Energize Eastside

Community Advisory Group Meeting #4a

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June 25, 2014

PSE PUGET SOUND ENERGY

Presentation overview

- PSE responses to information requests from Community Advisory Group Meeting #3
- Review and discuss results of the blind evaluation
- Additional information on route options

PSE responses to information requests

Information requests from Meeting #3:

- Construction methods of a typical 230 kV line
- Cost of other undergrounding and submerging projects around the country
- Revenue resulting from 3% to 8% regional power flow-through on the Energize Eastside line

Sample 230 kV transmission lines

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Construction methods of a typical 230 kV line

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Estimated cost of undergrounding the Energize Eastside project

- Estimated cost to underground Energize Eastside project: $20-28 million per mile
  - Costs include engineering and construction only
- Estimate based on:
  - 230kV XLPE Cable
  - Concrete duct bank
  - Suburban area
  - 25% contingency
  - AACE International Class 4 estimate
    - -15% to -30% low end
    - +20% to +50% high end

Cost of other undergrounding and submerging projects

- **Project:** Bartow-Northeast 230 kV Project
- **Location:** St. Petersburg, FL
- **Construction year:** 2009
- **Scope:** 4 miles new UG
- **Cost:** $84 million ($98.7 million in 2014 dollars)
- Approx. half in open, undeveloped land

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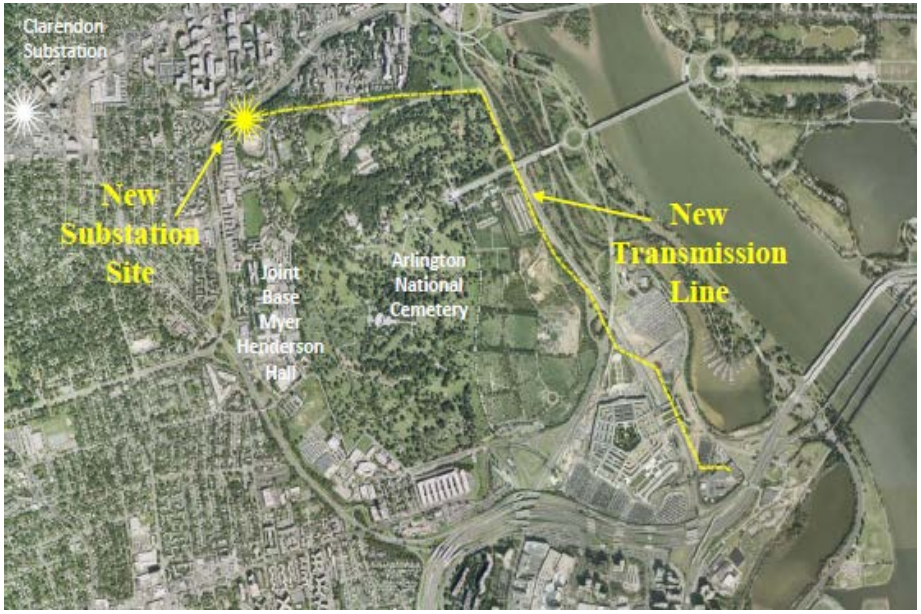
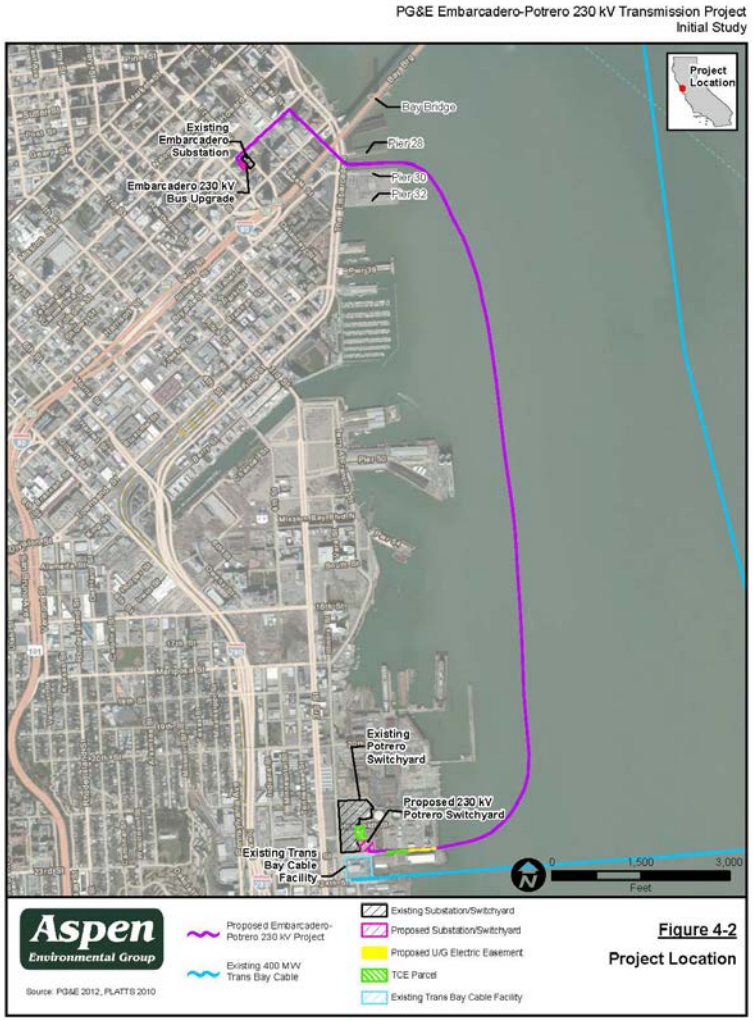
Cost of other undergrounding and submerging projects

- **Project:** Radnor Heights 230 kV Project
- **Location:** Arlington, VA
- **Construction year:** 2010-2014
- **Scope:** 1.2 miles new UG, 2.5 miles re-conductored
- **Cost:** $52.4 million ($58.9 million in 2014 dollars)



Cost of other undergrounding and submerging projects

- **Project:** Embarcardero/ Potrero 230 kV Transmission Project
- **Location:** San Francisco, CA
- **Status:** Not yet constructed
- **Scope:** 2.5 miles of submarine, 0.4 miles UG, 0.6 miles OH
- **Cost:** $196.8 million



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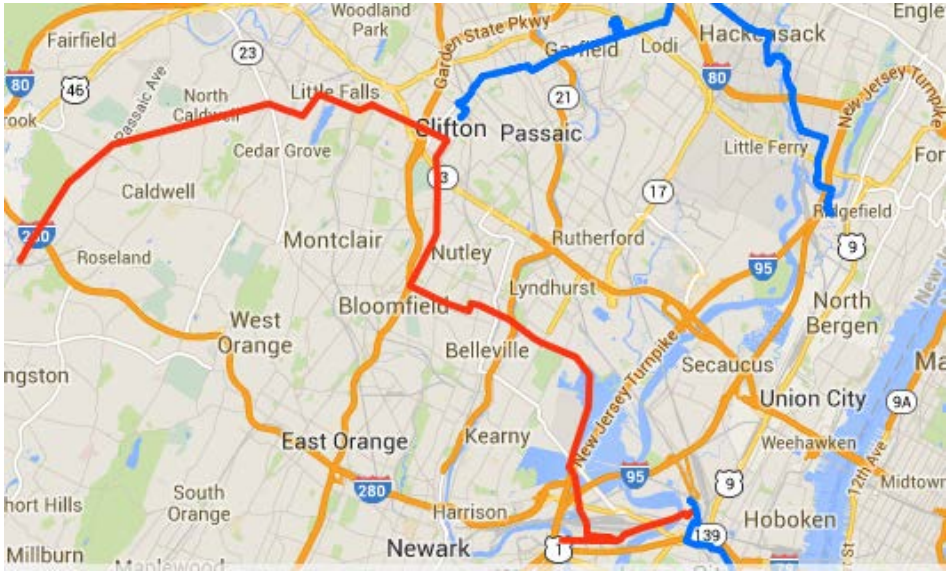
Cost of other undergrounding and submerging projects

- **Project:** Northeast Grid 230 kV Reliability Project
- **Location:** New Jersey
- **Status:** In construction
- **Scope:** 18.5 miles UG, 50 miles OH
- **Cost:** $907 million



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Regional power flow: What is wheeling?

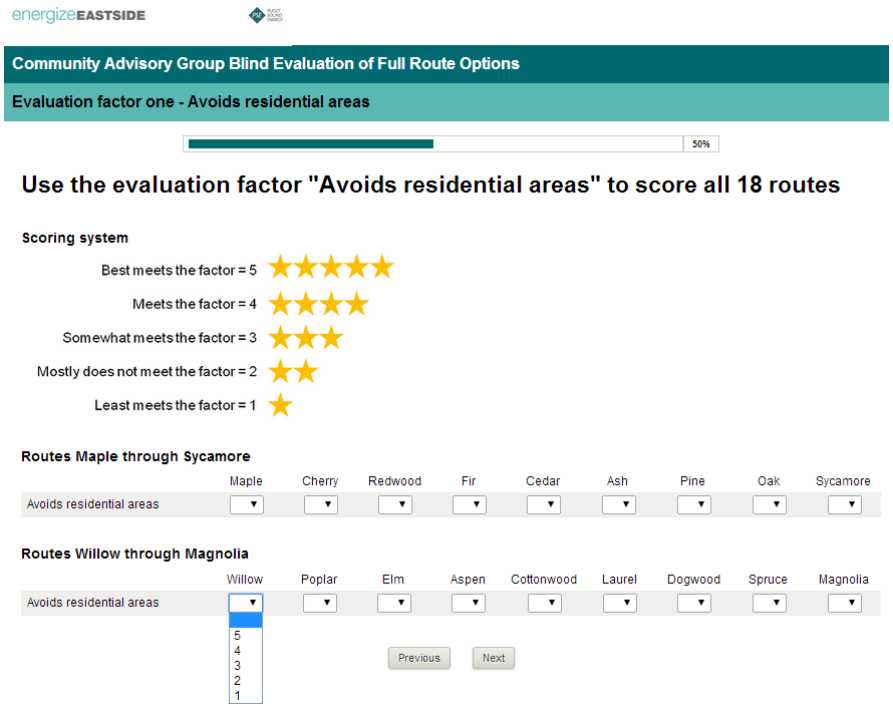
- Wheeling
  - It's like a toll on other entities for the transportation of electric power over PSE lines
- PSE's wheeling charges across its <u>entire transmission system</u> in 2013 was $28 million
  - 100% of the $28 million is passed back to our customers
- PSE makes **no profit** on wheeling power

Questions

Do you have clarifying questions about the information presented?

Results of the blind evaluation

- Evaluation of all 18 route options
- Available to advisory group members via an online survey June 4 to June 17



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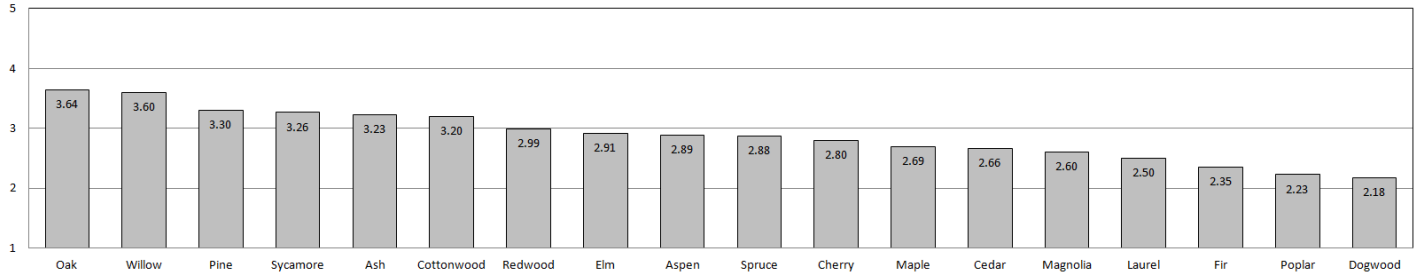
Results of the blind evaluation

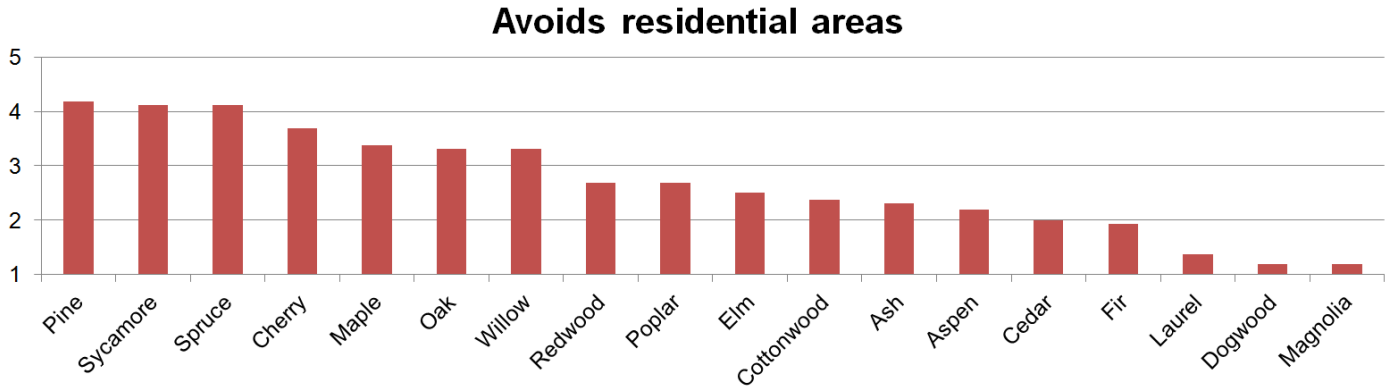
Average scores

Evaluation factors	Route Options																	
	Ash	Aspen	Cedar	Cherry	Cottonwood	Dogwood	Elm	Fir	Laurel	Magnolia	Maple	Oak	Pine	Poplar	Redwood	Spruce	Sycamore	Willow
Avoids residential areas	2.31	2.19	2.00	3.69	2.38	1.19	2.50	1.94	1.38	1.19	3.38	3.31	4.19	2.69	2.69	4.13	4.13	3.31
Avoids sensitive community land uses	2.75	3.56	3.63	2.31	2.75	2.38	2.88	2.88	4.00	3.13	3.38	3.25	2.19	2.00	2.44	2.25	2.25	3.38
Avoids sensitive environmental areas	3.88	2.81	2.38	2.75	3.69	1.75	3.13	2.13	2.44	3.31	2.25	3.69	3.50	1.75	2.69	2.69	3.38	3.88
Protects mature vegetation	3.88	3.06	2.69	2.56	3.25	1.88	2.94	1.88	2.69	2.94	2.38	4.25	3.56	1.44	3.25	2.50	2.88	4.00
Utilizes opportunity areas	3.31	2.81	2.63	2.69	3.94	3.69	3.13	2.94	2.00	2.44	2.06	3.69	3.06	3.25	3.88	2.81	3.69	3.44

Overall scores



Average scores by evaluation factor



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Observations

What are your observations from the blind evaluation exercise?

Route options worksheet

Route option (and segment combination)	Advantages	Disadvantages	Additional notes	Recommended for further consideration? (Y/N)
Ash (A-C-D-F-G1-I-K2-M-N)				
Aspen (A-C-E-G2-I-K1-L-N)				
Cedar (A-C-E-G2-G1-H-L-N)				
Cherry (A-B-F-G1-I-K1-L-N)				

Additional information on route options

Information by route option:

- Cost
- Constructability
- Permitability
- Maintainability
- Longevity
  - Future flexibility

Cost

- Route-specific cost estimates include all project costs
  - Engineering and construction, materials, easement acquisition, permitting, vegetation management, etc.
- Cost estimates were translated into estimated rate impacts for the average residential customer

Constructability

	Advantages	Disadvantages	Overall Ease of Constructability
Road	Access	Narrow working area, limited work hours, traffic control	More difficult
Cross-country	Longer work hours, minimal traffic control needed	Access roads needed	Neutral
Non-active Railroad	Access, longer work hours, minimal traffic control needed	None	Less difficult

Permitability

- All routes have unique permitting challenges
- While all routes ***cross*** a designated shoreline, Segment L ***parallels*** a regulated shoreline
  - As a result, any route that includes Segment L would likely be more challenging

Maintainability

- Steel poles require very little maintenance
- Vegetation maintenance requires boots-on-the-ground walking assessment
  - All routes are walkable, so ease of maintenance is neutral across all routes

Longevity

- All solutions provide capacity until the mid to late 2030s
  - Projection based on current load growth forecast

Future flexibility

- In the late 2030s, our current projections show that additional capacity will be needed on the Eastside
- By using the existing corridor (Willow), this additional capacity can be provided without structural changes to the transmission line or building additional lines
- If other routes are chosen, additional transmission lines will likely be needed to provide the additional projected capacity

Updated data table

Data	Description	Unit	Data Range		Route Options																	
			Min (advantage)	Max (disadvantage)	Ash A-C-D-F-G1-I-K2-M-N	Aspen A-C-E-G2-I-K1-L-N	Cedar A-C-E-G2-G1-H-L-N	Cherry A-B-F-G1-I-K1-L-N	Cottonwood A-C-D-F-G1-G2-J-M-N	Dogwood A-C-D-F-G1-G2-J-K2-K1-L-N	Elm A-C-D-F-H-K1-K2-M-N	Fir A-C-E-J-K2-K1-L-N	Laurel A-C-D-F-H-L-N	Magnolia A-C-D-F-G1-I-K1-L-N	Maple A-B-F-H-L-N	Oak A-C-E-G2-I-K2-M-N	Pine A-B-F-G1-I-K2-M-N	Poplar A-B-F-G1-G2-J-K2-K1-L-N	Redwood A-C-E-G2-G1-H-K1-K2-M-N	Spruce A-B-F-H-K1-K2-M-N	Sycamore A-B-F-G1-G2-J-M-N	Willow A-C-E-J-M-N
Additional information - Cost, constructability, permitability, maintainability, longevity, future flexibility, length																						
Cost*	Cost to construct.	USD (Millions)	$154	$289	$267	$186	$169	$289	$259	$250	$249	$181	$245	$273	$261	$176	$285	$252	$169	$266	$277	$154
	Estimated monthly increase to average residential customer.	USD	$0.90	$1.69	$1.56	$1.09	$0.99	$1.69	$1.52	$1.46	$1.46	$1.06	$1.43	$1.60	$1.53	$1.03	$1.67	$1.47	$0.99	$1.56	$1.62	$0.90
Constructability*	Ease of construction.	Less Difficult ↓ Neutral↔ or More Difficult↑	Less Difficult ↓	More Difficult ↑	↑	↓	↓	↔	↑	↔	↔	↔	↓	↓	↓	↔	↑	↔	↔	↔	↑	↑
Permitability*	Ease of permitting.	Less Difficult ↓ Neutral↔ or More Difficult↑	Less Difficult ↓	More Difficult ↑	↔	↑	↑	↑	↔	↑	↔	↑	↑	↑	↑	↔	↔	↑	↔	↔	↔	↔
Maintainability*	Ease of maintenance.	Less Difficult ↓ Neutral↔ or More Difficult↑	Less Difficult ↓	More Difficult ↑	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Longevity*	Estimated year when the next 230 kV line for a second Eastside transformer is needed.	Year	2038	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2038
Future Flexibility*	Percent of route on existing corridor.	Percent	100%	10%	61%	47%	48%	10%	71%	36%	61%	56%	31%	29%	10%	83%	39%	19%	79%	40%	50%	100%
Length*	Length of corridor.	Miles	16.15	22.14	17.70	17.88	18.06	19.46	18.62	21.69	17.61	19.22	17.78	19.01	18.23	16.59	18.15	22.14	17.50	18.06	19.07	16.15

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Additional photo simulations

Locations of photo simulation key observation points (KOPs)

<u>Examples:</u>

KOP North 13 – roadside

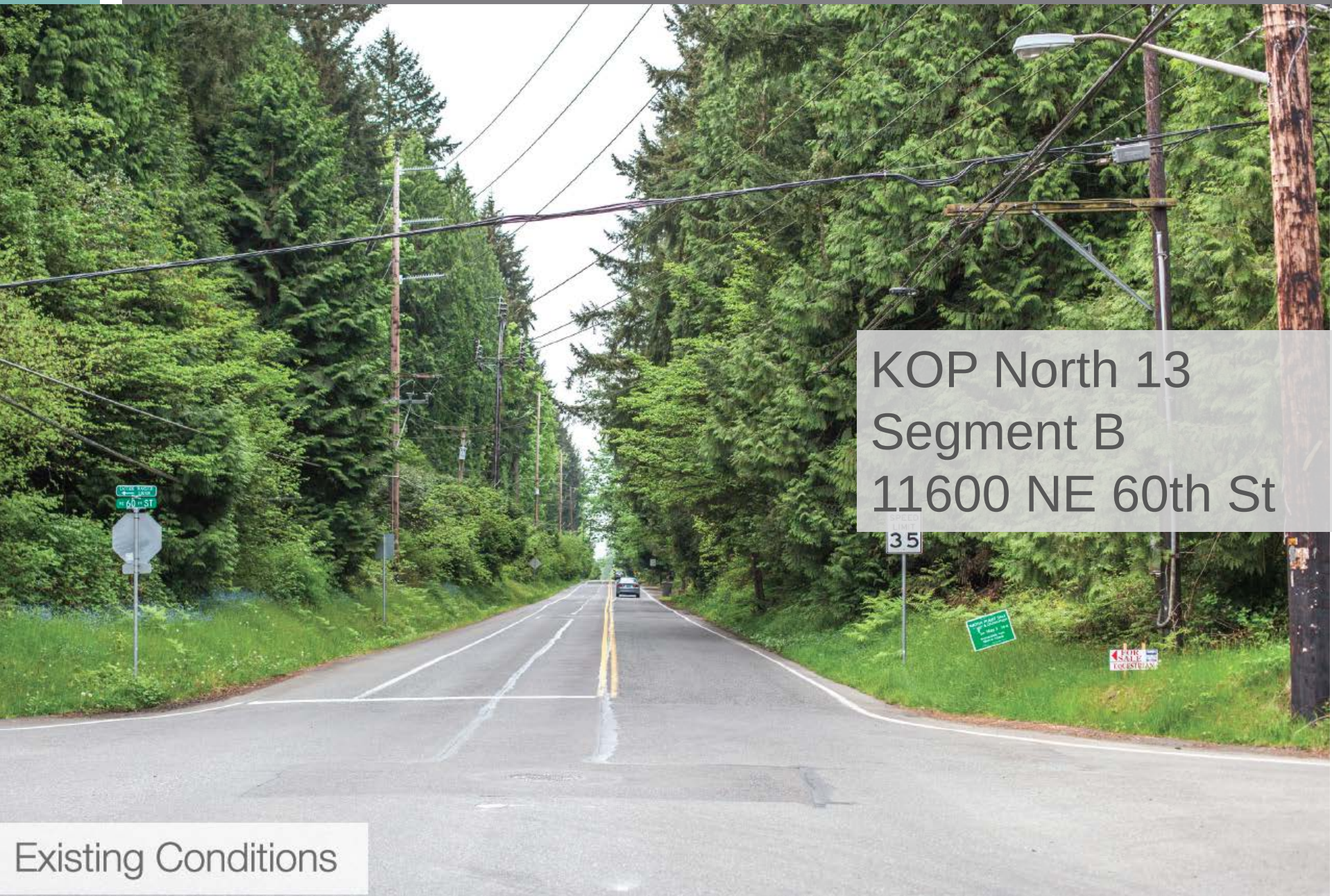
KOP Central 19 – along the railroad

KOP South 10 – cross-county

KOP Central 4 – cross-country

Note: Photos taken during spring 2014

Additional photo simulations



Additional photo simulations

KOP North 13
Segment B
11600 NE 60th St

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review.

Conceptual Project

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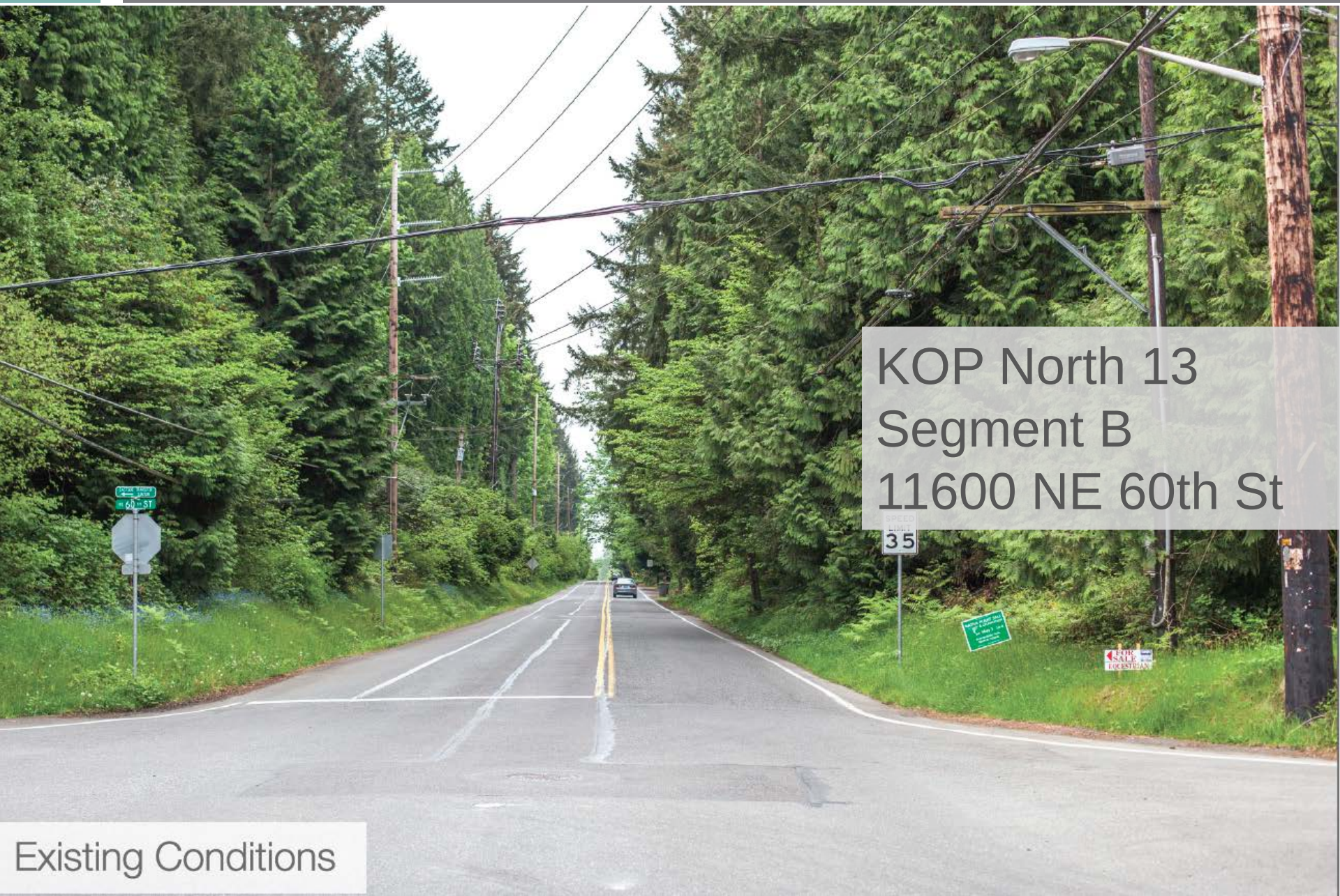
Additional photo simulations



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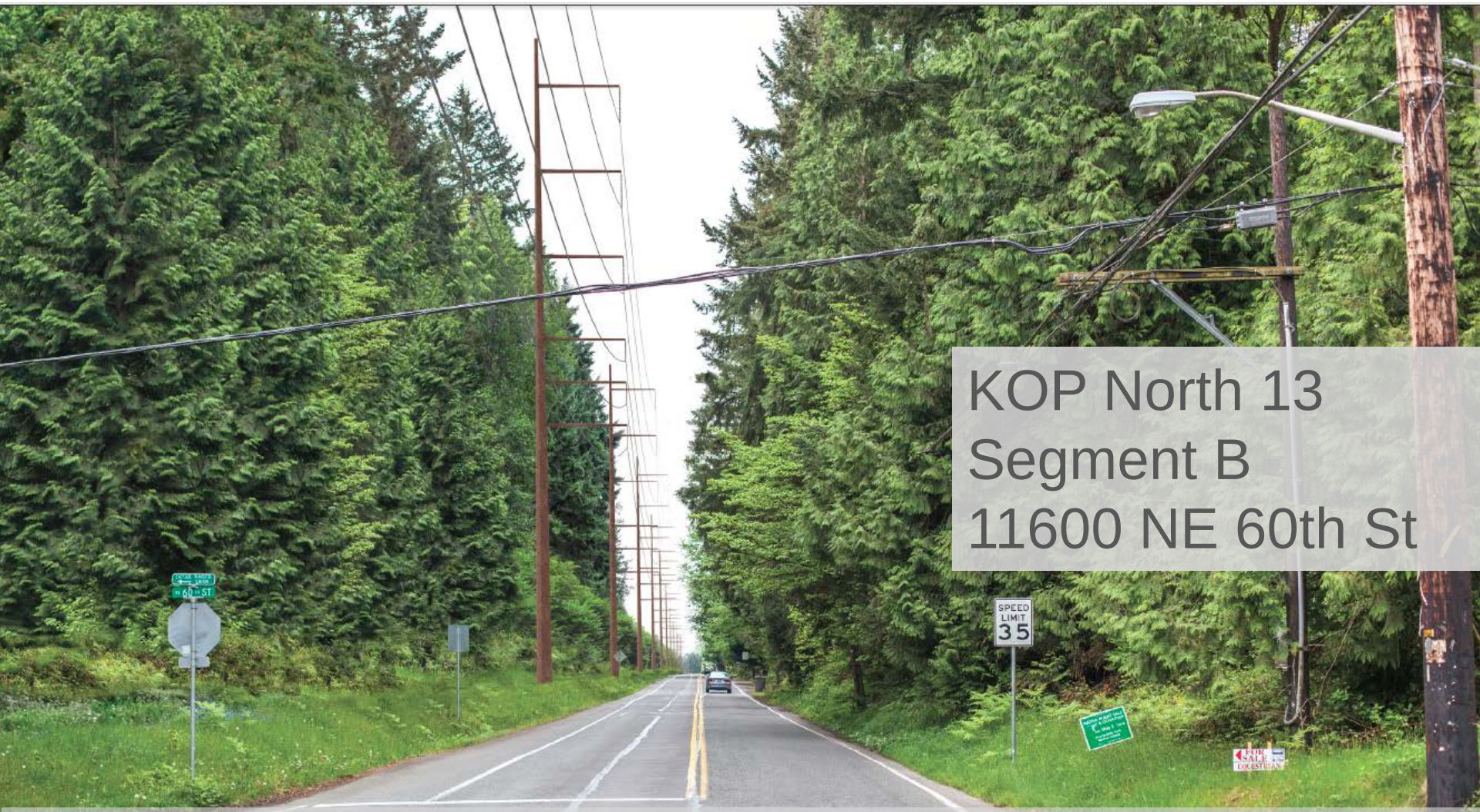

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Additional photo simulations

KOP Central 19
Segment H
4077 120th Ave SE

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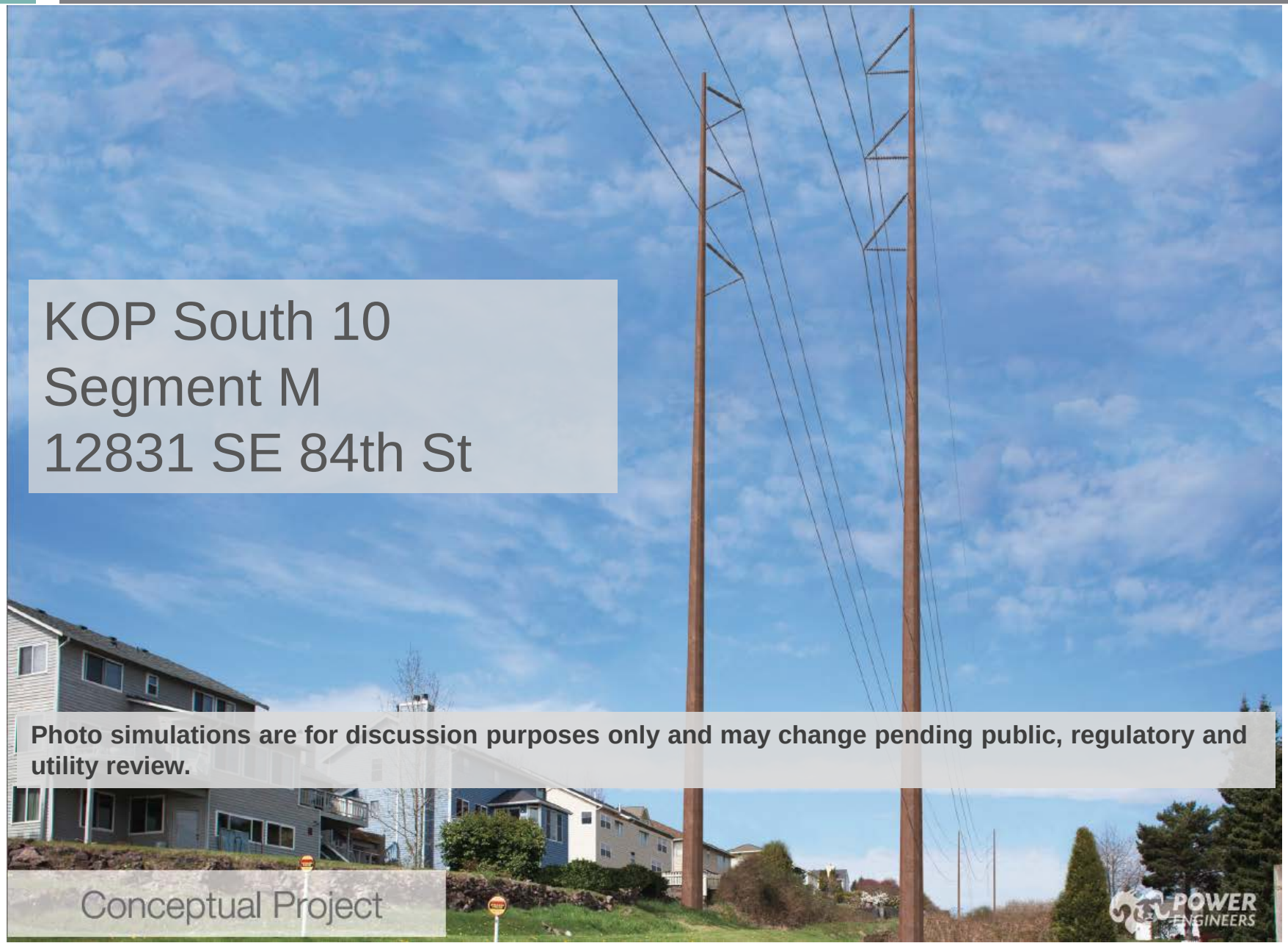

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Cherry (A-B-F-G1-I-K1-L-N)				

Public comment

Upcoming meetings

- **Q&A Session**

  July 7 from 6 to 9 p.m. at Redmond Marriott Town Center

- **Community Advisory Group Meeting #4b**

  July 9 from 5:30 to 8:30 p.m. at Renton Technical College

Thank you!