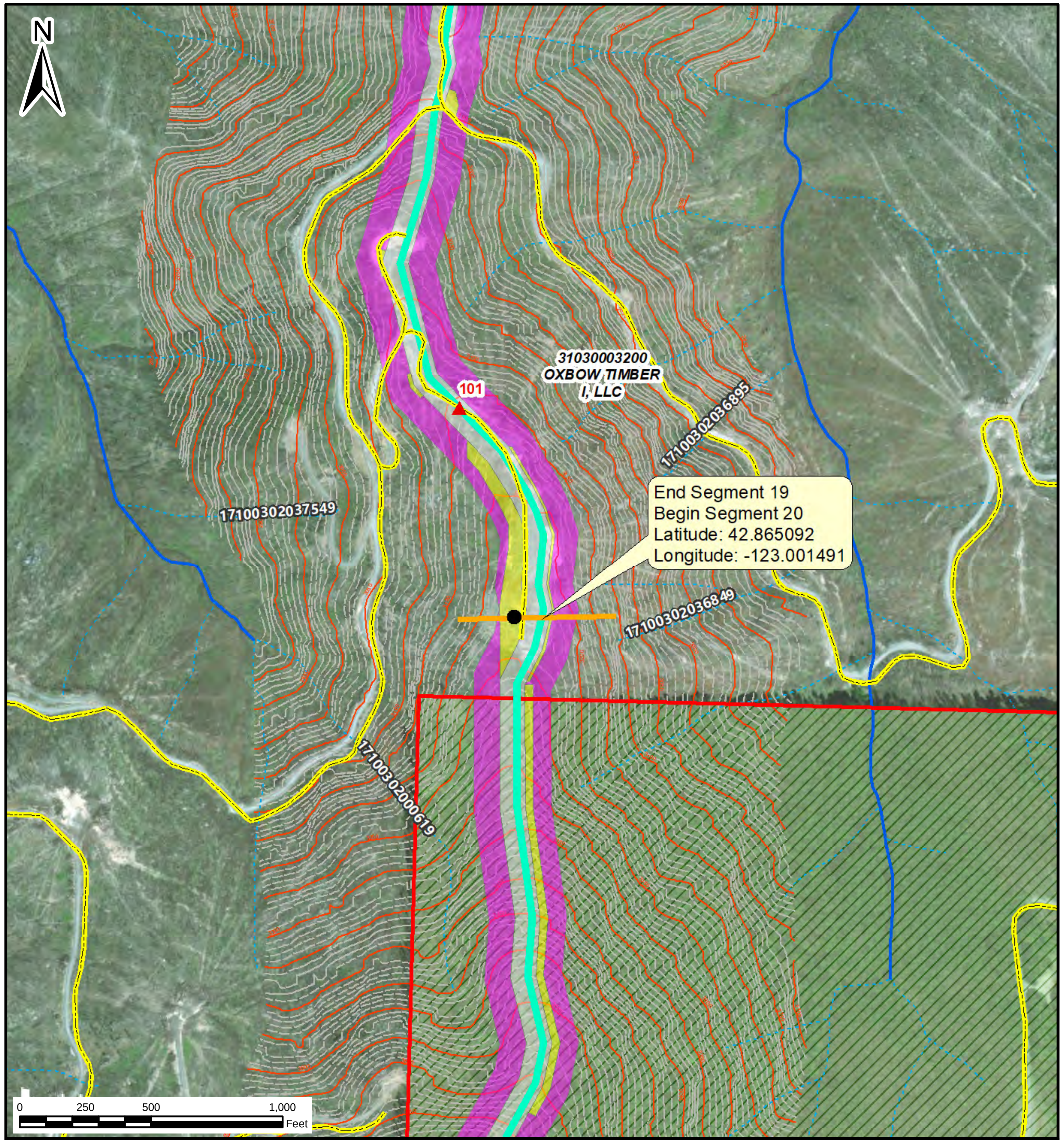
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 19 END / 20 BEGIN
MP 101.15
S-24, T-31-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 19 / 20	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 19 and 20.mxd



DRAWING NO.	REFERENCE TITLE

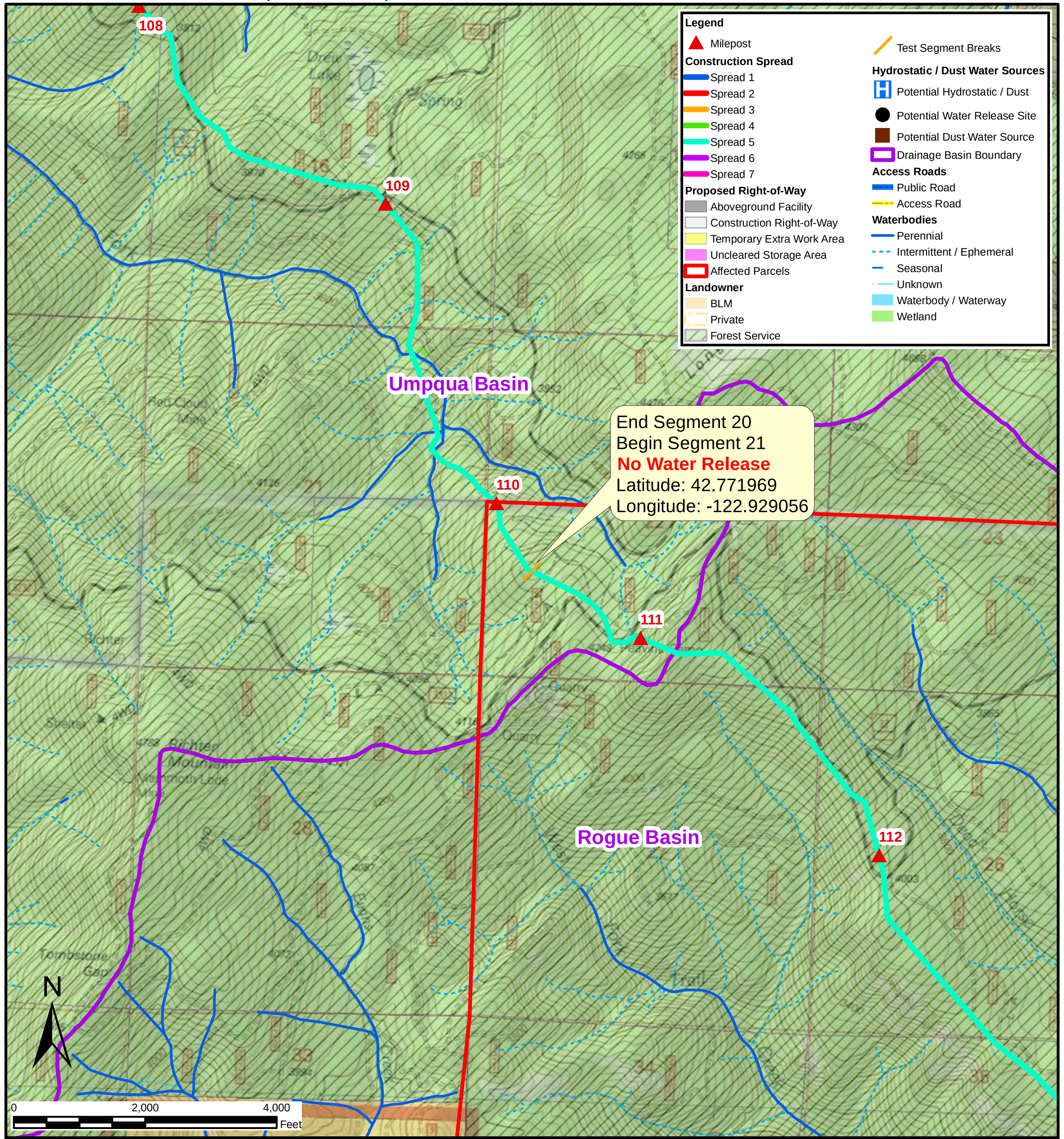
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 19 END / 20 BEGIN
MP 101.15
S-24, T-31-S, R-3-W
DOUGLAS COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 19 / 20	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 19 and 20.mxd



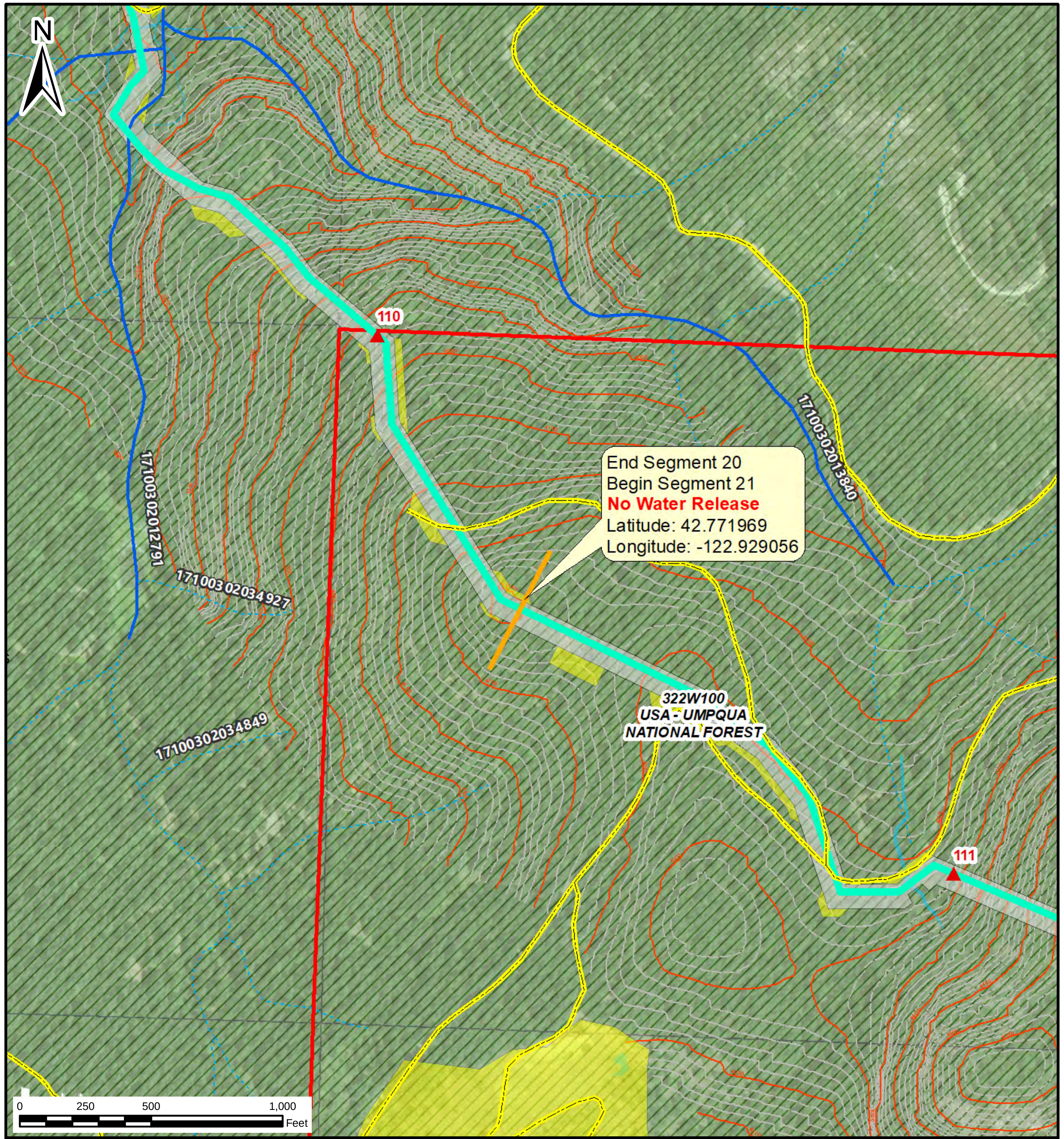
DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 20 END / 21 BEGIN
MP 110.23
S-22, T-32-S, R-2-W
JACKSON COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.	DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
							CHK BY:	DATE:	ISSUED FOR CONST:	
							APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 20 / 21	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 20 and 21.mxd



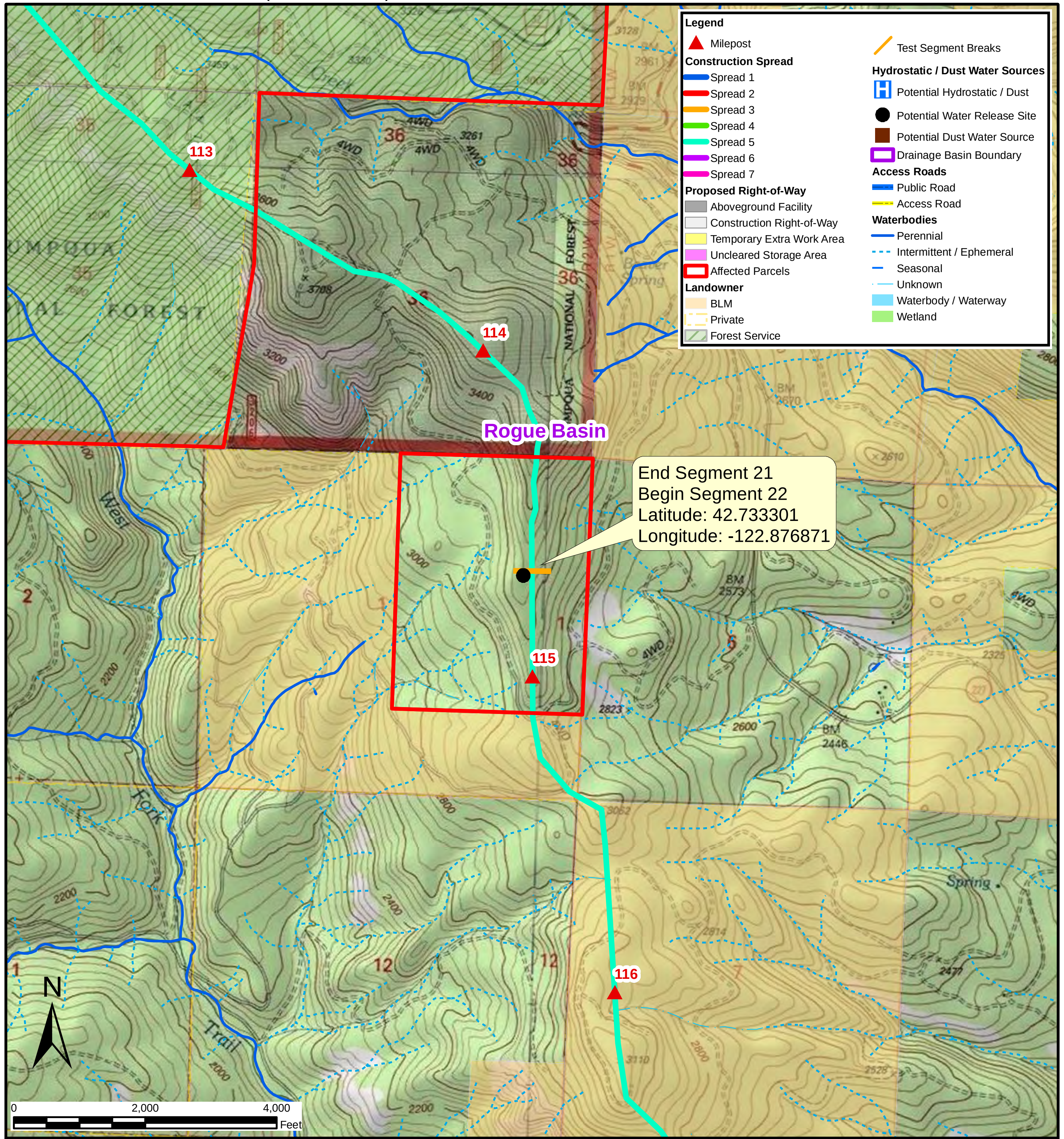
DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 20 END / 21 BEGIN
MP 110.23
S-22, T-32-S, R-2-W
JACKSON COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.	DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
							CHK BY:	DATE:	ISSUED FOR CONST:	
							APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 20 / 21	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 20 and 21.mxd



DRAWING NO.	REFERENCE TITLE

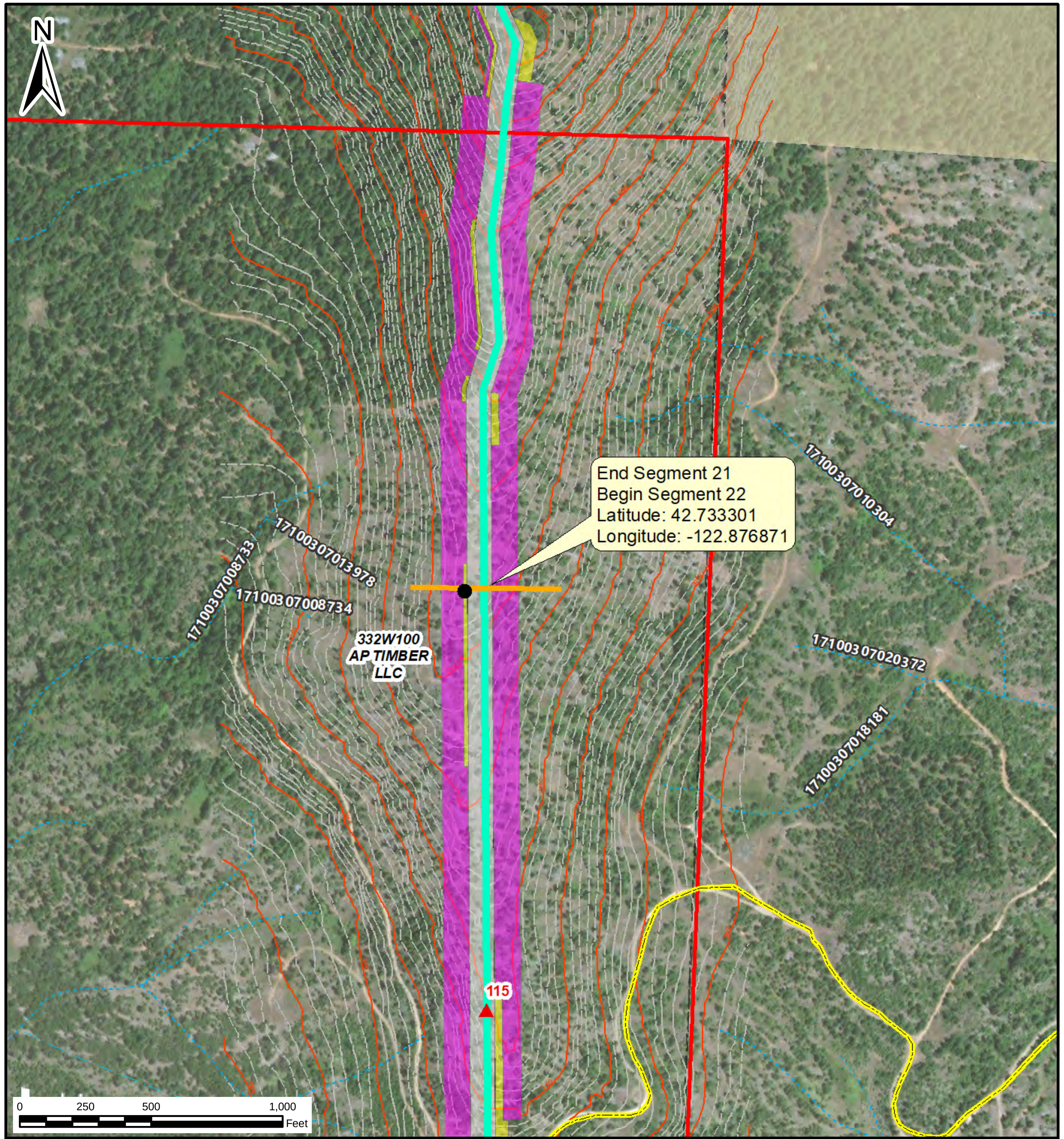
NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 21 END / 22 BEGIN
MP 114.70
S-1, T-33-S, R-2-W
JACKSON COUNTY, OREGON

Pacific Connector GAS PIPELINE

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 21 / 22	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 21 and 22.mxd



DRAWING NO.	REFERENCE TITLE

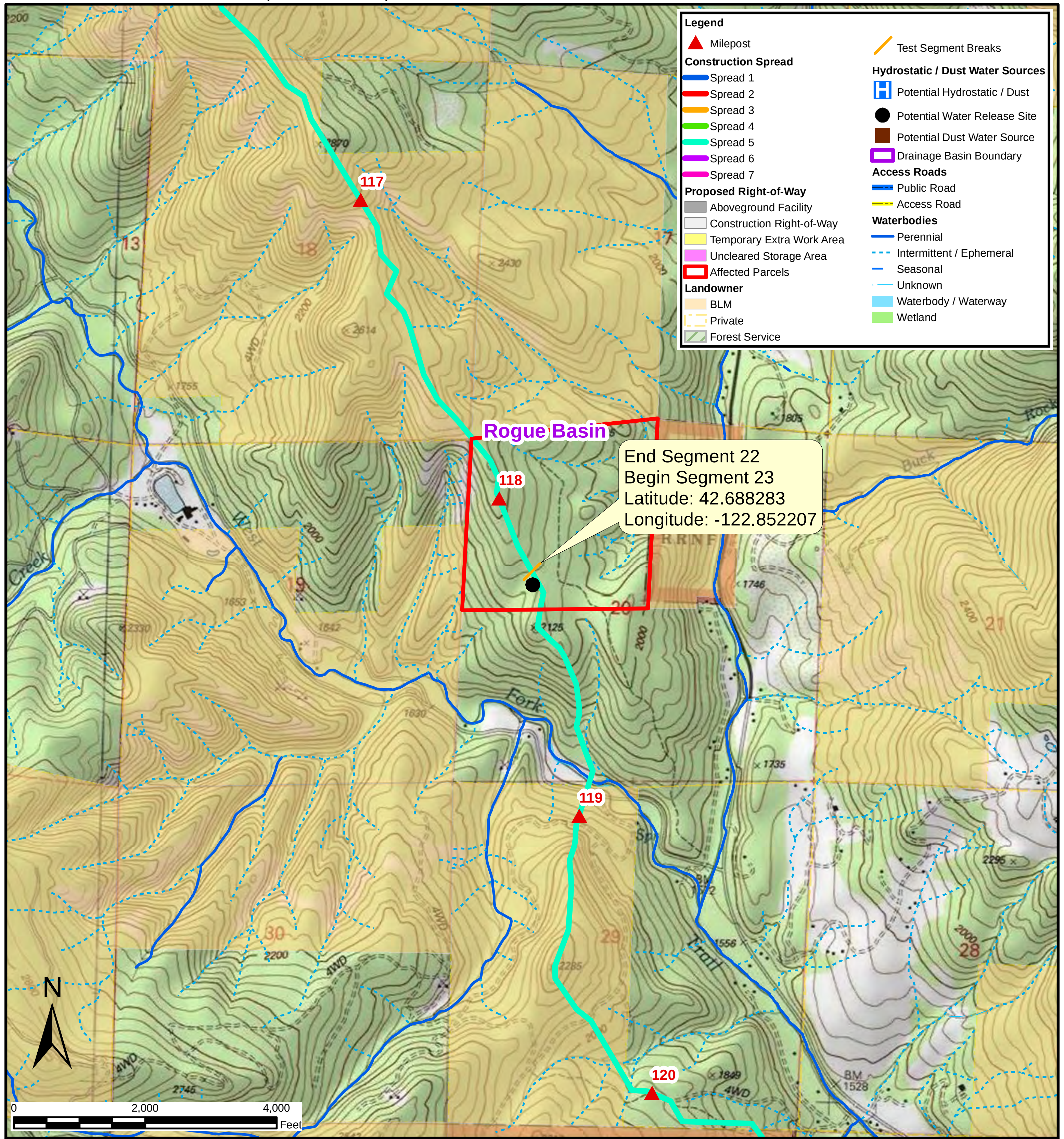
NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 21 END / 22 BEGIN
MP 114.70
S-1, T-33-S, R-2-W
JACKSON COUNTY, OREGON

Pacific Connector GAS PIPELINE

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 21 / 22	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 21 and 22.mxd



DRAWING NO.	REFERENCE TITLE

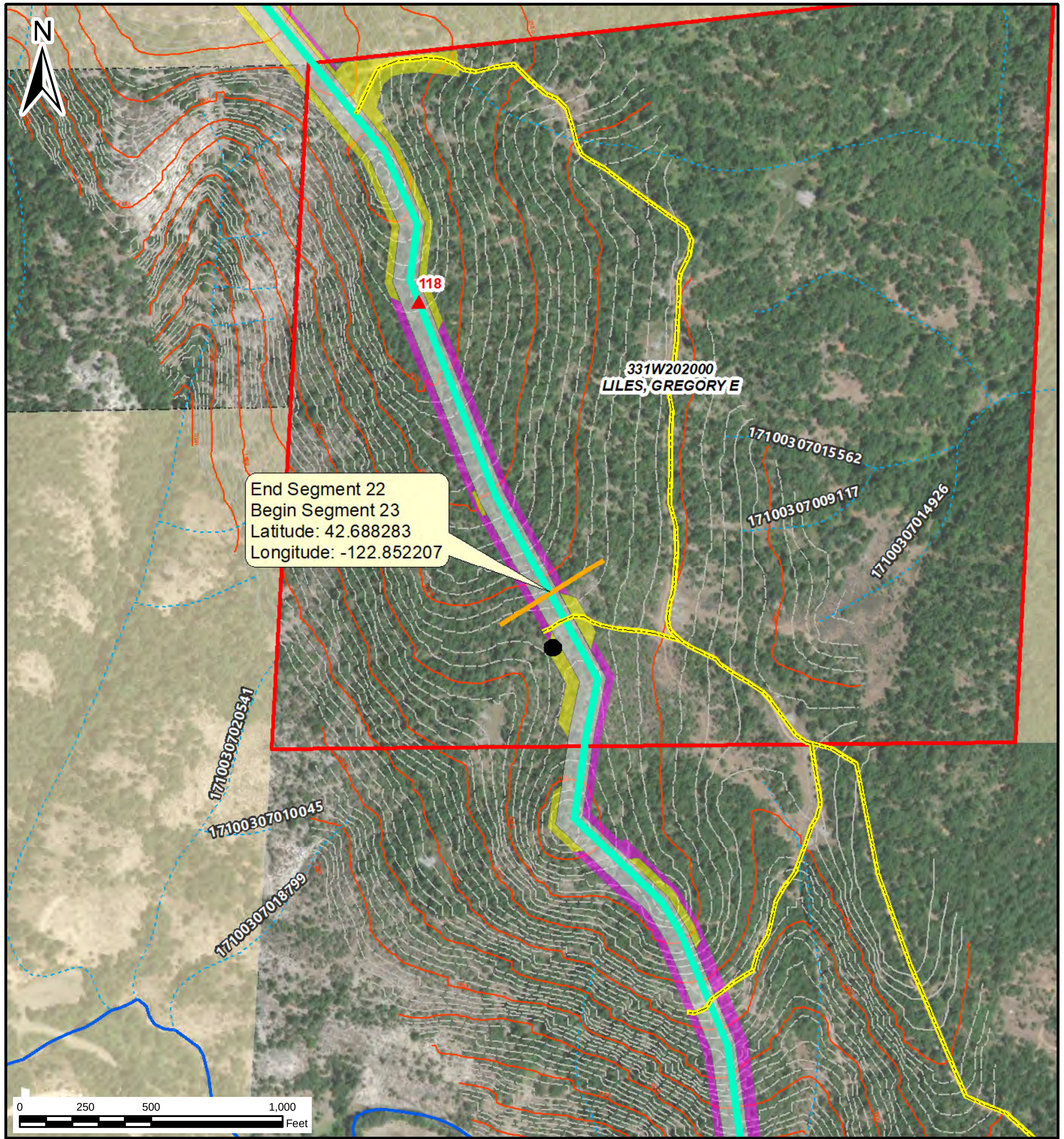
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 22 END / 23 BEGIN
MP 118.23
S-20, T-33-S, R-1-W
JACKSON COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 22 / 23	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 22 and 23.mxd



DRAWING NO.	REFERENCE TITLE

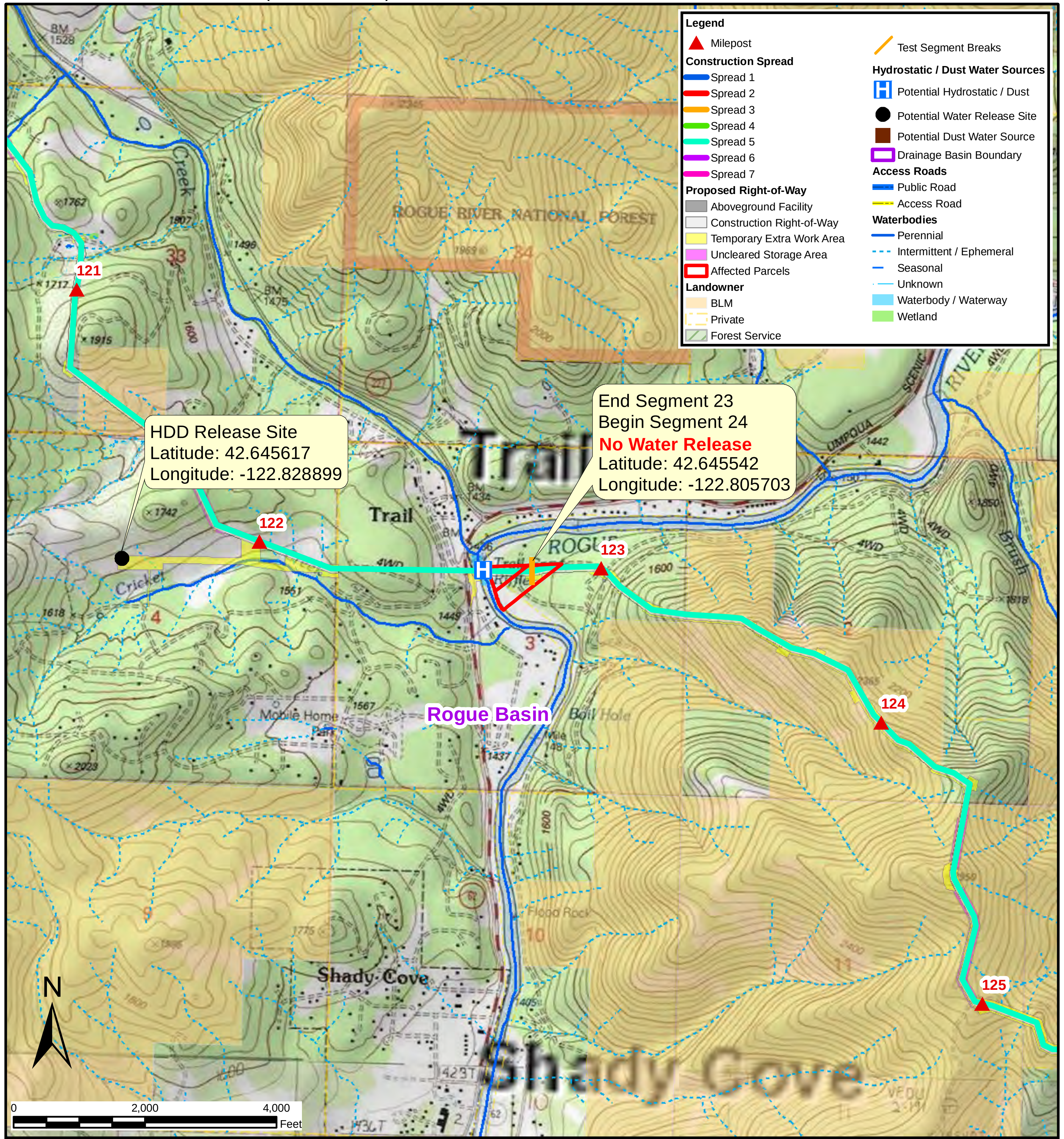
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 22 END / 23 BEGIN
MP 118.23
S-20, T-33-S, R-1-W
JACKSON COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 500
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 22 / 23	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 22 and 23.mxd



DRAWING NO.	REFERENCE TITLE

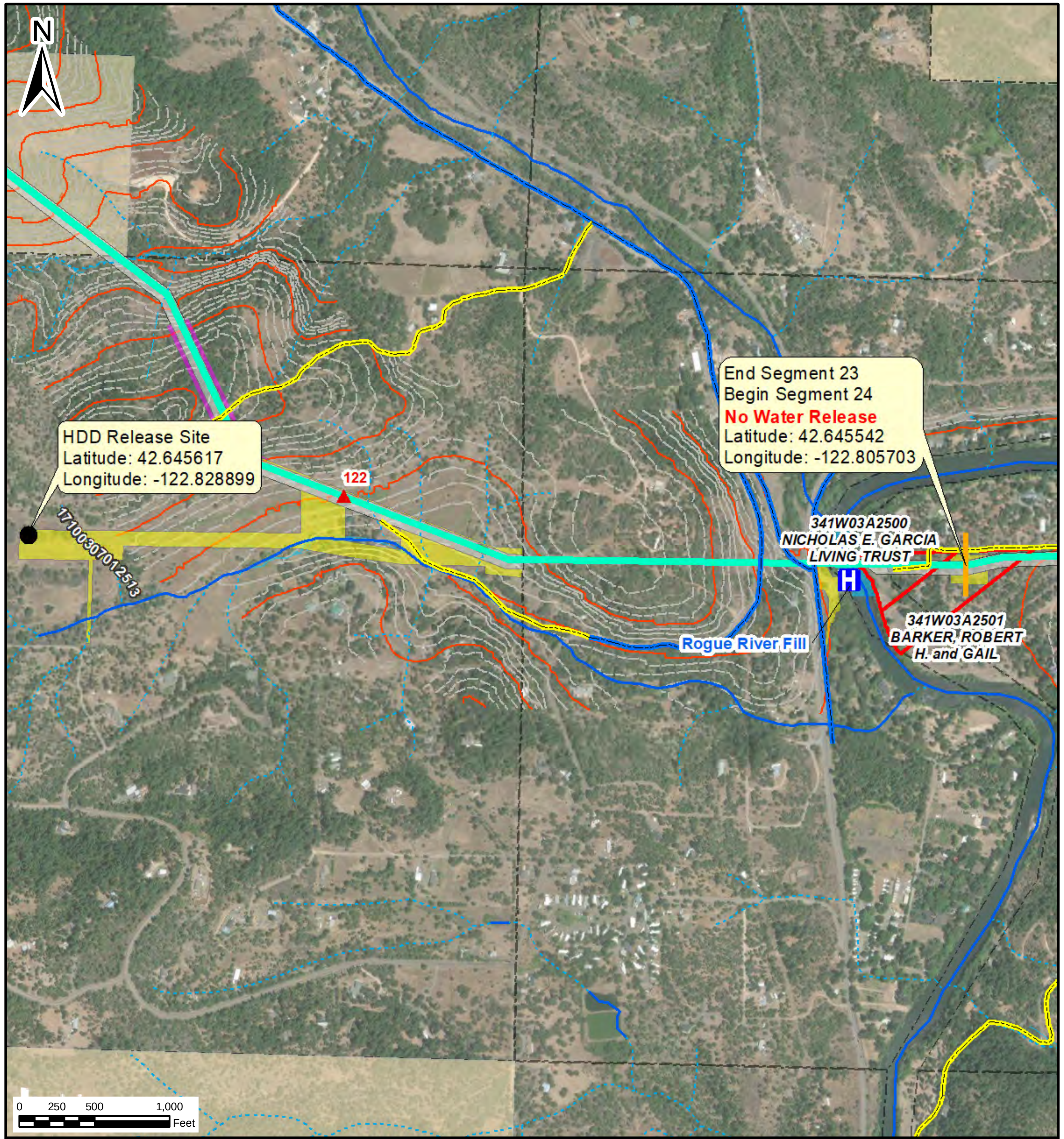
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 23 END / 24 BEGIN
MP 122.80
S-3, T-34-S, R-1-W
JACKSON COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 2000
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 23 / 24	SHEET 1 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 23 and 24.mxd



DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
36" PACIFIC CONNECTOR GAS PIPELINE
HYDROSTATIC TEST SEGMENT 23 END / 24 BEGIN
MP 122.80
S-3, T-34-S, R-1-W
JACKSON COUNTY, OREGON

Pacific Connector GAS PIPELINE

NO.	DATE	BY	REVISION NUMBER	W.O. NO.	CHK.	APP.

DWG. BY: EE	DATE: Aug - 2018	ISSUED FOR BID:	SCALE: 1 : 875
CHK BY:	DATE:	ISSUED FOR CONST:	
APPR. BY:	DATE:	DRAWING NUMBER: Test Segment 23 / 24	SHEET 2 OF 2

Path: P:\PCGP_JCLNG\ArcMap\DEQ\Test Segments 23 and 24.mxd