

**EXH. RBB-7
DOCKETS UE-22___/UG-22___
2022 PSE GENERAL RATE CASE
WITNESS: ROQUE B. BAMBA**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY,

Respondent.

**Docket UE-22___
Docket UG-22___**

**SIXTH EXHIBIT (NONCONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF**

ROQUE B. BAMBA

ON BEHALF OF PUGET SOUND ENERGY

JANUARY 31, 2022

Bainbridge Island System Improvement Project
Winslow – Murden Cove 115 kV Line, Winslow Tap Line Rebuild, and Energy Storage
Battery/DERs/Ferry Curtailment
Five-Year Planning

Corporate Spending Authorization (CSA)

Date Submitted:	6/17/2021
Officer Sponsor:	Dan Koch
Project Director:	Roque Bamba
Responsible Cost Center:	4022

REQUEST: This CSA is submitted for five-year budget planning in accordance with the schedule and financial information in section III. The total lifetime cost range for these projects in the initiation phase was estimated to be \$38.1M (base) to \$76M (+100%). Based on planning phase analyses and changing circumstances the total cost range is currently estimated to be \$48.82M (base) to \$73.23 (+50%).

The contributing factors for the cost estimate increase from the previous phase gate CSA include the following for the WIN-MUR 115-kV Line Project:

- 1) Increasing scope by adding fiber to the transmission line and a new control house at Port Madison Substation as part of the required system protection package;
- 2) Adding costs for wetland mitigation including purchase of property for a mitigation site;
- 3) Updating estimated easement and vegetation management costs;
- 4) Updating estimated costs for Winslow and Murden Cove substation modifications; and
- 5) Incorporating other identified cost and schedule risks based on a comprehensive project risk assessment.

Contributing factors for the energy storage battery include:

- 1) Incorporating identified permitting cost and scheduling risks;
- 2) Incorporating new National Fire Protection Association (NFPA 855) requirements for energy storage batteries into the project scope; and
- 3) Updating the general cost estimate based on cost information PSE received in response to a Request for Information (RFI) from Engineering, Procurement and Construction (EPC) battery vendors.

Table 1	Initiation	Planning	Design	Execution	Close Out
Winslow – Murden Cove 115-kV Line	2018-2019	12/17/2019 – 8/2021 CSA Update- 4/9/2021	Amendment 1 8/2021 - TBD	TBD	12/2025
Winslow Tap 115-kV Line	2018-2019	12/17/2020 – 5/2021 CSA Update- 4/9/2021	Amendment 1 5/2021 – 8/2022	9/2022- 9/2023	9/2023- 12/2023
Energy Storage Battery, DERs & Ferry Curtailment	2018-2019	12/17/2019 – 8/2021 CSA Update- 4/9/2021	Amendment 1 8/2021 - TBD	TBD	10/2023

Note: As the three projects covered by this combined CSA progress from the Planning to the Design Phase, each project will submit a separate CSA to pass through the phase gate and will thereafter submit a separate project specific CSA for future phase gates.

I. Project Overview

Puget Sound Energy, Inc. (PSE) completed a draft of the *Bainbridge Island Electric Needs Assessment* in 2018. PSE then worked with industry experts and conducted analyses of the traditional (wires) and non-wires alternatives (NWA). These analyses were conducted in order to determine a cost effective solution that addresses the identified system needs for Bainbridge Island over the 10 year planning horizon.

PSE's proposed solution is a combination of wires and non-wires components and is identified as the Top Hybrid Alternative in *PSE's Bainbridge Island Electric System Solutions Report, July 2019*. The solution is broken down into 3 components that address each of the (3) identified system needs separately:

- 1) Construction of Winslow – Murden Cove 115 kV line (transmission reliability need);
- 2) Rebuild of the Winslow Tap 115 kV line (aging infrastructure need); and
- 3) Installation of an approximate 3.3 MW 5 MWh energy storage battery, implementation of an approximate 3.3 MW distributed energy resource (DER) portfolio, and the ability to curtail the planned 10 MW electric ferry load under Schedule 46 (substation group capacity need).

The three components of the Top Hybrid Alternative are described in more detail below.

1) Winslow – Murden Cove 115 kV Line:

- Build a 3.5 mile 115 kV overhead transmission line (loop) connecting Winslow substation to Murden Cove substation on Bainbridge Island. Upgrade Winslow and Murden Cove substations to terminate the new transmission line.

2) Winslow Tap 115 kV Line Rebuild:

- Rebuild 4.5 mile long existing 115 kV overhead transmission line – Winslow Tap, on Bainbridge Island. Improve vegetation management and access along the line corridor. Approximately 25

poles of the 79 pole transmission line were replaced in 2020 as part of the pole replacement program.

3) Energy storage battery, DERs, and ferry curtailment:

- Install an approximate 3.3 MW/5 MWh battery energy storage system (BESS) planned for Murden Cove substation
- Implement an approximate 3.3 MW distributed energy resource (DER) portfolio on Bainbridge Island with customer-side resources including energy efficiency, renewable distributed generation, and the potential of demand response.
- Connect the new Washington State Ferry electrification charging load (10 MW) as a curtailable resource under schedule 46.

Business Need:

The Bainbridge Island Electric System Needs Assessment report identified needs and concerns¹ for PSE's transmission and distribution system on Bainbridge Island, which are briefly described below.

System needs and concerns for Bainbridge Island are:

Transmission Reliability need: A reliability improvement need was identified to improve the performance of the Winslow Tap transmission line that feeds Winslow substation. Nearly 70 percent of the transmission related customer minutes of service interruption² on Bainbridge Island were from outages to the Winslow Tap transmission line largely due to vegetation. The extreme duration of these outages is most often due to the poor access on the cross county section of the line.

Key observations regarding Winslow Tap transmission outages over the 5 year period between 2013 and 2017:

- Outages are long (from 1-2 hours to 13 hours per year)
- Outages are frequent (from 1 to 5 outages per year)
- During storms, reliability is worse

Reasons for poor reliability of the Winslow Tap:

- Heavy vegetation along Winslow Tap
- Difficult terrain and poor access along the line
- Limited distribution substation capacity for backup of Winslow substation

Transmission Aging Infrastructure need: An infrastructure replacement need was identified for the Winslow Tap transmission line support structures that are nearing end of useful life and could potentially fail leading to unplanned outages and emergency repairs. Aging infrastructure risks include failure prone wishbone style cross arms and a 60 year old conductor.

Substation Capacity need: A distribution substation group capacity need of 14.6 MW was identified on Bainbridge Island within the 10 year planning horizon (2018-2027) to support general load growth of 4.6 MW and planned 10 MW load addition for the new ferry electrification charging load. The anticipated capacity need is expected to grow to 16.6 MW by 2030 due to general load growth increase by 2 MW. Per the PSE Solution criteria a solution must last 10 years. The Needs Assessment shows that additional

substation capacity is needed by 2020. Therefore, the need of 16.6 MW is the ultimate need for a viable solution to last until 2030.

Transmission Operating Flexibility concern: Concerns related to ability to transfer load to support routine maintenance³ and outage management. Winslow and Murden Cove substations are on radial transmission taps (single transmission source) with no transmission backup. Customers served from these two substations have potential for outage in the event of an unplanned transmission outage or emergency transmission equipment repair situation due to lack of transmission backup.

Proposed Solution:

Specifically the hybrid solution:

- Improves transmission and distribution reliability by building approximately 3.5 miles of new overhead transmission line between Murden Cove and Winslow substations that will create a transmission “loop”. The loop will also improve operating flexibility on the transmission system to both Winslow and Murden Cove substations.
- Addresses the aging infrastructure need for the Winslow Tap transmission line by rebuilding the 4.5 mile line and improving the corridor access and vegetation management for maintainability and operability of the line. Install new poles and bigger conductor. Acquire necessary property rights.
- Addresses Bainbridge Island’s distribution capacity need with:
 - Connecting the new ferry electrification charging load (10 MW) as a curtailable resource.
 - Installing an approximately 3.3 MW/5 MWh battery storage system (planned for Murden Cove substation).
 - Implementing an approximately 3.3 MW DER portfolio on Bainbridge Island, with customer side resources such as energy efficiency, renewable distributed generation, and potential of demand response.

Project
Outcome/Results/Vision:

Based on the needs assessment and alternatives analysis, the proposed solution is a hybrid alternative. The hybrid alternative:

- Invests in traditional transmission infrastructure to replace aging equipment and improve reliability
- Deploys battery storage and DERs to support the island’s electric load growth and ferry electrification without the need for additional substation infrastructure.
- Adds a transmission loop that improves reliability and supports future technologies.
- Connects the new ferry electrification charging load (10MW) as a curtailable resource (dependent upon WSF acceptance).
- Provides cost savings as compared to the conventional wired alternative.

N/A
 Low Impact
 Medium Impact
 Significant Impact

OCM, Process & Training
Impact:

The two transmission lines will have low impact. The new energy storage battery will require new processes, training, and organizational changes.

Primary ISP Alignment:

Customer [ISP strategy descriptions](#)

Portfolio Description:

Risk Mitigation [Capital Allocation Definitions](#)

Project Complexity:

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- Straightforward and well understood Complex and well understood Complex and not well articulated
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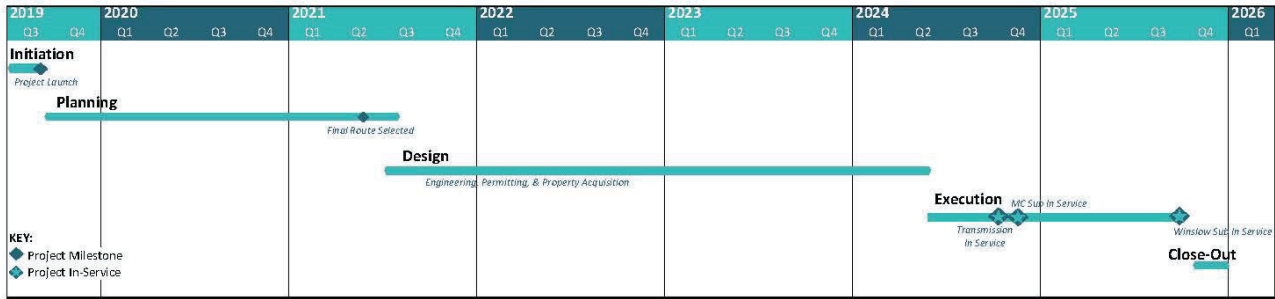
II. Key Schedule and Financial Information

Expected Start Date If Funded:	12/2019
Expected In-Service Date:	12/31/2025

High-Level Schedule

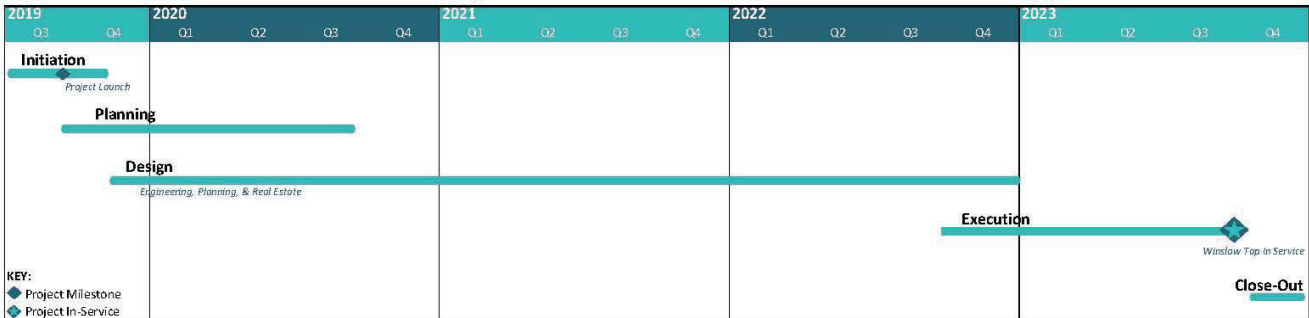
Winslow - Murden Cove Transmission Loop

Anticipated Project Schedule



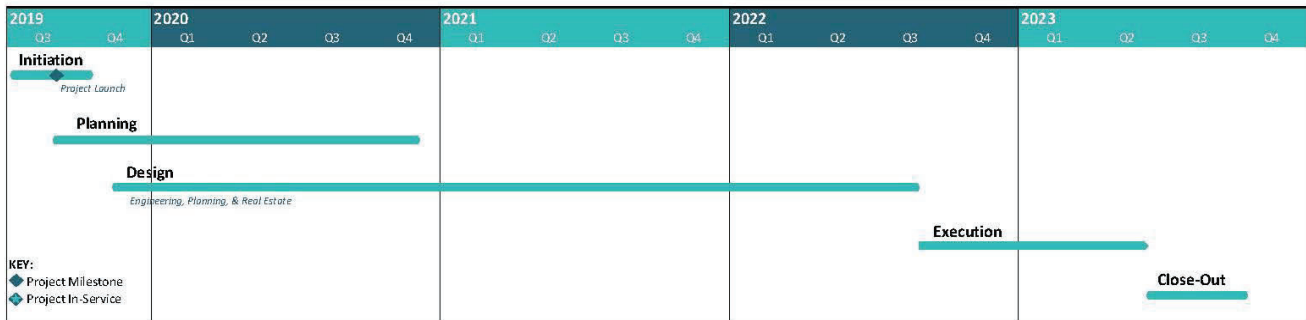
Winslow Tap Line Rebuild

Anticipated Project Schedule



Energy Storage Battery - Murden Cove

Anticipated Project Schedule



Initial Estimated Funding % by Phase as of 04/9/2021:

Initiation	Planning	Design	Execution	Closeout
2%	13%	17%	67%	1%

Initial Grand Total Estimate: \$49.18M Contingency Standard	Capital: \$48.82M	OMRC/Project O&M: \$360,000 (Not including O&M Tail)
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Estimated Five Year Allocation:**Winslow – Murden Cove Transmission Loop:**

Category:	2020≤	2021	2022	2023	2024	2025	Total
Capital (incl. contingency)	\$2,952,000	\$2,400,000	\$5,370,000	\$1,200,000	\$12,000,000	\$1,100,000	\$25,022,000
Project-related O&M	\$0	\$0	\$0	\$0	\$0	\$0	\$0
OMRC	\$0	\$0	\$0	\$0	\$50,000	\$50,000	\$100,000
Ongoing O&M	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Incremental Ongoing Annual O&M:

Category	Annual Amount
Vegetation Management	\$3,000
Transmission Line	\$2,000
Substations	\$2,000

Winslow Tap 115kV Line Rebuild:

Category:	<2020	2021	2022	2023	2024	Total
Cap. with contingency	\$1,435,000	\$1,605,000	\$2,100,000	\$6,740,000	\$200,000	\$12,080,000
Project-related O&M	\$0	\$0	\$0	\$0	\$0	\$0
OMRC	\$0	\$0	\$0	\$200,000	\$0	\$200,000
Ongoing O&M	\$0	\$0	\$0	\$0	\$0	\$0

Budget reduced due to 2020 pole replacements funded by pole program.

- 1) Above Capital costs are 2019 dollars and includes 25% contingency
- 2) OMRC is for distribution transfer work
- 3) The \$100K Ongoing O&M is for mitigation years 2-6, year 1 installation is capital

Incremental Ongoing Annual O&M:

Category	Annual Amount year 1-6	Annual Amount year 5-beyond
Veg Management	No change	No change
Veg Mitigation	\$25,000 for 5 years only	0
Osmoste (\$70/pole)	No change	No change
Access Maintenance	\$600	\$600
Total	\$25,600	\$600

Vegetation mitigation for critical area buffer impacts will likely be required. The installation of the mitigation will be a capital cost but the maintenance and reporting will be O&M. This should be limited to 5-years at the most. Beyond 5-years O&M will be the same as today with the exception of access road maintenance, estimated at \$600 per year.

Energy Storage Battery:

Category:	2020 ≤	2021	2022	2023	Total
Capital (incl. contingency)	\$850,000	\$2,120,000	\$1,750,000	\$7,000,000	\$ 11,720,000
Project-related O&M	\$0	\$0	\$0	\$0	\$0
OMRC	\$0	\$0	\$60,000	\$0	\$60,000
Ongoing O&M	\$0	\$0	\$0	\$0	\$0

Incremental Ongoing Annual O&M:

Category	Annual Amount
Fixed O&M	\$48,000
Variable O&M	\$12,000

III. Ongoing Benefits

Category:	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Ongoing O&M (to be funded by business)	N/A	N/A	N/A	N/A	N/A	N/A
Ongoing O&M (requesting \$'s)	N/A	N/A	N/A	N/A	N/A	N/A
Benefits	N/A	N/A	N/A	N/A	N/A	N/A
Net impact (= Benefits – O&M)	N/A	N/A	N/A	N/A	N/A	N/A
* Payback in Years	Years = Total Costs / Annual Cash Benefits					

* Enter positive amount or Not Applicable

<p>Summary Benefits (see Benefits realization plan for details):</p>	<p>Winslow – Murden Cove Transmission Loop: This project will reduce the frequency of outages caused by faults on the radial transmission lines feeding Winslow and Murden Cove Substations. The new line connecting Winslow and Murden Cove Substations will result in each of these substations having two transmission line feeds rather than one, which will greatly improve reliability. The project will reduce SAIDI and SAIFI numbers for Bainbridge Island customers. There will be an avoidance of O&M resulting from a reduction in the need for emergency repair of damage to the two radial taps.</p> <p>Winslow Tap 115kV Line Rebuild: Access will allow for easier and safer patrol during storms, vegetation maintenance and system repairs. There will be an avoidance of O&M resulting from a reduction in the need for emergency repair of damage. Aligning PSE access requirements with community trails will improve PSE recognition.</p> <p>Energy Storage Battery: The installation of a 3.3MW/5 MWh energy storage battery and implementation of a 3.3MW DER program, along with connecting the proposed electric ferry under a curtailable rate schedule will together defer the need to build a new substation and new feeders for 10 years or more. The hybrid alternative, which includes an energy storage battery as one of its components, is estimated to cost approximately \$4M less than an all wires solution.</p>
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IV. Risk Management Summary

<p>Summary of high level risks sentence:</p>	<p>Community Resistance, Permitting, and Condemnation pose the greatest risk to the Bainbridge Island Reliability Projects.</p>
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V. Phase Gate Change Summary

Use this section for changes from: **Planning to Design, Design to Execution or Execution to Closeout** phases. To have a history of the changes at each phase gate change, **copy/paste the table below above the previous table.**

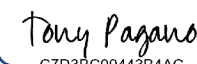
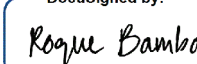
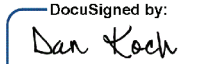
Phase:	Planning to Design
Scope:	Adding fiber, control house, and mitigation property to WIN-MUR. Emergency repair on Winslow Tap changed scope. Adding fire protection and alternate site for battery.
Budget:	\$10.72M increase for battery and loop.
Schedule:	WIN-MUR in-service Q3 2025. WIN TAP in-service Q4 2023. Battery in-service Q2 2023.
Benefits:	No change

Prepared by:	Barry Lombard and Jeff McMeekin
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VI. CSA Approvals

Add/remove rows as needed in the table below. Email approval is acceptable. To maintain a history of the changes at each phase gate change, **copy/paste the table below above the previous table.** Send to the Capital Budget team at CSA-TeamMail@pse.com. For a project in the Strategic Project Portfolio (SPP) review the [Escalation Criteria](#) for appropriate escalation and approvals.

For guidance on approval authority levels, follow [CTM-07 Invoice Payment Approval Exhibit I Invoice/Payment Approval Chart](#)

Project Phase	Select Phase			
Approved By	Title	Role	Date	Signature
Tony Pagano	Manager Major Projects	Manager	June 17, 2021	DocuSigned by:  C7D3BC09443B4AC...
Roque Bamba	Director Project Delivery	*Director Sponsor	June 17, 2021	DocuSigned by:  BC203E4E58BB426...
Dan Koch	Vice President Operations	Executive Sponsor	June 22, 2021	DocuSigned by:  7E7434ECBF5B4C0...

*Director Sponsor attests that all considered documentation has been approved.

Please direct any questions to either:

1. The Capital Budget team at CSA-TeamMail@pse.com, or
2. The Enterprise Project and Performance Project Practices team at EPP-ProjectPracticesTeam@pse.com