Eastsound, Washington

2026 – 2031
Construction Work Plan
Washington 9 (WA0009) San Juan

I hereby certify that this 2026-2031 Construction Work Plan was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of Washington.

Digitally signed by Russell H. Guerry, P.E.
DN: cn=Russell H. Guerry, P.E., o=Orcas Power and Light Cooperative, ou, email=rguerry@opalco.com, c=US
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March 12, 2026
(Date)

By: _____
Russell H. Guerry, P.E.
Registration No. 52424

Orcas Power & Light Cooperative
183 Mt. Baker Road
Eastsound, WA 98245

March 10, 2026

Contents

I. Executive Summary

A. Introduction and Purpose of Report

The 2026-2031 Construction Work Plan (CWP) provides a review of Orcas Power & Light Cooperatives' (OPALCO) existing system and a guide for improvements required to accommodate anticipated loads for the four years beginning July 1, 2026 through June 31, 2031. A work plan year will be defined as June 1st through July 31st of the following year, This work plan was developed with an emphasis on improving service reliability while minimizing the impact on immediate and long-term retail power costs.

The system improvements recommended herein are consistent with those in the 2020–2040 Long-Range Plan completed January 21, 2021. The anticipated demands, member growth, average usage and peak usage are consistent with the current 2026 Load Forecast. Furthermore, this CWP and recommended improvements reflect the design criteria contained herein.

A loan will be required to implement the construction recommendations in this CWP. The system improvements planned to be financed by the loan are tabulated in the plan listed below. These figures only include the expenditures expected within 2026-2031 and do not include any project cost prior to 2026 carried forward.

Table 1: 2026-2031 CWP Cost Summary

	Work Plan					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
TOTAL SYSTEM IMPROVEMENTS DISTRIBUTION	$ 12,150,000	$ 13,050,000	$ 7,270,000	$ 8,275,000	$ 5,850,000	$ 46,595,000
TRANSMISSION	$ -	$ -	$ 2,700,000	$ 1,100,000	$ -	$ 3,800,000
GENERATION	$ -	$ -	$ -	$ -	$ 5,200,000	$ 5,200,000
GRAND TOTAL CONSTRUCTION WORK PLAN	$ 12,150,000	$ 13,050,000	$ 9,970,000	$ 9,375,000	$ 11,050,000	$ 55,595,000

The system improvements in the 2026-2031 CWP are those needed to provide service for 15,907 members at an annual average monthly consumption of 1,139 kWh per member. The 2023-2024 system non-coincident peak was 85,213 kW. The projected non-coincident 2030 system peak is ~89,500 kW.

The Cooperative's 2016 Operations and Maintenance (O&M) review, RUS Form 300, was used to determine construction required to replace physically deteriorated equipment and material and improve reliability and quality of service. Additionally, the engineering staff reviewed each improvement in the field prior to its inclusion in this plan to assure its necessity.

B. Present System Analysis

The following Present System Analysis discusses features of the existing transmission and distribution systems as well as current operational conditions as they apply to the current Long-Range Plan. The latest O&M Survey, found in Figure VI-1:

RUS Form 300 – Page 1, was completed in 2016 and reviewed by Rodney Peach, RUS General Field Representative.

1. Service Area

OPALCO has headquarters in Eastsound, WA with district offices in Lopez Island, WA and Friday Harbor, WA. The cooperative's service territory encompasses parts of San Juan County, WA.

2. Power Supply

OPALCO purchases power from Bonneville Power Administration through a management contract with Pacific Northwest Generation Cooperative. Power is supplied through a delivery point on Lopez Island owned and operated by Bonneville Power Administration. The system has three delivery points at 69 kV from BPA. OPALCO currently owns and maintains 42.7 miles of 69 kV transmission.

3. Substations

OPALCO presently provides service to its members at 12.7/7.2 kV distribution voltage.

4. Distribution Circuits

Overall, the distribution system is, as noted in the RUS Form 300 Review Rating Survey – Operations & Maintenance, in satisfactory condition.

Voltage regulators are presently being used on several feeders to maintain acceptable voltage levels at system extremities and defer capital investment if feasible. In most instances, voltage regulators are used to correct the voltage drop caused by long distances from the source rather than voltage drop caused by large loads. The use of a large number of voltage regulators will result in excessive line losses due to the losses in the regulators as well as those of the smaller conductor and/or single-phase lines serving loads. Re-conductoring and multi-phasing is recommended to improve voltage conditions where economically justifiable.

Examination of the circuit loading suggests that there should be substantial effort directed toward maximizing phase balance on circuits and substation transformers. Multi-phasing improvements are designed to not only correct phase balance, but to improve voltage characteristics, reliability, coordination, and line losses.

5. System Energy Losses

The system annual energy losses from 2011 through 2025 are as follows:

Table 2: System Losses

Year	Losses	Percentage
2014	14,118,192	6.6%
2015	12,908,377	6.3%
2016	12,285,569	6.1%
2017	13,026,268	6.4%
2018	13,156,011	6.4%
2019	13,287,841	6.4%
2020	12,074,360	5.4%
2021	8,733,233	3.7%
2022	15,055,571	6.2%
2023	14,688,916	6.4%
2024	13,094,220	5.6%

The completion of the CWP improvements will aid in reducing system losses and maintaining adequate service reliability. Increased conductor sizes, shorted feeds through ties, and multi-phasing will decrease losses across our system by effectively reducing the impedance of the system.

6. Service Reliability

Service reliability is an important factor in measuring quality of service provided to the member. Although weather is uncontrollable, some measures can be taken to promote reliable service. A vigorous program of right-of-way re-clearing to alleviate problematic foliage conditions will continue to be maintained. Foliage in rights-of-way cause outages and obstruct the movement of line crews during storms, thereby increasing outage length. Periodic reviews of easements and right-of-way areas will continue and be expanded when needed and feasible.

Replacement of aging poles and conductors in accordance with an ordinary replacement program will lower material failures. These programs will also aid in reducing weather-related outages, particularly those caused by wind and/or ice storms.

Replacement of aging underground conductor when greater than one failure is seen in an installation area, soil type, and conductor type.

Additionally, multi-phasing and load-balancing will significantly reduce the number of members interrupted during a single-phase outage and will reduce outage lengths. In many areas where multi-phasing is required, the existing sectionalizing devices cannot be sized to pick up the entire cold load. This significantly increases the outage lengths since the line crews must re-energize the line in sections. Continued multi-phasing and the addition of new sectionalizing points will substantially reduce outage time per

member. New sectionalizing points will be added as a part of the Sectionalizing Study in addition to the projects included within this plan.

The upgrade of inter-substation tie lines will improve reliability by providing available capacity for load shifts as well as eliminating old, deteriorated conductors from the system. The cooperative will use 336.4 kcmil ACSR conductor on major overhead inter-substation tie lines and 500 kcmil Al conductor on major underground inter-substation tie lines.

Investments in communication infrastructure for field personnel communications and system monitoring and control will aid in reduction of outage times and response. This infrastructure will provide accessibility to system loads, switching status, outage extent and awareness of other personnel in the area.

The table below provides a five-year service interruptions (minutes per consumer) summary based on information derived from the cooperative's RUS Form 7.

Table 3: Outage Data (in minutes per member)

	2020	2021	2022	2023	2024	5 Year Average	Total	Percent of Total
Power Supply	25	1162	1390	1009	0	717	3585	67.6%
Major Storm	0	62	183	0	39	57	284	5.3%
Planned	52	35	22	165	25	60	299	5.6%
All Other	146	394	295	118	187	228	1139	21.5%
Total	222	1652	1889	1291	252	1061	5307	

C. Historical System Data

The Exhibits in this CWP illustrate historical system data utilized in the detailed analysis of system operations. System historical data was reviewed for system peak loads, energy purchased, energy sales, members billed, service interruptions, service extensions, commercial loads, and circuit loads. This data was compiled and analyzed to identify operational trends, positive and negative, to be addressed in the 2026-2031 CWP.

D. Projected System Loads

Load growth is projected at approximately 1% per year. Substation and load projections were based on historical growth rates and proposed load additions, including new subdivisions, commercial loads or large power additions.

E. Reviews with Staff and Use of System Model

The transmission and distribution system at OPALCO is modeled on the MilSoft Distribution Analysis Software, WindMil. One model of the system was prepared utilizing summer peaking data and another using winter peaking data. Projected substation loads were allocated to the model to obtain calculated voltage and loading profiles for each distribution circuit. Recommendations included in this CWP were based in part on the

analysis of the WindMil model. Management and operations personnel at the cooperative reviewed each case that the distribution model indicated a potential voltage or capacity problem. These reviews were used to confirm the computer calculations based upon available field data and experience. Additionally, these interviews review problem areas that did not appear during the WindMil analysis due to local knowledge of proposed subdivisions, increased commercial loads, or condition of distribution facilities. Adjustments were made to the CWP recommendations accordingly.

II. Design Criteria

A. Executive Summary

Improvements recommended in this CWP represent actions required to maintain standards for safety, adequate voltage, thermal loading and service reliability levels. The following outline describes basic design parameters utilized in this study.

1. Transmission Circuits

- Maximum of 50% of line rating
- Submarine terminal stations insulation ratings – one voltage class higher
- Ordinary conductor replacement based on imminent need rather than age
    - Replace when facilities experience in excess of five outages per year per member for two consecutive years (non-ROW related outages)

2. Distribution Circuits

- Maximum voltage drop – 5 volts (120 V base)
- Maximum of one stage of line voltage regulation
- Conductor loading
    - 50% of the thermal capacity for inter-substation ties
    - 80% of the thermal capacity for radial circuits
- Maximum of 35 amps on single-phase taps
- Ordinary conductor replacement based on imminent need rather than age
    - Replace when facilities experience in excess of five outages per year per member for two consecutive years (non-ROW related outages)
    - Replace URD cable after second failure per section or concentric neutral corrosion

3. Substations

- Initial loading of substation transformers to 60% of base capacity rating
- Existing transformer loaded to fan cooled rating for short-term peaks
- Utilize ANSI/IEEE Guide for loading liquid immersed equipment, including power transformers and voltage regulators
- Power loss evaluations of new transformer purchases

4. Voltage Regulation

- Load not exceeding standard manufacturer capacity or thermal rating
- Utilized where voltage drop is greater than 5 volts (120 V base) and conductor replacement is not feasible

5. Distribution Transformers

- Load at or near standard manufacturer capacity rating
- New transformer purchases evaluated for power loss optimization and total ownership costs

6. Conductor Sizing

- Overhead Transmission
  - 396.5 kcmil ACSR Ibis (26 X .1236, 7 X .1236) (594 amps)
  - 336.4 kcmil ACSR Linnet (26 X .1137, 7 X .0884) (529 amps)
  - 4/0 ACSR Penguin (6 X .1878, 1 X .1878) (357 amps)
- Submarine Transmission
  - Load based
- Overhead Distribution
  - Single-phase
    - 1/0 ACSR for low-load levels
  - Three-phase
    - 336.4 kcmil ACSR for main feeders
- Underground Distribution
  - Single-phase
    - 1/0 AL with Full Concentric Neutral within 2" Conduit
    - 4/0 AL with Full Concentric Neutral within 4" Conduit
  - Three-phase
    - 1/0 AL with Full Concentric Neutral within 6" Conduit
    - 4/0 AL with Full Concentric Neutral within 6" Conduit
    - 500 MCM AL with Full Concentric Neutral within 6" Conduit
- Submarine Distribution
  - Single-phase
    - #2 Cu

7. Sectionalizing

- Maximum of 40 momentary outages per feeder per year
- Maximum of 2 hours of outages per member per year – urban
- Maximum of 5 hours of outages per member per year – rural
- Limit loads on reclosers to 80% of trip coil rating
- Minimum phase-to-ground fault pick up capability
- Device use will be as follows:
  - Underground
    - Vacuum Fault Interrupter (VFI) – Loads greater than 40 Amps
    - Fused Junction Cabinet – Loads up to 40 Amps (when feasible)
    - Fused Elbow – Loads up to 40 Amps (when above not feasible)
  - Overhead
    - Recloser – Overhead with greater than 40 Amps or based on fusing
    - Fuse K Curve – Loads up to 40 Amps or no greater than 100K sizing

8. Capacitors/Reactors & Power Factor

- Goal of 95% lagging to 95% leading power factor

9. Line Improvements

- Improve voltage levels
- Maintain adequate thermal capacity
- Balance phase loads
- Line-loss reduction
- Improve reliability
- Address O&M Survey, RUS Form 300 concerns
- Underground cable installation and replacement based on outage and corrosion of cables

B. Transmission Circuits

1. Overhead

Transmission line construction, repair and modification shall follow current RUS 7 CFR Part 1728F-810 standards. Yearly average transmission line loading shall not exceed 50% of the yearly average rated capacity of the transmission line conductor. All transmission line poles are inspected on a seven-year schedule. Replacement of existing poles is based on inspection finding and 30-to-50-year maximum pole life. Poles and/or crossarms to be replaced if found to be physically deteriorated by visual inspection and/or tests. Primary new transmission line construction shall be overhead (except for underwater crossings).

2. Submarine Cables

Transmission line segments using underwater/underground submarine cable(s) shall be design using non-oil filled 69 kV rate armored cables. OPALCO has standardized on 500 MCM Cu lead shielded cables. All submarine cables are designed for 560 amps continuous uses with short period (4 hours) 125% overload rating. All submarine cables are seismically rated for OPALCO's seismic zone. Submarine cable terminal, where OPALCO transitions from underground to overhead are sized one voltage class higher due to the capacitive voltage induced at the terminals by the submarine cable(s) during periods of low usage.

C. Distribution Circuits

Voltage regulation will be utilized to achieve short-term deferral of capital investment.

Loads on single-phase taps should be limited depending on the size of the protective device and the overall sectionalizing coordination. Single-phase line fuses or reclosers should be limited to 50 amp devices, where practical. There will certainly be occurrences where larger single-phase tap line devices are applied, most particularly when these taps are closer to the substation and fault levels, including minimum fault levels, are

higher. Application of sectionalizing equipment along single-phase taps may be required to provide adequate protection while deferring expensive multi-phasing projects.

Conductor replacement of overhead and underground lines will be based on outage occurrences of the cables. Due to the variance of soil types in our service area, the corrosion may vary and requires inspections on a greater frequency after 20 years of installed life. All new installations of URD will be in conduit to provide a maximum cost benefit for the life of the trenched facilities.

The equipment additions within this plan allows for integration to OPALCO's communication infrastructure. This provides monitoring, control, and automation capabilities to increase safety, efficiency and reliability.

D. Substation

Substation transformer average yearly loading shall not exceed 60% of the nameplate rating on the transformer. Substation loading shall not exceed 110% of the transformer nameplate ratings.

The overall system transformation was studied not only on an individual substation basis, but also on a total system basis to determine the optimum capital to power loss ratio while keeping the transformers from exceeding their top forced air rating. A similar evaluation criterion was utilized on substation voltage regulators and line reclosers.

E. Sectionalizing

All circuit leaving substations shall have both instantaneous and overcurrent protection. A sectionalizing study will be conducted within the first year of this CWP. Sectionalizing enhancements will be recommended to reduce momentary outages to 40 per feeder per year and extended outages on urban feeders to an average of 2.0 hours per year per member. The extended outages on rural feeders will be 5.0 hours per year per member.

In general, an acceptable range of set points is defined by a minimum and maximum. When evaluating an existing setting that falls outside of the acceptable range, a preferred value will be determined. For creation of new settings, the preferred value is used when possible.

1. 69 kV Transmission Line Protection

Overcurrent element performance is more susceptible to changes in system fault contribution than distance elements which is why current protection practices at OPALCO require all new line relays to be installed with impedance-based distance elements as well as be capable of line differential protection.

- All new line relay terminals will have the following protective elements:
    - Impedance based distance elements (21P/G)
    - Directional instantaneous overcurrent (67P/G)
    - Differential capable (87L)

- Breakers will be required for all overhead protected lines.
- C400 or greater three phase current transformers and three phase line potential transformers will be required for all future installs.

2. Transformer Protection Guidelines

All new transformer protection packages installed at OPALCO will require a high-side circuit switcher or circuit breaker with dual slope differential protective elements. Additionally, temperature monitoring and alarming that can be viewed remotely will be a requirement for all future installs. Further evaluation of future technologies that provide more information of the transformer health or provide an indication of potential failure will be considered.

3. Distribution Protection Guidelines

Breakers/reclosers as well as switchgear will be capable of time overcurrent and directional overcurrent protection as well as the ability detect line and bus voltage.

F. Capacitors/Reactors

Power factor will be continually monitored. Projects will be submitted for amendment when instances of correction are needed.

G. Line Improvements

Multi-phasing will be utilized to aid in voltage improvement, elimination of overloaded conductors, reduction of power losses and improvements of system sectionalizing performance.

Voltage regulation will be utilized when voltage drop is greater than five volts and where conductor replacement can be delayed.

III.Summary of Report

A. Status of Previous Work Plan Projects

The following summary is a list of improvements proposed in the 2021-2025 Construction Work Plan and the status of each.

Code	Year	Project Name	Substation Area	Status
215	2021	Mullis Road Tie	Friday Harbor	Carry Forward
216	2022	Tarte Road Tie	Roche Harbor	Carry Forward
218	2024	Crescent Beach Bore	Eastsound	Removed

Code	Year	Project Name	Substation Area	Status
300	2021	Warbass Intersection Improvements	Friday Harbor	Carry Forward
301	2022	Egg Lake Road Conversion	Friday Harbor	Removed
312	2022	Dolphin Bay Road UG Phase Conversion	Orcas	Completed
319	2021	Beaverton Valley Road OH Conversion	Gravel Pit	Carry Forward
320	2022	San Juan Valley Road UG Conversion (Boyce)	Gravel Pit	Completed
330	2021	Urner-Harrison Point Conversion	Eastsound	Completed
331	2021	Hoffman Cove Road Conversion	Shaw	Completed
332	2021	San Juan Valley Conversion (Hospital to Douglas)	Gravel Pit	Completed
334	2021	Prune Alley Street Conversion	Eastsound	Completed
335	2021	Center Island Submarine Cable	Decatur	Completed
337	2021	Agate Beach Overhead Conversion	Lopez	Carry Forward
338	2025	Friday Harbor Sidewalk Replacements	Friday Harbor	Carry Forward
341	2021	C101/C104	Eastsound	Carry Forward
343	2022	Blanchard UG Rephase	Eastsound	Carry Forward
344	2023	Montgomery Lane Conversion	Orcas	Completed
345	2023	Decatur Three Phase to North Terminal	Decatur	Completed
347	2024	Terrill Beach Road Reconductor	Eastsound	Carry Forward
348	2024	Doe Bay Conversion	Olga	Completed

Code	Year	Project Name	Substation Area	Status
501	2021	Gravel Pit Differential	Gravel Pit	Completed
502	2023	Lopez 2nd Substation	Lopez	Carry Forward
504	2024	Shaw Disconnect Switch Replacement	Shaw	Completed
505	2022	San Juan Microgrid	San Juan	Carry Forward
506	2021	Decatur Lighting	Decatur	Completed
507	2021	Blakely Lighting	Blakely	Completed
511	2023	Eastsound Substation Upgrades	Eastsound	Removed
512	2023	Olga Substation Rebuild	Olga	Carry Forward
513	2021	LTC Control Replacements	-	Completed
515	2024	Orcas Battery Project	Orcas	Removed
517	2025	Circuit Switcher protection upgrades	-	Removed
518	2021	Decatur Energy Storage System	Decatur	Completed
519	2025	Friday Harbor Substation Upgrade	Friday Harbor	Completed

Code	Year	Project Name	Substation Area	Status
601	2025	Transformers and Meters	All Substations	Completed
601-1	2025	Meter Upgrade	All Substations	Completed
603-1	2021	Fairgrounds VFI	Gravel Pit	Carry Forward
603-19	2021	Mud Bay VFI	Lopez	Completed
603-3	2021	Mt Baker Road VFI Repairs	Eastsound	Completed
603-4	2021	White Beach 1ph VFI	Orcas	Completed
603-5	2022	iTAP conversion	-	Completed
603-6	2022	Recloser Control Replacement	-	Completed
603-7	2023	Fuse pad replacements Rosario	Olga	Carry Forward
604-1	2021	Orcas Substation Regulators	Orcas	Completed
604-7	2022	Bailer Hill Voltage Regulator	Gravel Pit	Carry Forward
606	2021	Distribution Pole Replacements	All Substations	Completed
607-1	2021	October Farm Conversion		Completed
607-2	2021	Price Street OH Conversion	Friday Harbor	Completed
607-4	2023	Alley Town Margeurite and School OH Conversion		Completed
608	2025	URD Replacements	All Substations	Completed

Code	Year	Project Name	Substation Area	Status
704-1	2022	SCADA Project - ADMS	-	Completed
704-2	2021	Ruggedcom Upgrades	-	Completed
704-3	2021	SCADA UPS & SFD Switches	-	Completed
706-2	2021	Pt Laurence Rd Fiber	Olga	Completed
706-3	2022	Jud Cove Fiber	Orcas	Completed
706-4	2024	Mt Baker Rd to Tank Corner Fiber Backbone	Eastsound	Carry Forward
706-5	2025	Active Site Replacements	-	Completed

Code	Year	Project Name	Substation Area	Status
903	2021	Fault Indication (SCADA)	Transmission	Comnpleted
904	2022	SJ2 Breaker	Transmission	Removed
905	2022	2017 San Juan Cable Real Time Temperature Monitoring	Transmission	Removed
906	2023	LZ to SH Cathodic Protection	Transmission	Carry Forward
907	2023	Blakely to Olga Sectionilizing	Transmission	Carry Forward
909	2024	SH to OR Cathodic Protection	Transmission	Carry Forward
911	2025	San Juan Differential Upgrade (parallel lines)	Transmission	Carry Forward
912	2025	DE to BL Cathodic Protection	Transmission	Carry Forward
913	2025	BL to OR Cathodic Protection	Transmission	Carry Forward
914	2025	Shaw South Breaker Replacements	Transmission	Removed
1000	2025	Transmission Pole Replacements	Transmission	Completed

Code	Year	Project Name	Substation Area	Status
1201	2023	Utility Solar (San Juan)	Generation	Removed
1202	2025	Utility Solar (Lopez)	Generation	Removed

B. Summary of 2026-2031 Recommended Plan

The following section is an overview of the recommended improvements for this CWP. This is intended to be a summary of the high-growth areas and of the types of improvements recommended to resolve all voltage and capacity problems through the year 2025. A detailed description and justification for each recommended improvement can be found in Section Description and Justification.

1. Multi-phasing and Re-conductoring

As discussed in the Executive Summary, the entire distribution system is modeled in MilSoft's WindMil. For each section of line that had capacity or voltage problems based on the year 2025 projections, several options were developed and reviewed by the engineering and operations staffs. The alternatives were reviewed from a least cost and operational standpoint to determine the best solution. Feeders with voltage drop problems were addressed by means of voltage regulators. In areas where feeder regulation already exists or where design criteria dictated, the lines were re-conductored or multi-phased as required. Where conductor capacity was insufficient, the conductor was replaced.

Multi-phasing and re-conductoring project listed in Section IV will be re-constructed in the existing right-of-way unless otherwise stated in the project descriptions.

2. Increased Substation Capacity

All substation loads were evaluated to ensure the substation transformers and voltage regulators limits will not be exceeded by the projected loads. If the projected loads exceed the limits set by the design criteria, this work plan will address one of two options: an increase in substation capacity or the switching of a portion of that substations load to another substation.

3. Sectionalizing

A Sectionalizing Study will be performed within the first year of this CWP.

4. Distribution Line Voltage Regulators

Voltage regulators are utilized throughout the system to correct inadequate voltages. Additional voltage regulators have been recommended as a short-term least-cost alternative to extensive multi-phasing or line re-conductoring improvements.

5. Conductor Replacements

Approximately 60 miles of conductor has been specifically identified by the cooperative personnel as posing significant reliability risks and targeted for replacement. This has been planned for though a single work plan item to allow the cooperative staff to locate and replace lines as needed based on faults, neutral condition, and other factors.

6. Transmission

New protection schemes on OPALCO's submarine cables will increase reliability while also increase the life of the associated asset. By running the San Juan cables in parallel OPALCO will be able to reduce the load on the XLPE cable. Decreasing the load

on this cable will decrease insulation degradation which in turn will increase the theoretical life span .

IV. Construction Program

The system improvements recommended in this CWP are listed herein along with their estimated cost, a discussion of their need, and the scheduling of their installation. All costs associated with adding new services and to the system and increasing service sizes are paid for by the prospective members. This policy is in place due to the large initial costs for building to the new service in addition to the high probability of the service remaining idle for most the year.

Periodic replacement of existing poles, crossarms, etc. is required for numerous reasons. When such replacements are made, it is often necessary to install units with greater height or strength requirements. When lines are relocated due to road changes or to eliminate cross-country sections, the Cooperative should install poles of strengths suitable for long range conductor size and, in some instances, to install part or all the long-range conductor. Normal operations require the routine addition of poles in existing lines, either for joint use attachments or to improve clearance.

Inflation of the cost of materials and labor is a continuing factor that must be considered. For this reason, the cost estimate for construction during 2026-2031 was adjusted to reflect the latest indices of the Bureau of Labor Statistics Consumer Price Index for the Seattle-Tacoma-Bremerton area. The recommended system improvements are summarized to conform to RUS Form 740C; however, to facilitate discussion and ease of identification, they are listed in the detailed portion of the estimate by substation area. The RUS Form 740C account code for each improvement is included in the cost estimate.

A. Improvement Items Summary

	Code	Description	Substation Area	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1			**Distribution**						
2			**200 - New Tie-Lines**						
3	215	Mullis Road Tie	Friday Harbor	-	-	-	$200,000	-	
4	216	Tarte Road Tie	Roche Harbor	-	-	$300,000	-	-	
5			**Subtotal**	**$0**	**$0**	**$300,000**	**$200,000**	**$0**	**$500,000**
6			**300 - Conversions and Line Changes**						
7	300	Warbass Intersection Improvements	Friday Harbor	-	$150,000	-	-	-	
8	319	Beaverton Valley Road OH Conversion	Gravel Pit	-	-	$300,000	-	-	
9	337	Agate Beach Overhead Conversion	Lopez	-	-	$80,000	-	-	
10	338	Friday Harbor Sidewalk Replacements	Friday Harbor	-	-	-	-	$150,000	
11	341	C101/C104	Eastsound	-	-	-	$200,000	-	
12	343	Blanchard UG Rephase	Eastsound	-	-	$50,000	-	-	
13	347	Terrill Beach Road Reconductor	Eastsound	-	-	-	$75,000	-	
14	350	Fisherman Bay Rd OH Conversion	Lopez	-	-	$500,000	-	-	
15	351	Friday Harbor Road Replacement	Friday Harbor	-	-	-	-	$600,000	
16			**Subtotal**	**$0**	**$150,000**	**$930,000**	**$275,000**	**$750,000**	**$2,105,000**
17			**500 - Substation, Switching Station, Metering Point Changes**						
18	502	Lopez 2nd Substation	Lopez	$1,400,000	-	-	-	-	
20	512	Olga Substation Rebuild	Olga	-	-	-	$2,300,000	-	
21	520	Gravel Pit Station Upgrades	Gravel Pit	-	-	-	$400,000	-	
22	521	Lopez Substation Control and Battery	Lopez	-	-	$500,000	-	-	
23	522	San Juan Battery Storage	Friday Harbor	$5,500,000	-	-	-	-	
24	523	Eastsound Substation Rebuild	Eastsound	-	$6,500,000	-	-	-	
25	524	Orcas Substation Upgrade	Orcas	-	$1,400,000	-	-	-	
26			**Subtotal**	**$6,900,000**	**$7,900,000**	**$500,000**	**$2,700,000**	**$0**	**$18,000,000**

	A.	B.	C.	D.	E.	F.	G.	H.	I.
	Code	Description	Area	Year 1	Year 2	Year 3	Year 4	Year 5	Total
27		**600 - Miscellaneous Distribution Equipment**							
28	601	Transformers and Meters	All Substations	$1,200,000	$1,200,000	$1,200,000	$1,200,000	$1,200,000	
29	601	Transclosure Upgrades	All Substations	$300,000	$300,000	$300,000	$300,000	$300,000	
30	603-1	Fairgrounds VFI	Gravel Pit	$150,000	-	-	-	-	
31	603-6	Recloser Control Replacement	-	-	-	-	-	$100,000	
32	603-7	Fuse pad replacements Rosario	Olga	-	-	$300,000	-	-	
33	604-7	Bailer Hill Voltage Regulator	Gravel Pit	$100,000	-	-	-	-	
34	606	Distribution Pole Replacements	All Substations	$500,000	$500,000	$500,000	$500,000	$500,000	
35	608	URD Replacements	All Substations	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	
36			**Subtotal**	**$5,250,000**	**$5,000,000**	**$5,300,000**	**$5,000,000**	**$5,100,000**	**$25,650,000**
37		**700 - Other Distribution Items**							
38	708	Jud Cove Fiber	Orcas	-	-	$30,000	-	-	
39	709	Mt Baker Rd to Tank Corner Fiber Backbone	Eastsound	-	-	$160,000	-	-	
40	710	Guard Tucker Corner Fiber	Friday Harbor	-	-	$50,000	-	-	
41	711	Guard Tucker Larson Fiber	Friday Harbor	-	-	-	$100,000	-	
42			**Subtotal**	**$0**	**$0**	**$240,000**	**$100,000**	**$0**	**$340,000**
43									
44			**Distribution Subtotal**	**$12,150,000**	**$13,050,000**	**$7,270,000**	**$8,275,000**	**$5,850,000**	**$46,595,000**
45		**Transmission**							
46		**1000 - Line and Station Changes**							
47	1000	Transmission Pole Replacements	Transmission	$500,000	$500,000	$500,000	$500,000	$500,000	
48	1006	LZ to SH Cathodic Protection	Transmission	-	-	-	$350,000	-	
49	1007	Blakely to Olga Sectionilizing	Transmission	-	-	-	$400,000	-	
50	1009	SH to OR Cathodic Protection	Transmission	-	-	-	$350,000	-	
51	1011	San Juan Differential Upgrade (parallel lines)	Transmission	-	-	$400,000	-	-	
52	1012	DE to BL Cathodic Protection	Transmission	-	-	$350,000	-	-	
53	1013	BL to OR Cathodic Protection	Transmission	-	-	$350,000	-	-	
54	1020	Lopez Terminal Upgrade	Transmission	-	-	$400,000	-	-	
55	1021	Shaw Terminal Upgrade	Transmission	-	-	$400,000	-	-	
56	1022	Orcas Terminal Upgrade	Transmission	-	-	$400,000	-	-	
57	1023	San Juan Terminal Upgrade	Transmission	-	-	$400,000	-	-	
58									
59			**Transmission Subtotal**	**$0**	**$0**	**$2,700,000**	**$1,100,000**	**$0**	**$3,800,000**
60		**Generation**							
61		**1200 -Generation**							
62	1200	San Juan Solar	San Juan	-	-	-	-	$5,200,000	
63			**Generation Subtotal**	**$0**	**$0**	**$0**	**$0**	**$5,200,000**	**$5,200,000**
64									
65			**Grand Total**	**$12,150,000**	**$13,050,000**	**$9,970,000**	**$9,375,000**	**$11,050,000**	**$55,595,000**

V. Description and Justification

The following is the descriptions and justifications for all proposed system improvements including cost estimates, associated projects and alternatives. The use of the "*" in conjunction with the 740C Code identification number indicates the construction item is being carried forward from the 2021-2025 Capital Work Plan to be completed in the 2026-2031 Capital Work Plan.

DISTRIBUTION CONSTRUCTION ITEM: Mullis Road Tie

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2029

740C CODE: 215

ESTIMATED COST: $200,000

DESCRIPTION: Install a three-phase 4/0 Al URD underground distribution system utilizing existing conduit system from location 1160158 to 1591121 (on Mullis Street from Spring Street to Cattle Point Road).

JUSTIFICATION: This tie will allow for back-feed between Circuit 53 of the Friday Harbor Substation and Circuit 113 of the Gravel Pit Substation. This creates loop feed capability providing more efficient flow of energy within the area and potential of alternative feeds during outage situations. The construction will utilize a conduit and vault system installed during a City of Friday Harbor road widening project. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Tarte Road Tie

SUBSTATION AREA: Roche Harbor

YEAR OF COMPLETION: 2028

740C CODE: 216

ESTIMATED COST: $300,000

DESCRIPTION: Replace 5,700 ft. of single-phase #2 Al URD underground distribution system with three-phase 1/0 Al URD underground distribution system in 6-inch conduit with 2-inch conduit and 96 count fiber from location 1053202 to 1043310.

JUSTIFICATION: This tie will allow for back-feed between the Friday Harbor Substation and the Roche harbor Substation. This creates loop feed capability providing more efficient flow of energy within the area and potential of alternative feeds during outage situations. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Warbass Intersection Improvements

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2027

740C CODE: 300

ESTIMATED COST: $150,000

DESCRIPTION: Underground power line relocation as required for town of Friday Harbor's Warbass way intersection improvements project

JUSTIFICATION: Relocation required by the town of Friday Harbor. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Beaverton Valley Road OH phase Conversion

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2028

740C CODE: 319

ESTIMATED COST: $300,000

DESCRIPTION: Replace 16,700 ft. of single-phase #6 overhead distribution to three-phase 336.4 kcmil ACSR overhead distribution.

JUSTIFICATION: This will serve as a tie from the Friday Harbor Substation to the Roche Harbor Substation for increased reliability in major outage events. This project will also aid in balancing load, reduce voltage drop and increase reliability for the area. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Agate Beach Overhead Conversion

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2028

740C CODE: 337

ESTIMATED COST: $80,000

DESCRIPTION: Replace 2,200 ft of single-phase 1/0 ACSR overhead distribution with 1/0 Al URD underground distribution from 3561221 to 3561353.

JUSTIFICATION: Poles, insulators, and transformers are aging and need to be replaced in the near future. Moving the system to underground will increase system reliability. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Friday Harbor Sidewalk Replacement

SUBSTATION AREA: Friday Harbor and Gravel Pit

YEAR OF COMPLETION: 2030

740C CODE: 338

ESTIMATED COST: $150,000

DESCRIPTION: Replace facilities and install facilities in conjunction with various Town of Friday Harbors replacement of sidewalks.

JUSTIFICATION: The existing facilities are aging and are not within current specifications and installation methodology. This will also provide opportunities to install ties for increased reliability and efficiencies in an area of congested infrastructure. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: C101/C104

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2029

740C CODE: 341

ESTIMATED COST: $200,000

DESCRIPTION: Reconductor three-phase URD from Eastsound Substation to Tank Corner 1/0 to 500.

JUSTIFICATION: Reconductor will create a loop feed to be used in conjunction with the Olga substation. This will boost OPALCO's ability to feed the island from an alternate source in the event of an outage or maintenance work. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Blanchard UG Rephase

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2028

740C CODE: 343

ESTIMATED COST: $50,000

DESCRIPTION: Replace single phase underground distribution system with three-phase underground distribution.

JUSTIFICATION: Opportunity to improve underground distribution assets as a joint project with the local water company. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Terrill Beach Road Reconductor

SUBSTATION AREA: Olga

YEAR OF COMPLETION: 2029

740C CODE: 347

ESTIMATED COST: $75,000

DESCRIPTION: Replace aging direct buried three-phase underground distribution system with three-phase underground distribution in conduit.

JUSTIFICATION: Opportunity to improve underground distribution assets as a joint project with the local water company. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Fisherman Bay Road Conversion

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2028

740C CODE: 350

ESTIMATED COST: $500,000

DESCRIPTION: Replace 3,200 ft. of three phase #4 ACSR overhead distribution system with 1/0 URD underground distribution system in 6" conduit from Location 3182201 to 3171417 along county road right-of-way.

JUSTIFICATION: The relocation and undergrounding of this line section will increase reliability and provide better access to these facilities for ease of maintenance. This overhead tie line is an important component of the Lopez Island distribution for providing back-feed capabilities between circuits 23 and 21 of the Lopez Substation. The standard utility overhead right-of-way trimming program has been less effective since the surrounding tree height exceeds the height of these line sections.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Friday Harbor URD Replacements

SUBSTATION AREA: Friday Harbor and Gravel Pit

YEAR OF COMPLETION: 2030

740C CODE: 351

ESTIMATED COST: $600,000

DESCRIPTION: Replace facilities and install facilities in conjunction with various Town of Friday Harbors road projects.

JUSTIFICATION: The existing facilities are aging and are not within current specifications and installation methodology. This will also provide opportunities to install ties for increased reliability and efficiencies in an area of congested infrastructure.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Step Down Lopez Substation

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2026

740C CODE: 502

ESTIMATED COST: $1,400,000

DESCRIPTION: Building a second substation on Lopez to provide a back-up source as well as provide a second point of delivery for future projects such as the Lopez micro grid and generation plans. Substation will pick-up one of the Lopez feeders and provide a tie between the two substations.

JUSTIFICATION: Each of the main ferry served islands has the ability to be backed up in the event of a transformer/substation outage. Lopez was identified as a reliability concern due to the lack of a back-up substation/transformer. This has prevented necessary substation maintenance as it would require an island wide outage. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: Mobile Substation

DISTRIBUTION CONSTRUCTION ITEM: Olga Substation Rebuild

SUBSTATION AREA: Olga

YEAR OF COMPLETION: 2029

740C CODE: 512

ESTIMATED COST: $2,300,000

DESCRIPTION: Substation rebuild and design to accommodate redundant power source from/to Orcas and Eastsound. Bring aging station up to industry and OPALCO standards. Design to include new distribution breakers, auxiliary bus, distribution transformer, and high-side protection. High-side protection required to be able to back-feed Blakely and Decatur.

JUSTIFICATION: Olga substation transformer is nearing capacity limits in the next 10 years and will need to be replaced. Additionally, OPALCO has had several power supply outages that could have resulted in minimal outage time for the island had the substation had the capacity to pick-up the island. High-side protection is required for instances that require back-feed to Blakely and Decatur. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Gravel Pit Station Upgrades

SUBSTATION AREA: Gravel Pit

YEAR OF COMPLETION: 2029

740C CODE: 520

ESTIMATED COST: $400,000

DESCRIPTION: Replace aging relays at Gravel Pit with our new standard relay package. Increase the relay protection of the transformer by adding current differential and restricted earth fault protection. As part of the relay upgrade a new high speed protection scheme will be implemented new arc flash relay to reduce the arc flash hazard at the station.

JUSTIFICATION: Upgrading relay protection based on IEEE Std. C37.91-2008 recommendations and industry best practices to increase reliability and safety. High speed protection can decrease damage sustained from internal faults, accurately determine fault location, and reduce the arc flash hazard in the zone of protection. In addition, electronic relays at the substation are approaching their end of life.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Lopez Substation Control and Battery

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2028

740C CODE: 521

ESTIMATED COST: $500,000

DESCRIPTION: Lopez substation is the only station to use a 125 VDC system that does not corelate to the OPALCO standard battery system. This would include replacing aging assets, upgrade control equipment to 48 VDC, and replace the battery system and house the batteries in a control enclosure.

JUSTIFICATION: The current battery system does not meet code, and aging assets are needing to be replaced. This would upgrade an aging system and bring the station into code.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: San Juan Battery Storage

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2026

740C CODE: 522

ESTIMATED COST: $5,500,000 (2,400,000 funded from CEF commerce grant)

DESCRIPTION: Installation of 1.0 MW/4.0 MWh Energy Storage System (ESS) on San Juan island near the Friday Harbor substation. This will connect on the distribution at 12.47kV. Project will enable a microgrid for a section of Eastsound. This can be used to provide critical power during outages.

JUSTIFICATION: This ESS will be used for load shifting from normal peak instances in the morning and evening to midday and night to increase load factor. It will also provide peak shaving during cold load pickup outage events to allow for a more cost-efficient restoration. 2,400,000 matching funds from CEF commerce grant.

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Eastsound Substation Rebuild

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2027

740C CODE: 523

ESTIMATED COST: $6,500,000

DESCRIPTION: Substation rebuild and design to accommodate redundant power source from/to Orcas and Olga. Bring aging station up to industry and OPALCO standards. Design to include new distribution breakers, auxiliary bus, distribution transformer, and high-side protection.

JUSTIFICATION: The Eastsound substation transformer is nearing capacity limits in the next 10 years and will need to be replaced. Additionally, OPALCO has been concentrating substation work on critical substations that could provide redundant options for the entire island.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Orcas Substation Upgrade

SUBSTATION AREA: Orcas

YEAR OF COMPLETION: 2026

740C CODE: 524

ESTIMATED COST: $1,400,000

DESCRIPTION: Replacing the oldest transformer in OPALCO's system while also upgrading aging equipment and relays. This will also include a new transformer high side protection package and transformer monitoring.

JUSTIFICATION: The Orcas transformer is in need of replacement, and with the new transformer existing equipment can be upgraded to provide better protection and reliability.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Transformer and Meter Replacements

SUBSTATION AREA: All

YEAR OF COMPLETION: 2030

740C CODE: 601

ESTIMATED COST: $6,000,000 ($1,200,000 per year)

DESCRIPTION: Replace transformers and meters as needed.

JUSTIFICATION: The transformers to be replaced have experience failure, have corrosion or are not to current specifications. The transformers purchased for replacement will improve efficiency and reduce losses. The meters purchased for replacement will have greater capabilities for gathering data and conforming to modern billing needs (i.e. time-of-use, demand, etc.)

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Transclosure Replacements

SUBSTATION AREA: All

YEAR OF COMPLETION: 2030

740C CODE: 601

ESTIMATED COST: $1,500,000 ($300,000 per year)

DESCRIPTION: Replace transclosures as these do not meet current OPALCO specifications.

JUSTIFICATION: These transformers are often some of the oldest in the system, do not meet current specifications, can pose a safety risk, and are often associated with failing open concentric cable.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Fairgrounds VFI

SUBSTATION AREA: Gravel Pit

YEAR OF COMPLETION: 2026

740C CODE: 603-1

ESTIMATED COST: $150,000

DESCRIPTION: Replace an aging fused switch with new sectionalizing equipment.

JUSTIFICATION: New sectionalizing equipment required to properly sectionalize off taps from this location. This will provide capability to monitor and control loads while better coordinating with the existing protection scheme. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Recloser Control Replacement Program

SUBSTATION AREA: Multiple

YEAR OF COMPLETION: 2028

740C CODE: 603-6

ESTIMATED COST: $100,000

DESCRIPTION: Replace existing controls across the system with a more robust design. This will allow for more sophisticated automation schemes and provide better inter-operability amongst the entire system.

JUSTIFICATION: The existing Form 6 controls have been failing on a regular basis. This has caused miscoordination issues due to an inoperable control as well as safety concerns due to controller malfunctions.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Fuse Pedestal Replacements

SUBSTATION AREA: Olga

YEAR OF COMPLETION: 2027

740C CODE: 603-7

ESTIMATED COST: $300,000

DESCRIPTION: Replace aging fuse pads in the Rosario area with new sectionalizing equipment to provide better coordination, fault location and remote monitoring.

JUSTIFICATION: The sectionalizing equipment is a safety concern and provides sub-optimal protection on downstream equipment. OPALCO is moving away from live front equipment and this is part of our conversion to dead front sectionalizing equipment. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES:

DISTRIBUTION CONSTRUCTION ITEM: Bailer Hill Voltage Regulators

SUBSTATION AREA: Gravel Pit

YEAR OF COMPLETION: 2026

740C CODE: 604-7

ESTIMATED COST: $100,000

DESCRIPTION: Replace aging three-phase voltage regulator bank at location 1673211.

JUSTIFICATION: Parts for these units are no longer manufactured. This will provide monitoring and control capabilities to increase power quality of serving area. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: Ordinary Replacements

SUBSTATION AREA: All

YEAR OF COMPLETION: 2030

740C CODE: 606

ESTIMATED COST: $2,500,000 ($500,000 per year)

DESCRIPTION: Based on historical figures, the anticipated ordinary replacement of poles is estimated at 35 poles per year. These replacements will be based on an annual pole inspection.

JUSTIFICATION: Wooden poles at end of life. Replacement of poles will increase system reliability during period of adverse weather.

ASSOCIATED PROJECTS: None

ALTERNATES: None

DISTRIBUTION CONSTRUCTION ITEM: URD Replacements

SUBSTATION AREA: All

YEAR OF COMPLETION: 2030

740C CODE: 608

ESTIMATED COST: $15,000,000 ($3,000,000 per year)

DESCRIPTION: Replacement of faulted, aging underground distribution conductors and replacement of underground unjacketed exposed concentric neutral conductors with corroded or missing neutrals. The tables below contain the project name, 740c code, substation area, year of completion, estimated length in feet, start and end locations and estimated construction costs.

JUSTIFICATION: OPALCO began installation of underground distribution conductors in the late 1960s. It is anticipated to replace approximately 60 miles of conductors with two or more faults and unjacketed exposed concentric neutral conductors having neutral corrosion enough so to effect power quality and protective scheme effectiveness.

Cable Type	Year of Standard	Est. Miles
Unjacketed, Direct Buried	Prior to 1979	150
Jacketed, Direct Buried	1979 – 2000	750
Jacketed, In Conduit	2000 - Present	300

ASSOCIATED PROJECTS: None

ALTERNATES: None

COMMUNICATION CONSTRUCTION ITEM: Judd Cove Fiber

SUBSTATION AREA: Orcas

YEAR OF COMPLETION: 2028

740C CODE: 708

ESTIMATED COST: $30,000

DESCRIPTION: Judd Cove 96 fiber replacing existing 48 to map corner then to McNallie splice location

JUSTIFICATION: Identified as OPALCO backbone fiber job.

ASSOCIATED PROJECTS: None

ALTERNATES: None

COMMUNICATION CONSTRUCTION ITEM: Mt. Baker Rd Tank Corner Fiber Backbone

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2028

740C CODE: 709

ESTIMATED COST: $160,000

DESCRIPTION: Install fiber backbone as part of OPALCO's fiber plan.

JUSTIFICATION: Identified as OPALCO backbone fiber job.

ASSOCIATED PROJECTS: None

ALTERNATES: None

COMMUNICATION CONSTRUCTION ITEM: Guard Tucker Corner Fiber

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2028

740C CODE: 710

ESTIMATED COST: $50,000

DESCRIPTION: Install fiber backbone as part of OPALCO's fiber plan.

JUSTIFICATION: Identified as OPALCO backbone fiber job.

ASSOCIATED PROJECTS: None

ALTERNATES: None

COMMUNICATION CONSTRUCTION ITEM: Guard Tucker Larson Fiber

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2029

740C CODE: 711

ESTIMATED COST: $100,000

DESCRIPTION: Install fiber backbone as part of OPALCO's fiber plan.

JUSTIFICATION: Identified as OPALCO backbone fiber job.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: Ordinary Replacements

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2030

740C CODE: 1000

ESTIMATED COST: $2,500,000 ($500,000 per year)

DESCRIPTION: Based on historical figures, the anticipated ordinary replacement of poles is estimated at nine poles per year. These replacements will be based on an annual pole inspection. – 9/year

JUSTIFICATION: Wooden poles at end of life and woodpecker damage. Replacement of poles will increase system reliability during period of adverse weather.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: LZ to SH Cathodic Protection

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2029

740C CODE: 1006

ESTIMATED COST: $350,000

DESCRIPTION: Upgrade submarine cable to incorporate cathodic protection.

JUSTIFICATION: Cathodic protection is one of the most important aspects of a corrosion prevention solution. A properly installed cathodic protection system could significantly extend the life of a submarine cable. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: Blakely to Olga Sectionalizing

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2029

740C CODE: 1007

ESTIMATED COST: $400,000

DESCRIPTION: Install a new three-phase 69 kV circuit Recloser at the Deer Point Submarine Cable Terminal.

JUSTIFICATION: These devices will assist in isolating faults along the transmission system and preserve the submarine cables. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: SH to OR Cathodic Protection

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2029

740C CODE: 1009

ESTIMATED COST: $350,000

DESCRIPTION: Upgrade submarine cable to incorporate cathodic protection.

JUSTIFICATION: Cathodic protection is one of the most important aspects of a corrosion prevention solution. A properly installed cathodic protection system could significantly extend the life of a submarine cable. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: San Juan Differential Upgrade

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2028

740C CODE: 1011

ESTIMATED COST: $400,000

DESCRIPTION: Upgrade protection to incorporate new differential scheme to run these two cables in parallel.

JUSTIFICATION: Will allow the lines to be run in parallel while also appropriately sectionalizing in the event of a sub cable fault. High speed protection could help prevent additional damage in the event of a fault. Additionally, newer protection technologies can help detect incipient faults. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: DE to BL Cathodic Protection

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2028

740C CODE: 1012

ESTIMATED COST: $350,000

DESCRIPTION: Upgrade submarine cable to incorporate cathodic protection.

JUSTIFICATION: Cathodic protection is one of the most important aspects of a corrosion prevention solution. A properly installed cathodic protection system could significantly extend the life of a submarine cable. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: BL to OR Cathodic Protection

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2028

740C CODE: 1013

ESTIMATED COST: $350,000

DESCRIPTION: Upgrade submarine cable to incorporate cathodic protection.

JUSTIFICATION: Cathodic protection is one of the most important aspects of a corrosion prevention solution. A properly installed cathodic protection system could significantly extend the life of a submarine cable. This project is a carryover from previous CWP.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: Lopez Terminal Upgrade

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2028

740C CODE: 1020

ESTIMATED COST: $400,000

DESCRIPTION: Upgrade transmission submarine cable terminals with new current transformers, electronics, battery backup systems, and protection systems.

JUSTIFICATION: The current wireless current transformer solution is failing and has already caused mis operations. This is part of a complete station upgrade across the OPALCO system.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: Shaw Terminal Upgrade

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2028

740C CODE: 1021

ESTIMATED COST: $400,000

DESCRIPTION: Upgrade transmission submarine cable terminals with new current transformers, electronics, battery backup systems, and protection systems.

JUSTIFICATION: The current wireless current transformer solution is failing and has already caused mis operations. This is part of a complete station upgrade across the OPALCO system.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: Orcas Terminal Upgrade

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2028

740C CODE: 1022

ESTIMATED COST: $400,000

DESCRIPTION: Upgrade transmission submarine cable terminals with new current transformers, electronics, battery backup systems, and protection systems.

JUSTIFICATION: The current wireless current transformer solution is failing and has already caused mis operations. This is part of a complete station upgrade across the OPALCO system.

ASSOCIATED PROJECTS: None

ALTERNATES: None

TRANSMISSION CONSTRUCTION ITEM: San Juan Terminal Upgrade

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2028

740C CODE: 1023

ESTIMATED COST: $400,000

DESCRIPTION: Upgrade transmission submarine cable terminals with new current transformers, electronics, battery backup systems, and protection systems.

JUSTIFICATION: The current wireless current transformer solution is failing and has already caused mis operations. This is part of a complete station upgrade across the OPALCO system.

ASSOCIATED PROJECTS: None

ALTERNATES: None

GENERATIOM CONSTRUCTION ITEM: San Juan Solar

SUBSTATION AREA: Gravel Pit

YEAR OF COMPLETION: 2031

740C CODE: 1200

ESTIMATED COST: $5,200,000

DESCRIPTION: Installation of a solar generation facility on San Juan island. This will connect on the distribution at 12.47kV. This will be a community solar site.

JUSTIFICATION: This solar site is part of the long range plan to increase local generation as is in line with the OPALCO IRP.

ALTERNATES: None

VI. Appendices

A. RUS Form 300 Review Rating Survey – Operations & Maintenance

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UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL UTILITIES SERVICE

REVIEW RATING SUMMARY

BORROWER DESIGNATION: Orcas Power & Light Cooperative (WA 0009)

DATE PREPARED: August 1, 2016

Ratings on form are: 0: Unsatisfactory -- No Records; 1: Corrective Action Needed; 2: Acceptable, but Should be Improved -- See Attached Recommendations; 3: Satisfactory -- No Additional Action Required at this Time; NA: Not Applicable

PART I. TRANSMISSION and DISTRIBUTION FACILITIES

	(Rating)
1. Substations (Transmission and Distribution)	
a. Safety, Clearance, Code Compliance	3
b. Physical Conditions: Structure, Major Equipment, Appearance	3
c. Inspection Records - Each Substation	3
d. Oil Spill Prevention	3
2. Transmission Lines	
a. Right-of-Way: Clearing, Erosion, Appearance, Intrusions	3
b. Physical Condition: Structure, Conductor, Guying	3
c. Inspection Program and Records	3
3. Distribution Lines - Overhead	
a. Inspection Program and Records	3
b. Compliance with Safety Codes: Clearances	3
Foreign Structures	3
Attachments	3
c. Observed Physical Condition from Field Checking:	
Right-of-Way	3
Other	3

	(Rating)
4. Distribution - Underground Cable	
a. Grounding and Corrosion Control	3
b. Surface Grading, Appearance	3
c. Riser Pole: Hazards, Guying, Condition	3
5. Distribution Line Equipment: Conditions and Records	
a. Voltage Regulators	3
b. Sectionalizing Equipment	3
c. Distribution Transformers	3
d. Pad Mounted Equipment	
Safety: Locking, Dead Front, Barriers	3
Appearance: Settlement, Condition	3
Other	3
e. Kilowatt-hour and Demand Meter Reading and Testing	3

PART II. OPERATIONS and MAINTENANCE

	(Rating)
6. Line Maintenance and Work Order Procedures	
a. Work Planning & Scheduling	3
b. Work Backlogs: Right-of-Way Maintenance	3
Poles	3
Retirement of Idle Services	3
Other	3

7. Service Interruptions

a. Average Annual Minutes/Consumer (Complete for each of the previous 5 years)

PREVIOUS 5 YEARS (Year)	POWER SUPPLIER a.	MAJOR STORM b.	PLANNED c.	ALL OTHER d.	TOTAL e.	(Rating)
2011			36.00	110.00	146.00	3
2012	390.00		42.00	28.00	460.00	3
2013	145.00		40.00	20.00	205.00	3
2014	358.00		27.00	179.00	564.00	3
2015	122.00	507.00	11.00	224.00	864.00	3

b. Emergency Restoration Plan: 3

	(Rating)
8. Power Quality	
a. General Freedom from Complaints	3
9. Loading and Load Balance	
a. Distribution Transformer Loading	3
b. Load Control Apparatus	3
c. Substation and Feeder Loading	3
10. Maps and Plant Records	
a. Operating Maps: Accurate and Up-to-Date	3
b. Circuit Diagrams	3
c. Staking Sheets	3

PART III. ENGINEERING

		(Rating)
11. System Load Conditions and Losses		
a. Annual System Losses	6.20%	3
b. Annual Load Factor	42.0%	3
c. Power Factor at Monthly Peak	98.0%	3
d. Ratios of Individual Substation Annual Peak kW to kVA		0.44
12. Voltage Conditions		
a. Voltage Surveys		3
b. Substation Transformer Output Voltage Spread		3

	(Rating)
13. Load Studies and Planning	
a. Long Range Engineering Plan	3
b. Construction Work Plan	3
c. Sectionalizing Study	3
d. Load Data for Engineering Studies	3
e. Load Forecasting Data	3

RUS Form **300** *(Rev. 3-09)* *(V2, 5/2009)*

PAGE 1 OF 2 PAGES

PART IV. OPERATION AND MAINTENANCE BUDGETS

YEAR	For Previous 2 Years		For Present Year	For Future 3 Years		
	2014	2015	2016	2017	2018	2019
	Actual $ Thousands	Actual $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands
Normal Operation	3,054,124	3,570,414	3,473,823	3,578,038	3,685,379	3,795,940
Normal Maintenance	1,778,516	1,713,924	1,702,147	1,753,211	1,805,808	1,859,982
Additional (Deferred) Maintenance						
Total	4,832,640	5,284,338	5,175,970	5,331,249	5,491,187	5,655,922

14. Budgeting: Adequacy of Budgets for Needed Work 3 *(Rating)*

15. Date Discussed with Board of Directors 8/18/2016 *(Date)*

EXPLANATORY NOTES

ITEM NO.	COMMENTS
1b	Substation Improvements to Shaw, Blakely and Decatur will occur 2017-2019.
2a	Transmission Line Right-of-Way clearing is identifying danger trees for removal.
7a	Service Interruptions are driven primarily by major storm or Power Supplier interruptions.
10a	Significant improvements in Operating maps have occurred over the last 2 years.
13a&b	In moving forward with the next 4 year CWP a new LRP will be needed which should include a Sectionalizing study.

General Comment:

Overall, there have been improvements in all areas and future projects to upgrade the distribution system and substations along with the installation of fiber throughout the system will enhance the utility's overall capabilities to provide safe, reliable, and reasonably affordable electricity.

		TITLE	DATE
RATED BY:	Joel Mietzner P.E.	System Engineer	08/01/16
REVIEWED BY:	Foster Hildreth	CEO &President	08/01/16
REVIEWED BY:	Rodney Peach	RUS GFR	08/01/16

RUS Form **300** *(Rev. 3-09) (V2, 5/2009)* PAGE 2 OF 2 PAGES

B. CWP Project Maps

Agate Beach Overhead Conversion

740c Code: 337
Year of Completion: 2027

Tax Parcels

Year of Completion

2027

2028

2029

ORCAS POWER & LIGHT CO-OP
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Beaverton Valley Road OH Phase Conversion

740c Code: 319
Year of Completion: 2027

- Tax Parcels

Year of Completion

- 2027
- 2028
- 2029

ORCAS POWER & LIGHT CO-OP
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BL to OR Cathodic Protection

740c Code: 1013
Year of Completion: 2028

Tax Parcels

Year of Completion

- 2027
- 2028
- 2029

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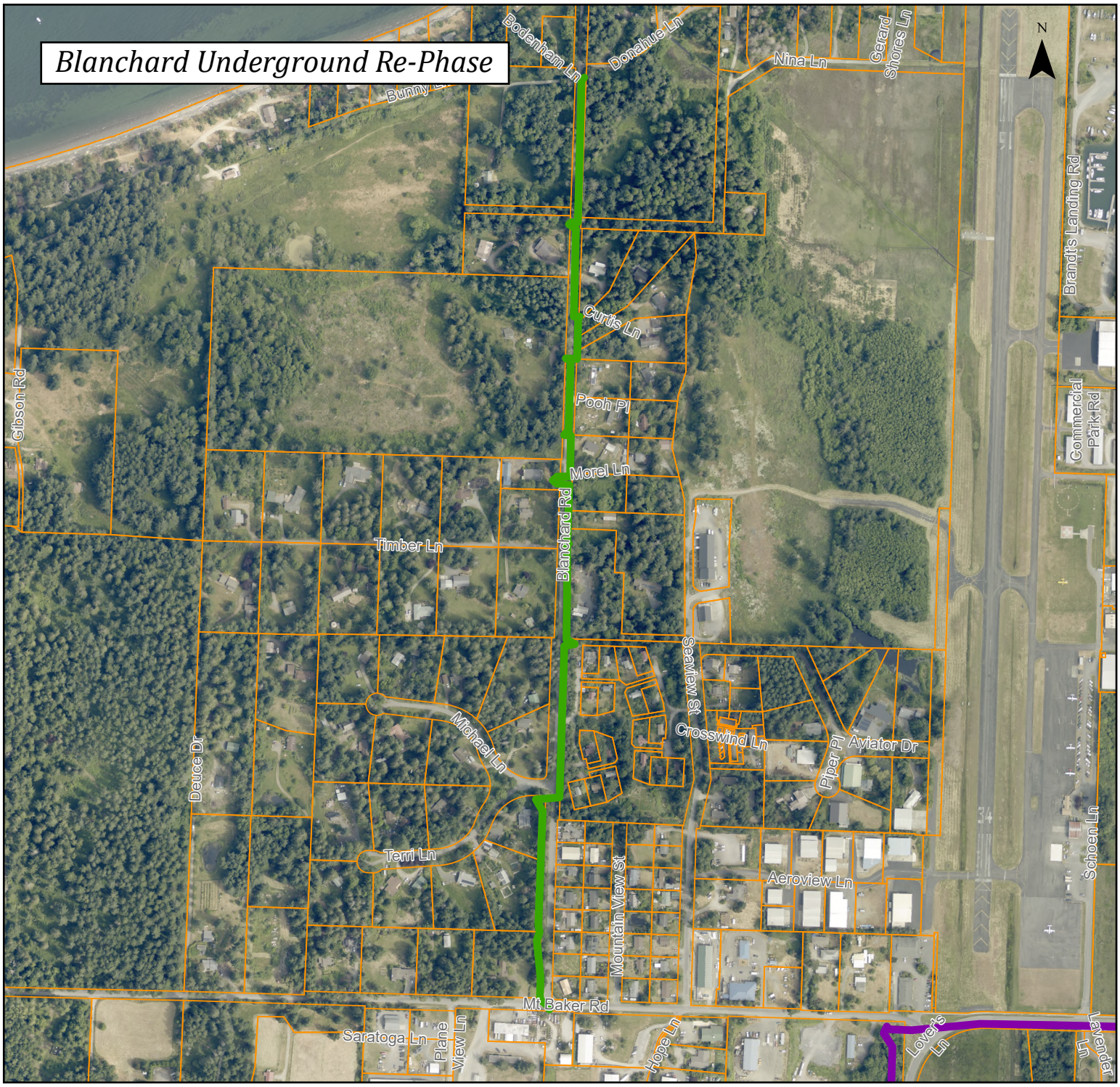
Blanchard Underground Re-Phase



740c Code: 343

Year of Completion: 2028

- Tax Parcels

Year of Completion

- 2027
- 2028
- 2029

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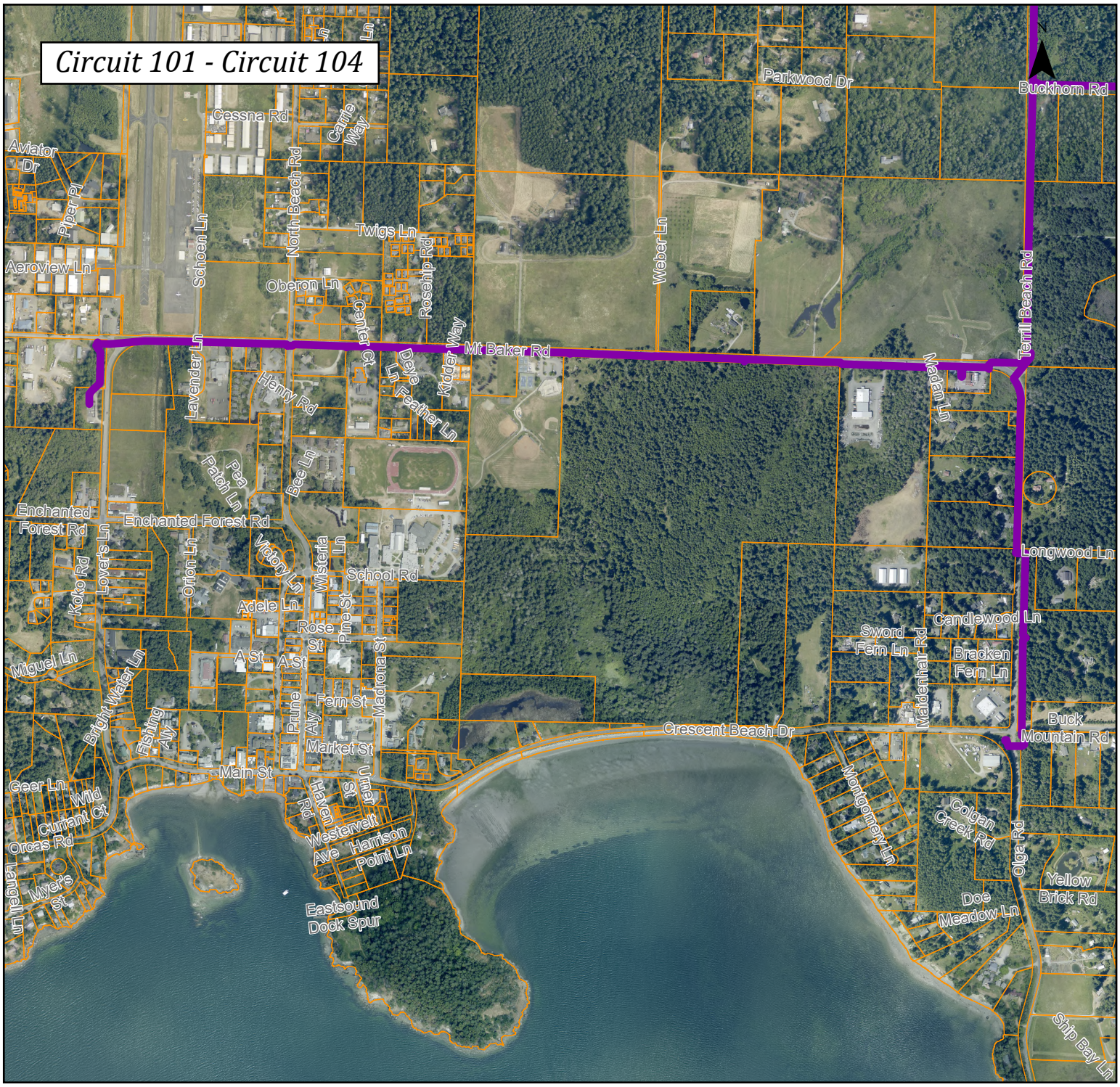

740c Code: 341

Year of Completion: 2029

Tax Parcels

Year of Completion

2027

2028

2029

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS

DE to BL Cathodic Protection

740c Code: 1012
Year of Completion: 2028

Tax Parcels

Year of Completion

2027

2028

2029

ORCAS POWER & LIGHT CO-OP
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Fisherman Bay Road Conversion

740c Code: 350
Year of Completion: 2028

Tax Parcels

Year of Completion

2027

2028

2029

ORCAS POWER & LIGHT CO-OP
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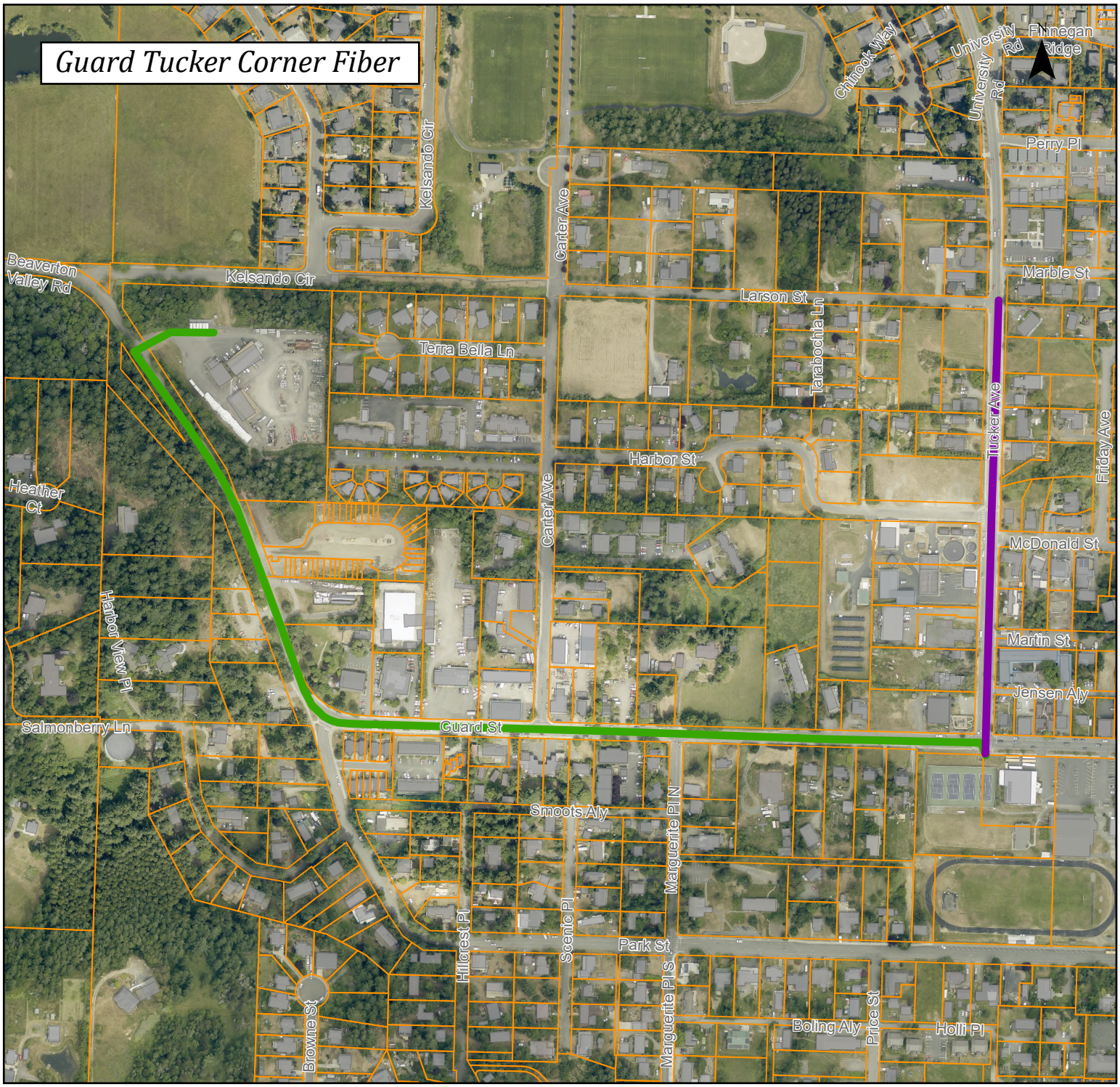
Guard Tucker Corner Fiber



740c Code: 710

Year of Completion: 2028

Tax Parcels

Year of Completion

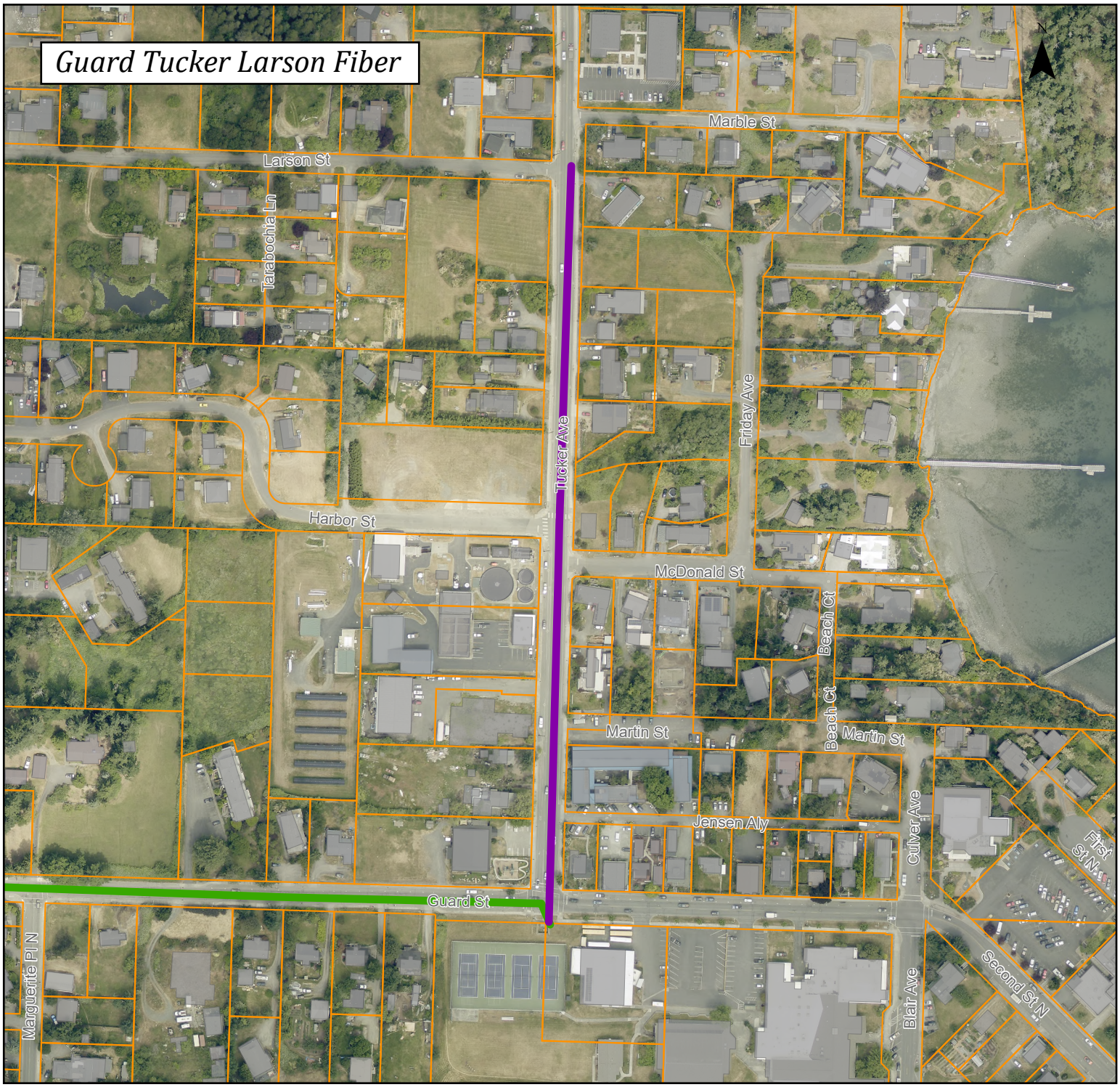
2027

2028

2029

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS

Guard Tucker Larson Fiber



740c Code: 711

Year of Completion: 2029

Tax Parcels

Year of Completion

2027

2028

2029

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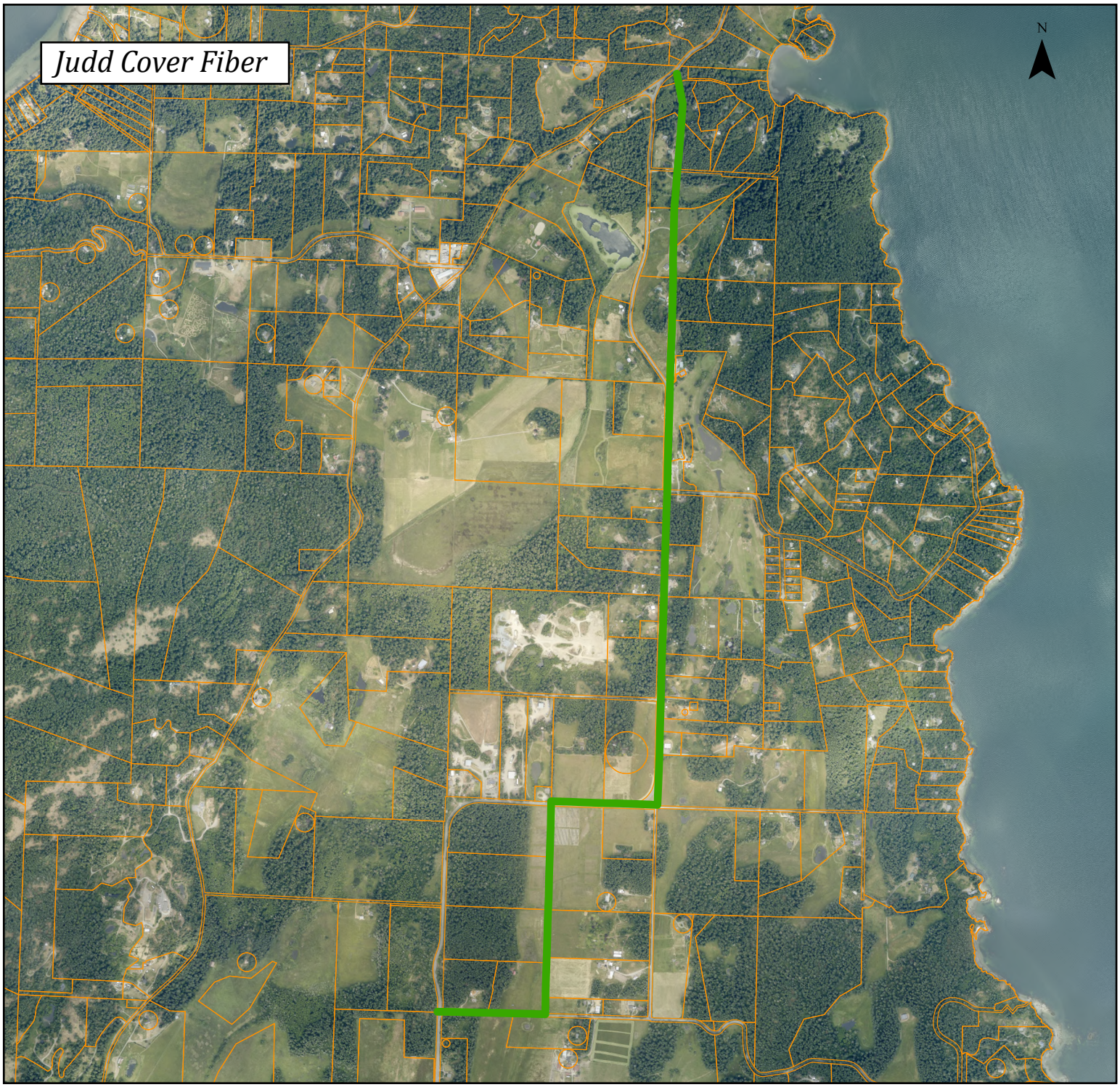
Judd Cover Fiber



740c Code: 708
Year of Completion: 2028

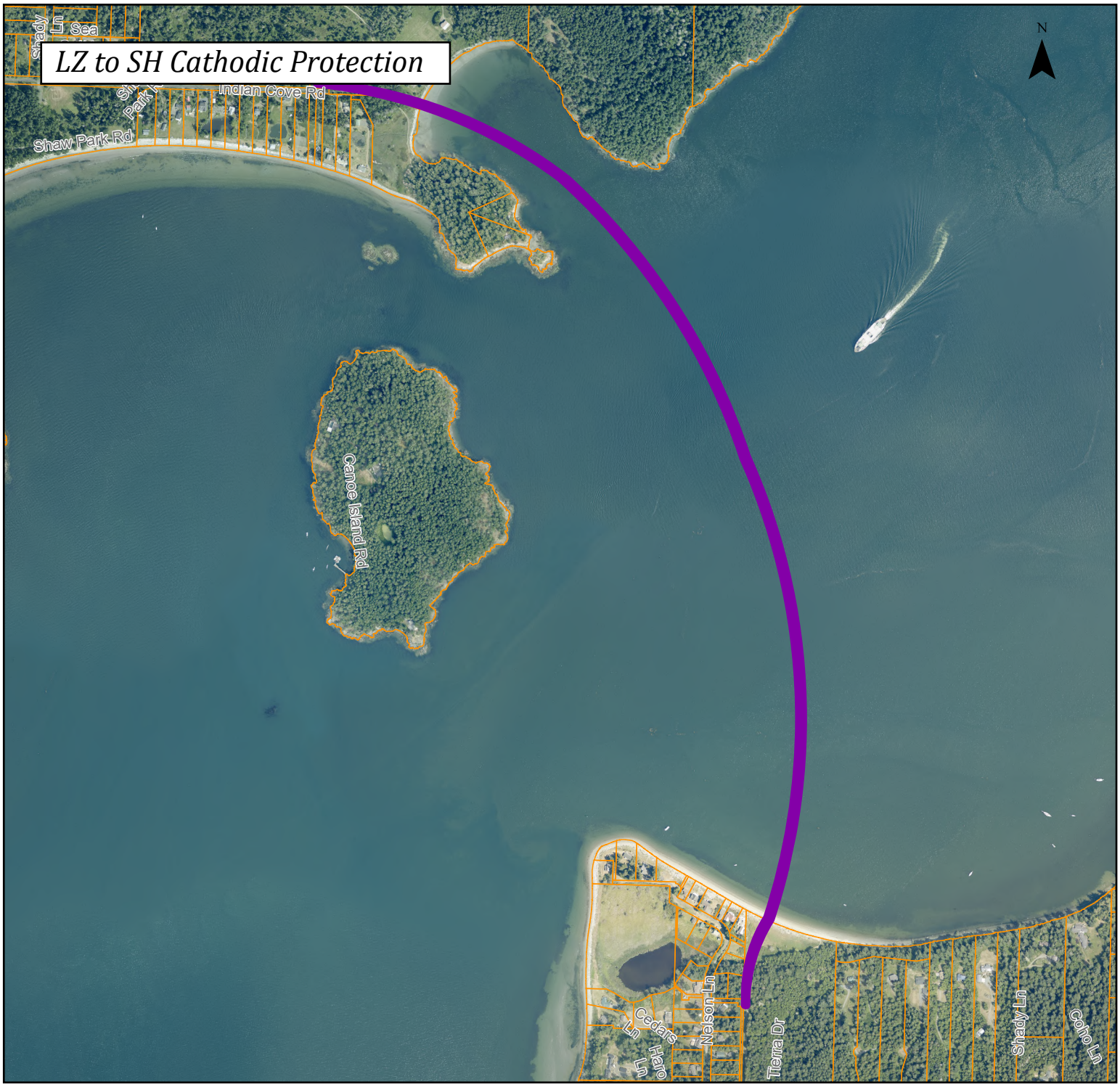
Tax Parcels

Year of Completion

- 2027
- 2028
- 2029

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS

LZ to SH Cathodic Protection



740c Code: 1006
Year of Completion: 2029

Tax Parcels

Year of Completion

- 2027
- 2028
- 2029

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Since 1937
SERVING THE SAN JUANS

740c Code: 215

Year of Completion: 2029

Tax Parcels

Year of Completion

2027

2028

2029

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS

San Juan Differential Upgrade

740c Code: 1011
Year of Completion: 2028

Tax Parcels

Year of Completion

2027

2028

2029

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS

SH or OR Cathodic Protection

740c Code: 1009
Year of Completion: 2029

Tax Parcels

Year of Completion

- 2027
- 2028
- 2029

ORCAS POWER & LIGHT CO-OP
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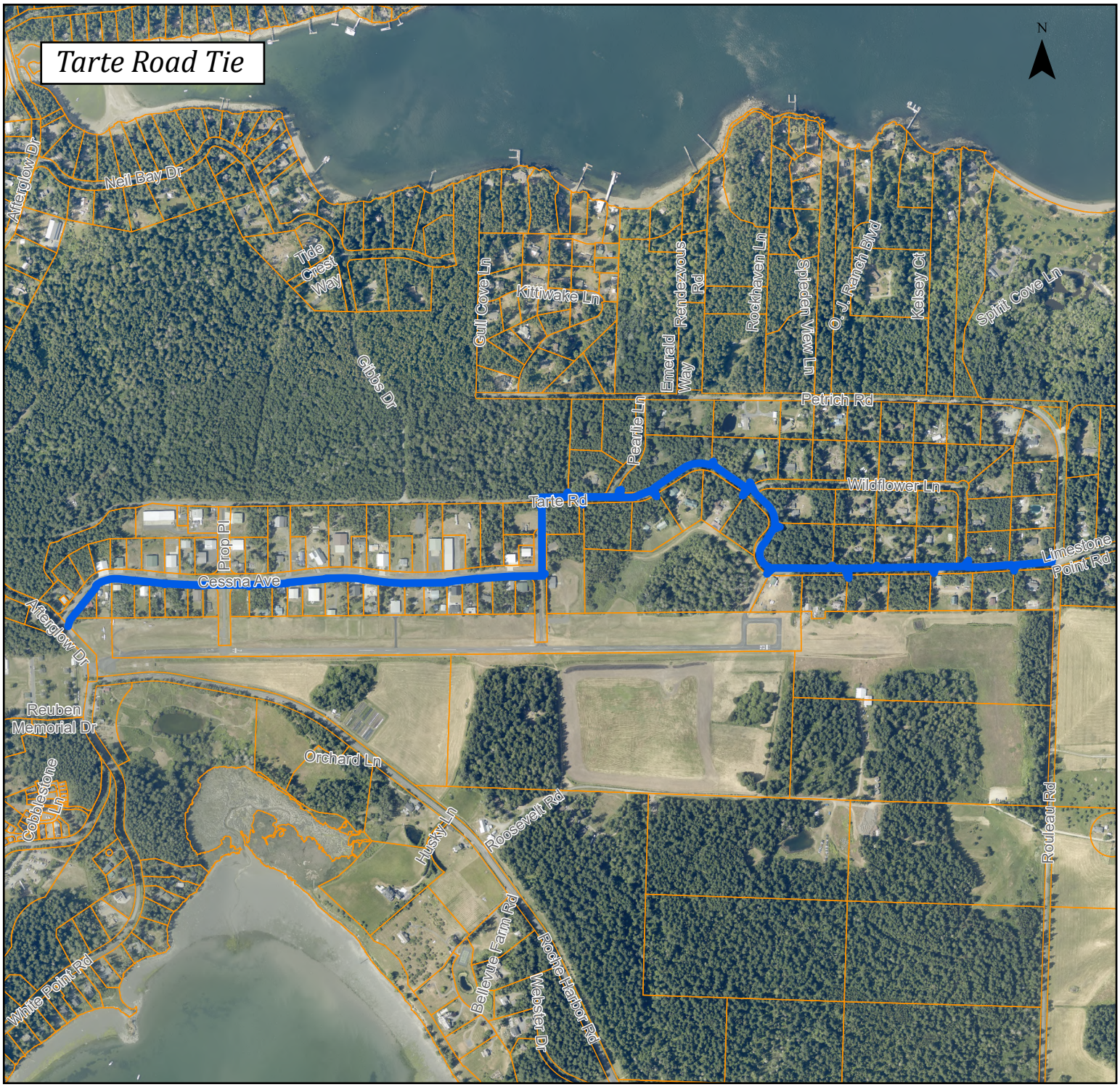


740c Code: 216

Year of Completion: 2027

Tax Parcels

Year of Completion

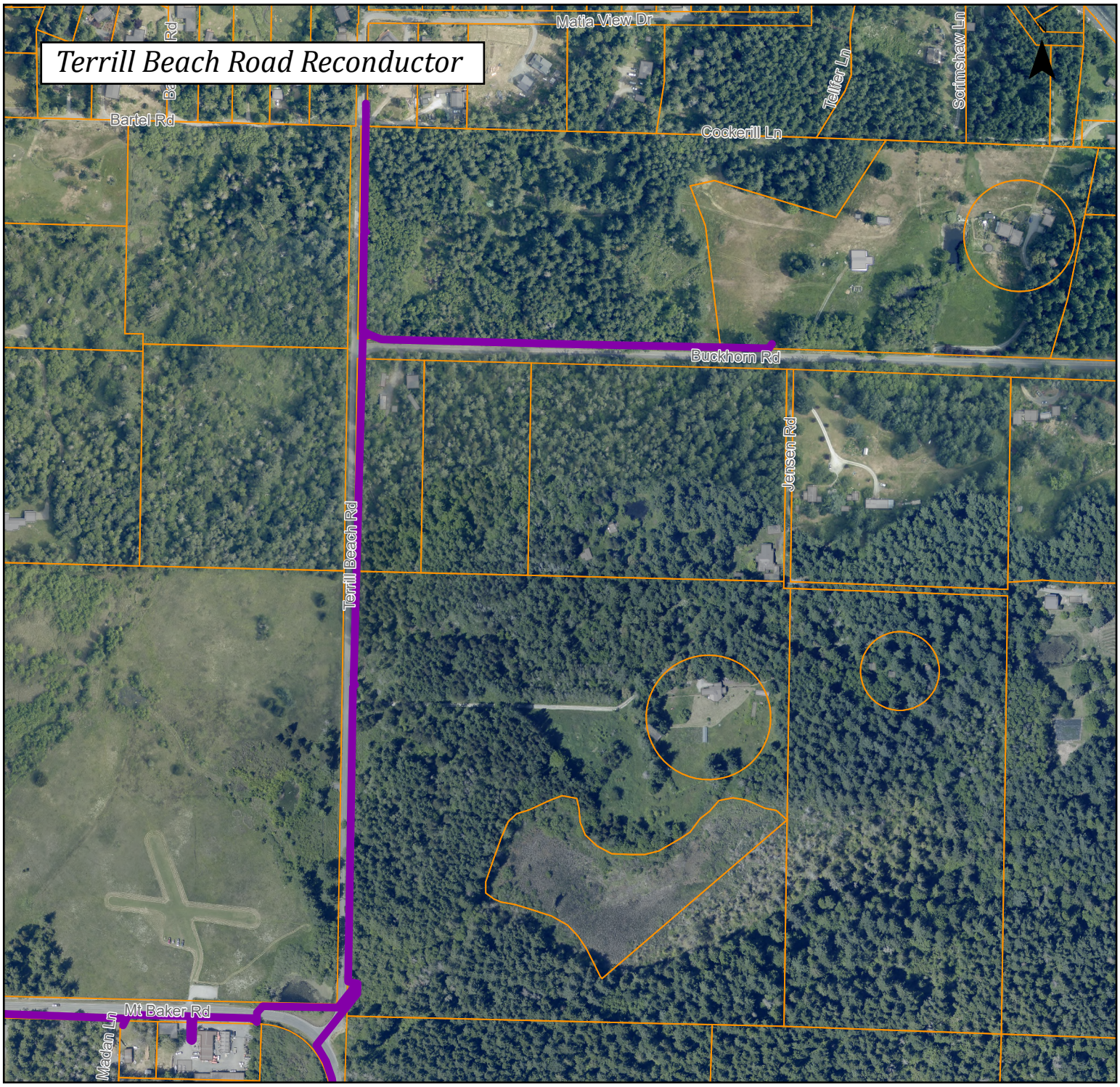
2027

2028

2029

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS

Terrill Beach Road Reconductor



740c Code: 347
Year of Completion: 2029

Tax Parcels

Year of Completion

- 2027
- 2028
- 2029

ORCAS POWER & LIGHT CO-OP
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Warbass Intersection Improvements

740c Code: 300
Year of Completion: 2027

Tax Parcels

Year of Completion

- 2027
- 2028
- 2029

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Step Down Lopez Substation

740c Code: 502
Year of Completion: 2026

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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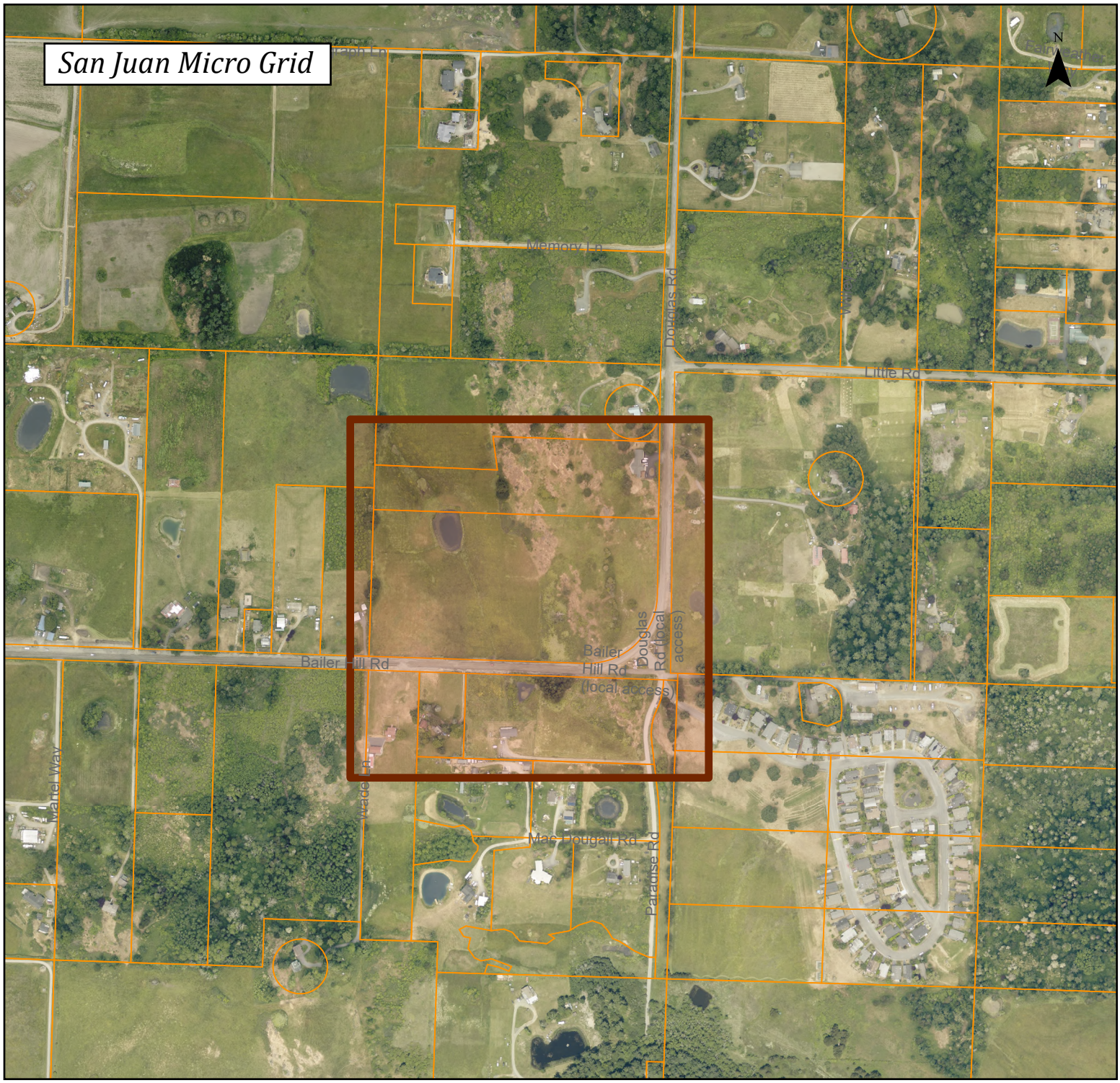
San Juan Micro Grid



740c Code: 505
Year of Completion: 2030

- Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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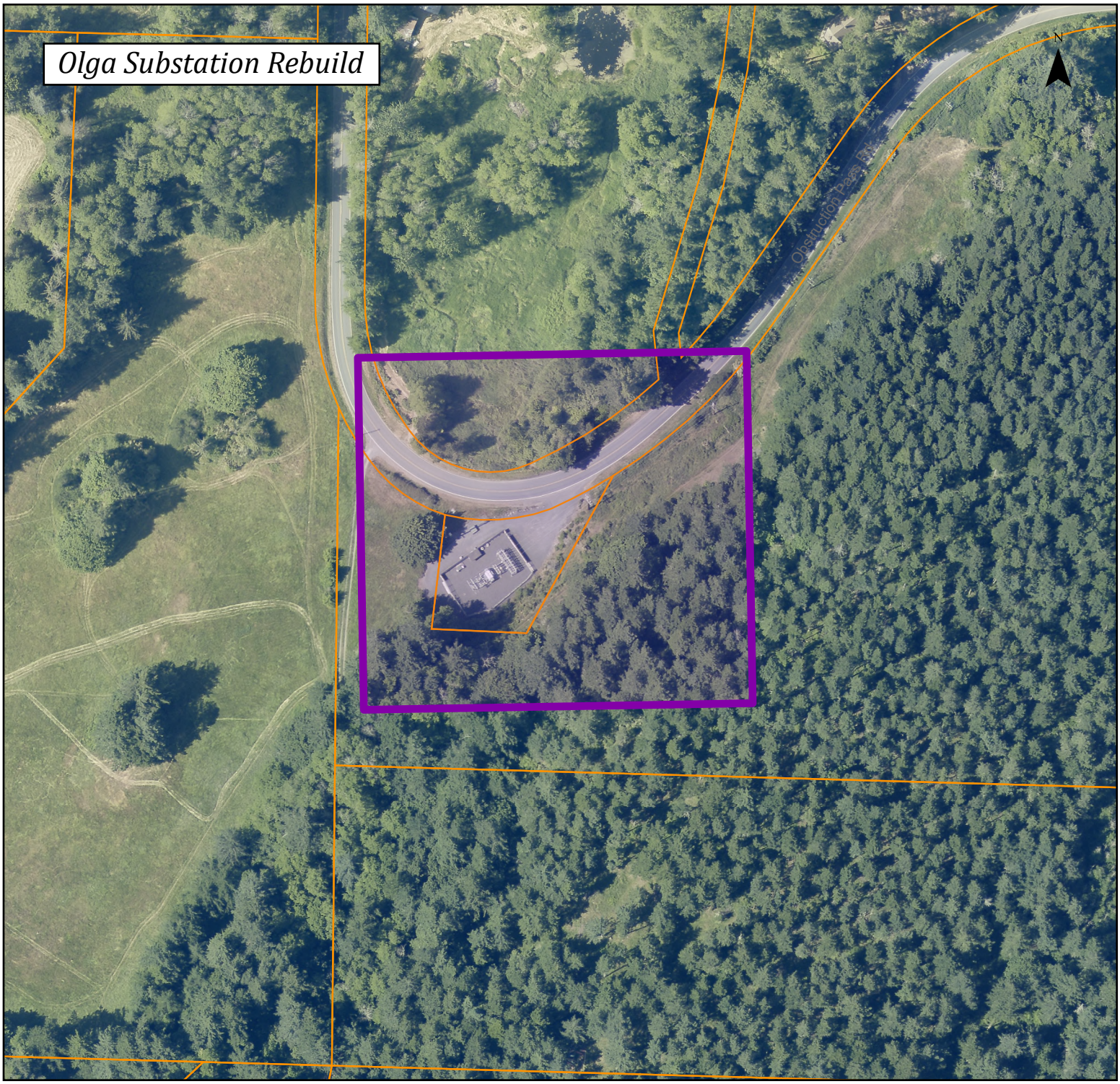
Olga Substation Rebuild



740c Code: 512
Year of Completion: 2029

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

ORCAS POWER & LIGHT CO-OP
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Gravel Pit Station Upgrades

740c Code: 520
Year of Completion: 2029

- Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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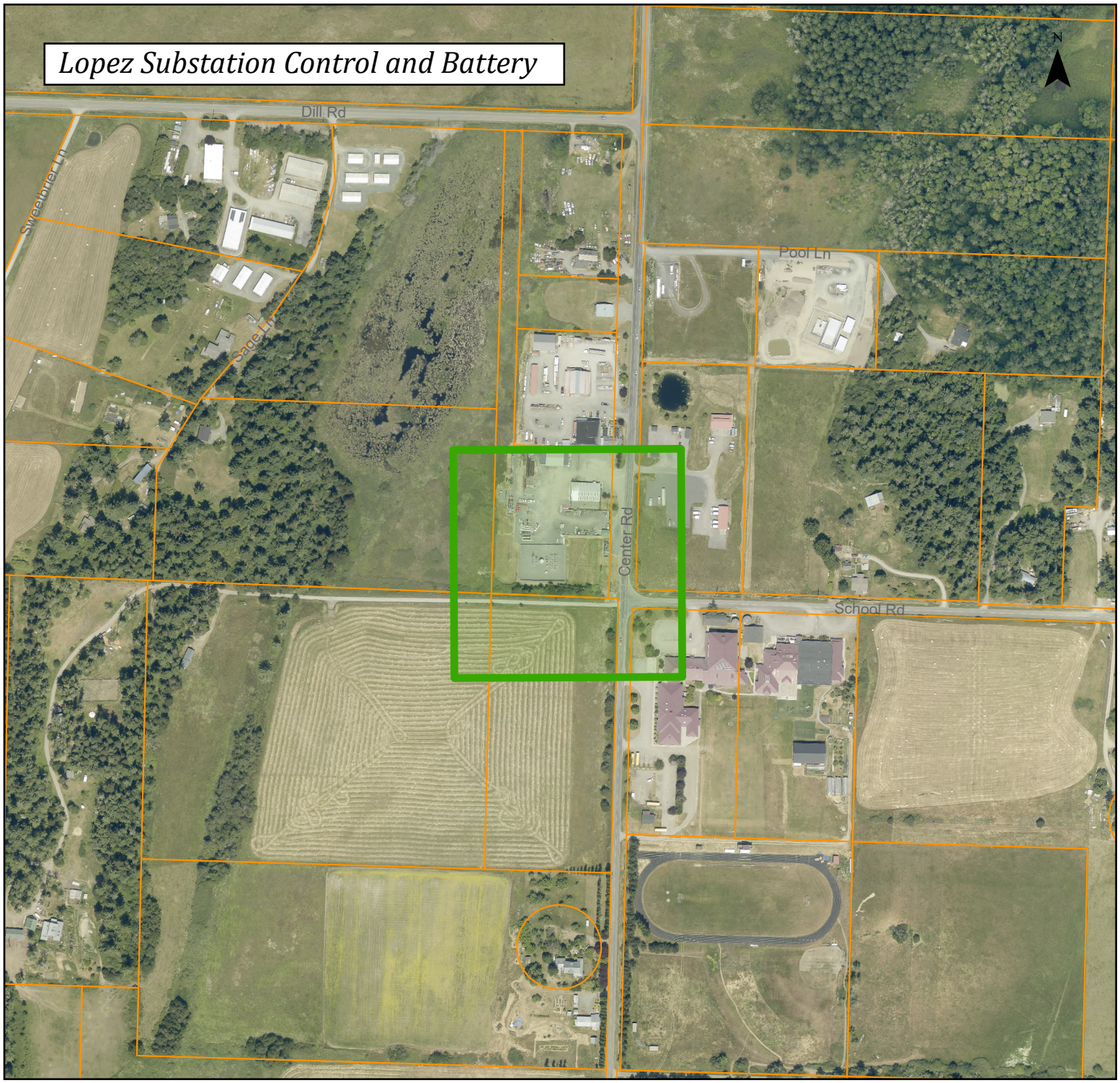
Lopez Substation Control and Battery



740c Code: 521
Year of Completion: 2028

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

ORCAS POWER & LIGHT CO-OP
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Eastsound Substation Rebuild

740c Code: 523
Year of Completion: 2027

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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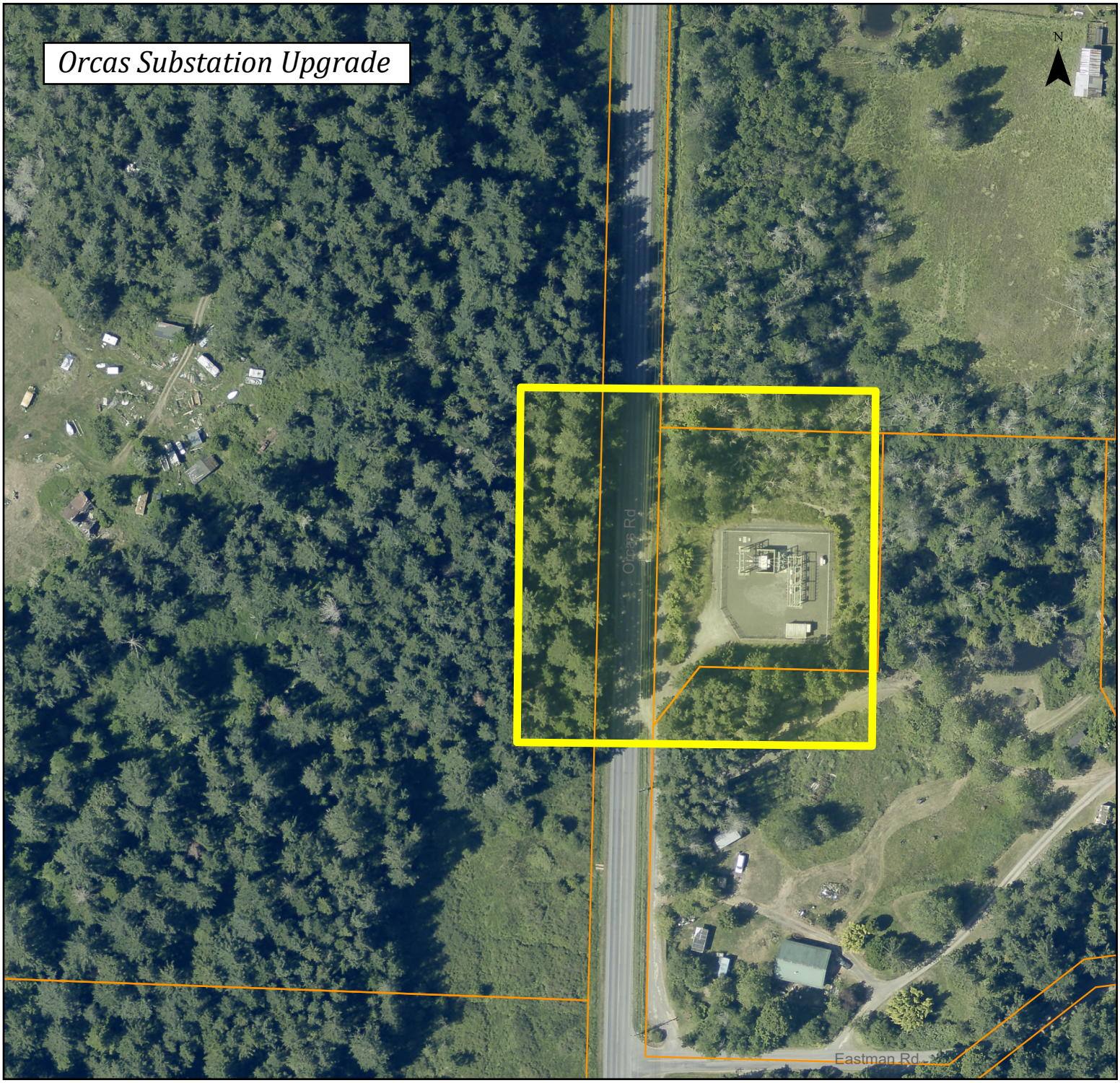
Orcas Substation Upgrade



740c Code: 524
Year of Completion: 2026

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

ORCAS POWER & LIGHT CO-OP
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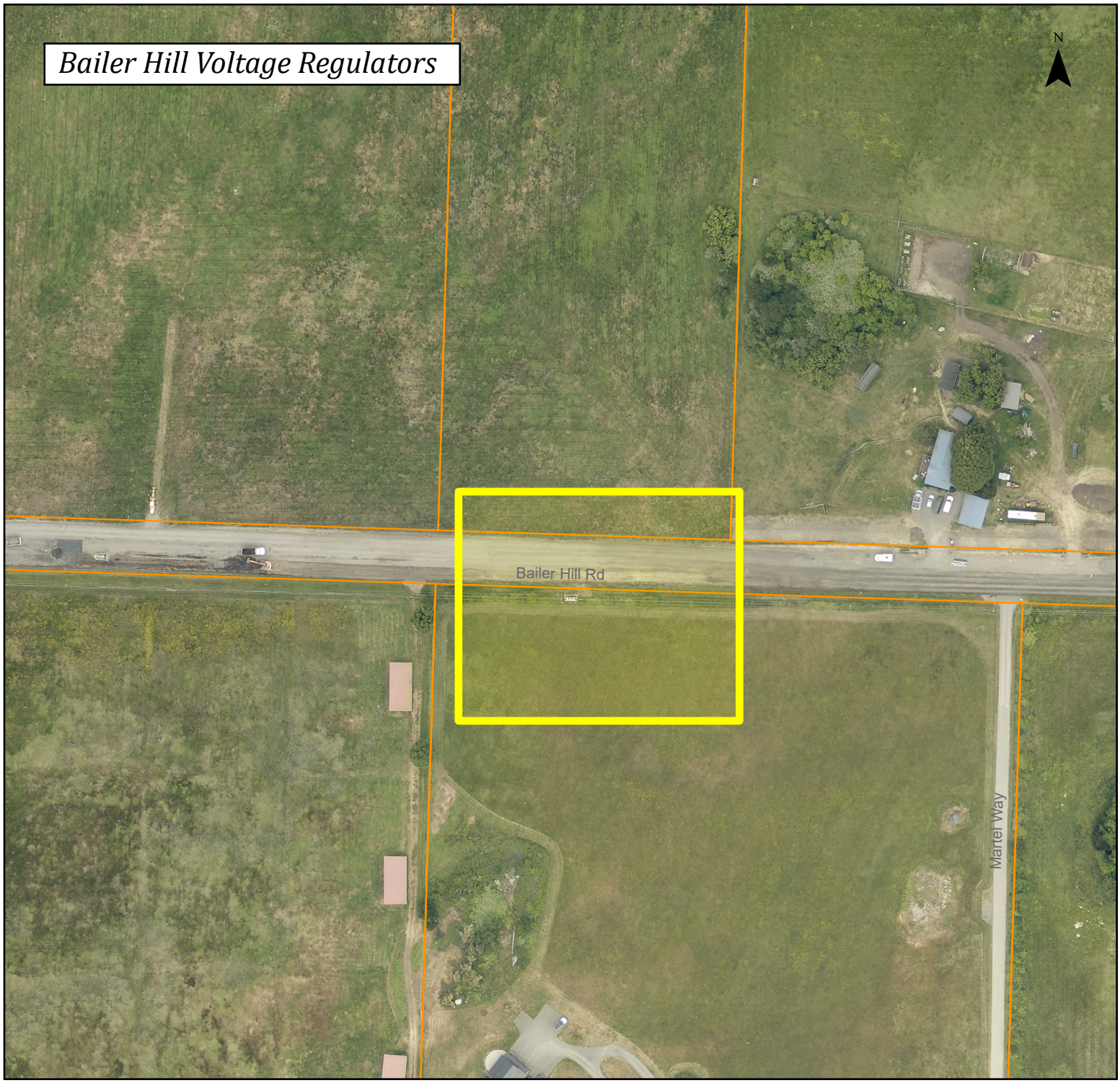
Bailer Hill Voltage Regulators



740c Code: 604-7
Year of Completion: 2026

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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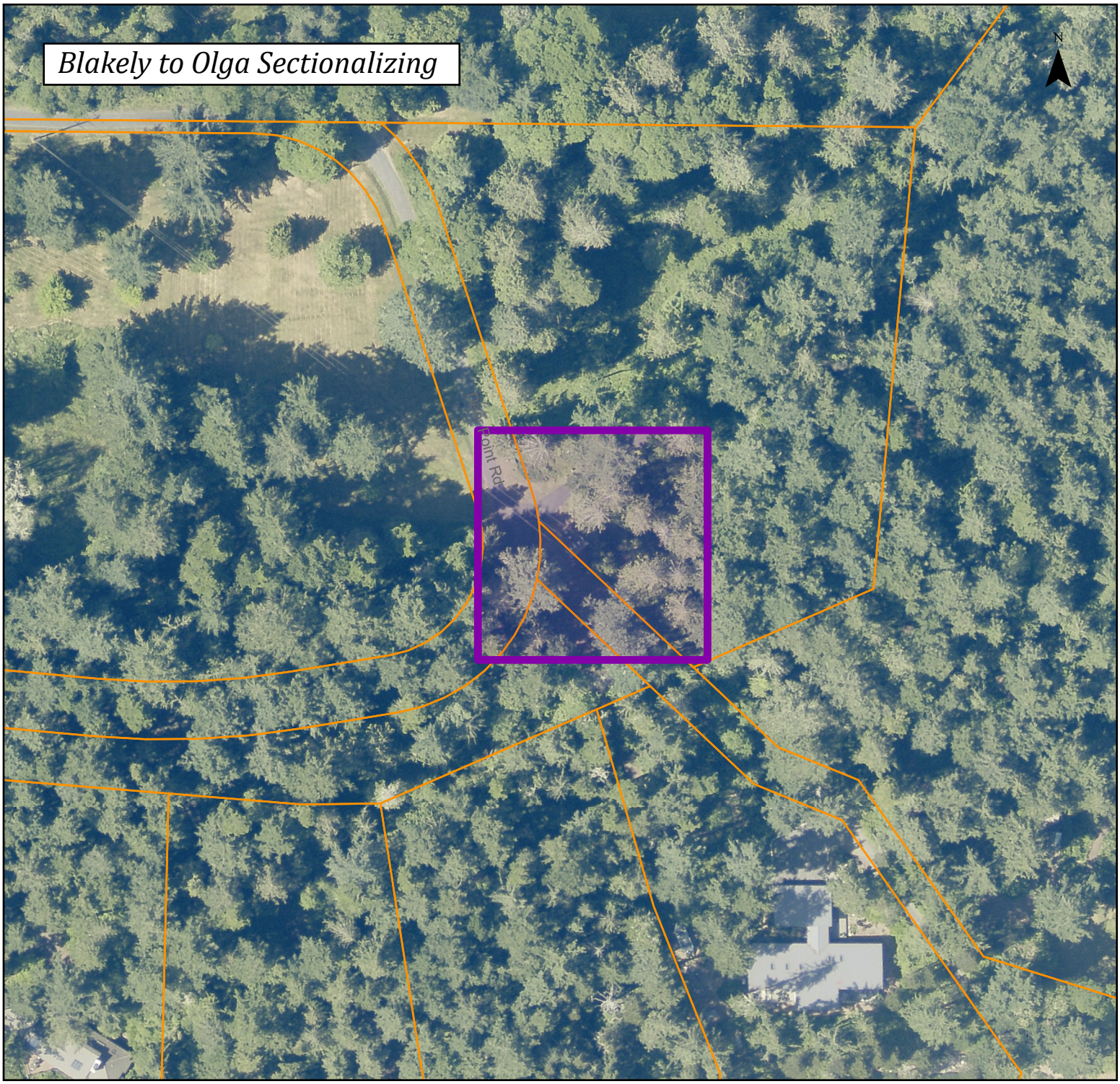
Blakely to Olga Sectionalizing



740c Code: 1007
Year of Completion: 2029

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS

Shaw Terminal Upgrade

740c Code: 1021
Year of Completion: 2028

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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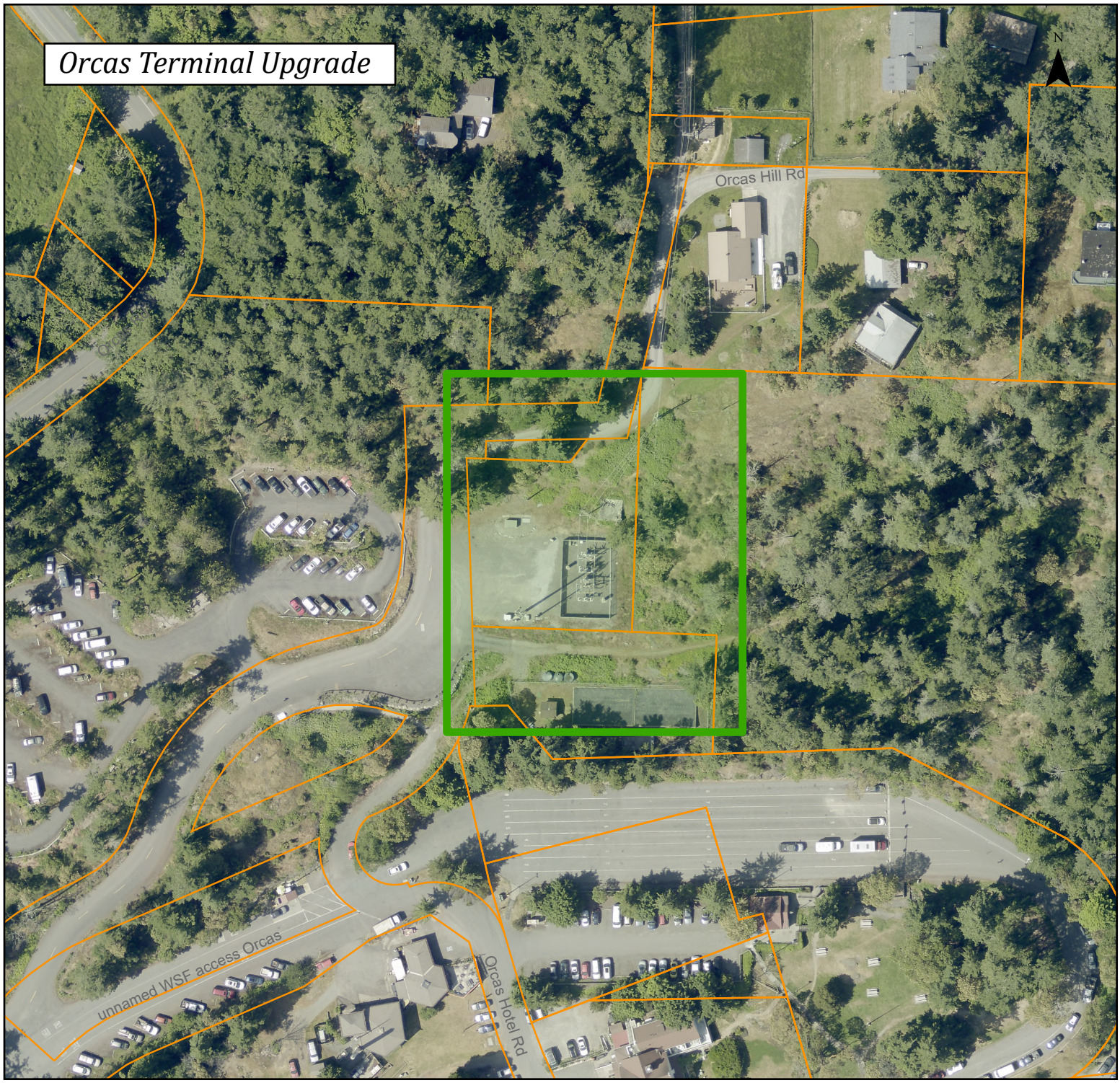
Orcas Terminal Upgrade



740c Code: 1022
Year of Completion: 2028

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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San Juan Terminal Upgrade

740c Code: 1023
Year of Completion: 2028

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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740c Code: 1020
Year of Completion: 2028

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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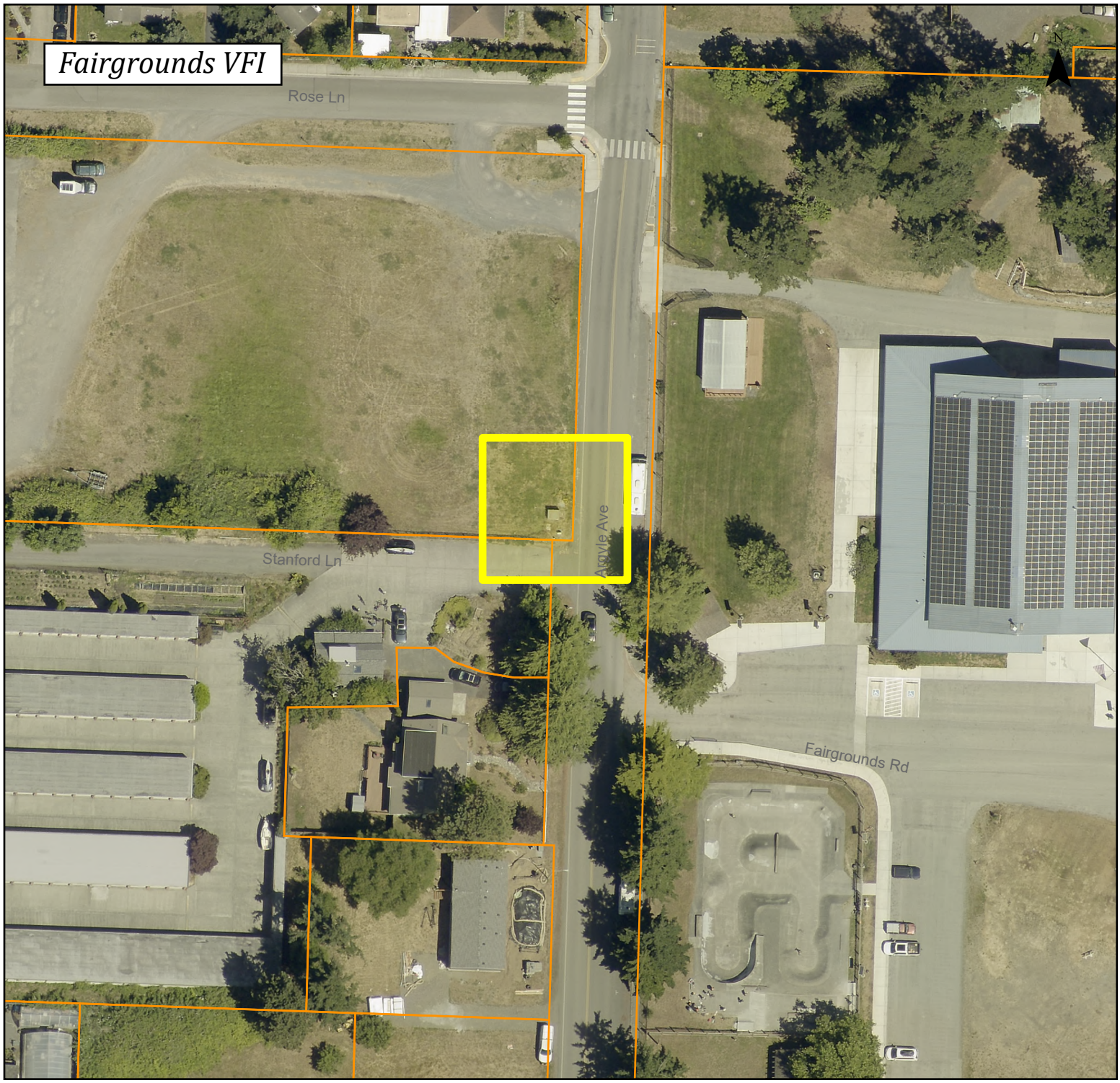


740c Code: 603-1
Year of Completion: 2026

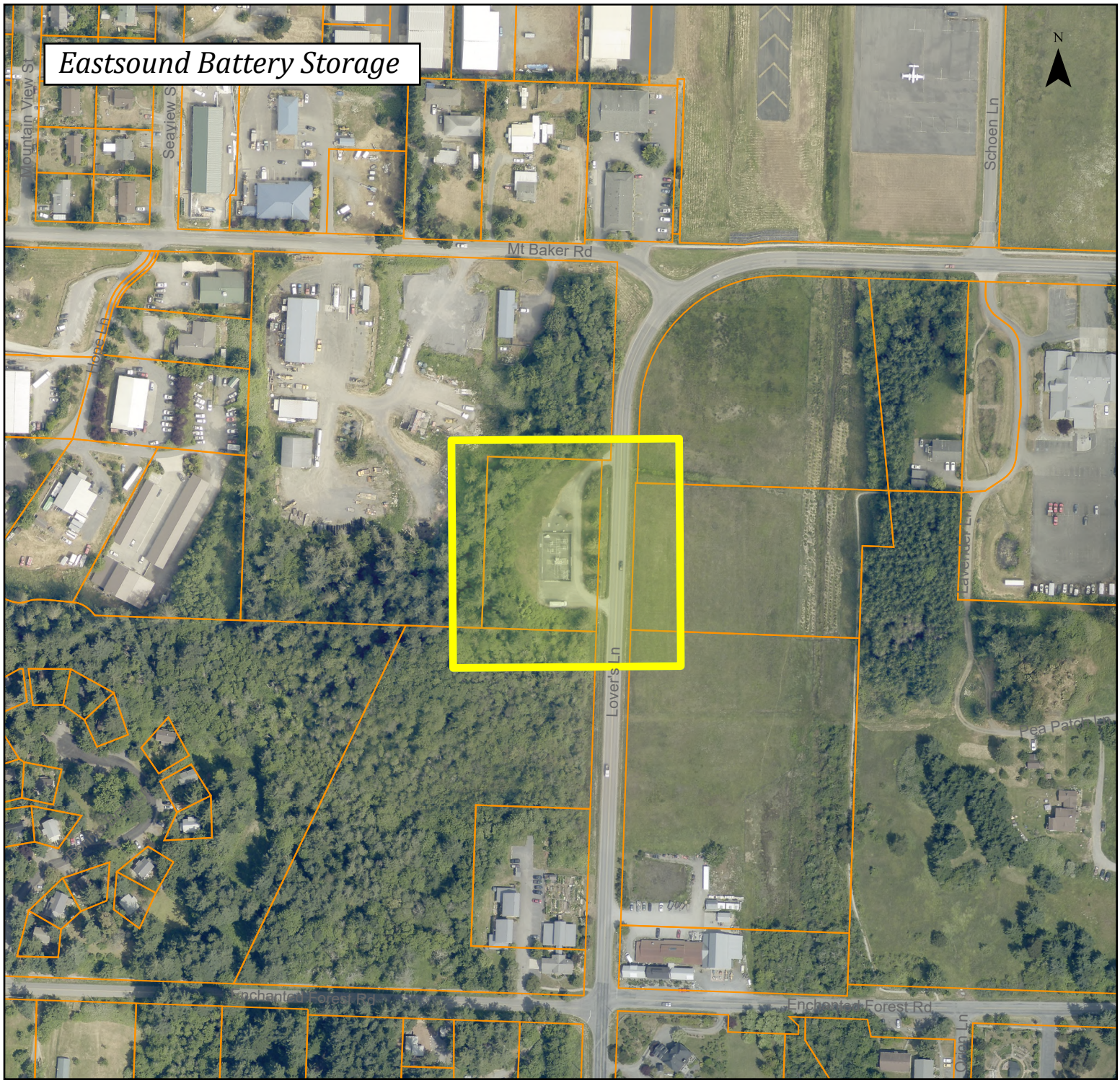
Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS

Eastsound Battery Storage



740c Code: 522
Year of Completion: 2026

Tax Parcels

year

- 2026
- 2027
- 2028
- 2029
- 2030

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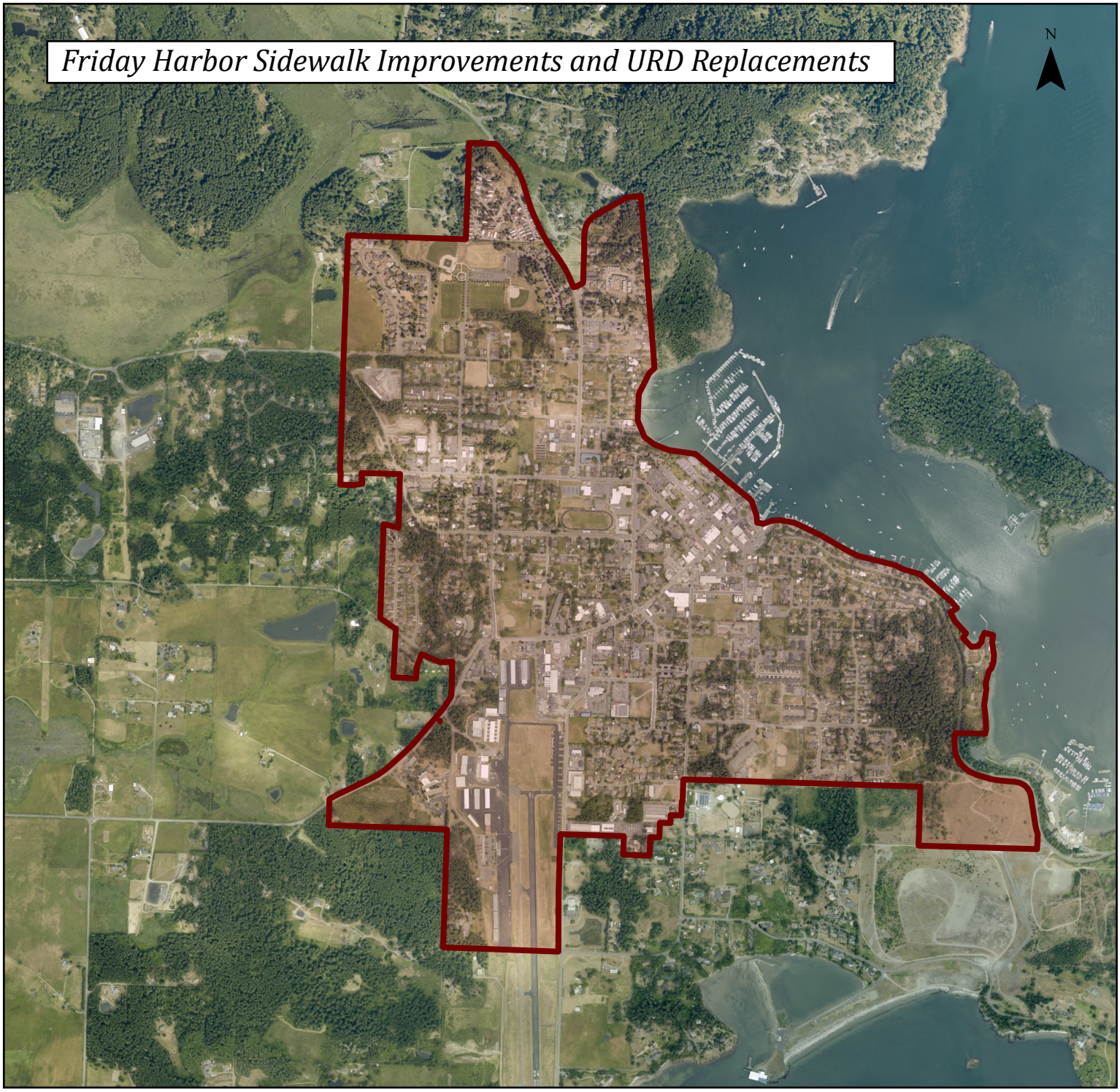
SERVING THE SAN JUANS

Friday Harbor Sidewalk Improvements and URD Replacements



740c Code: 351, 338
Year of Completion: 2030

Town of Friday Harbor

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Since 1937
SERVING THE SAN JUANS

URD Replacements

N

740c Code: 608
Year of Completion: 2030

Problematic Cables

Islands

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Transformer and Meter Replacements

N

740c Code: 601
Year of Completion: 2030

Transclosures

Islands

ORCAS POWER & LIGHT CO-OP
Since 1937
SERVING THE SAN JUANS