MEMORANDUM

December 9, 2016

TO: Board of Directors

FROM: Foster Hildreth

RE: 2017-2020 Construction Work Plan

Attached please find our 2017-2020 Construction Work Plan (CWP), 2017 Capital Budget to CWP comparison, and Resolution 6-2016. For your information, amendments are typically made to the CWP as individual capital projects evolve during the four-year work window.

This plan is in accordance with 7 CFR 1724.40. This document details the construction planning for January 1, 2017 to December 31, 2020. Please note the projects and figures contained in this CWP were used as the basis for the 2017 capital projects budget as presented at the November Board meeting for system safety, reliability, efficiency, loss reduction, voltage stability/improvement and end of life replacement.

Following board approval, the next steps are RUS CWP approval, environmental report approval, and RUS loan processing.

Please note the actual loan packaging process includes a financial analysis required by RUS to determine the appropriate level of self-funding versus RUS loan funding. Staff will present the final RUS loan submittal to the board for approval prior to submission in mid-2017.

Staff requests a motion to approve the 2017-2020 CWP and corresponding resolution as presented.

# ORCAS POWER AND LIGHT COOPERATIVE

## CAPITAL PROJECTS BUDGET TO CWP COMPARISION

| | | | | | A. Proposed Budget 2017 | B. CWP 2017 | C. Comments | D. Safety | E. Mission Statement Efficency | F. Reliability |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **RUS CWP DESCRIPTION** | | | | | | | | | |
| 2 | DISTRIBUTION | | | | | | | | | |
| 3 | 100 | New Services | | | **$ 291,000** | $ - | Not within CWP scope. | | | |
| 4 | 200 | New Tie Lines | | | **200,000** | 200,000 | | ✓ | ✓ | ✓ |
| 5 | 300 | Conversions and Line Changes | | | **1,335,000** | 1,335,000 | | ✓ | ✓ | ✓ |
| 6 | 400 | New Substations, switching station, metering point, etc. | | | **-** | - | | | | |
| 7 | 500 | Substation, Switching Station, Metering Point Changes | | | **126,000** | 119,000 | LTC Controller removed. | | ✓ | ✓ |
| 8 | 600 | Miscellaneous Distribution Equipment | | | | | | | | |
| 9 | | 601 | | Transformers & Meters | **525,000** | 525,000 | | | ✓ | ✓ |
| 10 | | 602 | | Sets of Service Wires to increase Capacity | **-** | - | | | | |
| 11 | | 603 | | Sectionalizing Equipment | **100,000** | 100,000 | | ✓ | ✓ | ✓ |
| 12 | | 604 | | Regulators | **-** | - | Regulator bank added in 2018. | | | |
| 13 | | 605 | | Capacitors | **-** | - | | | | |
| 14 | | 606 | | Ordinary Replacements | **119,000** | 119,000 | | ✓ | | ✓ |
| 15 | | 608 | | Underground Dist. Cable Replacement | **1,942,000** | 1,942,000 | | ✓ | ✓ | ✓ |
| 16 | 700 | Other Distribution Items | | | | | | | | |
| 17 | | 701 | | Engineering Fees | **-** | - | | | | |
| 18 | | 704 | | LMS & SCADA | **89,000** | - | Not within CWP scope. | | | |
| 19 | | 705 | | AMR (not including meters) | **-** | - | | | | |
| 20 | | 706 | | Communications | | | | | | |
| 21 | | | 706.0 | Island Network | **-** | - | | | | |
| 22 | | | 706.1 | Fiber/Microwave Infrastructure (1) | **1,290,000** | 1,290,000 | | ✓ | ✓ | ✓ |
| 23 | TRANSMISSION | | | | | | | | | |
| 24 | 800 | New Tie Line | | | **-** | - | | | | |
| 25 | 900 | New Substations, switching station, metering point, etc. | | | **650,000** | 650,000 | | | ✓ | ✓ |
| 26 | 1000 | Line and Station Changes | | | **8,408,000** | 8,408,000 | | ✓ | ✓ | ✓ |
| 27 | 1100 | Other Transmission | | | **-** | - | | | | |
| 28 | GENERATION | | | | | | | | | |
| 29 | 1200 | Generation | | | **-** | - | | | | |
| 30 | OTHER | | | | | | | | | |
| 31 | 1300 | Facilities | | | **300,000** | - | Not within CWP scope. | | | |
| 32 | 1400 | Acquisitions | | | **-** | - | | | | |
| 33 | 1500 | All Other | | | | | | | | |
| 34 | | 1501 | | Transportation/Equipment/Tools/Radios | **450,000** | - | Not within CWP scope. | | | |
| 35 | | 1502 | | Office Equipment/Furniture/Etc. | **20,000** | - | Not within CWP scope. | | | |
| 36 | | 1503 | | Computer/Servers/Software | **298,000** | - | Not within CWP scope. | | | |
| 37 | | 1504 | | Community Solar (member funded) (2) | **-** | - | | | | |
| 38 | 1600 | Minor Projects | | | **100,000** | - | Not within CWP scope. | | | |
| 39 | | | | **RUS CWP SUBTOTAL** | **16,243,000** | 14,688,000 | | | | |
| 40 | **CONTRIBUTION IN AID OF CONSTRUCTION (CIAC)** | | | | | | | | | |
| 41 | | New Services | | | **(291,000)** | - | Not within CWP scope. | | | |
| 42 | | Meters and Transformers | | | **(209,000)** | (209,000) | Not within CWP scope. | | | |
| 43 | | Joint Projects | | | **(298,000)** | - | Not within CWP scope. | | | |
| 44 | | Island Network Department | | | **-** | - | | | | |
| 45 | | WA DOC Grant Funding | | | **-** | - | | | | |
| 46 | | Community Solar Member Contributions | | | **(250,000)** | - | Not within CWP scope. | | | |
| 47 | | | | **RUS CWP NET TOTAL** | **15,195,000** | 14,479,000 | | | | |

# ORCAS POWER & LIGHT COOPERATIVE

**RESOLUTION 6-2016**

**A BOARD OF DIRECTORS**
**RESOLUTION APPROVING THE 2017-2020**
**CONSTRUCTION WORK PLAN**

**WHEREAS,** the Construction Work Plan (CWP) has been prepared and reviewed by OPALCO staff and is recommended for acceptance, and

**WHEREAS**, the Board considers the CWP to be a reasonable estimate of the Cooperative's four (4) year construction needs and loan fund requirements, and

**WHEREAS**, the CWP is consistent with the requirements included in the Cooperative's 2008-2020 Long Range Plan and conforms to the system load and customer growth projections within the current Long Range Forecast and Power Requirements Study.

**NOW, THEREFORE, BE IT RESOLVED** that the Board of Directors of Orcas Power and Light Cooperative at a regular meeting on December 15, 2016 accepts and approves the 2017-2020 CWP and directs the General Manager to carry out its recommendations.

**CERTIFICATE OF SECRETARY**

I, Winnie Adams, certify that I am Secretary of Orcas Power and Light Cooperative and that the above and foregoing is a true excerpt from the minutes of a meeting of the Board of Directors held on the 15th day of December 2016, at which a quorum was present, and that the above portion of the minutes have not been modified or rescinded.

Winnie Adams
Winnie Adams, Secretary

December 15, 2016
Date

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Eastsound, Washington

# 2017 – 2020
# Construction Work Plan
# Washington 9 (WA0009) San Juan

I hereby certify that this 2017-2020 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.

1/10/2017
(Date)

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

1/11/2017
(Date)

By: _____
Joel Mietzner, P.E.
Registration No. 42905

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

EXPIRES 3/16/2017

December 15, 2017

# I. Executive Summary

## A. Introduction and Purpose of Report

The 2017-2020 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 from January 1, 2017 through December 31, 2020. 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 present 2008–2020 Long-Range Plan completed June 6, 2008. The anticipated demands, member growth, average usage, and peak usage, are consistent with the current 2016 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 Construction Program Section and below. These figures only include the expenditures expected within 2017-2020 and not including any project cost prior to 2017 carried forward.

**Table I-1: 2017-2020 CWP Cost Summary**

| | Work Plan | | | | |
|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | Total |
| TOTAL SYSTEM IMPROVEMENTS DISTRIBUTION | $ 5,421,000 | $ 7,001,000 | $ 3,709,000 | $ 3,725,000 | $ 19,856,000 |
| TRANSMISSION | 9,058,000 | 2,386,000 | 89,000 | 92,000 | 11,444,000 |
| GRAND TOTAL 2017-2020 CONSTRUCTION WORK PLAN | 14,479,000 | 9,387,000 | 3,798,000 | 3,817,000 | 31,300,000 |

The system improvements in the 2017-2020 CWP are those needed to provide service for 11,370 members at an annual average monthly consumption of 949 kWh per member. The 2015 system non-coincident peak was 63,422 kW. The projected non-coincident 2020 system peak is 71,250 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.

System growth projections are reflected graphically in Section VI Exhibits (Figure VI-1, Figure VI-2, and Figure VI-3).

## 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 VII-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 one delivery point at 69 kV. 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. Table VI-1: Substation Transformers and Voltage Regulation with Improvements shows the primary and secondary voltage rating and the existing transformer capacity at each substation.

### 4. Distribution Circuits

Overall, the distribution system is, as noted in the Figure VII-1: RUS Form 300 - Page 1, in satisfactory condition. The CWP without Improvement circuit diagrams found in Appendix Circuit Diagrams illustrates how projected work plan loads affect the existing distribution system voltage and load characteristics.

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.

The CWP circuit diagrams found in Appendix Circuit Diagrams show the calculated voltage drops (120 V base) at line extremities.

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.

In addition, OPALCO will complete a Sectionalizing Study in the first year.

## 5. System Energy Losses

The system annual energy losses from 2006 through 2015 are as follows:

**Table I-2: System Losses**

| Year | Losses | Percentage |
|---|---|---|
| 2011 | 3,088,742 | 1.4% |
| 2012 | 19,699,502 | 9.2% |
| 2013 | 11,353,120 | 5.2% |
| 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 | 13,420,569 | 6.4% |

The losses from 2011 from 2015 in above table has fluctuation in losses due to the change to accounting for unbilled energy sales. This change took place in 2013. This additional process will aid in tracking energy sales and purchases with greater accuracy.

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

## 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 monitor 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 I-3: Outage Data (in minutes per member)**

| | 2011 | 2012 | 2013 | 2014 | 2015 | 5 Year Average | Total | Percentage of Total |
|---|---|---|---|---|---|---|---|---|
| Power Supply | 0 | 390 | 0 | 358 | 122 | 174 | 870 | 41.55% |
| Major Storm | 0 | 0 | 0 | 0 | 507 | 101 | 507 | 24.21% |
| Planned | 36 | 42 | 40 | 27 | 11 | 31 | 156 | 7.45% |
| All Other | 110 | 28 | 20 | 179 | 224 | 112 | 561 | 26.79% |
| Total | 146 | 460 | 60 | 564 | 864 | 419 | 2094 | |

## 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 I the 2017-2020 CWP.

## D. Projected System Loads

Figure VI-1: NCP and CP Demand and Figure VI-2: MWh Purchased and Sold reflect demand and energy forecasts for the OPALCO system. These projections are based upon historical system data, and are consistent with the current 2016 Load Forecast. 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 5 outages per year per member for 2 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 5 outages per year per member for 2 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
    - 350 MCM 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 7-year schedule. Replacement of existing poles is based on inspection finding and 30 top 45 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 350 MCM Cu lead shielded cables. All submarine cables are designed for 460 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.

## 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 2013-2016 Construction Work Plan and the status of each.

### 1. New Tie Lines (RUS 200)

| Code | Substation Area | Project Name | Miles | Status |
|---|---|---|---|---|
| 201 | Eastsound | Day Lake Road Tie Line | 0.5 | Completed |
| 202 | Eastsound | Raccoon Pt to Eagle Lake Tie Line | 0.4 | Removed |
| 203 | Eastsound | Aerie Road/Buck Mountain Road Tie Line | 0.2 | Completed |
| 204 | Lopez | Lopez Road Tie Line | 0.8 | Completed |
| 205 | Lopez | Vista Road Tie Line | 0.7 | Completed |
| 206 | Lopez | Davis Bay Tie Line | 0.1 | Removed |
| 207 | Eastsound | Circuit 104 | 2.0 | Removed |
| 208 | Gravel Pit | Circuit 114 | 0.6 | Removed |

### 2. Line Changes (RUS 300)

| Code | Substation Area | Project Name | Miles | Status |
|---|---|---|---|---|
| 301 | Friday Harbor | Egg Lake Road Conversion | 1.9 | Carry Forward |
| 302 | Friday Harbor | University Dr. Conversion | 0.2 | Removed |
| 303 | Olga | Willis Road Conversion | 0.6 | Removed |
| 304 | Orcas | Grindstone Bay Conversion | 0.6 | Removed |
| 305 | Shaw | Shaw Island Conversion | 1.6 | Removed |
| 306 | Orcas | White Point Conversion | 0.1 | Completed |
| 307 | Gravel Pit | False Bay Conversion | 0.8 | Completed |
| 308 | Friday Harbor | Euerka Conversion | 0.1 | Removed |
| 309 | Friday Harbor | Halvorsen Road Conversion | 0.4 | Completed |
| 310 | Friday Harbor | Carter Avenue Conversion | 0.1 | Completed |
| 311 | Orcas | Nordstrom/Crow Valley Road Conversion | 2.8 | Removed |
| 312 | Orcas | Dolphin Bay Road Conversion | 1.1 | Carry Forward |
| 313 | Gravel Pit | Grover Road Conversion | 0.3 | Removed |
| 314 | Roche Harbor | Cessna Road Conversion | 1.5 | Carry Forward |
| 315 | Eastsound | Bartel Road Conversion | 1.0 | Completed |
| 316 | Gravel Pit | Cattle Point Road Conversion | 2.7 | Completed |
| 317 | Roche Harbor | Rouleau Road Conversion | 1.1 | Removed |
| 318 | Orcas | Victorian Valley Road Conversion | 1.5 | Completed |
| 319 | Friday Harbor | Beaverton Valley Road Conversion | 3.2 | Carry Forward |
| 320 | Friday Harbor | San Juan Conversion | 1.9 | Completed |
| 321 | Eastsound | Cresent Beach Conversion | 0.9 | Carry Forward |
| 322 | Lopez | Ferry Road Conversion | 0.9 | Completed |
| 323 | Gravel Pit | Circuit 111 | 0.3 | Removed |
| 324 | Eastsound | Mt. Constitution Conversion | 2.0 | Carry Forward |
| 325 | Eastsound | Football Field Conversion | 0.2 | Carry Forward |

### 3. New Substation (RUS 400)

| Code | Substation Area | Project Name | Description | Status |
|---|---|---|---|---|
| 401 | Boyce | Boyce Road Improvements | Site preparation for substation | Removed |
| 402 | Boyce | Boyce Road Substation | Installation of new substation | Removed |

### 4. Increased Substation Capacity (RUS 500)

| Code | Substation Area | Project Name | Description | Status |
|---|---|---|---|---|
| 501 | Decatur | Decatur Substation Upgrade | Upgrade of Decatur Substation to 69 kV source | Carry Forward |
| 501 | Thatcher | Thatcher Substation Upgrade | Upgrade of Thatcherr Substation to 69 kV source | Carry Forward |
| 502 | Lopez | Lopez Stepdown Removal | Removal of the Lopez stepdown transformer | Carry Forward |
| 503 | Lopez | Lopez VAR Control and Energy Metering | Addition of VAR control at Lopez Substation | Carry Forward |
| 507 | Eastsound | Eastsound Feeder Breaker | Install breaker for new feeder in Eastsound Substaiton | Complete |
| 508 | Lopez | Lopez Battery Replacement | Replace battery system in Lopez Substaton | Complete |
| 509 | Gravel Pit | Gravel Pit Battery Replacment | Replace battery system in Gravel Pit Substaton | Complete |

## 5. Transformers and Meters Replacements (RUS 601)

| | | | | |
|---|---|---|---|---|
| 508 | Lopez | Lopez Battery Replacement | Replace battery system in Lopez Substaton | Complete |
| 509 | Gravel Pit | Gravel Pit Battery Replacment | Replace battery system in Gravel Pit Substaton | Complete |

## 6. Sectionalizing (RUS 603)

| | | | | |
|---|---|---|---|---|
| 601 | All | Transformer Replacement | Replacement of failed transformers and transclosures | Completed |
| 601 | All | Meter Replacement | Replacement of failed meters | Completed |

| Code | Substation Area | Project Name | Description | Status |
|---|---|---|---|---|
| 603.1 | Olga | Orcas to Blakely 15 kV Cable, Source Side | Install switch on source side of Orcas to Blakey cable | Carry Forward |
| 603.2 | Thatcher | Orcas to Blakely 15 kV Cable, Load Side | Install switch on load side of Orcas to Blakey cable | Carry Forward |
| 603.3 | Lopez | Lopez to Decatur Sectionalizing | Install switch on load side of Lopez to Decatur cable | Carry Forward |
| 603.4 | Gravel Pit | Fairgrounds VFI | Replace sectionalizing on circuit 112 | Completed |
| 603.5 | Gravel Pit | Pear Point VFI | Replace sectionalizing on circuit 113 | Completed |

## 7. Voltage Regulators (RUS 604)

| Code | Substation Area | Project Name | Description | Status |
|---|---|---|---|---|
| 604.1 | Lopez | Shark Reef Regulators | Install 100 A regulator on circuit 22 location 3272408 | Completed |
| 604.2 | Lopez | Mud Bay Regulators | Install 100 A regulator on circuit 22 location 3432439 | Completed |
| 604.3 | Roche Harbor | Roche Harbor Regulators | Install regulators at substation | Canceled |
| 604.4 | Orcas | Orcas Substation Regualtors | Install regulators at substation | Carry Forward |
| 604.5 | Decatur | Decatur Regualtors | Install 75 A regualtors at south end of Decatur Island | Carry Forward |
| 604.6 | Thatcher | Thatcher Regulators | Install 75 A regulators at north end of Blakely Island | Carry Forward |

## 8. Ordinary Replacements (RUS 606)

| Code | Substation Area | Project Name | Description | Status |
|---|---|---|---|---|
| 606 | All | Ordinary Pole Replacements | Replacement of pole as needed | Completed |

## 9. URD Replacements (RUS 608)

| Code | Substation Area | Project Name | Description | Status |
|---|---|---|---|---|
| 608 | All | URD Replacements | Replacement of URD based on faults, condition, etc. | Completed |

## 10. Miscellaneous Distribution (RUS 700)

| Code | Substation Area | Project Name | Description | Status |
|---|---|---|---|---|
| 706-1 | Orcas | Deer Harbor Fiber | Installation of Fiber to Deer Harbor area | Completed |
| 706-2 | Eastsound | Eastsound to Olga Fiber | Installation of Fiber from Eastsound to Olga substation | Completed |
| 706-3 | All | Smart Grid Communications Infrastructure | Installation of communicaiton infrastructure | Carry Forward |

## 11. Transmission (RUS 800,900, & 1000)

| Code | Substation Area | Project Name | Description | Status |
|---|---|---|---|---|
| 801 | Transmission | Boyce Road Transmission Feeder | Install 69 kV transmission feed to new Boyce Road Substation | Removed |
| 901 | Transmission | Decatur Switchyard | Installation of 69 kV Switchyard for additional power source | Carry Forward |
| 902 | Transmission | Lopez North Terminal Upgrades | Upgrade site and structures at cable terminal | Removed |
| 903 | Transmission | Shaw Terminal Upgrades | Upgrade site and structures at cable terminal | Removed |
| 904 | Transmission | Orcas Terminal Upgrades | Upgrade site and structures at cable terminal | Removed |
| 1001 | Transmission | Lopez to San Juan Submarine Cable | Replace 69 kV submarine cable | Carry Forward |
| 1002 | Transmission | Lopez North Sectionalizer | Install 69kV circuit switcher at north Lopez cable terminal | Carry Forward |
| 1002-2 | Transmission | Olga to Thatcher Re-insulation | Re-insulate from 25 kV to 69 kV | Completed |
| 1003 | Transmission | Lopez West Sectionalizer | Install 69kV circuit switcher at west Lopez cable terminal | Carry Forward |
| 1003-2 | Transmission | Thatcher to South Blakely Re-insulation | Re-insulate from 25 kV to 69 kV | Completed |
| 1004 | Transmission | Shaw North Sectionalizer | Install 69kV circuit switcher at north Shaw cable terminal | Carry Forward |
| 1005 | Transmission | Ordinary Pole Replacements | Replacement of aging and deteriorated poles | Completed |

# B. Summary of 2017-2020 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 2020. A detailed description and justification for each recommended improvement can be found in Section Description and Justification, 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 2020 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

An additional transmission tap has been planned for increased reliability and power quality. This tap will also allow for loop feed capabilities for decreasing outage time during major events. In addition, replacement of a transmission submarine cable will continue in this work plan for continued redundancy.

# 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 2017-2020 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.

**Table IV-1: CWP Costs**

| | Work Plan | | | | |
|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | Total |
| TOTAL SYSTEM IMPROVEMENTS | | | | | |
| DISTRIBUTION | $ 5,421,000 | $ 7,001,000 | $ 3,709,000 | $ 3,725,000 | $ 19,856,000 |
| TRANSMISSION | 9,058,000 | 2,386,000 | 89,000 | 92,000 | 11,444,000 |
| GRAND TOTAL 2017-2020 CONSTRUCTION WORK PLAN | 14,479,000 | 9,387,000 | 3,798,000 | 3,817,000 | 31,300,000 |

# A. Improvement Items Summary

| | Item | Quantity | 2017 Cost | 2018 Cost | 2019 Cost | 2020 Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| 1. | New Tie Lines | 0.7 Mi. | $ 200,000 | $ - | $ - | $ - | $ 200,000 |
| 2. | Line Changes | 15.4 Mi. | 1,335,000 | 1,592,000 | 875,000 | 510,000 | 4,312,000 |
| 3. | New Substations | | - | - | - | - | - |
| 4. | Increased Substation Capacity | | 119,000 | 2,150,000 | 450,000 | 350,000 | 3,069,000 |
| 5. | Sectionalizing | | 100,000 | 700,000 | 100,000 | 220,000 | 1,120,000 |
| 6. | Voltage Regulators | | - | 400,000 | 75,000 | 80,000 | 555,000 |
| 7. | Misc. Distribution | 60.0 Mi. | 3,667,000 | 2,159,000 | 2,209,000 | 2,565,000 | 10,600,000 |
| 8. | Capacitors | | - | - | - | - | - |
| | Total - Distribution | | **$ 5,421,000** | **$ 7,001,000** | **$ 3,709,000** | **$ 3,725,000** | **$19,856,000** |
| | Transmission | | **9,058,000** | **2,386,000** | **89,000** | **92,000** | **11,625,000** |
| | **Total 2017-2020** | | **$14,479,000** | **$ 9,387,000** | **$ 3,798,000** | **$ 3,817,000** | **$31,481,000** |

# B. Improvement Items per Substation Area

**Decatur Substation No. 1**
25 kV to 12.5/7.2 kV
Transformer Capacity: 333 kVA
2017-2020
Projected Load : 1,000 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | 335 | Center Island Submarine Cable | 3 | 0.5 Mi. | $ 600,000 /Mi. | $ - | $ - | $ 300,000 | $ - | $ 300,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **0.5 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ 300,000** | **$ -** | **$ 300,000** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Substation Changes | 501-2* | Decatur Substation Upgrade | 3 | | $ 200,000 | $ - | $ - | $ 200,000 | $ - | $ 200,000 |
| | 518 | Decatur Energy Storage System | 3 | | 2,200,000 | - | 2,150,000 | 50,000 | - | 2,200,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 2,150,000** | **$ 250,000** | **$ -** | **$ 2,400,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-3* | Lopez to Decatur Sectionalizing | 4 | | $ 120,000 | $ - | $ - | $ - | $ 120,000 | $ 120,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ 120,000** | **$ 120,000** |
| Voltage Regulators | 604-5 | Decatur Voltage Regulators | 2 | | $ 75,000 | $ - | $ 75,000 | $ - | $ - | $ 75,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 75,000** | **$ -** | **$ -** | **$ 75,000** |
| Miscellanious Distribution | 705-1 | Decatur AMR SCE | 2 | | $ 90,000 | $ - | $ 90,000 | $ - | $ - | $ 90,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 90,000** | **$ -** | **$ -** | **$ 90,000** |
| | | | | | **Subtotal By Years:** | **$ -** | **$ 2,315,000** | **$ 550,000** | **$ 120,000** | |
| | | | | | **Total Cost: 2017-2020 Decatur Substation No. 1:** | | | | | **$ 2,985,000** |

*** Carried Forward Improvement**

**Lopez Substation No. 2**
69 kV to 12.5/7.2
Transformer Capacity: 20 MVA
2017-2020
Projected Load : 8,120 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | 337 | Agate beach Overhead Conversion | 4 | 0.4 Mi. | $ 200,000 /Mi. | $ - | $ - | $ - | $ 80,000 | $ 80,000 |
| | 339 | Lopez to Decatur Overhead Conversion | 4 | 0.9 Mi. | 89,000 /Mi. | - | - | - | 80,000 | 80,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **1.3 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ 160,000** | **$ 160,000** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Substation Changes | 502* | Lopez Stepdown Transformer Removal | 4 | | $ 100,000 | $ - | $ - | $ - | $ 100,000 | $ 100,000 |
| | 503* | Lopez Stepdown VAR Control | 4 | | 250,000 | - | - | - | 250,000 | 250,000 |
| | 514 | Lopez LTC Controller Replacement | 1 | | 7,000 | 7,000 | - | - | - | 7,000 |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 7,000** | **$ -** | **$ -** | **$ 350,000** | **$ 357,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-19 | Mud Bay Road VFI | 1 | | $ 100,000 | $ 100,000 | | $ - | $ - | $ 100,000 |
| | 603-23 | Sperry VFI | 2 | | 100,000 | - | 100,000 | - | - | 100,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 100,000** | **$ 100,000** | **$ -** | **$ -** | **$ 200,000** |
| Voltage Regulators | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Miscellanious Distribution | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| | | | | | **Subtotal By Years:** | **$ 107,000** | **$ 100,000** | **$ -** | **$ 510,000** | |
| | | | | | **Total Cost: 2017-2020 Lopez Substation No. 2:** | | | | | **$ 717,000** |

*** Carried Forward Improvement**

**Shaw Substation No. 3**
69 kV to 12.5/7.2
Transformer Capacity: 5 MVA
2017-2020
Projected Load : 1,350 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | 331 | Hoffman Cove Road Conversion | 1 | 0.4 Mi. | $ 200,000 /Mi. | $ 80,000 | $ - | $ - | $ - | $ 80,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **0.4 Mi.** | **Total Cost:** | **$ 80,000** | **$ -** | **$ -** | **$ -** | **$ 80,000** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Substation Changes | 504 | Shaw Substation Switch Replacement | 1 | | $ 40,000 | $ 40,000 | $ - | $ - | $ - | $ 40,000 |
| | 513 | Shaw LTC Controller Replacement | 1 | | 7,000 | 7,000 | - | - | - | 7,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 47,000** | **$ -** | **$ -** | **$ -** | **$ 47,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Voltage Regulators | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Miscellanious Distribution | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| | | | | | **Subtotal By Years:** | **$ 127,000** | **$ -** | **$ -** | **$ -** | |
| | | | | | **Total Cost: 2017-2020 Shaw Substation No. 3:** | | | | | **$ 127,000** |

*** Carried Forward Improvement**

**Orcas Substation No. 4**
69 kV to 12.5/7.2 kV
Transformer Capacity: 20 MVA
2017-2020
Projected Load : 9,920 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | 312* | Dolphin Bay Road Conversion | 2 | 1.0 Mi. | $ 400,000 /Mi. | $ - | $ 400,000 | $ - | $ - | $ 400,000 |
| | 333 | Orcas Hill Overhead Conversion | 3 | 0.5 Mi. | 400,000 /Mi. | - | - | 200,000 | - | 200,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **1.5 Mi.** | **Total Cost:** | **$ -** | **$ 400,000** | **$ 200,000** | **$ -** | **$ 600,000** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Substation Changes | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-17 | Orcas Landing VFI | 2 | | $ 100,000 | $ - | $ 100,000 | $ - | $ - | $ 100,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 100,000** | **$ -** | **$ -** | **$ 100,000** |
| Voltage Regulators | 604-4* | Orcas Substation Voltage Regulators | 2 | | $ 325,000 | $ - | $ 325,000 | $ - | $ - | $ 325,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 325,000** | **$ -** | **$ -** | **$ 325,000** |
| Miscellanious Distribution | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| | | | | | **Subtotal By Years:** | **$ -** | **$ 825,000** | **$ 200,000** | **$ -** | |
| | | | | | **Total Cost: 2017-2020 Orcas Substation No. 4:** | | | | | **$ 1,025,000** |

*** Carried Forward Improvement**

**Friday Harbor Substation No. 5**
69 kV to 12.5/7.2 kV
Transformer Capacity: 20 MVA
2017-2020
Projected Load : 13,460 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | 215* | Mullis Road Tie | 1 | 0.7 | $ 286,000 /Mi. | $ 200,000 | $ - | $ - | $ - | $ 200,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.7 Mi.** | **Total Cost:** | **$ 200,000** | **$ -** | **$ -** | **$ -** | **$ 200,000** |
| Line Changes | 301* | Egg Lake Road Conversion | 2 | 1.5 Mi. | $ 267,000 /Mi. | $ - | $ 400,000 | $ - | $ - | $ 400,000 |
| | 319* | Beaverton Valley Road Conversion | 3 | 3.2 Mi. | 94,000 /Mi. | - | - | 300,000 | - | 300,000 |
| | 332 | San Juan Valley Reconductor | 1 | 0.6 Mi. | 500,000 /Mi. | 300,000 | - | - | - | 300,000 |
| | 338 | Friday Harbor Sidewalk Conversion | 4 | 0.4 Mi. | 375,000 /Mi. | - | - | - | 150,000 | 150,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **5.7 Mi.** | **Total Cost:** | **$ 300,000** | **$ 400,000** | **$ 300,000** | **$ 150,000** | **$ 1,150,000** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | | | **$ -** | **$ -** | **$ -** |
| Substation Changes | 516 | Friday Harbor LTC Controller Replacement | 1 | | $ 7,000 | $ 7,000 | $ - | $ - | $ - | $ 7,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 7,000** | **$ -** | **$ -** | **$ -** | **$ 7,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-15 | Tucker and Guard VFI | 2 | | $ 120,000 | $ - | $ 120,000 | $ - | $ - | $ 120,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 120,000** | **$ -** | **$ -** | **$ 120,000** |
| Voltage Regulators | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Miscellanious Distribution | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| | | | | | **Subtotal By Years:** | **$ 507,000** | **$ 520,000** | **$ 300,000** | **$ 150,000** | |
| | | | | | **Total Cost: 2017-2020 Friday Harbor Substation No. 5:** | | | | | **$ 1,477,000** |

*** Carried Forward Improvement**

**Roche Harbor Substation No. 7**
115 kV to 12.5/7.2
Transformer Capacity: 20 MVA
2017-2020
Projected Load : 8,350 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | 314* | Cessna Road Conversion | 2 | 1.3 | $ 308,000 | $ - | $ 400,000 | $ - | $ - | $ 400,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **1.3 Mi.** | **Total Cost:** | **$ -** | **$ 400,000** | **$ -** | **$ -** | **$ 400,000** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Substation Changes | 517 | Roche Harbor LTC Controller Replacement | 1 | | $ 7,000 | $ 7,000 | $ - | $ - | $ - | $ 7,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 7,000** | **$ -** | **$ -** | **$ -** | **$ 7,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-18 | Egg Lake Road Sectionalizing | 2 | | $ 45,000 | $ - | $ 45,000 | $ - | $ - | $ 45,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 45,000** | **$ -** | **$ -** | **$ 45,000** |
| Voltage Regulators | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Miscellanious Distribution | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| | | | | | **Subtotal By Years:** | **$ 7,000** | **$ 445,000** | **$ -** | **$ -** | |
| | | | | | **Total Cost: 2017-2020 Roche Harbor Substation No. 7:** | | | | | **$ 452,000** |

*** Carried Forward Improvement**

**Olga Substation No. 8**
69 kV X 25 kV to 13.2/7.6
Transformer Capacity: 10.5 MVA
2017-2020
Projected Load : 7,080 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Substation Changes | 511 | Olga LTC Controller Replacement | 1 | | $ 7,000 | $ 7,000 | $ - | $ - | $ - | $ 7,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 7,000** | **$ -** | **$ -** | **$ -** | **$ 7,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-1* | Olga to Blakely Sectionalizing | 4 | | $ 100,000 | $ - | $ - | $ - | $ 100,000 | $ 100,000 |
| | 603-20 | Moran State Park South VFI | 2 | | 75,000 | - | 75,000 | - | - | 75,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 75,000** | **$ -** | **$ 100,000** | **$ 175,000** |
| Voltage Regulators | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Miscellanious Distribution | 705-3 | Olga AMR SCE | 2 | | $ 90,000 | $ - | $ 20,000 | $ - | $ - | $ 20,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 20,000** | **$ -** | **$ -** | **$ 20,000** |
| | | | | | **Subtotal By Years:** | **$ 7,000** | **$ 95,000** | **$ -** | **$ 100,000** | |
| | | | | | **Total Cost: 2017-2020 Olga Substation No. 8:** | | | | | **$ 202,000** |

*** Carried Forward Improvement**

**Thatcher Substation No. 9**
25 kV to 12.5/7.2 kV
Transformer Capacity: 1.5 MVA
2017-2020
Projected Load : 1,080 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | | | **$ -** | **$ -** | **$ -** |
| Substation Changes | 501-1* | Thatcher Substation Upgrade | 3 | | $ 200,000 | $ - | $ - | $ 200,000 | $ - | $ 200,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ 200,000** | **$ -** | **$ 200,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-2* | Blakely to Olga Sectionalizing | 1 | | $ 100,000 | | $ - | $ 100,000 | $ - | $ 100,000 |
| | 603-12 | Thatcher VFI | 2 | | 80,000 | - | 80,000 | - | - | 80,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 80,000** | **$ 100,000** | **$ -** | **$ 180,000** |
| Voltage Regulators | 604-6 | Thatcher Voltage Regulators | 3 | | $ 75,000 | $ - | $ - | $ 75,000 | $ - | $ 75,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ 75,000** | **$ -** | **$ 75,000** |
| Miscellanious Distribution | 705-2 | Thatcher AMR SCE | 2 | | $ 90,000 | $ - | $ 90,000 | $ - | $ - | $ 90,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 90,000** | **$ -** | **$ -** | **$ 90,000** |
| | | | | | **Subtotal By Years:** | **$ -** | **$ 170,000** | **$ 375,000** | **$ -** | |
| | | | | | **Total Cost: 2017-2020 Thatcher Substation No. 9:** | | | | | **$ 545,000** |

*** Carried Forward Improvement**

**Eastsound Substation No. 10**
115 kV to 12.5/7.2 kV
Transformer Capacity: 20 MVA
2017-2020
Projected Load : 14,160 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | 321* | Crescent Beach Conversion | 3 | 0.9 Mi. | $ 84,000 /Mi. | $ - | $ - | $ 75,000 | $ - | $ 75,000 |
| | 324* | Mt. Constitution Conversion | 2 | 2.3 Mi. | 312,000 /Mi. | 325,000 | 392,000 | - | - | 717,000 |
| | 330 | Urner-Harrison Point Conversion | 4 | 0.5 Mi. | 400,000 /Mi. | - | - | - | 200,000 | 200,000 |
| | 334 | Prune Alley Conversion | 1 | 0.6 Mi. | 418,000 /Mi. | 250,000 | - | - | - | 250,000 |
| | 336 | Lovers Lane Conversion | 1 | 0.4 Mi. | 200,000 /Mi. | 80,000 | - | - | - | 80,000 |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **4.7 Mi.** | **Total Cost:** | **$ 655,000** | **$ 392,000** | **$ 75,000** | **$ 200,000** | **$ 1,322,000** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Substation Changes | 505 | Eastsound Substation Insulator Replacement | 1 | | $ 30,000 | $ 30,000 | $ - | $ - | $ - | $ 30,000 |
| | 512 | Eastsound LTC Controller Replacement | 1 | | 7,000 | 7,000 | - | - | - | 7,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 37,000** | **$ -** | **$ -** | **$ -** | **$ 37,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-16 | Lover Lane and Main Street VFI | 2 | | $ 100,000 | $ - | $ 100,000 | $ - | $ - | $ 100,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 100,000** | **$ -** | **$ -** | **$ 100,000** |
| Voltage Regulators | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Miscellanious Distribution | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| | | | | | **Subtotal By Years:** | **$ 692,000** | **$ 492,000** | **$ 75,000** | **$ 200,000** | |
| | | | | | **Total Cost: 2017-2020 Eastsound Substation No. 10:** | | | | | **$ 1,459,000** |

*** Carried Forward Improvement**

**Gravel Pit Substation No. 11**
69 kV to 12.5/7.2 kV
Transformer Capacity: 20 MVA
2017-2020
Projected Load : 7,080 kW

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| New Tie Lines | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles:** | | | **0.0 Mi.** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Line Changes | 320* | San Juan Valley Road Conversion | 1 | 1.9 Mi. | $ 158,000 | $ 300,000 | $ - | $ - | $ - | $ 300,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total Miles** | | | **1.9 Mi.** | **Total Cost:** | **$ 300,000** | **$ -** | **$ -** | **$ -** | **$ 300,000** |
| New Substations | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Substation Changes | 515 | Gravel Pit LTC Controller Replacement | 1 | | $ 7,000 | $ 7,000 | $ - | $ - | $ - | $ 7,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 7,000** | **$ -** | **$ -** | **$ -** | **$ 7,000** |
| Capacitors | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | **Total kVAR** | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| Sectionalizing | 603-22 | Portland Fair VFI | 2 | | $ 80,000 | $ - | $ 80,000 | $ - | $ - | $ 80,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ 80,000** | **$ -** | **$ -** | **$ 80,000** |
| Voltage Regulators | 604-7 | Bailor Hill Voltage Regulators | 4 | | $ 80,000 | $ - | $ - | $ - | $ 80,000 | $ 80,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ 80,000** | **$ 80,000** |
| Miscellanious Distribution | | | | | | $ - | $ - | $ - | $ - | $ - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | **0.0** | **Total Cost:** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** |
| | | | | | **Subtotal By Years:** | **$ 307,000** | **$ 80,000** | **$ -** | **$ 80,000** | |
| | | | | | **Total Cost: 2017-2020 Gravel Pit Substation No. 11:** | | | | | **$ 467,000** |

*** Carried Forward Improvement**

**Miscellaneous Distribution and Transmission**
All Substation Areas

| | 740C Code | Description | Year | Qty | | Cost 2017 | Cost 2018 | Cost 2019 | Cost 2020 | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| Miscellanious Distribution | 601 | Transformer Replacements | 4 | | $ 1,129,000 | $ 292,000 | $ 300,000 | $ 308,000 | $ 229,000 | $ 1,129,000 |
| | 601 | Meter Replacements | 4 | | 104,000 | 24,000 | 25,000 | 27,000 | 28,000 | 104,000 |
| | 606 | Ordinary Pole Replacements | 4 | | 500,000 | 119,000 | 123,000 | 127,000 | 131,000 | 500,000 |
| | 608 | URD Replacements | 4 | 60.0 Mi. | 7,046,000 | 1,942,000 | 1,211,000 | 1,732,000 | 2,161,000 | 7,046,000 |
| | 706-3 | Grid Control Communications Infrastructure (1) | 4 | | 8,231,000 | 1,290,000 | 300,000 | 15,000 | 16,000 | 1,621,000 |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | | | - | - | - | - | - |
| | | | | **60.0 Mi.** | **Total Cost:** | **$3,667,000** | **$1,959,000** | **$ 2,209,000** | **$ 2,565,000** | **$10,400,000** |
| Miscellaneous Transmission | 901 | Decatur 69 kV Switchyard | 2 | | $ 1,150,000 | $ 650,000 | $ 500,000 | $ - | $ - | $ 1,150,000 |
| | 1001* | Lopez to San Juan Submarine Cable | 2 | | 15,000,000 | 7,625,000 | 1,300,000 | - | - | 8,925,000 |
| | 1002* | Lopez to Shaw Sectionalizing | 2 | | 250,000 | - | 250,000 | - | - | 250,000 |
| | 1003* | Lopez to San Juan Sectionalizing | 1 | | 250,000 | 250,000 | - | - | - | 250,000 |
| | 1004* | Shaw to Orcas Sectionalizing | 1 | | 250,000 | 250,000 | - | - | - | 250,000 |
| | 1009 | Orcas Road Relocation | 2 | | 250,000 | - | 250,000 | - | - | 250,000 |
| | 1010 | Tucker Road Relocation | 1 | | 200,000 | 200,000 | - | - | - | 200,000 |
| | 1011 | Ordinary Pole Replacements | 4 | | 350,000 | 83,000 | 86,000 | 89,000 | 92,000 | 350,000 |
| | | | | | | - | - | - | - | - |
| | | | | | **Total Cost:** | **$ 9,058,000** | **$ 2,386,000** | **$ 89,000** | **$ 92,000** | **$ 11,625,000** |
| | | | | | **Subtotal By Years:** | **$ 12,725,000** | **$ 4,345,000** | **$ 2,298,000** | **$ 2,657,000** | |
| | | | | | **Total Cost: 2017-2020 Miscellaneous Distribution and Transmission:** | | | | | **$ 22,025,000** |

*** Carried Forward Improvement**
**(1) See Note on page V-60**

# 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 2013-2016 Capital Work Plan to be completed in the 2017-2020 Capital Work Plan.

DISTRIBUTION CONSTRUCTION ITEM: Mullis Road Tie

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2017

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 backfeed 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.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing conduit and Vault system. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Egg Lake Road Conversion

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2018

740C CODE: 301*

ESTIMATED COST: $400,000

DESCRIPTION: Replace 15,500 ft. of single-phase #6 HD Cu overhead distribution system with three-phase 4/0 Al URD underground distribution system.

JUSTIFICATION: This project will provide a tie between the Friday Harbor and the Roche Harbor Substation. This will increase reliability between substation by creating alternative feeds from multiple circuits from each substation.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

DISTRIBUTION CONSTRUCTION ITEM: Dolphin Bay Road Conversion

SUBSTATION AREA: Orcas

YEAR OF COMPLETION: 2018

740C CODE: 312*

ESTIMATED COST: $400,000

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" conduit along with 2" conduit and 96 count fiber from location 2207458 to 2290228.

JUSTIFICATION: This project completes a 3-phase loop and increases system reliability. This route is along Dolphin Bay Road and will complete a 3-phase loop and tie between Circuits 42 and 43 of the Orcas Substation. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

DISTRIBUTION CONSTRUCTION ITEM: Cessna Road Conversion

SUBSTATION AREA: Roche Harbor

YEAR OF COMPLETION: 2018

740C CODE: 314*

ESTIMATED COST: $400,000

DESCRIPTION: Replace 7,800 ft. of single-phase #2 Al URD underground distribution system with three-phase 4/0 Al URD underground distribution system from location 1053202 to 1043310.

JUSTIFICATION: This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. This route is along Cessna Road and Tarte Road and will complete a 3-phase loop and tie between Circuits 71 and 72 of the Roche Harbor Substation.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

DISTRIBUTION CONSTRUCTION ITEM: Beaverton Valley Road Conversion

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2019

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.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

DISTRIBUTION CONSTRUCTION ITEM: San Juan Valley Road Conversion

SUBSTATION AREA: Gravel Pit

YEAR OF COMPLETION: 2017

740C CODE: 320*

ESTIMATED COST: $300,000

DESCRIPTION: Replace 9,900 ft. of three-phase #4 ACSR overhead distribution system with three-phase 336.4 kcmil ACSR overhead distribution system from location 1483223 to 1383242 (on San Juan Valley Road from Strawberry Lane to Boyce Road and Boyce Road from San Juan Valley Road to Beaverton Valley Road).

JUSTIFICATION: The Increasing conductor size will reduce voltage drop and reduce system losses.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

DISTRIBUTION CONSTRUCTION ITEM: Crescent Beach Conversion

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2019

740C CODE: 321*

ESTIMATED COST: $75,000

DESCRIPTION: Replace 4,700 ft. of three-phase 2/0 ACSR overhead distribution system with three-phase 336.4 kcmil ACSR overhead distribution system from location 2037140 to 2039250 (on Crescent Beach Drive from Madrona Street to Olga Road).

JUSTIFICATION: This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. A fiber optic line will be installed along this route to provide automation to a VFI switch at the east end of this project. This route is along Crescent Beach Drive from Madrona Street to Terrill Beach Road and will provide a more reliable tie between Circuits 102 of the Eastsound Substation and 82 of the Olga Substation and Circuits 102 and the planned 104.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

DISTRIBUTION CONSTRUCTION ITEM: Mt. Constitution Conversion

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2018

740C CODE: 324*

ESTIMATED COST: $987,000

DESCRIPTION: Replace #6 Cu overhead distribution from entrance of Moran State Park (Location 2134245) to Mt. Constitution (Location 2071148) with 1/0 Al underground distribution from Olga Road and Buck Mountain Road intersection (Location 2039160) to Mt. Constitution (Location 2071148). The new route will be upgraded from #2 Al underground distribution.

JUSTIFICATION: The existing overhead line is difficult to access and serves critical yet little load. Remove of overhead from this route will reduce the risk of fires. The planned route has been identified as an area scheduled for replacement of the URD due to faults and corroded neutral. This project in addition to reducing fire hazards will increase reliability, aid in balancing loads, reduce line losses and voltage drop, and create better abilities to tie to the Raccoon Point area.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

NEW DISTRIBUTION CONSTRUCTION ITEM: Urner-Harrison Point Conversion

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2020

740C CODE: 330

ESTIMATED COST: $200,000

DESCRIPTION: Replace 1,100 ft. of single-phase #6 HD Cu overhead distribution system with a single-phase 1/0 URD underground system in 2" conduit for taps south, east, and west from Location 2037118.

JUSTIFICATION: The undergrounding of these line sections provides increased reliability and reduced fire hazards. Standard utility right-of-way management has become increasingly difficult since the trees surrounding these lines have grown to a height excessive of the lines. These facilities are also past useful life and in need of replacement.

ASSOCIATED PROJECTS: None

ALTERNATES: Replace with overhead infrastructure due to age. Acquire further Right-of-way to reduce outage opportunities.

ENVIRONMENTAL: Environmental review is required.

NEW DISTRIBUTION CONSTRUCTION ITEM: Hoffman Cove Road Conversion

SUBSTATION AREA: Shaw

YEAR OF COMPLETION: 2017

740C CODE: 331

ESTIMATED COST: $80,000

DESCRIPTION: Replace 2,000 ft. of single-phase #6 HD Cu overhead distribution system with 1/0 URD underground distribution system in 2" conduit from Location 4039263 to 4047309 along county road right-of-way.

JUSTIFICATION: The relocation and undergrounding of these lines section will increase reliability and provide better access to these facilities for ease of maintenance. These facilities will be relocated to the county road right-of-way for ease of access. This overhead tie line is an important component of the Shaw Island distribution for providing backfeed capabilities between circuits 31 and 32 of the Shaw 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: Replace with overhead infrastructure due to age. Acquire further Right-of-way to reduce outage opportunities.

ENVIRONMENTAL: Environmental review is required.

NEW DISTRIBUTION CONSTRUCTION ITEM: San Juan Valley Reconductor

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2017

740C CODE: 332

ESTIMATED COST: $300,000

DESCRIPTION: Replace 3,400 ft. of direct buried three-phase 4/0 URD Al underground distribution system with three-phase 500 MCM Al underground in 6" conduit from location 1180177 to 1484417 (San Juan valley Road from Franklin Drive to Douglas Road).

JUSTIFICATION: Three-phase direct buried #4/0 AL has failed at least once causing all of circuit 53 to trip off leaving 1300 members out of power. OPALCO would like to put this 5000-foot span of URD underground in conduit before the area becomes developed and OPALCO's ability to access and maintain this line becomes problematic. The existing underground direct buried facilities have sustained several faults. Installation of a conduit and vault system will increase reliability to the 1300 services downline and provide operational opportunities during downline outage events.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded - Facilities are to be located in previously disturbed soils within existing County road right-of-way. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Orcas Hill Overhead Conversion

SUBSTATION AREA: Orcas

YEAR OF COMPLETION: 2019

740C CODE: 333

ESTIMATED COST: $200,000

DESCRIPTION: Replace 2,600 ft. of single-phase #6 HD Cu overhead distribution system with single-phase 1/0 URD underground distribution system from location 2299154 to 2300203 (Orcas Submarine Cable Terminal to Killebrew Lake Road).

JUSTIFICATION: Replacing existing overhead system would increase system reliability and reduce future maintenance costs.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Environmental review is required.

NEW DISTRIBUTION CONSTRUCTION ITEM: Prune Alley Conversion

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2017

740C CODE: 334

ESTIMATED COST: $250,000

DESCRIPTION: Replace 1,500 ft. of three-phase #6 HD Cu overhead distribution system with three-phase 1/0 URD underground distribution system in 6" conduit. Tap of direct buried #2 Al open concentric neutral URD will be replaced with 1/0 Al jacketed 220 mil insulated bale in 2" conduit.

JUSTIFICATION: The County is widening the road and is requiring OPALCO to relocate its present facilities that are in the County Right of Way. OPALCO will be required to move its electrical lines into existing trenches use by phone, fiber, water and sew line.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: San Juan County is the lead agency doing the permitting. Environmental review is required, but will be done by the County.

NEW DISTRIBUTION CONSTRUCTION ITEM: Center Island Submarine Cable

SUBSTATION AREA: Decatur

YEAR OF COMPLETION: 2019

740C CODE: 335

ESTIMATED COST: $300,000

DESCRIPTION: Replace 2,800 ft. of #2 Cu Submarine Cable with 1/0 Cu Submarine Cable with fiber from Decatur Island to Center Island (Location 6101340 to 6103200).

JUSTIFICATION: This distribution submarine cable has faulted once and is nearing end of life.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Environmental review is required.

NEW DISTRIBUTION CONSTRUCTION ITEM: Lovers Lane Conversion

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2017

740C CODE: 336

ESTIMATED COST: $80,000

DESCRIPTION: Replace 2,000 ft. of three-phase 350 MCM direct buried URD underground distribution system with three-phase 500 MCM URD underground distribution system in 6" conduit from location 2022180 to 2037267 (Lovers Lane from Enchanted Forest Road to Main Street).

JUSTIFICATION: Replacement of this tie will allow for backfeed to both the Orcas and Olga Substations.

ASSOCIATED PROJECTS: 603-16

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will dig over the top of existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Agate Beach Overhead Conversion

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2020

740C CODE: 337

ESTIMATED COST: $80,000

DESCRIPTION: Replace 2,200 ft. of single-phase 1/0 ACSR overhead distribution system with 1/0 Al URD underground distribution system from location 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 in this area.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Environmental review is required.

NEW DISTRIBUTION CONSTRUCTION ITEM: Friday Harbor Sidewalk Replacement

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2020

740C CODE: 338

ESTIMATED COST: $150,000

DESCRIPTION: Replace facilities and install facilities in conjunction with 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.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Town of Friday Harbor is the lead agency doing the permitting. Environmental review is required, but will be done by the Town of Friday Harbor.

NEW DISTRIBUTION CONSTRUCTION ITEM: Lopez to Decatur OH Conversion

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2020

740C CODE: 339

ESTIMATED COST: $80,000

DESCRIPTION: Replace aging poles and hardware from SJI 6/18 to Decatur Substation.

JUSTIFICATION: This line will be maintained for backfeed capabilities from Lopez Substation via the leased BPA 25 kVA submarine cable. This provides an alternative feed if the Decatur Substation is out of service.

ASSOCIATED PROJECTS: 901

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will replace poles in place. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Thatcher Substation Upgrade

SUBSTATION AREA: Thatcher

YEAR OF COMPLETION: 2019

740C CODE: 501-1*

ESTIMATED COST: $200,000

DESCRIPTION: Upgrade of the Thatcher Substation bus and transformer from 25 kV to 69 kV.

JUSTIFICATION: This project required to accommodate higher voltages due to project 901. The Thatcher Substation is aging and lightly loaded. These upgrades along with project 604-5 will increase reliability and provide better monitoring and control increasing safety by allowing personnel to manage without boating to Blakely.

ASSOCIATED PROJECTS: 901, 604-6

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Decatur Substation Upgrade

SUBSTATION AREA: Decatur

YEAR OF COMPLETION: 2019

740C CODE: 501-2*

ESTIMATED COST: $200,000

DESCRIPTION: Upgrade of the Decatur Substation bus and transformer from 25 kV to 69 kV.

JUSTIFICATION: This project required to accommodate higher voltages due to project 901. The Decatur Substation is aging and lightly loaded. These upgrades along with project 604-5 will increase reliability and provide better monitoring and control increasing safety by allowing personnel to manage without boating to Decatur.

ASSOCIATED PROJECTS: 901, 604-5

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Lopez Stepdown Transformer Removal

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2020

740C CODE: 502*

ESTIMATED COST: $100,000

DESCRIPTION: Removal of the 69 kV to 25 kV transformer from the Lopez Stepdown Substation and rebuild the bud work for future backfeed to Decatur at 12 kV.

JUSTIFICATION: Required to complete project #901. This project would remove the 69 kV to 24.9 kV step down transformer at the Lopez Step Down transformer site that feeds the Decatur, Thatcher, and Olga Substations. This will be done due to the removal of the Decatur and Thatcher Substations and the new Decatur 69 kV switchyard that will provide a 69-kV feed to the Olga Substation.

ASSOCIATED PROJECTS: 901

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Lopez Stepdown VAR Control

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2020

740C CODE: 503*

ESTIMATED COST: $250,000

DESCRIPTION: Install a line reactor, potential transformers (PTs), and current transformers (CTs) for monitoring and control of the system power factor at the Lopez Stepdown Substation.

JUSTIFICATION: OPALCO has a leading power factor due to capacitance of the Submarine cables. This project will add PT's and CT's to monitor power factor and power quality. Capacitors or line reactors will be added at the Lopez Step Down Substation site on the 69-kV system to correct power factor. The power factor is leading however further investigation by the Cooperative with its power supplier (BPA) is needed before an exact size is known.

ASSOCIATED PROJECTS: 901

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Shaw Substation Switch

SUBSTATION AREA: Shaw

YEAR OF COMPLETION: 2017

740C CODE: 504

ESTIMATED COST: $40,000

DESCRIPTION: Replace an aging switch in the Shaw Substation with a switch having a higher BIL rating.

JUSTIFICATION: Substations secondary 3 phase air break disconnect switch is unable to close in while the substation transformer is energized. Replacement parts are not available for this switch due to age of equipment.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Olga LTC Controller

SUBSTATION AREA: Olga

YEAR OF COMPLETION: 2017

740C CODE: 511

ESTIMATED COST: $7,000

DESCRIPTION: Replace LTC controller.

JUSTIFICATION: Aging controllers do not provide the level of automation needed for system operations. The expanded control and monitoring capabilities will provide the members with better power quality.

ASSOCIATED PROJECTS: None

ALTERNATES: Replace as failures occur.

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Eastsound LTC Controller

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2017

740C CODE: 512

ESTIMATED COST: $7,000

DESCRIPTION: Replace LTC controller.

JUSTIFICATION: Aging controllers do not provide the level of automation needed for system operations. The expanded control and monitoring capabilities will provide the members with better power quality.

ASSOCIATED PROJECTS: None

ALTERNATES: Replace as failures occur.

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Shaw LTC Controller

SUBSTATION AREA: Shaw

YEAR OF COMPLETION: 2017

740C CODE: 513

ESTIMATED COST: $7,000

DESCRIPTION: Replace LTC controller.

JUSTIFICATION: Aging controllers do not provide the level of automation needed for system operations. The expanded control and monitoring capabilities will provide the members with better power quality.

ASSOCIATED PROJECTS: None

ALTERNATES: Replace as failures occur.

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Lopez LTC Controller

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2017

740C CODE: 514

ESTIMATED COST: $7,000

DESCRIPTION: Replace LTC controller.

JUSTIFICATION: Aging controllers do not provide the level of automation needed for system operations. The expanded control and monitoring capabilities will provide the members with better power quality.

ASSOCIATED PROJECTS: None

ALTERNATES: Replace as failures occur.

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Gravel Pit LTC Controller

SUBSTATION AREA: Gravel Pit

YEAR OF COMPLETION: 2017

740C CODE: 515

ESTIMATED COST: $7,000

DESCRIPTION: Replace LTC controller.

JUSTIFICATION: Aging controllers do not provide the level of automation needed for system operations. The expanded control and monitoring capabilities will provide the members with better power quality.

ASSOCIATED PROJECTS: None

ALTERNATES: Replace as failures occur.

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Friday Harbor LTC Controller

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2017

740C CODE: 516

ESTIMATED COST: $7,000

DESCRIPTION: Replace LTC controller.

JUSTIFICATION: Aging controllers do not provide the level of automation needed for system operations. The expanded control and monitoring capabilities will provide the members with better power quality.

ASSOCIATED PROJECTS: None

ALTERNATES: Replace as failures occur.

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Roche Harbor LTC Controller

SUBSTATION AREA: Roche Harbor

YEAR OF COMPLETION: 2017

740C CODE: 517

ESTIMATED COST: $7,000

DESCRIPTION: Replace LTC controller.

JUSTIFICATION: Aging controllers do not provide the level of automation needed for system operations. The expanded control and monitoring capabilities will provide the members with better power quality.

ASSOCIATED PROJECTS: None

ALTERNATES: Replace as failures occur.

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Decatur Energy Storage System

SUBSTATION AREA: Decatur

YEAR OF COMPLETION: 2019

740C CODE: 518

ESTIMATED COST: $2,200,000 ($1,000,000 in WA DOC Grant Funds)

DESCRIPTION: Installation of 0.5 MW/2.0 MWh Energy Storage System (SCE) at the Decatur Substation. This will connect to at 12.47kV voltage.

JUSTIFICATION: This EES 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. In addition, this will be used to condition a planned community solar installation on the same site. OPALCO has received a $1,000,000 grant from Washington State Department of Commerce (WA DOC) for this project.

ASSOCIATED PROJECTS: 901, 604-5, 501-1

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Transformer Replacements

SUBSTATION AREA: All

YEAR OF COMPLETION: 2020

740C CODE: 601

ESTIMATED COST: $1,270,000

DESCRIPTION: Replace transformers as needed.

JUSTIFICATION: The transformer replaced have experience failure, have corrosion, or are not to current specifications (transclosures). The transformers purchased for replacement will improve efficiency and reduce losses.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Meter Replacements

SUBSTATION AREA: All

YEAR OF COMPLETION: 2020

740C CODE: 601

ESTIMATED COST: $52,000

DESCRIPTION: Replace meters as needed.

JUSTIFICATION: The meters replaced have experienced failure. 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:

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Olga to Blakely Sectionalizing

SUBSTATION AREA: Olga

YEAR OF COMPLETION: 2020

740C CODE: 603-1*

ESTIMATED COST: $100,000

DESCRIPTION: Install a three-phase 15 kV recloser at the Deer Point Submarine Cable Terminal.

JUSTIFICATION: This device will assist in isolating faults along the circuit and preserve the submarine cables now feeding the Thatcher Substation.

ASSOCIATED PROJECTS: 901

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Blakely to Orcas Sectionalizing

SUBSTATION AREA: Thatcher

YEAR OF COMPLETION: 2019

740C CODE: 603-2*

ESTIMATED COST: $100,000

DESCRIPTION: Install a three-phase 15 kV pad mounted VFI and three-phase pad mounted transformer at the North Blakely Submarine Cable Terminal. The transformer will be quoted for an ungrounded wye - grounded wye and ungrounded wye - delta - grounded wye.

JUSTIFICATION: Required for alternative feed to Blakely. The VFI device will assist in isolating faults along the circuit and preserve the submarine cables now feeding the Thatcher Substation. The transformer is a 1 MVA unit at a one to one voltage ratio with a wye-delta-wye winding. Since the submarine crossing is made up of three conductors without a neutral this unit will re-establish the connection to ground.

ASSOCIATED PROJECTS: 901

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Lopez to Decatur Sectionalizing

SUBSTATION AREA: Decatur

YEAR OF COMPLETION: 2018

740C CODE: 603-3*

ESTIMATED COST: $120,000

DESCRIPTION: Install a three-phase 15 kV overcurrent protection device at the Decatur termination of the Lopez to Decatur distribution submarine cable.

JUSTIFICATION: The added protective device will assist in isolating faults along the circuit and preserve the submarine cables. This line is currently at 25 kV and is the transmission feed to the Decatur and Thatcher Substations. It will connect to the Lopez substation and become a 12.47 kV distribution circuit to feed Decatur Island.

ASSOCIATED PROJECTS: 901

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Tucker and Guard VFI

SUBSTATION AREA: Friday Harbor

YEAR OF COMPLETION: 2018

740C CODE: 603-15

ESTIMATED COST: $120,000

DESCRIPTION: Replace an existing fuse pedestal with a VFI-12 at location 1090110.

JUSTIFICATION: The present fuse pedestal only protects two of the four taps at this location. Faults on the unfussed taps cause outages of over 1200 members and trips the protective device back at the substation. This will provide capability to monitor and control loads while better coordinating with the existing protection scheme.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Lovers Lane and Main Street VFI

SUBSTATION AREA: Eastsound

YEAR OF COMPLETION: 2018

740C CODE: 603-16

ESTIMATED COST: $100,000

DESCRIPTION: Replace an existing switch with a VFI-12 at location 2037267.

JUSTIFICATION: These fused elbows cannot be managed in their present location. This switch also tie's circuit 102 to circuits 43 and 81. Fusing is recommended at this location such that a fault on either circuit will not affect the members on the other circuit during periods when the circuits are tied together. This will provide capability to monitor and control loads while better coordinating with the existing protection scheme.

ASSOCIATED PROJECTS: 336

ALTERNATES: Remove fused elbows and increase outage exposure to broader area.

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Orcas Landing VFI

SUBSTATION AREA: Orcas

YEAR OF COMPLETION: 2018

740C CODE: 603-17

ESTIMATED COST: $100,000

DESCRIPTION: Replace aging fuse pedestal with a VFI-7 feeding approximately 450 members at location 2299169.

JUSTIFICATION: The existing fuse switch has failed to operate in the past due to failure of the equipment's older electronics boards. Coordination of fusing with up-line and down line fusing equipment is unreliable.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Egg Lake Road Sectionalizing

SUBSTATION AREA: Roche Harbor

YEAR OF COMPLETION: 2018

740C CODE: 603-18

ESTIMATED COST: $45,000

DESCRIPTION: Replace three single-phase disconnect switches with a gang operated three-phase switch at location 1242379. The project will utilize existing overhead facilities.

JUSTIFICATION: Gang switch operation provides proper operation for the loads in the area. This will also provide monitoring and control capabilities.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Mud Bay Road VFI

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2017

740C CODE: 603-19

ESTIMATED COST: $100,000

DESCRIPTION: Replace an aging fuse pedestal with a VFI-12 feeding approximately 450 members at location 3512363.

JUSTIFICATION: The existing fuse switch has failed to operate in the past due to failure of the equipment's internal electronic and mechanical components. Repair have been made to existing unit, but spare parts are problematic to find. This will provide capability to monitor and control loads while better coordinating with the existing protection scheme.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Moran State Park South VFI

SUBSTATION AREA: Olga

YEAR OF COMPLETION: 2018

740C CODE: 603-20

ESTIMATED COST: $75,000

DESCRIPTION: Replace an aging fuse pedestal with a VFI-12 feeding approximately 60 members at location 2161408.

JUSTIFICATION: The existing fuse switch has failed to operate in the past due to failure of the equipment's internal electronic and mechanical components. Repair have been made to existing unit, but spare parts are problematic to find. This will provide capability to monitor and control loads while better coordinating with the existing protection scheme.

ASSOCIATED PROJECTS:

ALTERNATES:

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Thatcher VFI

SUBSTATION AREA: Thatcher

YEAR OF COMPLETION: 2018

740C CODE: 603-21

ESTIMATED COST: $80,000

DESCRIPTION: Replace an aging fuse pedestal with a VFI-12 feeding approximately 110 members at location 5028320.

JUSTIFICATION: The existing fuse switch has failed to operate in the past due to failure of the equipment's internal electronic and mechanical components. Repair have been made to existing unit, but spare parts are problematic to find. This will provide capability to monitor and control loads while better coordinating with the existing protection scheme.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Portland Fair VFI

SUBSTATION AREA: Gravel Pit

YEAR OF COMPLETION: 2018

740C CODE: 603-22

ESTIMATED COST: $80,000

DESCRIPTION: Replace an aging fused switch at location 1742437 which was recalled by the manufacturer due to arc flash hazards.

JUSTIFICATION: The existing fuse switch has failed to operate in the past due to failure of the equipment's internal electronic and mechanical components. Repair have been made to existing unit, but spare parts are problematic to find. This will provide capability to monitor and control loads while better coordinating with the existing protection scheme.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Sperry VFI

SUBSTATION AREA: Lopez

YEAR OF COMPLETION: 2018

740C CODE: 603-23

ESTIMATED COST: $100,000

DESCRIPTION: Replace aging VFI which has experience several electronic failures.

JUSTIFICATION: The existing fuse switch has failed to operate in the past due to failure of the equipment's internal electronic and mechanical components. Repair have been made to existing unit, but spare parts are problematic to find. This will provide capability to monitor and control loads while better coordinating with the existing protection scheme.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Orcas Substation Voltage Regulators

SUBSTATION AREA: Orcas

YEAR OF COMPLETION: 2018

740C CODE: 604-4*

ESTIMATED COST: $325,000

DESCRIPTION: Install a three-phase bank of voltage regulators at the Orcas Substation 12.47 kV bus and decommission the Orcas Substation LTC.

JUSTIFICATION: These are required to keep adequate voltage levels on the Orcas Substation. The LTC is near end of life and maintenance costs have reached a level where decommissioning and installation of single-phase regulator is more economical. This will also allow per phase control of voltage on a substation with mostly single-phase load improving the power quality of those served.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Decatur Voltage Regulators

SUBSTATION AREA: Decatur

YEAR OF COMPLETION: 2018

740C CODE: 604-5*

ESTIMATED COST: $75,000

DESCRIPTION: Install a three-phase overhead bank of 57.2 kVA 75 Amp voltage regulators at the south end of Decatur Island on the recently converted 12.47 kV overhead line.

JUSTIFICATION: These are required to keep adequate voltage levels on Decatur while being fed by the Lopez Substation.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Thatcher Voltage Regulators

SUBSTATION AREA: Thatcher

YEAR OF COMPLETION: 2019

740C CODE: 604-6*

ESTIMATED COST: $75,000

DESCRIPTION: Install a three-phase overhead bank of 57.2 kVA 75 Amp voltage regulators within several spans of location 5004179 at the north end of Blakely Island.

JUSTIFICATION: These are required to keep adequate voltage levels on Blakely while being fed by the Olga Substation.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Bailor Hill Voltage Regulators

SUBSTATION AREA: Gravel Pit

YEAR OF COMPLETION: 2020

740C CODE: 604-7

ESTIMATED COST: $80,000

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.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Ordinary Replacements

SUBSTATION AREA: All

YEAR OF COMPLETION: 2020

740C CODE: 606

ESTIMATED COST: $500,000

DESCRIPTION: Based on historical figures, the anticipated ordinary replacement of poles is estimated at 45 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

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: URD Replacements

SUBSTATION AREA: All

YEAR OF COMPLETION: 2020

740C CODE: 608

ESTIMATED COST: $7,046,000

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

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

**Table V-1: 2017 URD Projects**

| Name | 740c Code | Substation Area | Year | Est. Length (ft.) | Start Location | End Location | Est. Cost ($) |
|---|---|---|---|---|---|---|---|
| Boones Pond URD Replacement | 608-1 | Eastsound | 2017 | 2,300 | 2064407 | Downline | 49,000 |
| Coho Lane URD Replacement | 608-2 | Lopez | 2017 | 2,300 | 3082330 | 3082226 | 49,000 |
| Country Club Lane URD Replacement | 608-3 | Gravel Pit | 2017 | 3,100 | 1681111 | 1681216 and 1681217 | 66,000 |
| Gafford Lane URD Replacement | 608-4 | Eastsound | 2017 | 3,400 | 2040205 | 2053235 and 2053204 | 72,000 |
| Garden Path Lane URD Replacement | 608-5 | Gravel Pit | 2017 | 3,200 | 1651338 | Downline | 68,000 |
| Harper Road URD Replacement | 608-6 | Eastsound | 2017 | 2,300 | 2049115 | Downline | 49,000 |
| Hodgson Road URD Replacement | 608-7 | Lopez | 2017 | 900 | 3423321 | 3423352 | 19,000 |
| Home Place URD Replacement | 608-8 | Friday Harbor | 2017 | 1,500 | 1404431 | 1404434 | 32,000 |
| Hunter Bay URD Replacement | 608-9 | Lopez | 2017 | 9,200 | 3364410 | Downline | 194,000 |
| Indian Beach URD Replacement | 608-10 | Gravel Pit | 2017 | 1,400 | 1862488 | 1862402 and 1861394 | 100,000 |
| Killebrew/Bayhead URD Replacement | 608-11 | Orcas | 2017 | 700 | 2300198 | 2300101 | 15,000 |
| Lampard Road URD Replacement | 608-12 | Friday Harbor | 2017 | 4,600 | 1370109 | 1181152 | 97,000 |
| Lonesome Cove Road URD Replacement | 608-13 | Roche Harbor | 2017 | 2,800 | 1051129 | Downline | 59,000 |
| Old Homestead URD Replacement | 608-14 | Lopez | 2017 | 6,000 | 3083182 | 3043442 | 126,000 |
| Pavey Blvd URD Replacement | 608-15 | Lopez | 2017 | 1,600 | 3522161 | 3521293 | 34,000 |
| Pinedrona Lane URD Replacement | 608-16 | Gravel Pit | 2017 | 3,100 | 1511349 | 1511317 | 66,000 |
| Pleasant Valley URD Replacement | 608-17 | Roche Harbor | 2017 | 5,000 | 1352153 | Downline to 1274335 | 105,000 |
| Prohaska Road URD Replacement | 608-18 | Friday Harbor | 2017 | 5,700 | 1454215 | 1452183 | 120,000 |
| Raichland URD Replacement | 608-19 | Gravel Pit | 2017 | 1,000 | 1682384 | North Tap | 21,000 |
| Raven Ridge URD Replacement | 608-20 | Roche Harbor | 2017 | 2,500 | 1361158 | 1284484 | 73,000 |
| Humphrey Head URD Replacement | 608-21 | Lopez | 2017 | 4,000 | 3054388 | Downline | 84,000 |
| Smugglers Cove URD Replacement | 608-22 | Roche Harbor | 2017 | 1,500 | 1261192 | 1261124 | 32,000 |
| Snug Harbor URD Replacement | 608-23 | Lopez | 2017 | 3,800 | 3522101 | Downline | 80,000 |
| Sweetbriar Lane URD Replacement | 608-24 | Lopez | 2017 | 3,700 | 3233394 | Downline | 78,000 |
| Trailer Park URD Replacement | 608-25 | Friday Harbor | 2017 | 2,200 | 1010405 | Downline | 117,000 |
| Veneda Trail Replacement | 608-26 | Olga | 2017 | 1,200 | 2159246 | 2159288 | 42,000 |
| Wally Way URD Replacement | 608-27 | Gravel Pit | 2017 | 4,500 | 1593314 | Downline | 95,000 |

**Table V-2: 2018 URD Projects**

| Name | 740c Code | Substation Area | Year | Est. Length (ft.) | Start Location | End Location | Est. Cost ($) |
|---|---|---|---|---|---|---|---|
| Bay Lane URD Replacement | 608-28 | Gravel Pit | 2018 | 1,600 | 1591131 | 1602225 | 34,000 |
| Carefree Way URD Replacement | 608-29 | Roche Harbor | 2018 | 11,200 | 1431225 | Downline | 236,000 |
| Center View URD Replacement | 608-30 | Decatur | 2018 | 500 | 6101168 | 6101144 | 11,000 |
| Decatur Head URD Replacement | 608-31 | Decatur | 2018 | 5,400 | 6072471 | 6071120 | 114,000 |
| Evergreen Way URD Replacement | 608-32 | Orcas | 2018 | 500 | 2293305 | 2293359 | 11,000 |
| Killdeer Lane URD Replacement | 608-33 | Gravel Pit | 2018 | 2,700 | 1753250 | 1753448 | 57,000 |
| Maideenhair Road URD Replacement | 608-34 | Eastsound | 2018 | 1,300 | 2026310 | Downline | 28,000 |
| Ocean Mist/Cascade Tie URD Replacement | 608-35 | Olga | 2018 | 500 | 2159405 | 2159106 | 11,000 |
| Pine Drive URD Replacement | 608-36 | Friday Harbor | 2018 | 11,000 | 1324229 | 1322301 | 231,000 |
| Pioneer Hill Road URD Replacement | 608-37 | Olga | 2018 | 6,900 | 2237112 | Downline | 145,000 |
| Rocky Bay Road URD Replacement | 608-38 | Roche Harbor | 2018 | 2,300 | 1104430 | 1113281 | 49,000 |
| San Juan Drive Taps URD Replacement | 608-39 | Roche Harbor | 2018 | 2,500 | 1063202 | Various downline taps | 53,000 |
| Three Meadows URD Replacement | 608-40 | Roche Harbor | 2018 | 3,600 | 1304207 | 1313221 | 76,000 |
| West Beach URD Replacement | 608-41 | Orcas | 2018 | 1,300 | 2064115 | 2064202 | 28,000 |
| Williams Lane URD Replacement | 608-42 | Lopez | 2018 | 2,300 | 3172448 | 3173287, 3172482, 3172494 | 49,000 |
| Wold Road URD Replacement | 608-43 | Gravel Pit | 2018 | 3,700 | 1454471 | 1551123 | 78,000 |

**Table V-3: 2019 URD Projects**

| Name | 740c Code | Substation Area | Year | Est. Length (ft.) | Start Location | End Location | Est. Cost ($) |
|---|---|---|---|---|---|---|---|
| Crow Valley Lane URD Replacement | 608-44 | Friday Harbor | 2019 | 2,800 | 1462287 | 1383353 and taps | 59,000 |
| EJ Young/Marrymac URD Replacement | 608-45 | Olga | 2019 | 4,500 | 2275113 | 2276304 | 95,000 |
| Kanaka Bay Road URD Replacement | 608-46 | Gravel Pit | 2019 | 3,300 | 1654133 | 1654415 | 70,000 |
| Miller Road URD Replacement | 608-47 | Roche Harbor | 2019 | 6,800 | 1301265 | 1234280 | 143,000 |
| Northstar Road URD Replacement | 608-48 | Lopez | 2019 | 3,100 | 3444291 | 3442476 | 66,000 |
| Ocean View Drive URD Replacement | 608-49 | Gravel Pit | 2019 | 2,900 | 1783432 | 1783348 and 1783204 | 61,000 |
| Reef Net Road URD Replacement | 608-50 | Roche Harbor | 2019 | 3,300 | 1233103 | 1232438 | 70,000 |
| Rosario Road URD Replacement | 608-51 | Olga | 2019 | 3,200 | 2159246 | 2160222 | 68,000 |
| Sawmill Road URD Replacement | 608-52 | Orcas | 2019 | 3,200 | 2173197 | 2148161 | 68,000 |
| Shoal Bay Lane URD Replacement | 608-53 | Lopez | 2019 | 1,500 | 3053468 | 3092287 | 32,000 |

**Table V-4: 2020 URD Projects**

| Name | 740c Code | Substation Area | Year | Est. Length (ft.) | Start Location | End Location | Est. Cost ($) |
|---|---|---|---|---|---|---|---|
| Aleck Bay Park URD Replacement | 608-54 | Lopez | 2020 | 6,000 | 3572122 | Downline | 126,000 |
| Burton Lane URD Replacement | 608-55 | Gravel Pit | 2020 | 5,400 | 1593186 | 1592210 | 114,000 |
| Davidson Head URD Replacement | 608-56 | Roche Harbor | 2020 | 5,500 | 1031190 | Downline | 116,000 |
| Decatur NW URD Replacement | 608-57 | Decatur | 2020 | 14,000 | 6023260 | 6062302 | 294,000 |
| Double Hill Road URD Replacement | 608-58 | Orcas | 2020 | 4,100 | 2022377 | Downline | 87,000 |
| Emmerling Place UDR Replacement | 608-59 | Friday Harbor | 2020 | 2,100 | 1473341 | 1473122 | 45,000 |
| Michell Bay URD Replacement | 608-60 | Roche Harbor | 2020 | 8,400 | 1203322 | Downline | 177,000 |
| Mountain Entrance URD Replacement | 608-61 | Olga | 2020 | 6,200 | 2234409 | 2234108 and 2211461 | 131,000 |
| No. 2 Schoolhouse Road URD Replacement | 608-62 | Friday Harbor | 2020 | 8,300 | 1474130 | 1472433 and 1471142 | 175,000 |
| Paradise Drive URD Replacement | 608-63 | Gravel Pit | 2020 | 7,600 | 1674201 | Downline | 160,000 |
| Rossel Lane URD Replacement | 608-64 | Eastsound | 2020 | 2,700 | 2016193 | Downline | 57,000 |
| Starkman Lane URD Replacement | 608-65 | Lopez | 2020 | 1,100 | 3264402 | 3342283 | 24,000 |
| Timber Lane URD Replacement | 608-66 | Roche Harbor | 2020 | 4,800 | 1382374 | 1384243 and 1384232 | 101,000 |
| Watmough Head Road URD Replacement | 608-67 | Lopez | 2020 | 5,800 | 3592332/1339 | Downline | 122,000 |
| White Point South URD Replacement | 608-68 | Roche Harbor | 2020 | 2,845 | 1083108 | 1092229 | 32,000 |
| Unidentified Lines | 608 | All | 2020 | | | | 1,400,000 |

NEW DISTRIBUTION CONSTRUCTION ITEM: Decatur AMR SCE

SUBSTATION AREA: Decatur

YEAR OF COMPLETION: 2018

740C CODE: 705-1

ESTIMATED COST: $90,000

DESCRIPTION: Installation of new Automatic Meter Reading (AMR) Substation Communication Equipment (SCE) located in the Decatur Substation. This project is in preparation for completion of 901, since this equipment is installed at distribution voltages.

JUSTIFICATION: Due to the transmission system voltage change from 25 kV to 69 kV, the SCE is needed to continue utilizing the AMR system previously invested in.

ASSOCIATED PROJECTS: 901, 501-2

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Thatcher AMR SCE

SUBSTATION AREA: Thatcher

YEAR OF COMPLETION: 2018

740C CODE: 705-2

ESTIMATED COST: $90,000

DESCRIPTION: Installation of new AMR SCE located in the Decatur Substation. This project is in preparation for completion of 901, since this equipment is installed at distribution voltages.

JUSTIFICATION: Due to the transmission system voltage change from 25 kV to 69 kV, the SCE is needed to continue utilizing the AMR system previously invested in.

ASSOCIATED PROJECTS: 901, 501-1

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

NEW DISTRIBUTION CONSTRUCTION ITEM: Olga AMR SCE

SUBSTATION AREA: Olga

YEAR OF COMPLETION: 2018

740C CODE: 705-3

ESTIMATED COST: $20,000

DESCRIPTION: Installation of new AMR SCE located in the Decatur Substation. This project is in preparation for completion of 901, since this equipment is installed at distribution voltages.

JUSTIFICATION: Due to the transmission system voltage change from 25 kV to 69 kV, the SCE is needed to continue utilizing the AMR system previously invested in.

ASSOCIATED PROJECTS: 901

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

DISTRIBUTION CONSTRUCTION ITEM: Smart Grid Infrastructure

SUBSTATION AREA: All

YEAR OF COMPLETION: 2020

740C CODE: 706-3*

ESTIMATED COST: $22,866,000

Note: In 2013, RUS loan funds were put in place sufficient to deploy communications infrastructure throughout San Juan County. To date, only a portion of these funds are required. Funds spent to date and planned include the approved $7.5M and $731k for future redundant links and reliability additions. The remainder ($14.635M) of the funds are not required.

DESCRIPTION: Install fiber optic and wireless communications infrastructure to support smart gird and communications needs. This infrastructure will allow communications to field personnel and devices for management, monitor, and control of the transmission and distribution system.

JUSTIFICATION: Due to location and topography, communications for safety and operations has been a challenge. Coupling this with the high cost of installation and low population of our service territory, telecommunication providers have only established a limited and unreliable telecommunication network. This infrastructure will provide increased safety, greater system awareness, and improved restoration capabilities.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

TRANSMISSION CONSTRUCTION ITEM: Decatur 69kV Switchyard

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2018

740C CODE: 901*

ESTIMATED COST: $1,150,000

DESCRIPTION: Install a 69kV switchyard at the Decatur Substation for acceptance of delivery point from Bonneville Power Administration. This will include BPA equipment, a breaker, and connections to the Decatur Substation and the transmission line feeding north to the Thatcher Substation and Olga Substation.

JUSTIFICATION: Currently, the voltage is transformed from 69 kV to 24.9 kV and feeds back to Decatur and then north across Blakely Island to Orcas Island ending at the Olga Substation. The switchyard would provide the tap for the three downline substations to be fed at 69 kV and eventually create a loop once a tie is established between the Eastsound Substation and the Olga Substation. At this switchyard, BPA and OPALCO would have separate equipment in order to operate the switches independently.

ASSOCIATED PROJECTS: 501-2

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

TRANSMISSION CONSTRUCTION ITEM: Lopez to San Juan Submarine Cable

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2018

740C CODE: 1001*

ESTIMATED COST: $15,000,000

DESCRIPTION: Replace 2.9 miles of 350 MCM Cu oil filled submarine transmission cable installed in 1977 with 500 MCM non-oil filled Cu submarine transmission cable from West Lopez Submarine Terminal to San Juan Submarine Cable Terminal including 144 count fiber optics. This project includes installation of cathodic protection for this cable.

JUSTIFICATION: Existing cable is at end of life based on inspections using a remote operated vehicle. This cable was installed in 1977 and repaired in 1991. Cathodic testing of the 350 MCM copper Sumitomo cable is indicating an increase in corrosion of the protective shield surrounding the oil lines running through the cable. Although these tests are not conclusive, OPALCO needs to be pro-active towards any potential release of oil into an ecologically sensitive waterway.

ASSOCIATED PROJECTS: 1002

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under CWP 2012-2016 NEPA and SEPA documentation completed.

TRANSMISSION CONSTRUCTION ITEM: Lopez to Shaw Sectionalizing

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2018

740C CODE: 1002*

ESTIMATED COST: $250,000

DESCRIPTION: Install two three-phase 69 kV circuit switchers at the North Lopez Submarine Cable Terminal.

JUSTIFICATION: These devices will assist in isolating faults along the transmission system and preserve the submarine cables.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

TRANSMISSION CONSTRUCTION ITEM: Lopez to San Juan Sectionalizing

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2017

740C CODE: 1003*

ESTIMATED COST: $250,000

DESCRIPTION: Install two three-phase 69 kV circuit switchers at the West Lopez Submarine Cable Terminal.

JUSTIFICATION: These devices will assist in isolating faults along the transmission system and preserve the submarine cables.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

TRANSMISSION CONSTRUCTION ITEM: Shaw to Orcas Sectionalizing

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2017

740C CODE: 1004*

ESTIMATED COST: $250,000

DESCRIPTION: Install two three-phase 69 kV circuit switchers at the North Shaw Submarine Cable Terminal.

JUSTIFICATION: These devices will assist in isolating faults along the transmission system and preserve the submarine cables.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Approved for construction under 2013-2016 CWP. See Environmental Report for 2013-2016 CWP.

NEW TRANSMISSION CONSTRUCTION ITEM: Orcas Road Relocation

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2018

740C CODE: 1009

ESTIMATED COST: $250,000

DESCRIPTION: Relocate 4,700 ft. of three-phase 336.4 kcmil 69 kV overhead transmission system. (Location 2178262 to 2128301)

JUSTIFICATION: San Juan County is relocating a portion of Orcas Road. OPALCO is using this opportunity to replace aging poles and bring this line section up to current specifications. This project is in accordance with OPALCO's franchise agreement with San Juan County.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: San Juan County is the lead agency doing the permitting. Environmental review is required, but will be done by the County.

NEW TRANSMISSION CONSTRUCTION ITEM: Tucker Road Relocation

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2017

740C CODE: 1010

ESTIMATED COST: $200,000

DESCRIPTION: Relocate 1,500 ft. of three-phase 69 kV overhead transmission system on Tucker Ave. from Harbor Street To University Road. (Location 1060426 to 1020101)

JUSTIFICATION: Town of Friday Harbor is expanding it's a portion of its road system. To accommodate this expansion, OPALCO will relocate multiple spans of lines. This project is in accordance with OPALCO's franchise agreement with the Town of Friday Harbor.

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Town of Friday Harbor is the lead agency doing the permitting. Environmental review is required, but will be done by the Town of Friday Harbor.

NEW TRANSMISSION CONSTRUCTION ITEM: Ordinary Replacements

SUBSTATION AREA: Transmission

YEAR OF COMPLETION: 2020

740C CODE: 1011

ESTIMATED COST: $350,000

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

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

ASSOCIATED PROJECTS: None

ALTERNATES: None

ENVIRONMENTAL: Categorically Excluded – Will use existing facilities. OPALCO is requesting that in accordance with RUS Environmental Policies and Procedures, 7 CFR Part 1970 that this project is Categorically Excluded in accordance with 7 CFR 1970.51.

# VI. Exhibits

**Figure VI-1: NCP and CP Demand**
**2011 through 2015, extended to 2020**

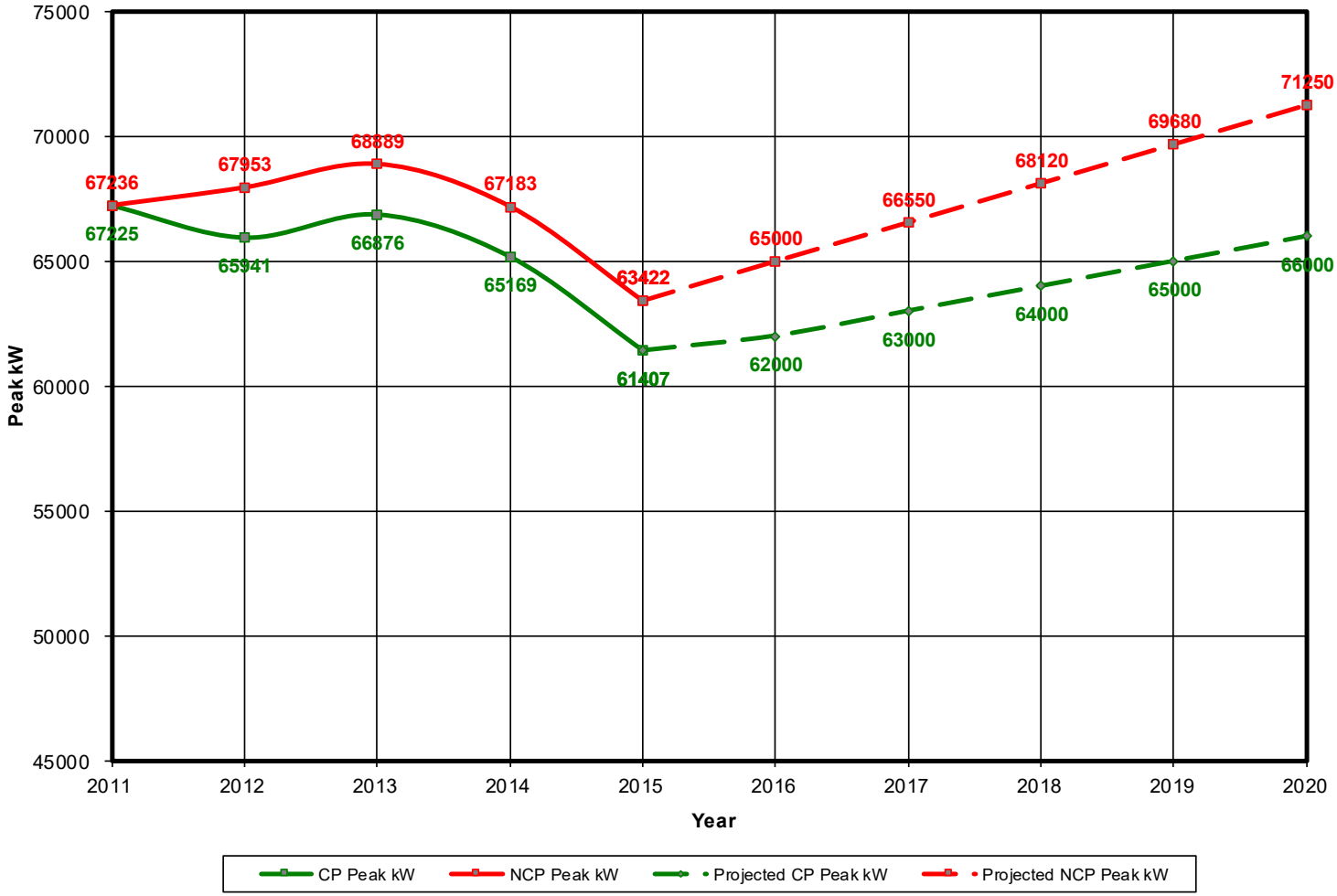

**Figure VI-2: MWh Purchased and Sold**
**2010 through 2015, estimated to 2020**

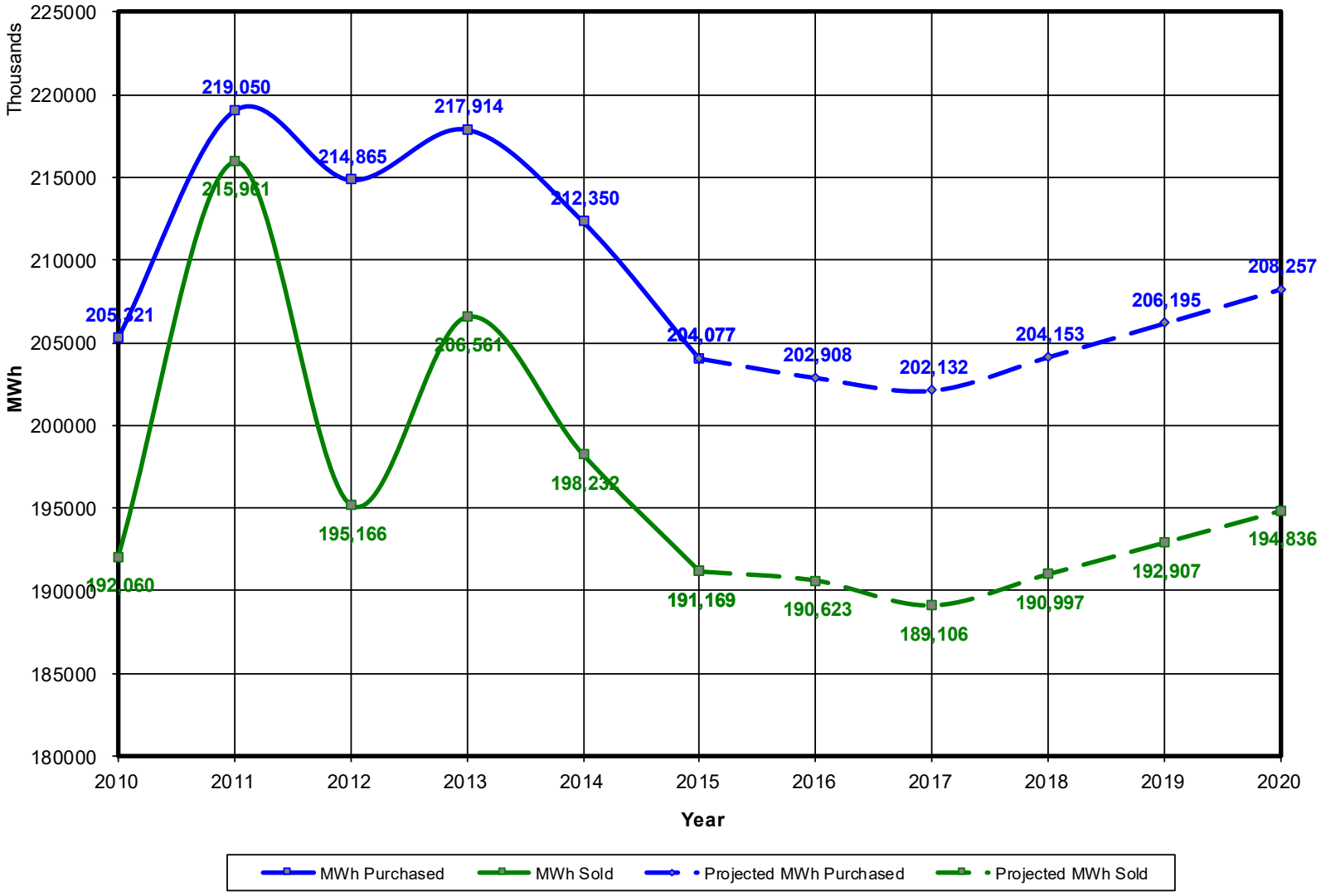

**Figure VI-3: Services in Place and Members Billed**
**2004 through 2009, extended to 2014**

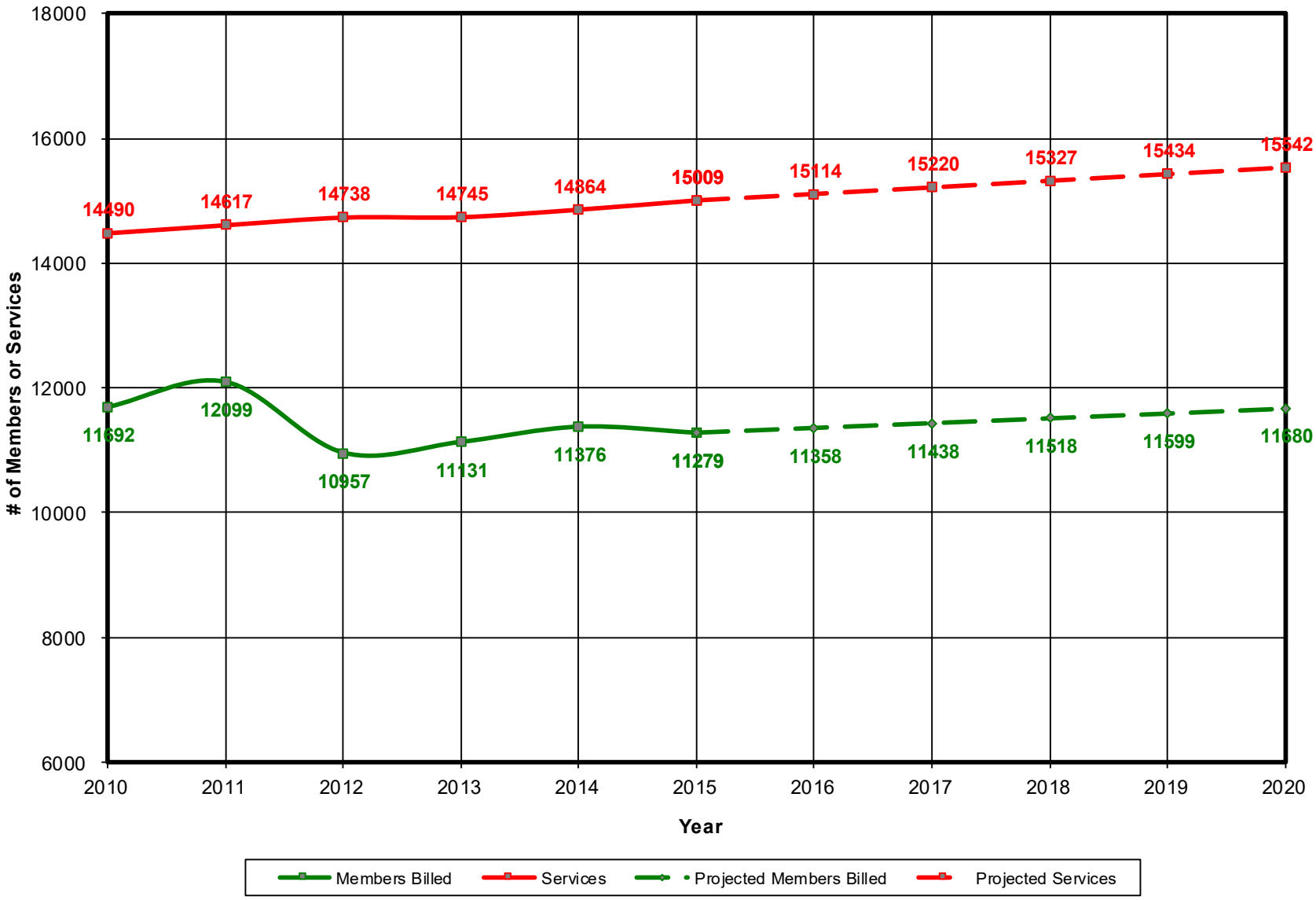

**Table VI-1: Substation Transformers and Voltage Regulation with Improvements**

| Substation | Voltage (kV) | Existing Transformer Size (MVA) | | Existing Voltage Regulation/LTC Size (kVA) | Present | | | Post 2017-2020 Work Plan | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Non-Coincidental Peak Demand August 2016 | | Percent Load at Peak | Estimated Peak Demand (kW) | BASE Rating Percent Loaded at Peak | UPPER Rating Percent at Peak | |
| | | Base | Upper | | kW | pf | | | | | |
| Decatur #1 | 69 - 12.47/7.2 | 1 | 1.25 | N/A | 530 | 98.0% | 54.1% | 1,000 | 102% | 82% | See Project 501-2 & 604-6 |
| Lopez #2 | 69 - 12.47/7.2 | 12 | 20 | 20 | 7,000 | 98.0% | 59.5% | 8,120 | 69% | 41% | |
| Shaw #3 | 69 - 12.47/7.2 | 3.75 | 5 | 2 | 1,200 | 98.0% | 32.7% | 1,350 | 37% | 28% | |
| Orcas #4 | 69 - 12.47/7.2 | 12 | 20 | 20 | 8,550 | 98.0% | 72.7% | 9,920 | 84% | 51% | |
| Friday Harbor #5 | 69 - 12.47/7.2 | 12 | 20 | 20 | 11,600 | 98.0% | 98.6% | 13,460 | 114% | 69% | |
| Roche Harbor #7 | 69 - 12.47/7.2 | 12 | 20 | 20 | 7,200 | 97.0% | 61.9% | 8,350 | 72% | 43% | |
| Olga #8 | 69 - 12.47/7.2 | 7.5 | 10.5 | 10.5 | 6,100 | 98.0% | 83.0% | 7,080 | 96% | 69% | |
| Thatcher #9 | 69 - 12.47/7.2 | 1 | 1.5 | N/A | 930 | 98.0% | 94.9% | 1,080 | 110% | 73% | See project 501-1 & 604-5 |
| Eastsound #10 | 69 - 12.47/7.2 | 12 | 20 | 20 | 12,200 | 97.0% | 104.8% | 14,160 | 122% | 73% | |
| Gravel Pit #11 | 69 - 12.47/7.2 | 12 | 20 | 20 | 6,100 | 99.0% | 51.3% | 7,080 | 60% | 36% | |

**Table VI-2: Substation Transformers and Voltage Regulators without Improvements**

| Substation | Voltage (kV) | Existing Transformer Size (MVA) | | Existing Voltage Regulation/LTC Size (kVA) | Present | | | Post 2017-2020 Work Plan | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Non-Coincidental Peak | | Percent Load at Peak | Estimated Peak Demand (kW) | BASE Rating Percent Loaded at Peak | UPPER Rating Percent at Peak |
| | | Base | Upper | | kW | pf | | | | |
| Decatur #1 | 25 - 12.47/7.2 | 0.333 | 0.375 | N/A | 530 | 98.0% | 162.4% | 1,000 | 306% | 272% |
| Lopez #2 | 69 - 12.47/7.2 | 12 | 20 | 20 | 7,000 | 98.0% | 59.5% | 8,120 | 69% | 41% |
| Shaw #3 | 69 - 12.47/7.2 | 3.75 | 5 | 2 | 1,200 | 98.0% | 32.7% | 1,350 | 37% | 28% |
| Orcas #4 | 69 - 12.47/7.2 | 12 | 20 | 20 | 8,550 | 98.0% | 72.7% | 9,920 | 84% | 51% |
| Friday Harbor #5 | 69 - 12.47/7.2 | 12 | 20 | 20 | 11,600 | 98.0% | 98.6% | 13,460 | 114% | 69% |
| Roche Harbor #7 | 69 - 12.47/7.2 | 12 | 20 | 20 | 7,200 | 97.0% | 61.9% | 8,350 | 72% | 43% |
| Olga #8 | 25 - 12.47/7.2 | 7.5 | 10.5 | 10.5 | 6,100 | 98.0% | 83.0% | 7,080 | 96% | 69% |
| Thatcher #9 | 25 - 12.47/7.2 | 1 | 1.5 | N/A | 930 | 98.0% | 94.9% | 1,080 | 110% | 73% |
| Eastsound #10 | 69 - 12.47/7.2 | 12 | 20 | 20 | 12,200 | 97.0% | 104.8% | 14,160 | 122% | 73% |
| Gravel Pit #11 | 69 - 12.47/7.2 | 12 | 20 | 20 | 6,100 | 99.0% | 51.3% | 7,080 | 60% | 36% |

# VII. Appendices

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

**Figure VII-1: RUS Form 300 - Page 1**

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0572-0025. The time required to complete this information collection is estimated to average 4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

**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

**Figure VII-2: RUS Form 300 - Page 2**

**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:<br>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. Circuit Diagrams

### 1. Decatur Substation Area No. 01

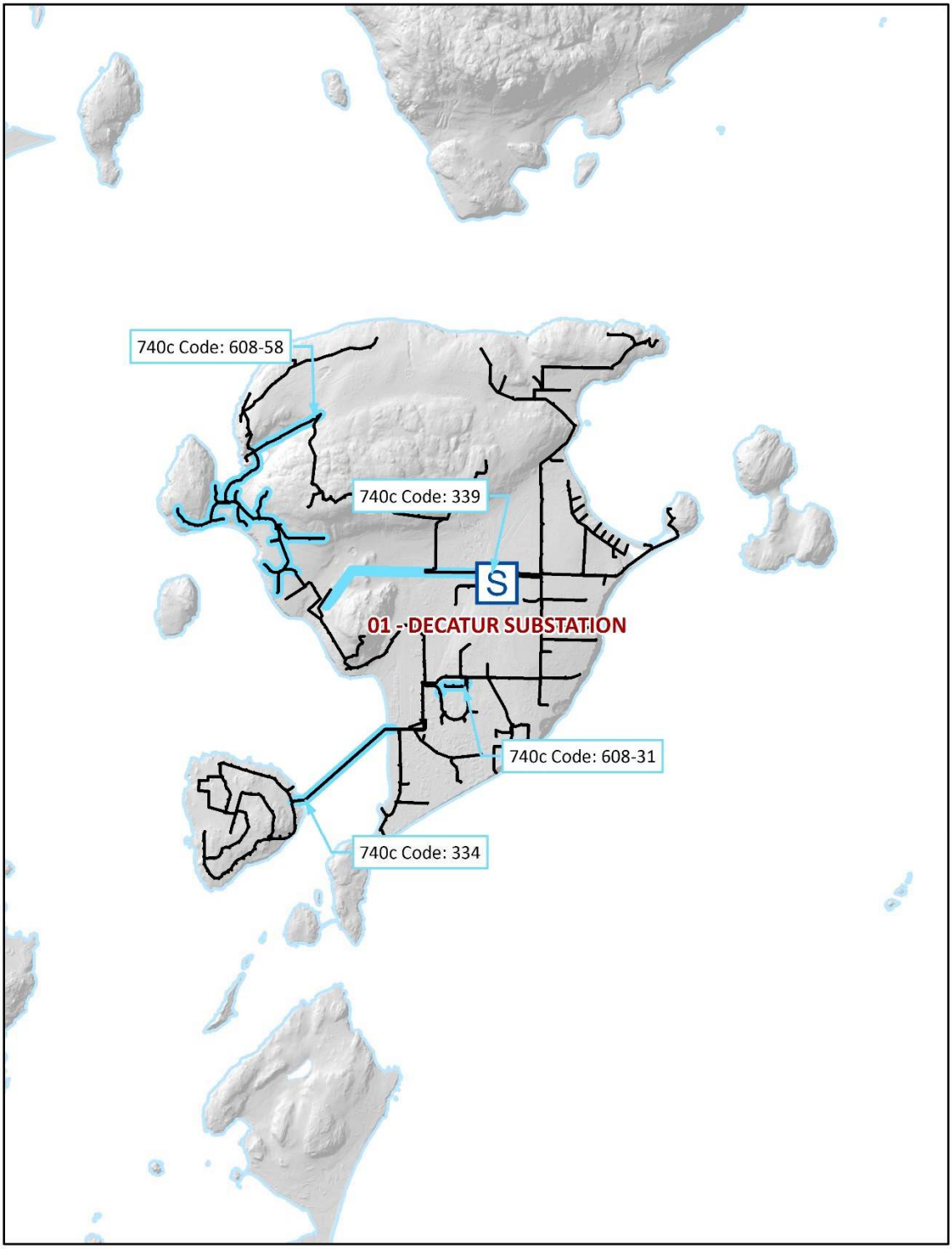


**Figure VII-3: Decatur Substation Area with Improvements**

## 2. Lopez Substation Area No. 02

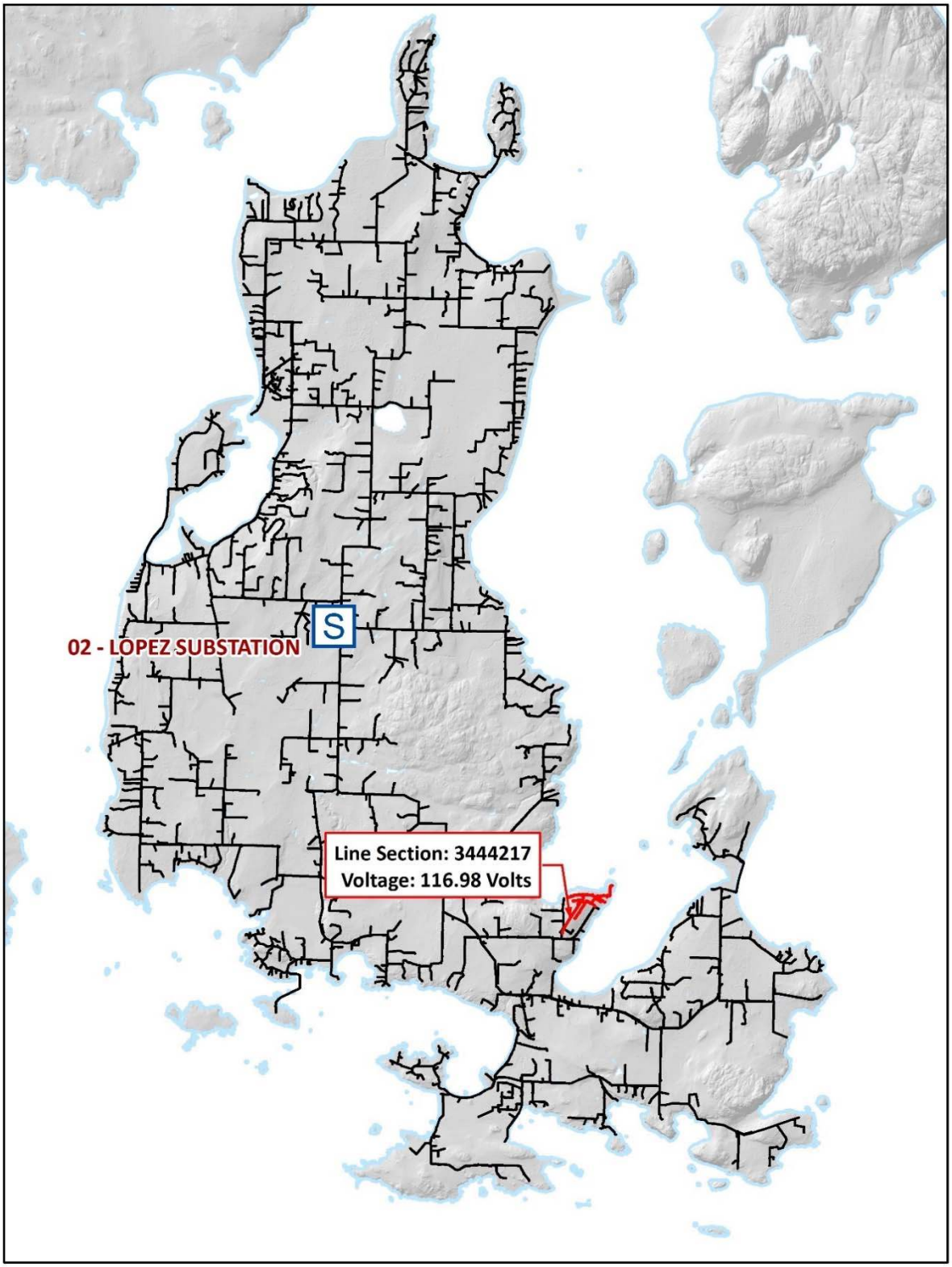


**Figure VII-4: Lopez Substation Area without Improvements**

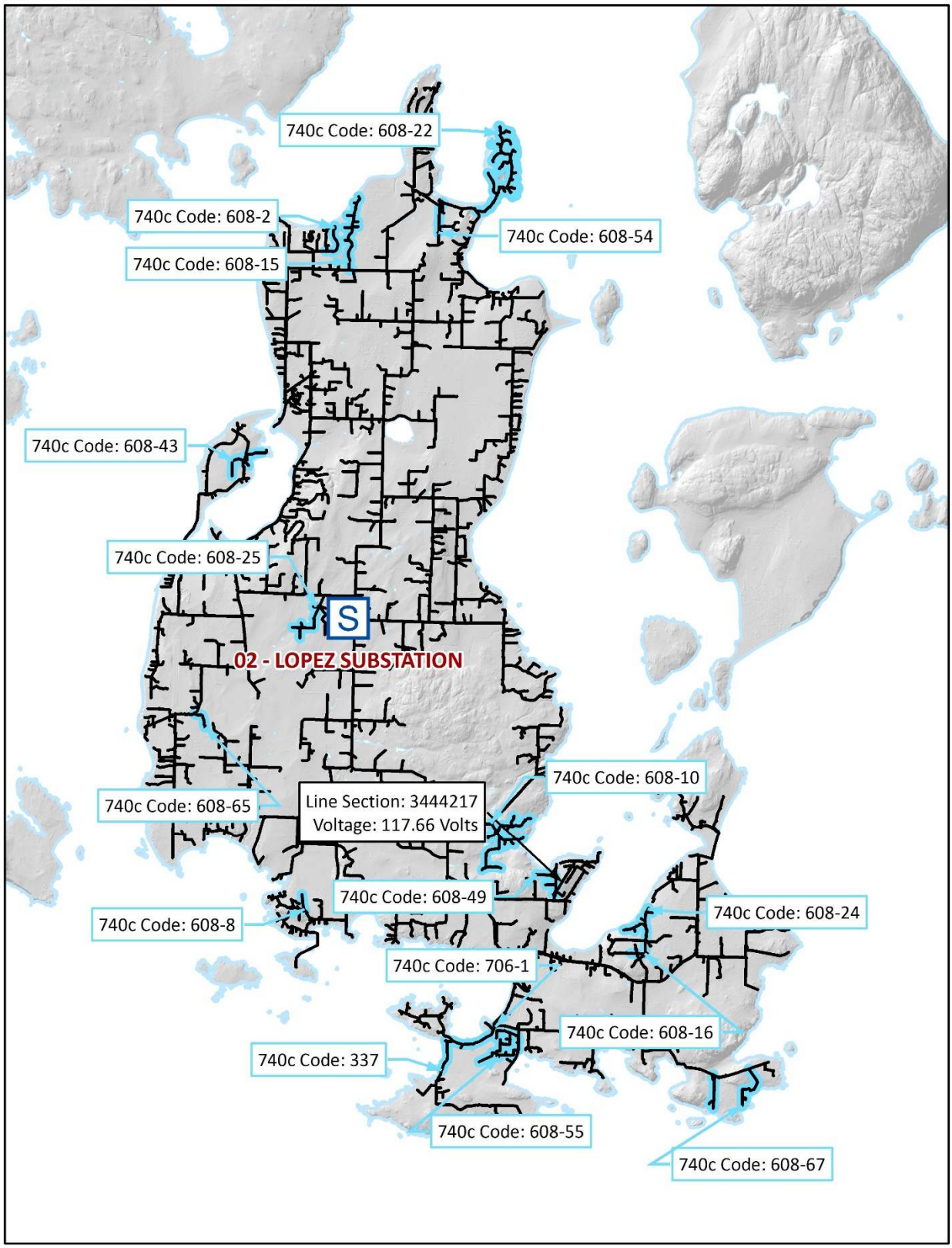


**Figure VII-5: Lopez Substation Area with Improvements**

## 3. Shaw Substation Area No. 03

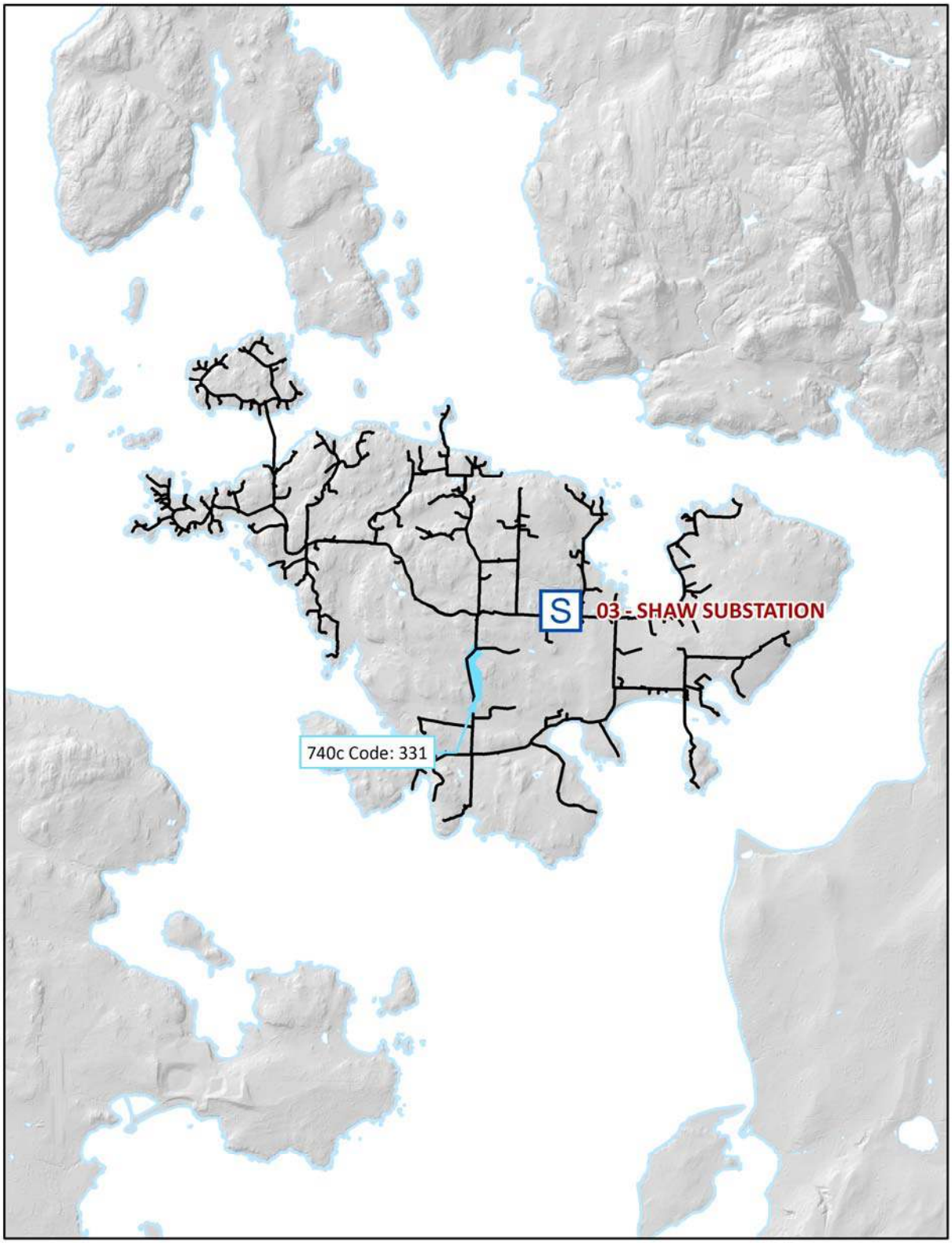


**Figure VII-6: Shaw Substation Area with Improvements**

## 4. Orcas Substation Area No. 04

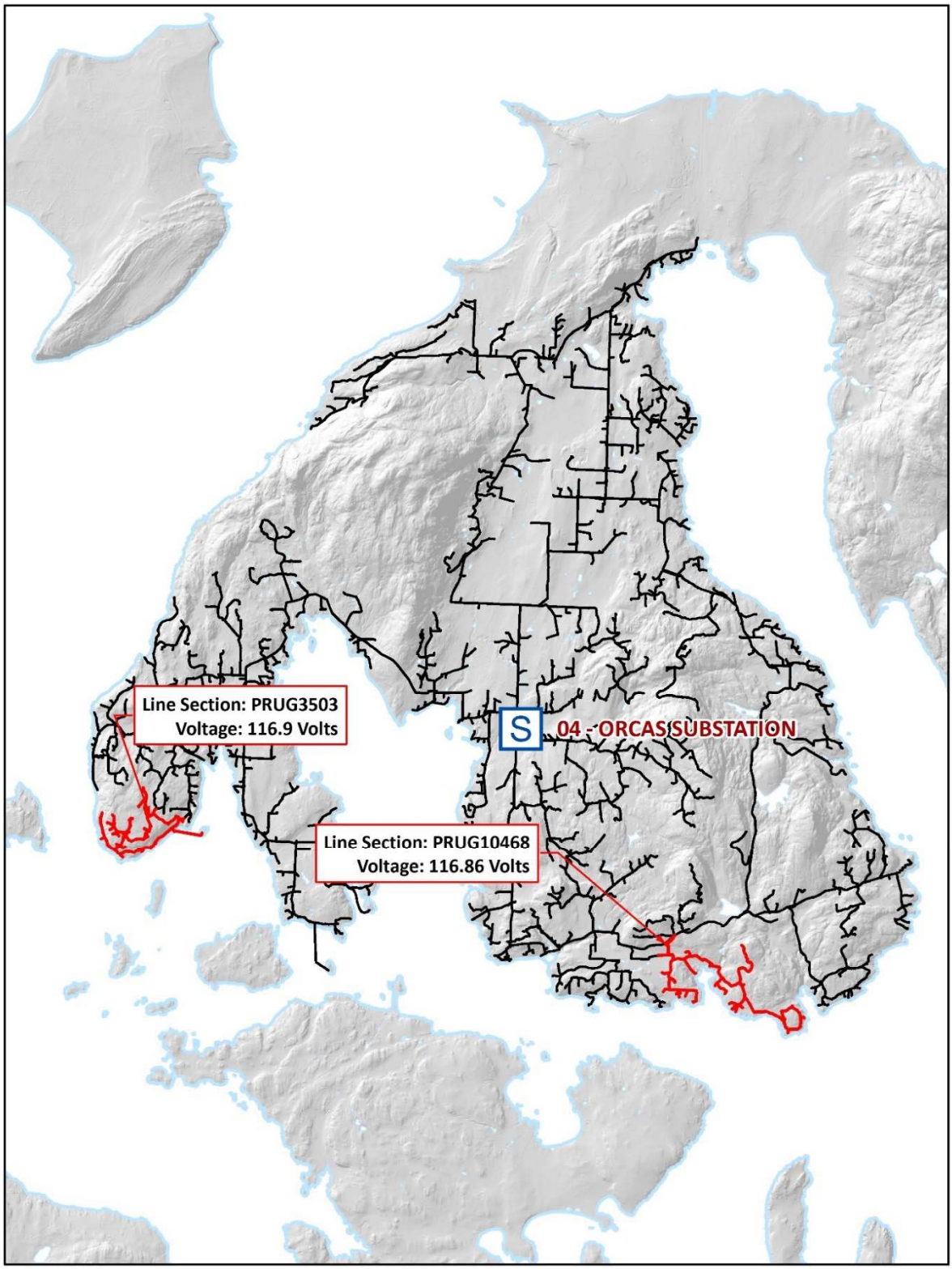


**Figure VII-7: Orcas Substation Area without Improvements**

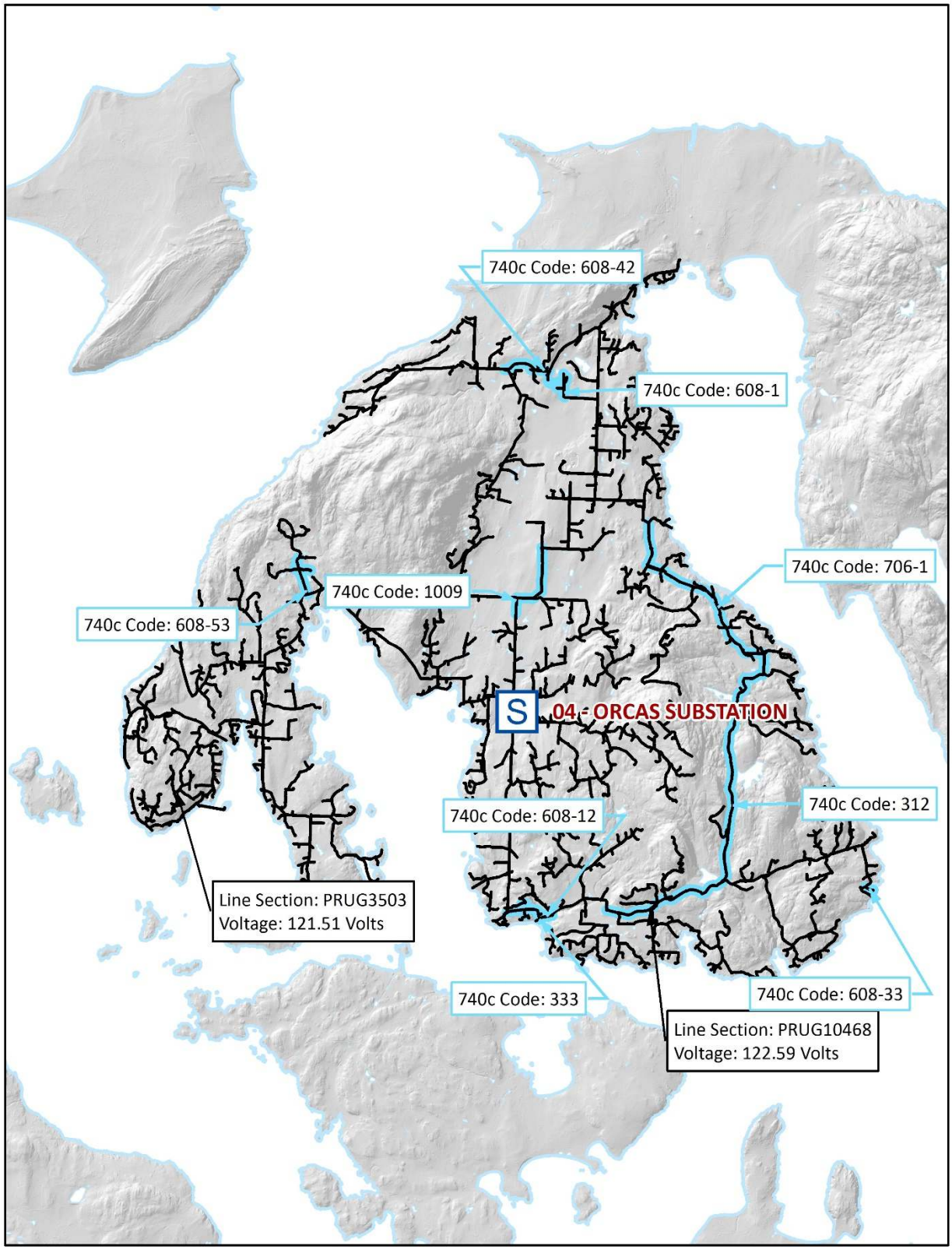


**Figure VII-8: Orcas Substation Area with Improvements**

## 5. Friday Harbor Substation Area No. 05

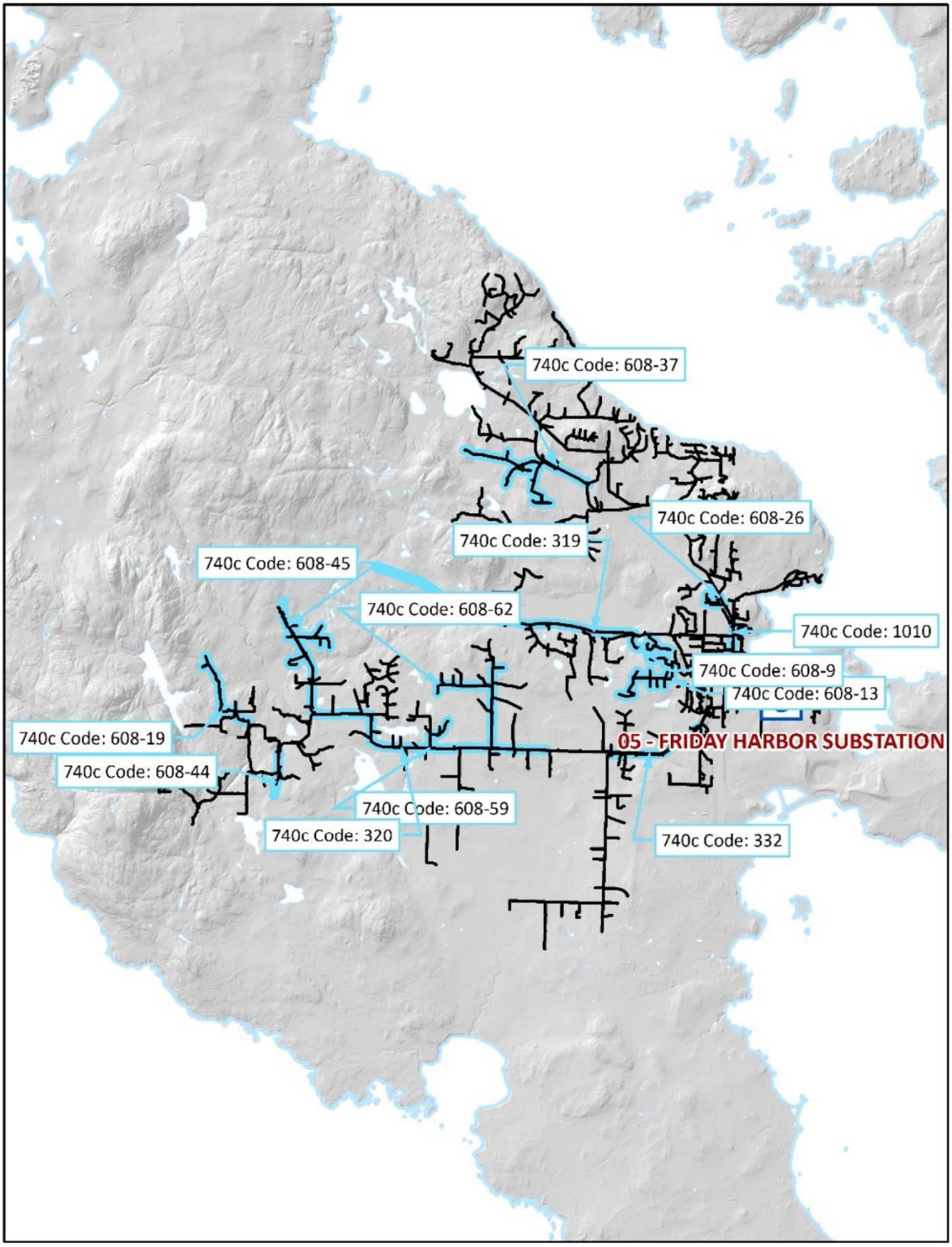


**Figure VII-9: Friday Harbor Substation Area with Improvements**

## 6. Roche Harbor Substation Area No. 07

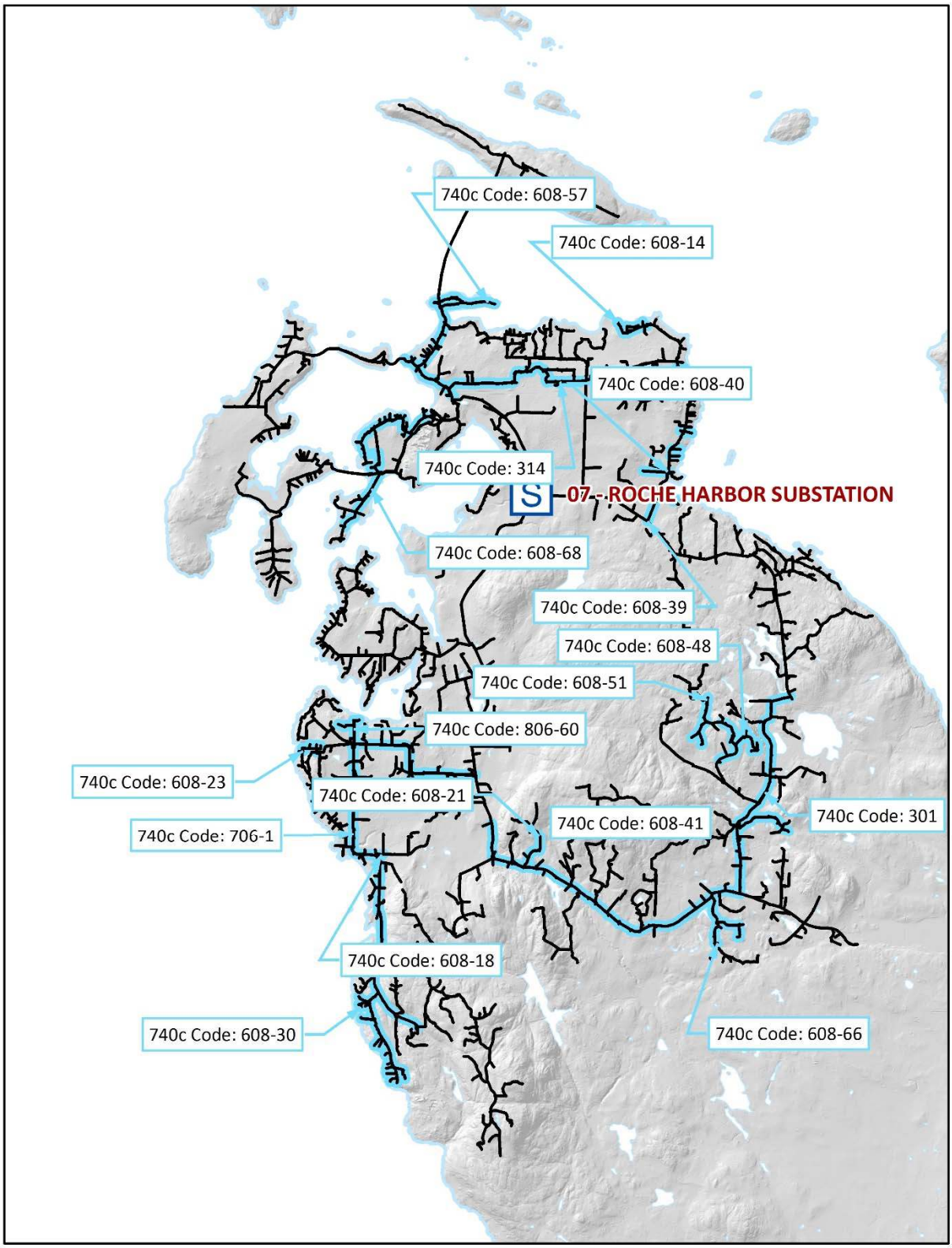


**Figure VII-10: Roche Harbor Substation Area without Improvements**

## 7. Olga Substation Area No. 08

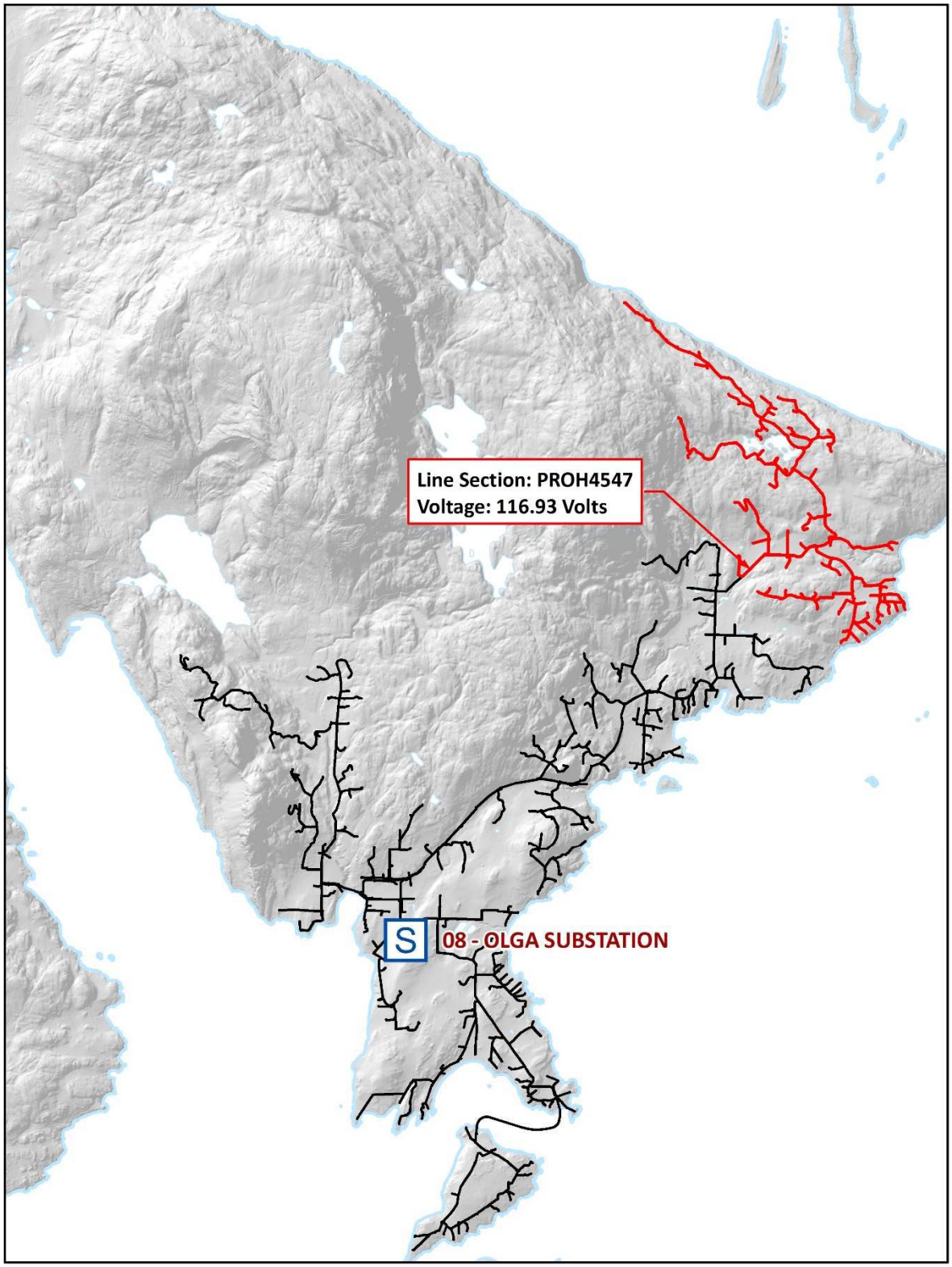


**Figure VII-11: Olga Substation Area without Improvements**

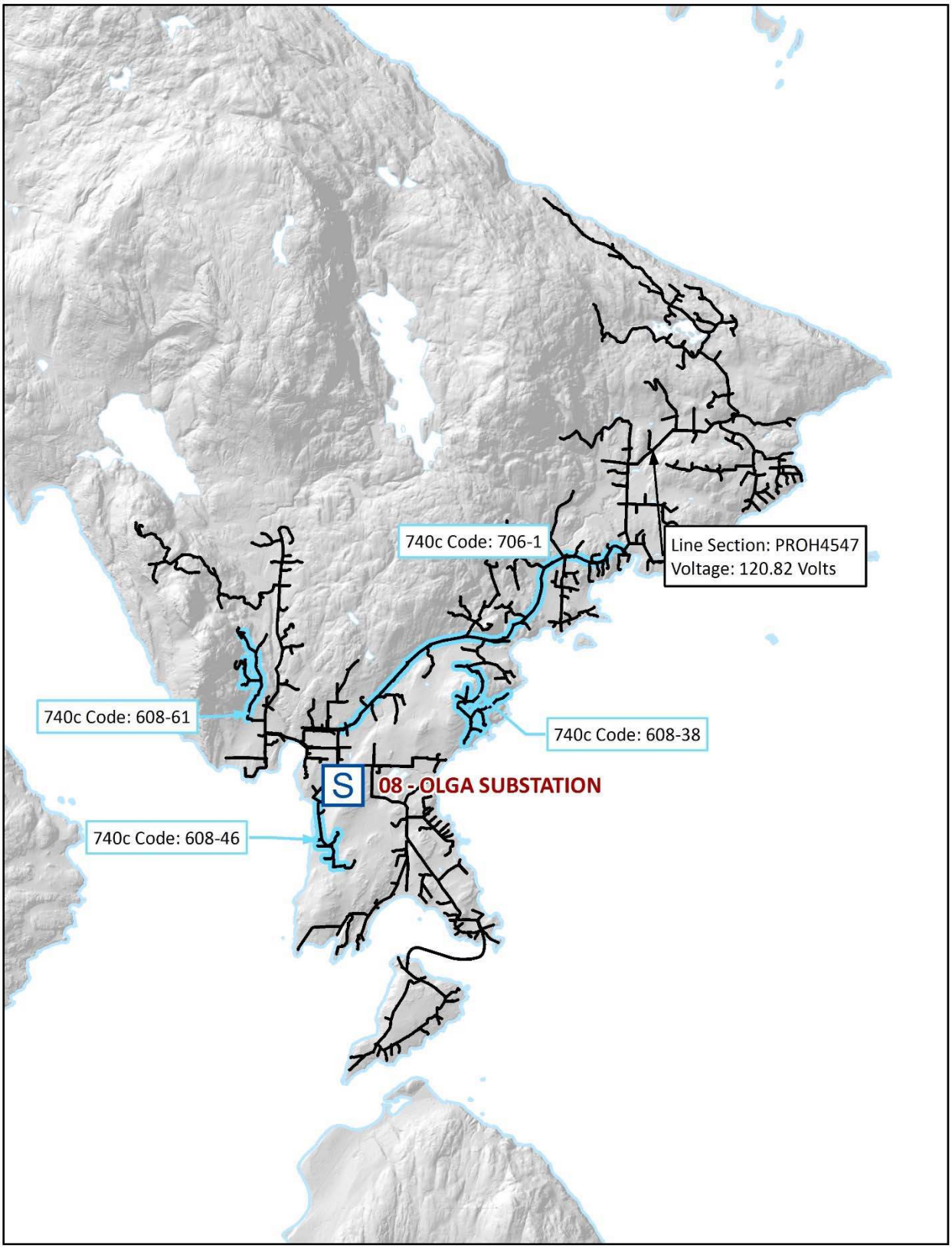


**Figure VII-12: Olga Substation Area with Improvements**

## 8. Thatcher Substation Area No. 09

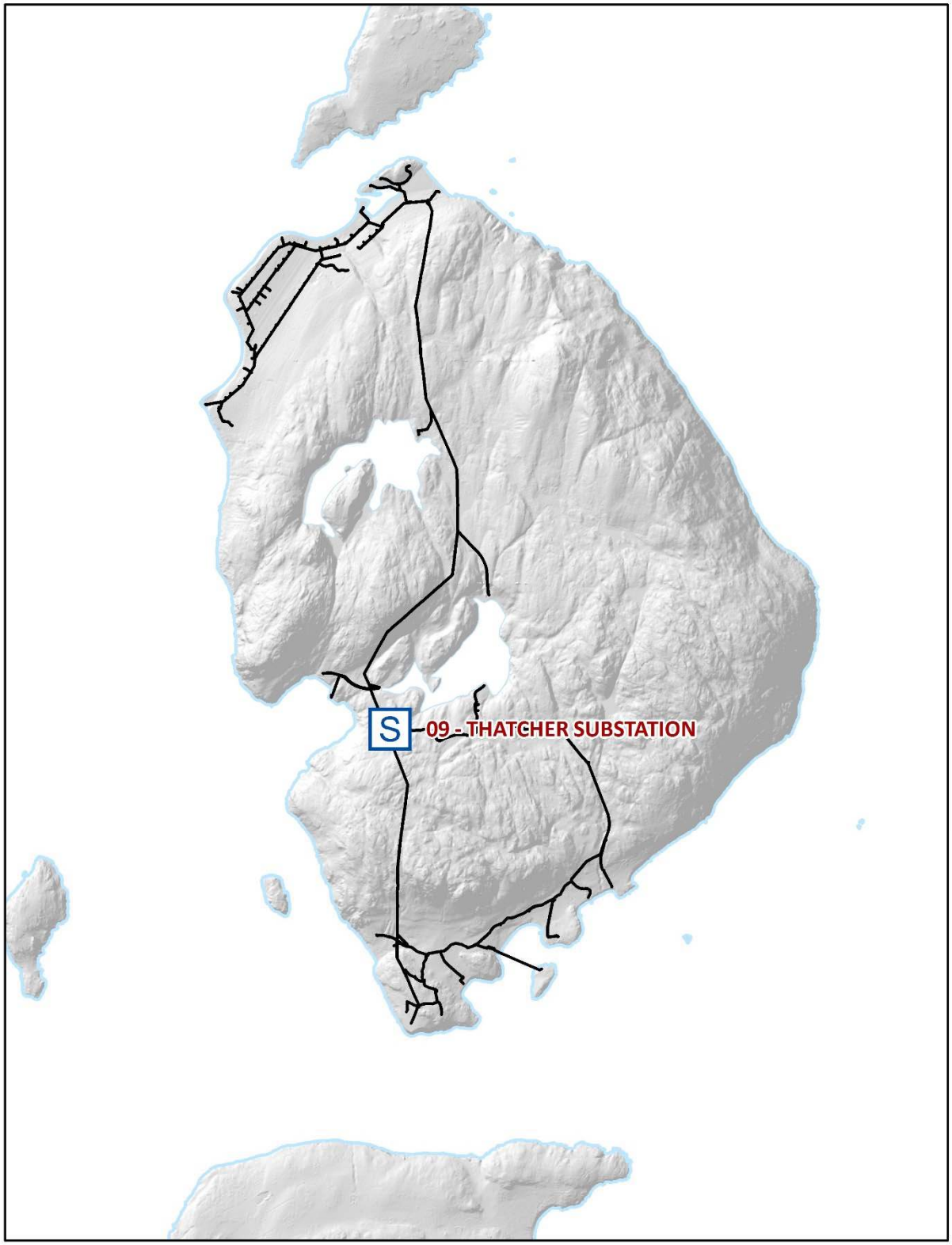


**Figure VII-13: Thatcher Substation Area with Improvements**

## 9. Eastsound Substation Area No. 10

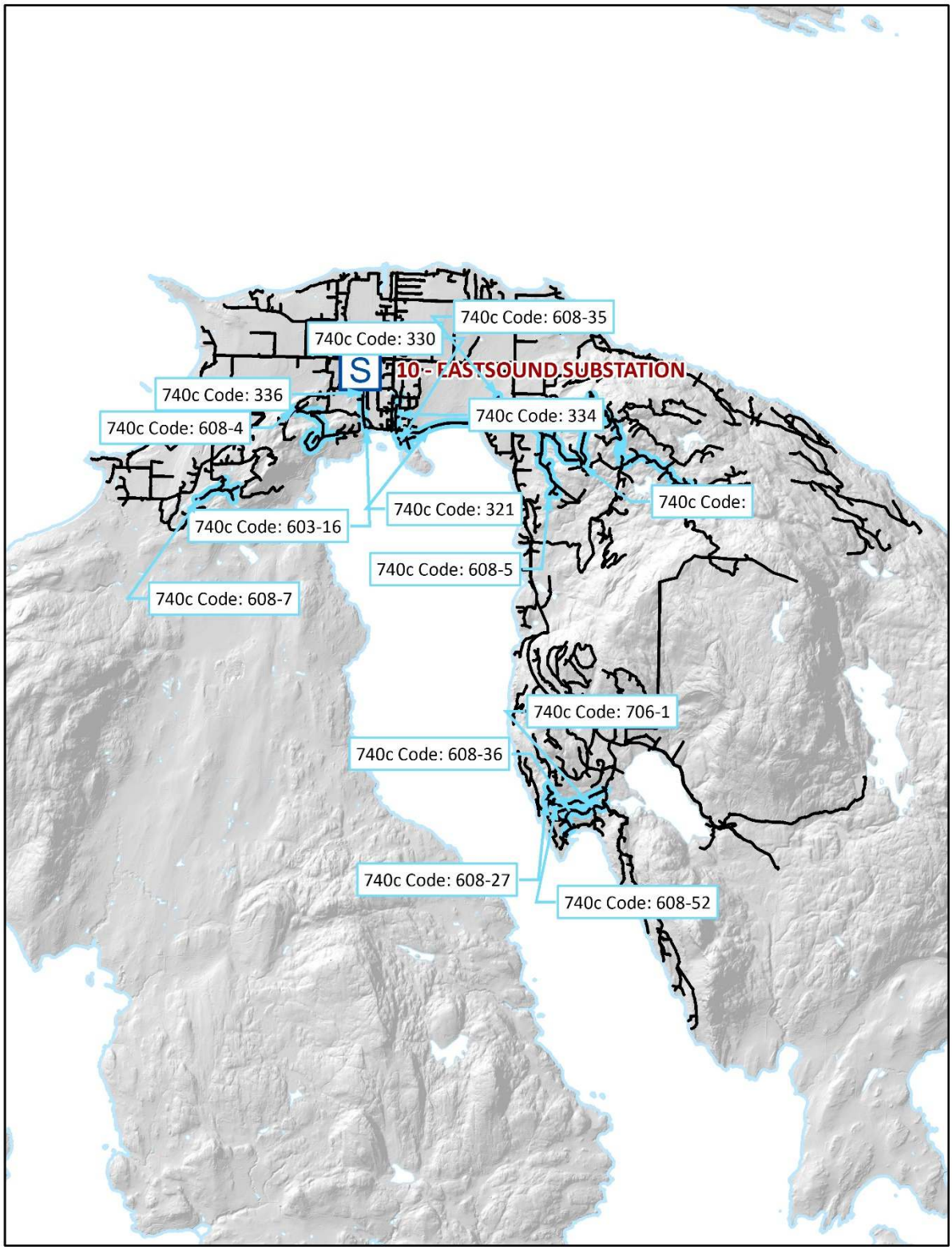


**Figure VII-14: Eastsound Substation Area without Improvements**

## 10. Gravel Pit Substation Area No. 11

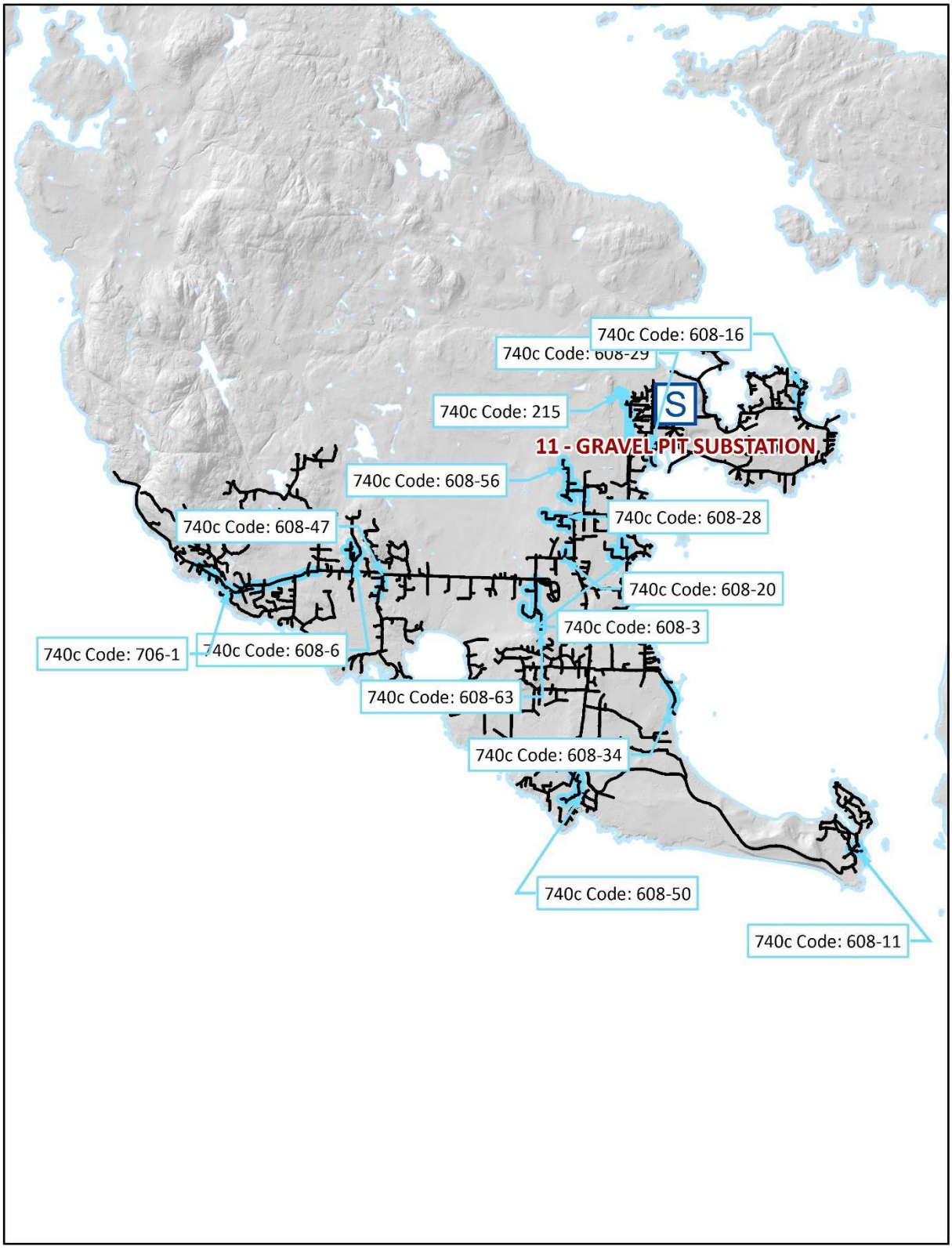


**Figure VII-15: Gravel Pit Substation Area without Improvements**