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Pacific Power Oregon Resiliency Funding Application

Pacific Power provides opportunities to qualifying parties to receive financial support to help advance the construction of qualifying new non-residential energy storage projects. For additional information on the Resiliency program and/or project funding please visit our website, pacificpower.net/resiliency.

How to Apply for Funds

Step 1	Review project requirements and eligibility, award recipient requirements, and evaluation and selection criteria at pacificpower.net/resiliency
Step 2	Email the completed application to communityresiliency@pacificorp.com • Subject: **Applicant name; Pacific Power Oregon Resiliency Application** • Attach the complete and signed application form in **Microsoft Word** format • Attach Supplemental Documents in **PDF** format • Multiple emails are acceptable based on the size of the application and appendices
Questions	Email communityresiliency@pacificorp.com

Timeline

October 11, 2021	Pacific Power begins accepting applications
January 14, 2022	5 p.m. PST – Application deadline
February 25, 2022 *(Tentative)*	Applicants will be notified in writing of award decision; applicants selected to receive funding will be asked to sign an agreement detailing the conditions and requirements of accepting Resiliency funds. Funds will be disbursed upon completion of the project and once reporting requirements are met.
August 25, 2023	Project installation and renewable portable generator procurement must be completed. Extensions to this timeline may be considered on a case-by-case basis for projects associated with the construction of a new building or structure.

Eligibility

Qualifying technologies:	Grid-tied Energy Storage
Project host:	Grid Tied Energy Storage Grant eligibility criteria. A project host must be a one of the following types of facility: police stations; fire stations; emergency response providers as defined in D.19 05 042; emergency operations centers; 911 call centers, also referred to as Public Safety Answering Points; medical facilities including hospitals, skilled nursing facilities, nursing homes, blood banks, health care facilities, dialysis centers and hospice facilities; public and private gas, water, wastewater or flood control facilities; jails and prisons; locations designated by the IOUs to provide assistance during PSPS events; cooling centers designated by state or local governments; and, homeless shelters supported by federal, state, or local governments; grocery stores, corner stores, markets and supermarkets that have average annual gross receipts of $15 million or less as calculated at a single location, over the last

	three tax years; independent living centers; and, food banks. (Load serving electric utilities and PacifiCorp affiliates are not eligible).

Applicant Information

The applicant should be the entity occupying the property where the renewable energy project will be installed.

Organization Name:	City of Sweet Home	Physical address where the project will be installed:	1500 47th Ave Sweet Home OR 97386
Type of organization:	Local government, public utility	Pacific Power meter number(s) at the installation site or the temporary meter number for new construction:	74264047 – treatment building 74264046 – raw water building
Website:	https://www.sweethomeor.gov	How did you hear about the Resiliency program?	contracted Engineer of Record, Preston Van Meter

Brief description of the applicant organization. Include the mission, purpose, and who the organization serves.

The City of Sweet Home provides public services including water and wastewater utilities to a population of 9,828 City residents. Area residents from outside of City Limits also come in for school and work, bringing the estimated service population to approximately 11,000. Sweet Home is recognized as an economically distressed community.

VISION STATEMENT

We, as City Council, have been entrusted to make decisions that do the most good, for the most people, for the longest period of time to enhance the quality of life for our community.

MISSION STATEMENT

The City of Sweet Home will work to build an economically strong community with an efficient and effective local government that will provide infrastructure and essential services to the citizens we serve. As efficient stewards of the valuable assets available, we will be responsive to the community while planning and preparing for the future.

Council Goals to implement the Vision & Mission Statements are available here:
https://www.sweethomeor.gov/citycouncil/page/council-goals

DEMOGRAPHICS

As of the 2020 census (source: https://data.census.gov/cedsci/profile?g=1600000US4171950), there are 9,828 people residing in the City, of which 24.7% are children under the age of 18, and 19.2% are seniors age 65 and over. The median age is 39.0 years. The city was documented as having 3,721 households of which 38.7% are married couples, 23.3% are male householders with no spouse, and 27.1% are female householders with no spouse. The average family size is 3.00 people.

The racial makeup of these residents is 86.2% White, 0.3% Black or African American, 1.5% Native American, 0.7% Asian, 0.1% Pacific Islander, 1.7% from other races, and 9.4% from two or more races. Hispanic or Latino residents of any race make up 5.8% of the population. 5.3% of residents speak a language other than English at home. The

median household income is $43,589, only 65% of the Oregon median of $67,058. 20.7% of residents are below the poverty line, nearly double the Oregon poverty rate of 11.4%. Only 5.9% of adults age 25+ have a bachelor's degree or higher. 27.4% of residents have a disability.

Primary Contact Information

This person should be able to answer questions about the application and will provide ongoing reporting for the project.

Name:	Greg Springman	Email address:	gspringman@sweethomeor.gov
Title:	Public Works Director	Phone number:	541-367-6359
Organization Name:	City of Sweet Home	Role in the project	Owner
Name of individual completing application *Include affiliation and contact information if different from primary contact*			
Trish Rice, City of Sweet Home, price@sweethomeor.gov, 541-936-2310 Preston VanMeter, West Yost Associates, pvanmeter@westyost.com, 503-784-9536			
Please verify that the project satisfies the *Requirements & Eligibility* provided above *Also available at pacificpower.net/resiliency*		☒ I certify that this project meets Pacific Power's Resiliency Grant funding award eligibility requirements	

Project Information

Physical address where the project will be installed:	1500 47th Ave, Sweet Home OR 97386
What is the purpose of the project?	This project will install backup power generators, solar generation & battery storage for the municipal Water Treatment Plant to operate the treatment process, SCADA system, and distribution pumps. (This is the "Comprehensive Resiliency" option identified in the 2021 Energy Storage Site Evaluation Report. See Attachment A, Site Evaluation Report.) There are two structures that will be served by the project as illustrated in Attachment B, Site Map and Attachment C, Site Photos. The Raw Water Building (power meter 74264046) receives influent from Foster Reservoir and pumps it to the Treatment Building. It will be equipped with 75kW diesel generator, 865 kWh storage, and 350kW-DC of solar production. The Treatment Building (power meter 74264047) houses the treatment processes and pumps the potable effluent into the distribution system. It will be equipped with 200kW diesel generator, 1130 kWh storage, and 175kW-DC of solar production.
How will the project contribute to community resiliency?	The City's Risk and Resiliency Assessment for the water system ranks power failure as an Extreme risk. The Water Treatment Plant is the sole source of potable water for

	the vast majority of residents, all medical facilities, and all firefighting water within City Limits. The WTP currently has no emergency generator and no battery storage. During an outage event, the City is unable to produce potable water and must rely solely on reservoir storage, and the SCADA system is inoperable. Our reservoir storage would accommodate at most about 4 days at low winter demand and 2 days at peak summer demand; that is assuming the reservoirs were full at the beginning of the power outage and that there are no major firefighting events during the outage, which could potentially deplete the stored water in a matter of hours. This project will ensure that the WTP continues to produce and distribute potable water during an extended emergency. This in turn will ensure that drinking water, medical services, and firefighting services remain available during crisis when they are most needed.
How many people will the project serve?	As of the 2020 census there are 9,828 City residents. Area residents from outside of City Limits also come in for school and work, bringing the estimated service population to approximately 11,000.
How are you involving the communities served in project planning and execution?	The project is subject to several public meetings throughout budgeting, design, and bidding phases. All of these meetings are advertised and accept public comment. The City budget, including capital improvement projects, is reviewed and approved annually by the Budget Committee which consists of 7 elected City Councilors and 7 citizens appointed from the community at large. Staff has presented the 2021 Energy Storage Site Evaluation Report findings to City Council and received project guidance. The project will be presented to City Council again at major design milestones to keep them updated, and requires Council authorization to post the bid and again for contract award after bidding.
In what ways will this project address the needs of historically underserved communities?	Children, elderly adults, disabled people, and people whose primary language is not English are generally considered vulnerable populations. Sweet Home has a substantial population of children (24.7%), elderly adults (19.2%), and disabled people (27.4%), and a small population whose primary language is not English (5.7%). Sweet Home also has a substantial poverty rate (20.7%). The vast majority of these vulnerable populations rely on the City for their only source of potable water. This project will increase the reliability of the City water treatment and distribution systems so that these vulnerable populations continue to have access to potable water throughout crisis situations.

A. Project Feasibility & Readiness

The scoring favors projects that are "shovel-ready" where technical concerns have been evaluated and mitigated by a qualified professional.

1. Discharge Capacity (kW)	275 kW

2. Storage Capacity (kWh)	1995 kWh
3. Existing Onsite Generation Type (e.g., solar, diesel, propane)	none
4. Existing Onsite Generation Size (kW)	none
5. Onsite Fuel Storage Capacity	none existing; 2,000 gal diesel storage proposed

6. **Technology:** Describe why the particular technology was chosen. What are the technical risks and how have they been mitigated? If the technology is proven and established, attach equipment specification sheets for the main system components. Attach any system design drawings (one-line diagram, site plan) and site photos.

Enhancing water system resiliency is a key goal of City staff and elected officials. The City has funding available to install a new standby diesel engine generator at the WTP that would provide fuel storage for 24-48 hours in an emergency situation where power is lost. This new generator would continue to operate during an extended outage as long as fuel delivery is available to the WTP site. However, the City of Sweet Home is located in a remote rural area that could have transportation challenges in a natural disaster. In planning for those potential longer-duration emergencies, the City desires water system resiliency of at least 2 weeks as per Oregon's Office of Emergency Management recommendations. This will be provided through the comprehensive resiliency measures of adding onsite battery storage and solar PV panels to allow the WTP to continue operating in periods when the new standby generator may be at risk of running out of fuel.

7. **Project team:** Describe the overall structure of the project team, the primary roles of each team member, and the team's motivation to see the project succeed. Either attach resumes or describe each project team members' relevant experience and credentials demonstrating their ability to satisfy their role. If certain key contractors have not yet been selected, describe your contractor selection process.

The project team includes the Sweet Home City Council, City staff, West Yost Associates (the City's contracted Engineer of Record); Landis Consulting (electrical engineering subconsultant to West Yost); Pacific Power providing technical assistance with the feasibility study; and the Oregon Health Authority (OHA).
Team member roles and qualifications:

- City Council – As public servants, City Councilors are highly motivated to rovide high-quality public services to the citizens to improve quality of life; provide high-level project direction; approve project budget and contract award.
- City staff – As public servants, City staff are highly motivated to provide reliable service to the citizens and are bound to protect public health and safety via safe drinking water.
  - Public Works Director Greg Springman – Provide mid-level project direction; develop & oversee department budget; promote projects that increase the reliability of the City water system.
  - Finance Director Brandon Neish – Procurement manager; oversee accounts payable; develop & monitor City budget; main contact for federal funding applications.
  - Utility Manager Steven Haney – Oversee the daily operations of the Water Treatment Plant; submit regulatory reporting to OHA; provide input on project design elements and provide operations-level plan review of designs.
  - Engineering Technician Trish Rice – Coordinate collaboration & information sharing between stakeholders; coordinate the capital improvement program for water treatment and distribution system projects; provide input on project design elements and provide operations-level plan review of designs; execute project procurement; provide daily project construction observation.
- Oregon Health Authority – Bound to protect public health and safety via safe drinking water; oversee regulatory compliance; perform plan review of water system improvements.

- West Yost Associates –
  - Project Manager Preston Van Meter, PE – Oversee civil design and coordinate disciplines; recommend best practices; develop project cost baseline; oversee development of bid documents; provide construction inspection support.
- Landis Consulting –
  - Provide electrical engineering discipline for project design.
- Pacific Power – Major funding partner; also provided technical assistance for this project via a previous Resiliency grant.

The construction contractor will be selected via public bid in accordance with public contracting law ORS 279C. The solicitation will be advertised on the City website, the Daily Journal of Commerce, and the local newspaper. The bid will be awarded to the lowest responsible bidder.

8. **Project site:** Describe the physical location of the proposed equipment and how the project site was selected. Describe the current condition of the site and any modifications that would be required prior to installation of the proposed project. Either describe or attach reports of any analysis that was completed to determine the technical feasibility of the location (site analysis, structural or geotechnical evaluation, electrical studies, etc).

Attachment B, Site Map contains illustrates the locations of the City's Water Treatment Plant and Raw Water Building. The proposed location of the new Standby Generator and battery storage is designed to be in close proximity to the main WTP switchgear. Solar panels would be located on the roof of the WTP Building. Solar panels for the Raw Water Building will be located in the open field in the middle of the site.

9. **Timeline and status:** Describe the current status of the project and any pre-development work that has been completed to date (permitting, interconnection agreement, property rights secured, construction contracts obtained, etc.). What is the plan for bringing the project to completion? What is the anticipated commissioning date? Identify potential challenges to completing the project on time and your strategy for mitigating those risks. Note: It is recommended to contact Pacific Power's Customer Generation Group early in the design process to identify potential interconnection concerns (www.pacificpower.net/savings-energy-choices/customer-generation.html).

The project is currently in design. City staff and consultant engineers are completing preliminary design in conjunction with grant funding applications. Final design and incorporation of energy storage elements will be based on available outside funding. City staff intend to complete design in 2022 and begin construction of the selected alternative in 2023. If material shortages and lead times continue as they are now, then commissioning is likely to occur in 2024.

10. **Energy Production:** Please provide a description of any generating systems that will be installed in conjunction with this project. Provide an estimate of the energy production from the new generating facilities.

The diesel generators will total 275kW and will provide short-term energy for operations. (75kW for the raw water building and 200kW for the treatment building.) Long-term energy production will come from the solar PV installation. The Site Evaluation Report recommends solar PV sizing of 525kW-DC. (350kW-DC for the raw water building and 175kW-DC for the treatment building.)

11. **Operations and Maintenance:** Describe the long-term O&M plan, including sources of funding to implement the plan. What are the maintenance activities and who will complete them? Will the equipment be covered by an insurance policy? Describe any warranties on equipment and labor. Will a reserve fund be set aside for repairs not covered by warranty or insurance? Describe any data monitoring capabilities and who will be responsible for reviewing the data and/or responding to data anomalies.

Long-term O&M will come through the City's water utility that is funded through utility fees. Routine maintenance of the equipment such as cleaning, checking filters, etc will be performed by City facilities maintenance staff. Maintenance or repairs requiring a licensed electrician is anticipated to be minimal and will be contracted out as needed.

Our standard construction contract requires a minimum 1-year warranty on equipment & labor which is provided via a performance bond. The equipment will also be covered by the manufacturer's warranty, typically 10 years, and will be covered by the City's property insurance policy.

B. Costs, Financing, & Additionality

The scoring favors projects that demonstrate the availability of matching funds, funding requests that offer a good value in the amount of community benefit, and funding requests where the amount requested is reasonable.

12. **Project Budget:** Describe efforts to ensure that the proposed budget represents the maximum value for the price. Were multiple bids received or vendors approached? Identify potential challenges to completing the project or purchasing the equipment within budget and your strategy for mitigating those risks, including contingency.

The preliminary project cost estimate is $3M. The engineer's estimate will continue to be refined through the design phase.

The project will be bid competitively as per Oregon public contracting laws using the final design completed by the City's engineering team. This will assure competitive bids are secured, while also pricing in current inflationary pressures and supply chain issues in the construction marketplace.

13. Fill in the table below and attach contractor/ vendor bid(s) to support the numbers listed.

Company Name	Cost ($)	Summary of scope of work
Project has not been bid yet.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Total	Click here to enter text.	Click here to enter text.

The following costs are NOT eligible for reimbursement:

- *Site improvements that would be considered general facilities maintenance (e.g. re-roofing, tree removal or trimming).*
- *Generation equipment for grid tied energy storage projects*
- *Administrative or project management costs*
- *Construction bond costs, interest and warranty charges*
- *Ongoing system or facility maintenance or repair costs*
- *Donated, in-kind or volunteer labor or materials*
- *Engineering/design costs incurred to date (e.g., site evaluations, estimates/bids)*
- *Interconnection studies*

14. **Funding Sources:** Describe the financial structure of the project, include information on renewable generation if included in the project scope. Include who will pay for and own the project, the different sources of funding that

have been secured, who will receive the financial benefits, who are the financial partners? Note that the Resiliency grant is a reimbursement and the applicant will need to secure the upfront costs to complete the project. Please include a summary of the host organization's current financial status and indicate how the host organization will fund its portion of project costs.
The preliminary project cost estimate is $3.9M. This is an increase from the $2.8M estimate given in the Site Evaluation Report to account for the rapid inflation seen in the construction market in 2021, and which better aligns with bids West Yost has seen recently on similar projects. The engineer's estimate will continue to be refined throughout the design phase. The City has budgeted $1M of federal ARPA funds for this project. The remainder of the project funding is being sought through FEMA Mazard Mitigation Assistance BRIC program grants and the Energy Trust of Oregon.
15. **Additionality:** Describe efforts undertaken to explore alternate sources of funding. Why are funds from the Resiliency program needed to make the project successful? If the project is not awarded a Resiliency grant or is offered a partial award, what will happen to the project?
The remainder of the project funding is being sought through FEMA Mazard Mitigation Assistance BRIC program grants and the Energy Trust of Oregon. The BRIC program FY21 cycle has closed. We anticipate the FY22 application cycle to be announced this summer, which will allow us to leverage City funds and the Resiliency award as match funds in our BRIC application. If the project is not fully funded then the scope will be reduced to the available funds. Final design and incorporation of energy storage elements will be based on available outside funding. If no external funding is awarded and City funds are the sole source, then the project will be reduced to the "Basic Resiliency" option which only includes the backup power generators and fuel storage, but no battery storage or solar generation. This option is undesirable because it still leaves the City dependent on third-party fuel suppliers during an extended emergency.

C. Community Benefits

Grant evaluation scoring favors projects that provide a substantial resiliency benefit to the community. Priority is also given to projects that have high visibility and are located in communities that are low-income, rural, and/or underserved.

23. **Community Benefits:** How will the project benefit the community? Will local contractors or locally-manufactured products be used? Will the project cultivate local careers in clean energy? Will the project help to meet any publicly-stated local or regional environmental goals (e.g., city climate action plan, etc.)? List any additional benefits to the local community.
This project helps meet City Council Goal #1, *Develop specific steps for implementation of the adopted infrastructure master plans.* The Water Treatment Plant is the sole source of potable water for the vast majority of residents, all medical facilities, and all firefighting water within City Limits. This project will ensure that the WTP continues to produce and distribute potable water during an extended emergency. This will in turn ensure that drinking water, medical services, and firefighting services remain available during crisis when they are most needed. There are also significant utility bill savings associated with the comprehensive system option. The facility requires approximately 660,000 kWh annually at a cost of approximately $59,000/year. The savings are attributed primarily to the new solar arrays but also the storage component. Energy storage allows the facility to adapt and take advantage of demand reduction charge opportunities. The estimated annual energy savings is $53,200/year,

the vast majority of the energy bill. Subtracting the estimated O&M costs of $22,300/year, the net benefit to the ratepayers will be approximately $30,900/year.

24. **Educational Benefits:** What educational benefits are associated with the proposed project? How many people will see and learn from the project per year and at what level of engagement?

The City participates annually in the high school Career Day and we are developing an educational outreach program to introduce local students to the water industry as a career path. Career Day reaches approximately 100 students per year. The benefits of this project can easily be incorporated into presentations and facility tours to introduce children to real-world STEM applications. The City also has a communications program to distribute news via social media, City website, local newspaper and radio, and utility bill stuffers, which reach the majority of the City residents. The City will advertise this project to inform the community and lead by example emergency preparedness and interagency collaboration.

25. **Community Leadership:** What activities have taken place to involve the community in planning the project? Include any outreach beyond the project team. Is it likely that there will be actual or perceived negative impacts from this project? Have potential negative impacts been properly mitigated?

The project is subject to several public meetings throughout budgeting, design, and bidding phases. All of these meetings are advertised and accept public comment. The City budget, including capital improvement projects, is reviewed and approved annually by the Budget Committee which consists of 7 elected City Councilors and 7 citizens appointed from the community at large. Staff also presented the 2021 Energy Storage Site Evaluation Report findings to City Council and received project guidance. The project will be presented to City Council at major design milestones to keep them updated, and requires Council authorization to go to bid and again after bidding for contract award.

There are no anticipated negative impacts from this project.

26. **Diversity, Equity, and Inclusion:** Describe the project team's demonstrated commitment to diversity, equity and inclusion. Is the host organization located in and/or serve a low-income, rural, or underserved community?

Sweet Home is both a low-income and rural community. Sweet Home is situated in Linn County, which is recognized by the State of Oregon as an economically distressed area. (Source: https://www.oregon.gov/biz/reports/Pages/DistressedAreas.aspx) The median household income is $43,589, only 65% of the Oregon median of $67,058; and 20.7% of residents are below the poverty line, nearly double the Oregon poverty rate of 11.4%. (Source: https://data.census.gov/cedsci/profile?g=1600000US4171950)

The City Council and staff actively engage in projects to promote the welfare of all citizens of our community, especially the disadvantaged and impoverished. The City is an equal opportunity employer, both for internal hiring and for contractor selection. Examples of our commitment to diversity, equity, and inclusion include:

- Jan 25, 2022 City Council proclamation denouncing racism and condemning any words, behaviors, or attitudes that provoke fear, shame, or hostility towards another person;
- 2020-2022 extensive City Council and staff involvement in planning the development of a managed homeless shelter facility;
- 2019-2021 Redevelopment of Sankey Park (the primary City park) with all new hard-surface paths and all new ADA-compliant playground;
- 2016 formation of the ad-hoc Community Health Committee to improve residents' access to medical care;
- RFPs for services include additional scoring points given to COBID-registered businesses (minority-owned businesses, women-owned businesses, etc);

- Contracted with Sunshine Industries, a local agency that provides skills training and job opportunities to developmentally challenged adults, for City facility cleaning services;
- Contribution of City funds to Local Improvement Districts to extend water, sewer, and street infrastructure to unserved areas where residents can't afford the full project costs without assistance;
- Partnership with the Senior Center and Linn Shuttle to provide additional local services to disadvantaged citizens;
- Staff training on diversity/equity/inclusion laws and procedures;
- Staff training on interpretation services available to assist non-English speaking customers.

D. Supplemental Documents

Applicants should include the following documents for their project to be considered for funding. These documents can typically be provided by the installation contractor.

☐	**Equipment Specifications.** Include product specification sheets for all major components to be installed or procured to support the response to Question A.6.
☒	**Site Evaluation**. Include any reports to support the answer in Question A.8, including, but not limited to, site evaluation, structural or installation feasibility assessments, and interconnection analysis or documentation of discussions with the Pacific Power customer generation group.
☒	**Design Drawings**. Site plan showing the location of the project components on the property (if applicable). If available, provide a one-line electrical diagram and structural engineering drawings.
☒	**Site Photos**. Photos or renderings of the proposed project site and/or building with captions (if applicable).

☐	**Contractor Bid(s).** A bid should be included for each contractor listed in Question B.13. The bids must include a description of the scope of work to be included and a detailed breakdown of the project cost into the following categories:
	• Engineering & design costs (not yet incurred)
	• Equipment
	  ○ energy storage equipment
	  ○ inverters/power electronics
	  ○ other electrical equipment
	  ○ racking/structural components
	  ○ other equipment
	• Labor
	• Permitting fees
	• Data monitoring system
	• Other (signage, shipping, etc)

☒	**Project Development Timeline.** A Gantt chart or schedule that includes duration of each development stage and dates of major milestones.
☐	**Secured Funding Sources.** Documentation (i.e. award letters, confirmation emails, and other communication) confirming outside secured or granted funding sources and amounts.

E. Certifications

The applicant certifies to each of the following:

☒	*I certify that the host organization owns the property or has a long-term lease agreement that allows for the installation of the proposed project.*
☒	*I certify that the host organization has operating funds and capacity necessary to complete and maintain the proposed project.*
☒	*I certify that in preparation for submitting this application I have reviewed the applicant as well as the award recipient requirements, understand that should this project be awarded funding, my organization will be able to meet the award recipient requirements as described on the Pacific Power website.*
☒	*I attest that the information provided above responding to this application is both accurate and current.*
☒	*I understand that submitting an application in no way obligates Pacific Power to provide funding and that funds are distributed at the sole discretion of Pacific Power.*

Signatures

The application form must be returned as a Microsoft Word document, but please feel free to provide your signed certification page in a separate document as a PDF or image file.

Signature	[signature]
Date	2-18-2022
Printed Name	Greg Springman
Title	Public Works Director
Organization	City of Sweet Home
Contact number	541-367-6359

If this request is being submitted by multiple parties or a party other than the host, please indicate below by providing the party's name, title and contact information. The project host/owner must approve the submittal on their behalf through signature demonstrating that all parties linked to installation have reviewed the application and support the project.

Signature	
Date	Click here to enter text.
Printed Name	Click here to enter text.
Title	Click here to enter text.
Organization	Click here to enter text.
Contact number	Click here to enter text.

Attachment A
Site Evaluation Report

ENERGY STORAGE SITE EVALUATION REPORT

Community Resiliency Pilot

Sweet Home: Water Treatment Plant

1500 47th Avenue

Sweet Home, Oregon 97386

May 14, 2021

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About

For over 100 years, Pacific Power has provided Oregon customers with safe, affordable, and reliable electricity service, but sometimes power disruptions occur. The cause of these potential disruptions can range from car-hit-pole accidents to a Cascadia Subduction Zone earthquake. Acknowledging that a power disruption may be more than just an inconvenience for facilities critical to emergency management and disaster recovery, Pacific Power developed the Community Resiliency Pilot to help customers at these critical facilities expand their understanding of energy storage and how they may be able to meet the resiliency needs of the communities they serve with energy storage. Community energy resilience is defined as the ability for a community to withstand "high-consequence, low-probability" events and to regain normal operational activity after such events occur. In addition to examining the benefits of energy storage for critical facilities, the pilot explores the available technologies, costs, use cases, and feasibility associated with installing energy storage on their site.

Methodology & Assumptions

The overall methodology for this analysis is designed to identify a technically feasible energy storage system to provide or supplement the resiliency of a critical facility. This begins with a high-level screening that looks at facility attributes, existing and planned resiliency resources such as existing backup generation, and data availability. After initial screening, more detailed facility information is collected, and a site visit is performed. From there, a trained energy engineer develops baseline conditions and assumptions about the electricity use patterns at the site. This model is used to perform iterative analysis on project configurations. These configurations can include existing or new backup generators, existing or new solar PV, and a new energy storage system resulting in different resiliency levels.

Disclaimer

The analysis in this report has been reviewed for technical accuracy. However, as energy savings ultimately depend on behavioral factors, the weather, and many other factors outside its control, Pacific Power does not guarantee the energy or cost savings estimated in this report. Costs included in this report are initial planning estimates for equipment and installation and may vary from actual quotes provided by contractors.

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Executive Summary

As a facility critical to community emergency management and disaster response, the Sweet Home Water Treatment Plant has interest in assessing their opportunity to increase community resiliency through the integration of solar generation and energy storage resources. Sweet Home Water Treatment Plant has an existing resiliency strategy but it's one that is solely reliant upon fossil fuel consumption from a backup generator which results in greater GHG emissions. Sweet Home Water Treatment Plant is seeking a resilient and sustainable approach the community can better depend upon during a long-term outage.

As analyzed through this report, a fully integrated energy storage system could be capable of supplying power during both short- and long-term grid outages and would reduce the risk of fuel supply interruption during disasters.

Adopting a solar plus storage system at the Sweet Home Water Treatment Plant would increase resiliency during a disaster event and may also provide additional benefits to the facility and the community.

This report provides a site evaluation and analysis of the feasibility of incorporating energy storage at the Sweet Home Water Treatment Plant to support a minimum two-week power outage event as recommended by the Oregon's Office of Emergency Management. It also includes a comparison, including the estimated costs, of three levels of resiliency.

- **Standard** – consisting of new, permanent backup generators only
- **Enhanced** – consisting of new, permanent backup generators, plus the addition of energy storage
- **Comprehensive** – consisting of new, permanent backup generators optimized and integrated with new solar generation and energy storage

The cost of adopting energy storage and associated technologies to increase resiliency depends on the level of resiliency desired.

The report considers the following services/benefits: (1) ability to provide backup power generation and community resiliency, (2) ability to reduce carbon footprint, and (3) ability to reduce energy costs.

Resiliency Benefits

All three levels of resiliency provide benefits to the Sweet Home Water Treatment Plant. The table below shares how the benefits accrue by resiliency level. Energy storage provides a more resilient back-up system than a standard backup generator and could pay for itself after a disaster event. Further information regarding the quantification of resiliency benefits is shared in subsequent sections.

Benefits	Standard Resiliency	Enhanced Resiliency	Comprehensive Resiliency
Capability to maintain emergency operations during resiliency events	X	X	X

Capable of addressing short-term resiliency events without generator		X	X
Reduces dependence on fuel deliveries during an outage		X	X
Minimizes carbon emissions			X

System Specifications

This analysis identifies the size of a battery energy storage system which could be paired with new diesel back-up generators and new solar arrays to support continuing operations at the facility during a two-week duration outage[1]. Financial analysis of the resiliency benefits assumes a single two-week duration outage during the life of the battery energy storage system. Any bill savings identified assumes annual use of the system during normal operations. The following table summarizes the changes to system component sizing, estimated costs, and estimated savings of each resiliency option.

There are a number of grants to support your facility in adopting a solar plus storage system to improve resiliency. More information is provided in the Financial Incentives and Grants Section.

	Standard Resiliency	Enhanced Resiliency	Comprehensive Resiliency
Estimated Benefits and Costs*			
Annual Bill Savings	$0	$6,500	$53,200
One-time Outage Resiliency Benefits**	$9,207,400	$9,209,100	$9,212,000
Capital Costs***	$110,000	$1,511,400	$2,835,500
One-time Outage Fuel Costs	$10,400	$8,300	$5,000
Annual Incremental O&M****	$9,600	$12,000	$22,300
System Specifications			
GHG Emissions (lbs CO_2)*****	885,400	908,800	417,000
Backup Generator Capacity (kW)	275	275	275
Solar Capacity (kW)	0	0	525
Energy Storage Capacity (kW)	0	275	400
Energy Storage Capacity (kWh)	0	1,520	1,995

**All benefits and costs in this report are high-level estimates and should be used only for initial planning purposes. Energy savings may vary depending on behavioral factors, the weather, and other factors outside PacifiCorp's control. Actual costs for equipment and installation may vary from the initial planning estimates. Thus, both actual costs and benefits should be evaluated when working with storage providers and contractors.*

***Resiliency benefits are calculated assuming one two-week disaster event over a 25 year project lifetime*

****Includes solar, energy storage, and backup generator-related costs*

*****Includes O&M costs related to new solar, energy storage, and/or backup generator equipment*

******Includes annual site emissions from electricity consumption during normal operations and backup generator operation during a two-week outage. Grid emissions based on Pacific Power's 2019 IRP Projected Emissions*

[1] As recommended by Oregon's Office of Emergency Management.

Introduction

Pacific Power designed the Community Resiliency Pilot to help communities understand what it will take to keep a critical facility online and operating during times when the power grid shuts down. The Pilot is specifically focused on the integration of energy storage and associated technologies to support critical operations during an outage.

Through a virtual audit and analysis, this report identifies resiliency options for the Sweet Home Water Treatment Plant. The plant provides municipal water to residences and business within the community. The plant is located near the Northeast border of the city of Sweet Home, Oregon, which has a population of roughly 9,620, and draws raw water from the Foster reservoir. During a disaster, the facility will need to maintain water filtration and pump operation to provide potable water to the Sweet Home community.

What is Energy Storage and Why Now?

Energy storage is the capture of electricity produced at one time and stored for use later. Energy storage can provide a solution for a community to keep a critical facility operating when the power grid shuts down during a short- or long-term power outage.

In the Pacific Northwest, electricity customers face looming risk from earthquakes, wildfire seasons, intense storms, droughts, flooding, and more, all of which have the potential to disrupt power supply. Pacific Power developed this Community Resiliency Pilot in order to assist communities in preparing for these natural disasters by exploring the feasibility of deploying battery-based energy storage to enhance critical facility resiliency[2].

What are the Benefits of Energy Storage?

Energy storage can help keep a community's critical facility online and operating during times when the power grid shuts down. This involves integrating battery storage technologies to support critical operations during an outage. These technologies can also provide benefits to site participants beyond traditional backup power, including long-term reduced energy costs and a reduced carbon footprint during non-resiliency periods.

What is in this Report?

This report provides a site evaluation and analysis of the feasibility of incorporating energy storage at the Sweet Home Water Treatment Plant to support a minimum two-week power outage event.

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[2] Resiliency is defined as the ability for a community to withstand "high-consequence, low-probability" events and to regain normal operational activity after such events occur.

In this report, Pacific Power includes a comparison, including the estimated costs, of the following three levels of resiliency during a power outage event at West Side Fire Station:

1. Standard Resiliency: Utilize new permanent backup generation and relies entirely on backup generator and fuel deliveries to sustain continuous resiliency operations
2. Enhanced Resiliency: Utilize new permanent backup generation and add new energy storage system and reduces risk associated with fuel deliveries by creating wider windows for deliveries to occur.
3. Comprehensive Resiliency: Upgrade and optimize backup generation and add new energy storage system and new solar capable of eliminating dependency on fuel deliveries to sustain continuous resiliency operations.

These resiliency levels are evaluated based on each of the following services/benefits: (1) ability to provide backup power generation and community resiliency, (2) ability to reduce carbon footprint, and (3) ability to reduce energy costs.

The report includes the following sections:

- **Property Profile**: This section provides background on the property including a property description, energy usage and costs, and details on critical loads at this facility to support during an outage event.

- **Key Results**: This section details the recommended system and economic analysis for an energy storage system at the site.

- **Energy Storage Feasibility**: This section details the key considerations and constraints for storage at this site, including system sizing requirements, site availability, electrical, interconnection requirements, and operations and maintenance.

- **Financial Resources**: This section details available federal and state grants and incentives to offset installation costs for solar and storage.

Property Profile

The facility is part of the county's emergency operations management plan, and it has a role to support county efforts prior to, during, and after emergencies.

Property Name: City of Sweet Home: Water Treatment Plant

Address: 1500 47th Avenue, Sweet Home, Oregon 97386

Property Contact: Public Works Director | City of Sweet Home

Property Type: Water Treatment Plant

Property Description

The Water Treatment Plant (WTP) is a city of Sweet Home facility located in Sweet Home, Oregon, about 50 miles Southeast of Salem. The WTP is able to produce up to 6 Million gallons per day (MGD) of municipal water. It provides municipal water to Sweet Home citizens and water customers. The city of Sweet Home has a population of about 9,620 people. End-uses in the building include lighting, a small ductless heat pump unit in the server room, split-system AC units, and various sizes of pump motors and air blowers used in the water treatment and filtration process. There is a laboratory area, offices, conference room, storage areas, and a server room in addition to the main water processing area in the facility. Current resiliency resources at the site include plans for a mobile generator, which could support approximately half the plant.

During a disaster, the facility will continue to provide potable water to the community. In general, water treatment plants remove contaminants from raw water sources (such as lakes or rivers) to produce water that is pure enough for human consumption, without any adverse health effects.

Site Selection and Key Considerations

After conducting a screening process to determine suitability for participation in the Oregon Community Resiliency Pilot, Pacific Power selected the Sweet Home Water Treatment Plant to participate on January 14, 2021.

The following includes site selection highlights and key considerations for the Sweet Home Water Treatment:

Sweet Home Water Treatment: Site Selection Highlights

- ❑ Large amount of available space to site energy storage and solar (roof and ground mount)
- ❑ Disaster management plan in place to support energy storage for community resiliency
- ❑ Moderate wildfire activity in surrounding area

(Refer to Key Results section for detailed summary.)

Sweet Home Water Treatment: Key Considerations

- ❑ The site has plans to use a mobile backup generator in case of outage, but has no onsite fuel storage
- ❑ There are plans to increase pumping/processing capacity in the near future
- ❑ There are plans to upgrade main plant main service panel

Electricity Usage and Costs

The site is on a large commercial tariff with flat energy rates and a tiered demand rate structure. Electricity use profiles and statistics used in the analysis were developed based on available interval data and equipment information. There are plans to increase the pumping capacity at the main plant by about 100 hp, so this additional load was included in the modeled electricity use. Costs were then modeled based on the applicable tariff, and do not reflect actual costs incurred.

Average Electric Energy Consumption

The values in the following tables are the average typical electricity use by all end-uses or equipment at the site over the time period (day, month, year).

Raw Water Pumphouse

Daily	449 kWh
Monthly	13,654 kWh
Annual	163,843 kWh

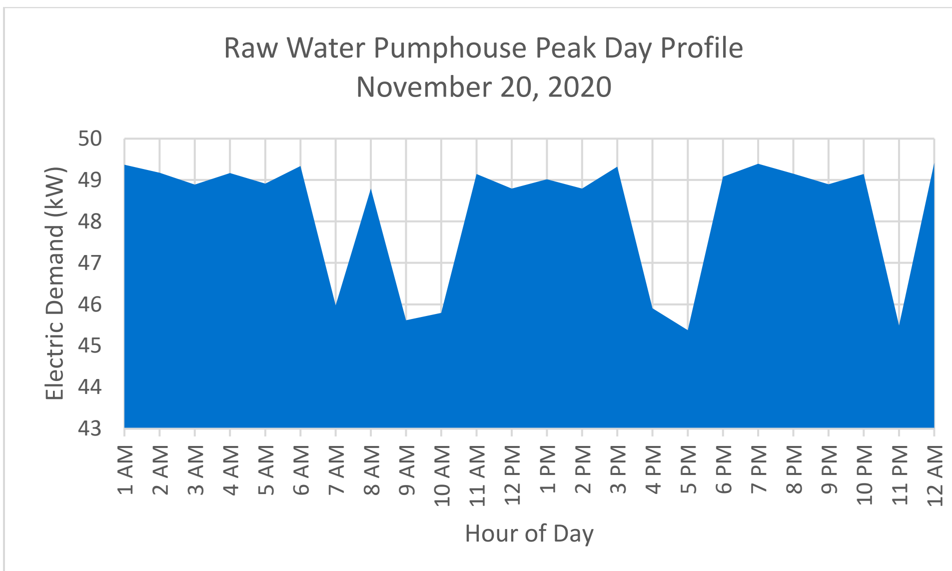
Main Plant

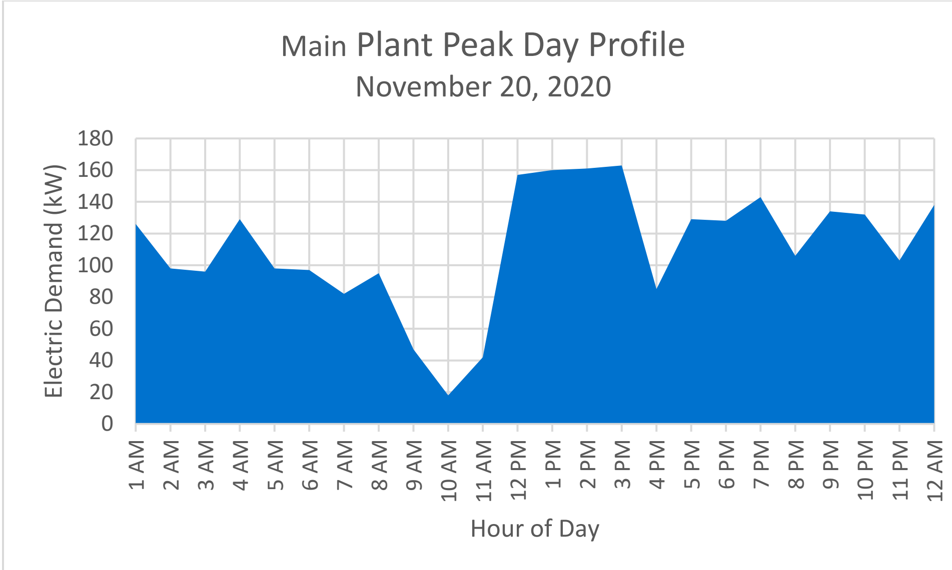
Daily	1,358 kWh
Monthly	41,311 kWh
Annual	495,737 kWh

(Refer to Appendix A: Monthly Electric Profiles for modeled monthly usage and costs.)

Annual Peak Day Electric Demand

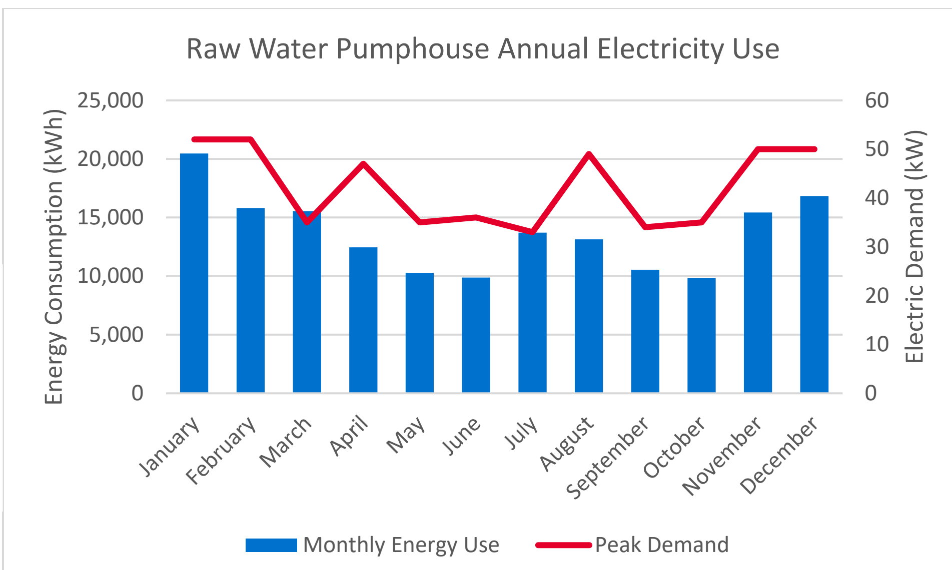
The following charts are the hourly electricity use for the day with the highest electricity use throughout the year for each meter (about 49 kW for Raw Water Pumphouse and 163 kW for Main Plant). From a technical standpoint, a feasible solution would need to, at minimum, meet the power needs of these peak days.



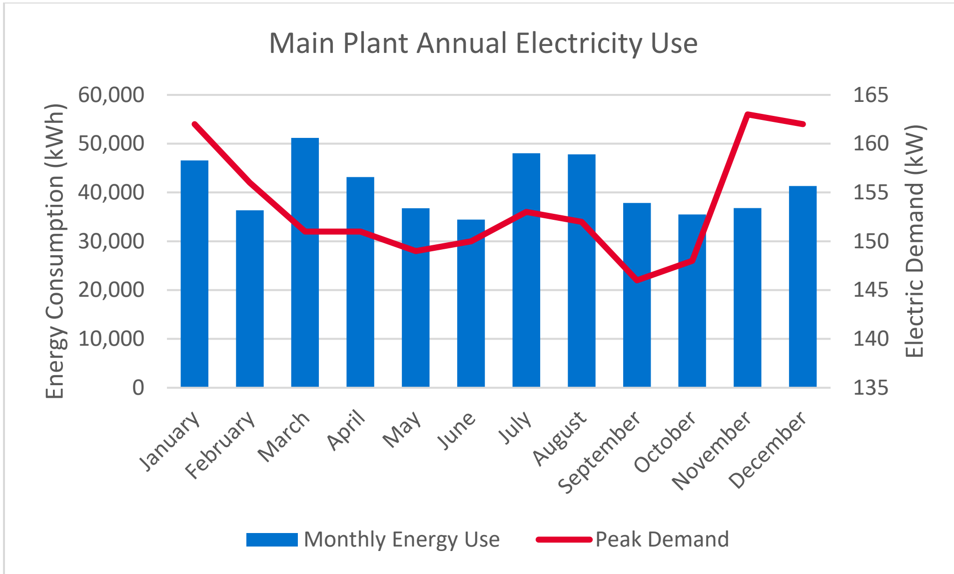


Annual Load Profile

The following charts represent the electricity use throughout the year for each meter at the facility. From the graphs, there does not appear to be a clear correlation between electricity use and seasonal/weather variations. This is due to the majority of energy use being associated with process loads at the facility which are operated based on customer water demands.



Monthly coincident peak demand at the site is between about 179 kW and 212 kW. The annual maximum demand is about 212 kW.


Main Plant Annual Electricity Use
Energy Consumption (kWh)
Electric Demand (kW)
60,000
50,000
40,000
30,000
20,000
10,000
0
165
160
155
150
145
140
135
January
February
March
April
May
June
July
August
September
October
November
December
Monthly Energy Use
Peak Demand

Critical Loads

Critical loads are those loads to which power supply must be maintained under any circumstances, as depicted in Figure 1.

During a resiliency event, the site could support electric demand of critical loads which support emergency operations. The evaluations in this report assumed normal demand use from all end-uses and equipment during an outage.

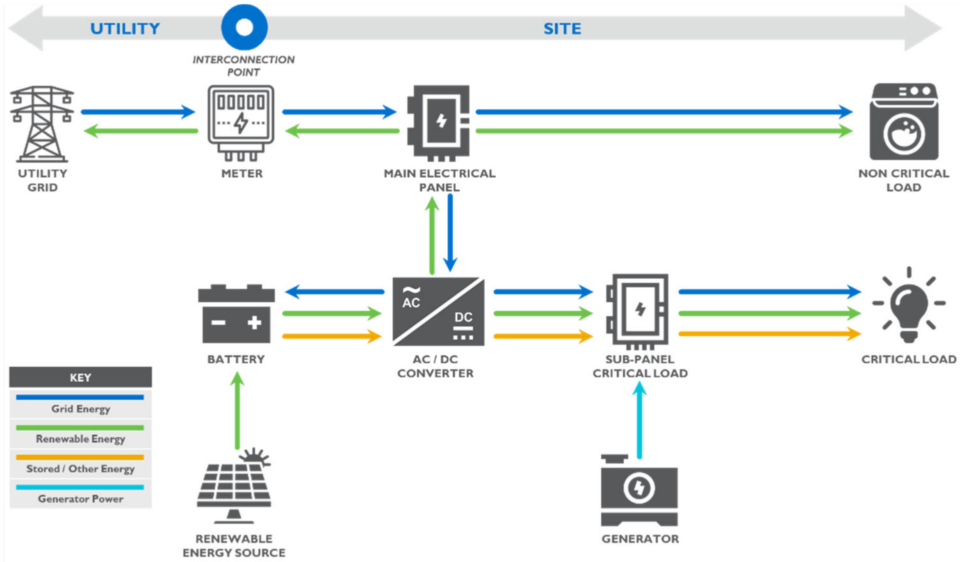


Figure 1: Typical Critical Load Scenario

The site currently does not have a permanent backup generator but has the capability to connect a mobile backup generator to supply power to a portion of the facility in the event of an outage. Facility representatives expressed interest in being able to supply power to the entire facility during an outage. Therefore, all loads are considered critical and would need to be downstream of any resiliency power system. The equipment and end-uses that would be part of the load supported during an outage are lighting, process pump motors, air blower motors, split-system AC units, server equipment and electric outlets for plug loads.

During the virtual audit, facility staff also indicated there are plans to increase the process pumping capacity by about 100 hp. The peak demand requirements of the site over the two-week outage, including this additional pumping capacity, was estimated to be about 163 kW[3]. This increase in demand was calculated using an extrapolation of a correlation between the current pumping capacity and demand use.

[3] Modified load assumption is based on conversations with facility and community representatives regarding resiliency operations of this site.

Key Results

Options for Backup Power Generation and Community Resiliency

This study analyzed three resiliency system options/scenarios.

1. Standard Resiliency: Would utilize new permanent 75 kW (Raw Water Pumphouse) and 200 kW (Main Plant) diesel backup generators. Capital and O&M costs are detailed in the table below.
2. Enhanced Resiliency: Would add 150 kW, 865 kWh (Raw Water Pumphouse) and 250 kW, 1,130 kWh (Main Plant) energy storage systems as well as utilize the new permanent 275 kW of backup generators to supply power to the critical loads and recharge the battery when it is depleted. The capital and O&M costs would be the same as those listed for energy storage in the component details table below.
3. Comprehensive Resiliency: Would add about 350 kW-DC (Raw water Pumphouse) 175 kW-DC (Main Plant) of solar to the energy storage systems identified in the Enhanced system and optimize the new permanent 275 kW backup generators to primarily be used for supplementing the solar and energy storage. Capital and O&M costs are detailed in the table below. For this facility, new diesel storage tanks and fuel supply skids are recommended to further reduce fuel delivery risks.

Since the Comprehensive system has the greatest potential for resiliency benefits and GHG reductions, the following focuses on the results and benefits of a Comprehensive system.

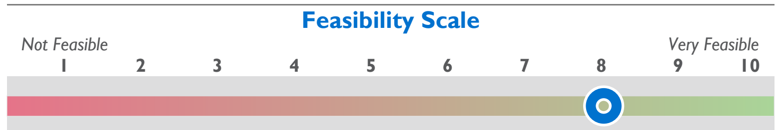
Comprehensive Resiliency

For the Sweet Home Water Treatment Plant, this evaluation analyzed how well an energy storage system could provide the following services/benefits to the site: (1) ability to provide backup power generation and community resiliency, (2) ability to reduce carbon footprint, and (3) ability to reduce energy costs.

The financial assessment performed utilized current utility tariff structures and equipment and technology pricing. While the system may be limited in providing some of these services and benefits under present conditions, utility tariffs are moving towards more dynamic rates, and the energy storage industry continues to mature, both factors which will increase the value of an energy storage system in the future.

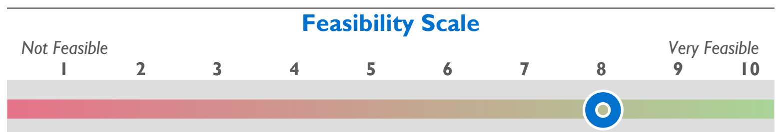
- ❑ **Backup Power Generation & Community Resiliency | High Feasibility**

  Given the nature of the facility and its role and operations during an emergency, having the comprehensive resiliency system identified is a technically feasible solution. The energy storage and solar components would reduce the fuel usage and run time of the backup generator and primarily use it to charge the energy storage during an extended outage.



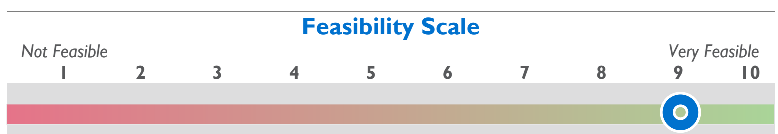
- **Reduced Carbon Footprint | High Feasibility**

  The new solar arrays would eliminate a significant amount of GHG emissions related to grid electricity consumption and mitigate nearly all backup generator emissions when used in an outage.



- **Reduced Energy Costs | High Feasibility**

  There are significant utility bill savings associated with the comprehensive system option. These savings are attributed primarily to the new solar arrays but also the storage component. Energy storage allows the facility to adapt and take advantage of demand reduction charge opportunities. Solar bill reductions would require service on a Net Metering Aggregation tariff.



The comprehensive resiliency system evaluated would utilize new permanent backup diesel generators, new solar photovoltaic (PV) arrays, and new energy storage systems. In addition to the generation and storage resource components, the project also includes adding 2,000 gallons of diesel fuel storage and fuel supply skids (in estimated backup generator installed costs).

System Component Details

Component	Solar PV	Energy Storage	Backup Generator
Installation Size	525 kW	400 kW/1,995 kWh	275 kW
Estimated Installed Cost	$889,200	$1,826,300	$120,000
Estimated Annual Expense	$8,700	$3,900	$9,600

This configuration would provide resiliency backup for up to two weeks, as recommended by Oregon's Office of Emergency Management. Further, it would significantly reduce and/or eliminate the site's dependence and risk related to fuel deliveries in a time of disaster. As a secondary benefit, during typical operations the system would also provide carbon and utility bill cost reductions. Further, the system has the capability to smooth/shave peak electric demands (kW) of the facility, should it become more beneficial to do so in the future.

The following table summarizes the initial, annual, and lifetime costs and annual energy savings from normal operations of the comprehensive resiliency system.[4]

Comprehensive Resiliency System Results

Energy Storage System Size:	**400 kW/1,995 kWh**
Generation Resources:	**525 kW-DC Solar PV** **275 kW Diesel Generators**
Estimated Annual Energy Savings:	**$53,200 /yr.**
Estimated System Capital Cost:	**$2,835,500**
Estimated Annual Operations and Maintenance Cost:	**$22,300 /yr.**
Estimated 25-year Lifetime Cost (Net Present Cost)*:	**$3,174,049**

*Net Present Cost estimated without tax credits or depreciation. Please consult with your financial advisor about your specific financial situation

(Refer to Appendix A: Detailed System Analyses for more details.)

The chart below illustrates the performance of the resiliency resources of the Comprehensive system during a two-week outage. The dashed line indicates the site's total electric power needs over the outage period. Under this curve, shaded areas illustrate which resource is providing power to the site. Shaded areas above the curve shows the resources that the energy storage system would use to charge. For this site, the energy storage system and solar arrays would provide most of the daily power to the site and the backup generator is used as a secondary source during low solar production periods and to charge the system and supply power to the site.

[4] This analysis reflects initial planning estimates. Actual savings and costs may vary based on a number of factors as discussed previously. Actual costs and benefits should be evaluated when working with storage providers and contractors.

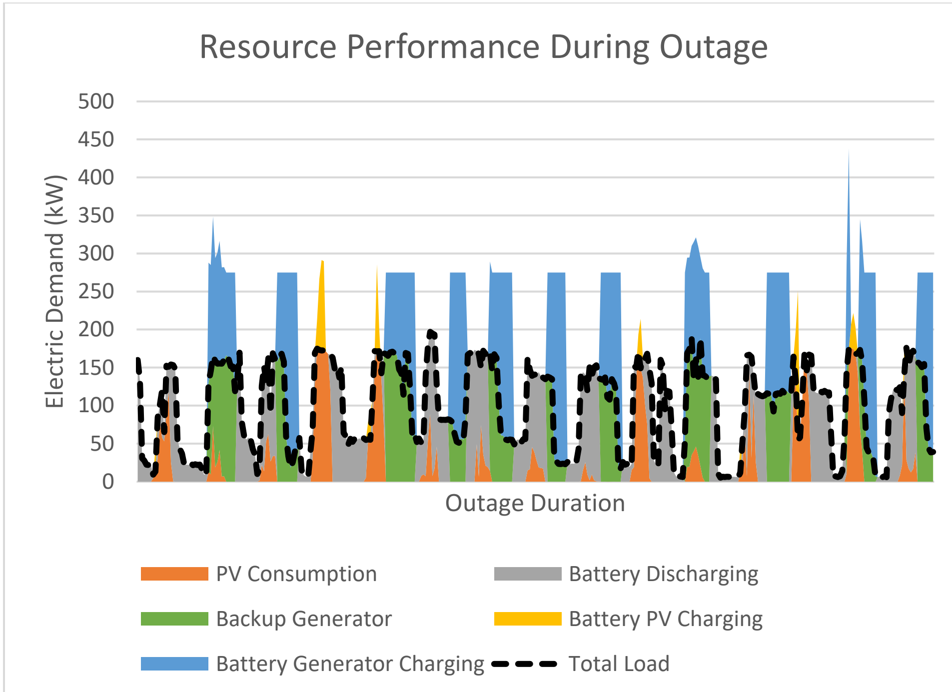


Figure 2: Performance of the Facility's Resiliency Resources During and Outage

Resiliency Capabilities and Benefits

During a resiliency event, the system would sense a grid outage, disconnect from the grid, and come online. The energy storage system would be the primary generation resource to meet facility demand. Solar PV arrays would power facility load and charge the energy storage system when excess generation is available. The backup generator would be available to provide charging to the energy storage system and/or meet facility demand not met by the solar PV arrays.

This Comprehensive system would be able provide these quantitative and qualitative resiliency benefits:

Adopting a solar plus storage system at the Sweet Home Water Treatment Plant would increase community resiliency by addressing shorter- and longer-term outages and reducing the risk of fuel supply interruption during disasters for backup generators.

Ability to address shorter and longer term resiliency events

- The facility is proximate to an area which regularly experiences wildfires, which may result in a disruption to the utility power supply.
- A comprehensive resiliency system could allow the facility to operate during these types of outages without the backup generator.

Reduction of risk during disaster events resulting in a more resilient community

- Ensuring power supply to the facility would ensure the capacity to provide emergency services to the community during outages.
- The addition of solar generation and energy storage would reduce the risk and dependency on diesel fuel supply in a long-term outage.
  - The comprehensive system would consume 50% less diesel than if the generator were to provide backup power alone over the two weeks.
  - Generator run time would be reduced by solar power production.
  - When the generator is run, it would be at full load rather than partial load. This is a more fuel-efficient operation.

Serves as a hedge against low probability, high cost disaster events

- FEMA Cost-Benefit Analysis (CBA) calculator estimates a value of $9,212,000 for the facility to operate the comprehensive system during a single two-week outage over the 25 year life of the project.

Energy Storage Feasibility

Key Considerations & Constraints

- ❑ The site has plans to use a mobile backup generator in case of outage, but has no onsite fuel storage
- ❑ There are plans to increase pumping/processing capacity in the near future
- ❑ There are plans to upgrade main plant main service panel

The site currently does not have a permanent backup generator. During a two-week outage with backup generators as the only available resource, they would consume about 3,640 gallons of diesel.

System Sizing & Requirements

The primary goal of this evaluation is to determine an energy storage system size which would reduce or eliminate the need to operate a backup generator during a two-week outage. To accomplish this, it would be necessary to utilize new solar generation, either developed on its own, or integrated with the existing solar generation resources at the facility. Secondary sizing considerations were based on any additional power or energy storage capacity needed to reduce electricity costs and potentially increase project viability.

Renewable Energy Potential

The site currently does not have existing solar arrays installed. However, there are some areas available for new solar arrays on a dirt lot, between the Main Plant and Raw Water Pumphouse (North of the main building), as well as on the roof of the Main Plant. New arrays would be on ground-mount structures or roof-mounted. Refer to Appendix B: *Site Visit Data Collection Report* for potential location details). The approximate new capacity that might be installed is about 525 kW-DC (~350 kW-DC ground-mount for the Raw Water Pumphouse and 175 kW-DC roof-mounted for the Main Plant).

In order to achieve the lowest risk resiliency system, maximizing solar at the facility would be key. More solar available in an outage means less backup generation run time, which means less fuel consumed, which means less risk and dependency associated with diesel fuel supply.

Site Availability

There are several areas which can host an energy storage system of the size contemplated. Typically, energy storage systems at this scale have a similar footprint to a medium commercial transformer, approximately eight to ten-foot square. One such area which could host an energy storage system of the size contemplated would be the same lot where solar arrays could be installed for the Raw Water Plant. Another might be on the large grass area by the utility transformer and main switch gear/panel. Facility representatives indicated there may be other locations as well but would require further investigation as there are potential civil, easement, or environmental concerns.

(Refer to Appendix B: Site Visit Data Collection Report for more site details.)

Electrical

Any energy storage system requires supporting components and/or auxiliary systems. These electrical components can consist of wiring, conduits, distribution panels, transfer switches, disconnects, and/or mechanical ventilation/air-conditioning.

(Refer to Appendix A: One-line Diagrams/Schematics and Controls Specifications for more details.)

Interconnection Requirements[5]

Pacific Power supports the implementation of energy storage and is currently developing a policy for battery interconnections. In the interim, the following technical requirements apply to battery system interconnect requests to ensure safe and reliable operation of the energy grid. These requirements may change as Pacific Power continues to develop its battery interconnection policy.

- Battery systems shall not export power through the point-of-interconnection (POI) to the energy grid.
- Battery inverters/converters shall be IEEE 1547 & UL 1741 Certified, with intentional islanding permitted.
- Battery systems shall comply with applicable electrical codes.
- A one-line drawing shall be required with each battery system interconnection request.
- An AC disconnect switch shall be required for every battery system.
- A transfer switch shall be required with every battery system.
- All inspections provided by the Authority Having Jurisdiction (AHJ) must clearly reflect inspection of the battery system.

Operations & Maintenance[6]

Energy storage systems have requirements for periodic maintenance and are typically identified by the energy storage system provider. Regular maintenance activities are minimal, but can include basic cleaning of the system enclosure, inspecting modules and other components for corrosion, regular capacity testing, and with larger systems changing any ventilation filters.

More proactive maintenance and inspection activities, however, can better sustain system uptime and availability. Preventive maintenance protocols depend on system size, design, complexity, and environment. These activities maximize system output, prevent more expensive failures from occurring, and maximize the life of an energy storage system. This can involve visual or thermal

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[5] Pacific Power, Interim Battery System Technical Requirements, 2018 https://www.pacificpower.net/content/dam/pcorp/documents/en/pp-rmp/customer-generation/PC_Interim_Battery_System_Technical_Requirements.pdf

[6] NREL, Best Practices for Operation and Maintenance of Photovoltaic and Energy Storage Systems, 2018 https://www.nrel.gov/docs/fy19osti/73822.pdf

inspections of AC/DC wiring, real-time cell-level monitoring to identify and justify preventive maintenance that may not be visible at the battery string or battery bank level, and other methodologies for assessing when a product may be approaching a failure mode.

Operations and Maintenance (O&M) can be performed through service contracts or by facility staff, each with their pros and cons. In any case, preventive maintenance and/or system monitoring must be balanced by financial cost to the project.

Typical usable life for Lithium-Ion battery energy storage systems are approximately 10 to 15 years. Major maintenance on the system, such as outlined above, is usually necessary every 5 to 8 years to remain operational. However, the usable life of energy storage systems is also dependent on how often and how heavily the system is used. The ranges identified are based on 3,500 to 5,000 cycles at 80% depth of discharge. Most Lithium-Ion battery energy storage system providers or manufacturers offer warranties that cover typical operation and use cycles. These are usually at least 10 years in length and cover the system components and installation.

Financial Resources: Grants and Incentives

Participants in the Community Resiliency Pilot may be eligible for the following grant and incentive programs to offset costs for storage and solar systems recommended in this report.[7]

Name	Details	Eligible Systems
Federal Investment Tax Credit	The investment tax credit (ITC) is a tax credit that can be claimed on federal income taxes for a percentage of the cost of a solar photovoltaic (PV) or solar+storage eligible system that is placed in service during the tax year. Currently the ITC is 26 percent for projects commencing construction between January 1, 2020, and December 31, 2020, but placed in service before 2024.	Solar Storage
Bonus Depreciation	Bonus depreciation is a tax incentive that allows a business to immediately deduct a large percentage of the purchase price of eligible assets. For qualified property acquired and placed in service after Sept. 27, 2017, and before Jan. 1, 2023, the bonus depreciation is 100 percent.	Solar Storage
Modified Accelerated Cost Recovery System Depreciation	The modified accelerated cost recovery system (MACRS) is a depreciation system used for tax purposes which allows the capitalized cost of an asset to be recovered over a specified period via annual deductions. Solar and solar+storage systems would use the 5-year MACRS schedule.	Solar Storage
Energy Trust of Oregon Solar for Business	Pacific Power commercial customers are eligible for up to $20,000 in incentives.	Solar
FEMA Hazard Mitigation Grant Program	FEMA provides up to 75 percent of the funds for mitigation projects. The remaining 25 percent can come from a variety of sources.	Solar Storage
Oregon Energy Loan Program	Oregon's energy loan program offers fixed-rate, long-term loans for qualified projects that invest in energy conservation, renewable energy, alternative fuels, or create products from recycled materials.	Solar Storage
Oregon Renewable Energy	Renewable Energy Development Grants, or RED Grants, support individuals and	Solar

[7] Pacific Power is exploring opportunities to provide grant funding for storage installations. Additional information will be provided to participants regarding funding.

Development Grants	organizations that are investing in renewable energy systems.

FEMA Grant Requirements

Community Resiliency Pilot participants may be eligible for the Federal Emergency Management Association's (FEMA) Hazard Mitigation Grant Program. FEMA provides up to 75 percent of the funds for mitigation projects. The remaining 25 percent can come from a variety of sources. To be eligible to receive funding through FEMA's mitigation grant programs, an application must be submitted. The scope of work, work schedule or timeline, and budget for the project must be integrated. While each element is independent, they include many common data points. Both planning and project grant applications share the following four elements:

- Scope of Work
- Schedule
- Project Cost Estimate
- Cost Share Allocation

This site evaluation report can be used to supplement a FEMA grant application, however additional analysis and project development is needed beyond the information presented in this report as detailed to the right.

These application elements are required for all mitigation grant programs. However, in addition to the basic elements described above, the application must also address:

- Decision-making Process
- Damage History
- Property Data
- Facility Data
- Engineering Feasibility
- Cost Effectiveness
- Environmental/Historic Preservation Compliance

Appendix A: Engineering Analysis

Detailed System Analyses

The following table summarizes the changes to system component sizing, estimated costs, and estimated savings at each step in the analysis. This analysis includes a one-time two-week duration outage.

	Standard Resiliency	Enhanced Resiliency	Comprehensive Resiliency
Capital Costs	$110,000	$1,511,400	$2,835,500
Annual Utility Costs	$58,900	$52,400	$5,700
Annual GHG Emissions (lbs CO2)*	885,400	908,800	417,000
Backup Generator Capital Cost	$110,000	$110,000	$120,000
Backup Generator Capacity (kW)	275	275	275
One-time Outage Fuel Usage (gal LP)	3,640	2920	1770
One-time Outage Fuel Costs	$10,400	$8,300	$5,000
Solar Capital Cost	$9,600	$9,600	$9,600
Solar Capacity (kW)	$0	$0	$889,200
Annual Incremental Solar O&M	0	0	525
Energy Storage Capital Cost	$0	$0	$8,700
Energy Storage Capacity (kW)	$0	$1,401,400	$1,826,300
Energy Storage Capacity (kWh)	0	275	400
Annual Energy Storage O&M	0	1520	1995
Annual Bill Savings	$0	$2,400	$3,900
One-time Outage Resiliency Benefits	$0	$6,500	$53,200

All benefits and costs in this report are high-level estimates and should be used only for initial planning purposes. Energy savings may vary depending on behavioral factors, the weather, and other factors outside PacifiCorp's control. Actual costs for equipment and installation may vary from the initial planning estimates. Thus, both actual costs and benefits should be evaluated when working with storage providers and contractors.

Includes annual site emissions from electricity consumption during normal operations and backup generator operation during a two-week outage.* ***Grid emissions based on Pacific Power's 2019 IRP Projected Emissions.

Backup Generator Only

Using only a backup generator over a longer-term outage still has an inherent risk associated with it. Generators pose the risk of being unavailable due to problems with maintenance, failing to start and support load, and failing to run for the duration of the outage. Fuel-related risks are highest for widespread, long outages. When the generator is working properly but stalls due to insufficient fuel, a failure of fuel supply (FFS) occurs. FFS for a generator generally occurs when resupply shipments are disrupted, and the generator exhausts its fuel tank. Under normal conditions, fuel can be replenished well before a generator exhausts its fuel tank. However, long outages often coincide with abnormal conditions, such as extreme weather events or disasters, which can close roads and impede normal transportation. Despite common assertions regarding the ability, or inability, to resupply generators during natural disasters, very little analysis has been conducted and no data set was identified with information on the likelihood of resupply during long outages. For this analysis, a 14 percent likelihood of a failure of resupply was based on NREL's "A Comparison of Fuel Choice for Backup Generators"[8].

The first step in the technical analysis was to determine the baseline resiliency operation, which for this facility involved operating a new permanent backup generator the entire two-weeks. The facility has current plans to use a mobile generator, but it would not support all the loads at the facility, so a generator size was estimated based on electricity data and panel information provided. Estimated generator costs were for a typical diesel backup generator to be installed permanently. Generic generator specifications (e.g. fuel curve, power output, etc.) were input to the energy modeling software, which determined the total fuel consumption and cost.

Energy Storage Sizing

The next step involved determining the energy storage system size that would be capable of adequately charging from the generator and discharging to meet site demands and reduce the risk associated with fuel resupply. Reducing fuel supply risk comes from more efficient generator operation (running the generator at full load) and decreasing generator run time frequency. The calculations determined that above 175 kWh of storage capacity, the generator ran only marginally less. Further, the analysis determined that approximately 20kW of inverter capacity would be necessary to adequately charge from the generator and support any connected loads. These system parameters were entered into the energy modeling software to provide updated fuel consumption and estimated costs, estimated system capital costs, estimated system O&M costs, and resource performance charts.

Solar PV Sizing

After the initial storage sizing was determined, the analysis added solar PV arrays through an iterative process up to the physical limit at the site. Solar would further reduce risk associated with fuel resupply by further lessening the generator run time frequency. Ideally, enough solar would be included to eliminate the need for the backup generator for the entire two-week outage, but additional solar beyond the 30 kW identified did not significantly reduce fuel consumption/generator run time compared to the capital cost increase. The result was utilizing as much available space with solar as feasible. These system parameters were entered into the energy modeling software to provide updated fuel consumption and estimated costs, estimated system capital costs, estimated system O&M costs, and resource performance charts.

Reduced Energy Costs

Once a resiliency system was determined, we evaluated how it might provide electricity bill cost reductions during normal operations. Under the current rate structure, most of the savings from the Comprehensive system is achieved by the solar arrays, and savings from peak demand (kW) reduction is a lesser component of overall savings. As tariffs change over the life of the project, this composition of savings may also change, and more demand savings might be possible.

Monthly Electric Profiles

The following electric utility usage and cost profiles are for normal site operations. Pacific Power's Schedule 28 (General Service - Large Non-residential) for secondary voltage delivery service was used as the cost basis for the estimated monthly utility charges below.

[8] Ericson, Sean and Dan Olis. 2019. A Comparison of Fuel Choice for Backup Generators. Golden, CO: National Renewable Energy Laboratory. NREL/ TP-6A50-72509. https://www.nrel.gov/docs/fy19osti/72509.pdf

Raw Water Pumphouse

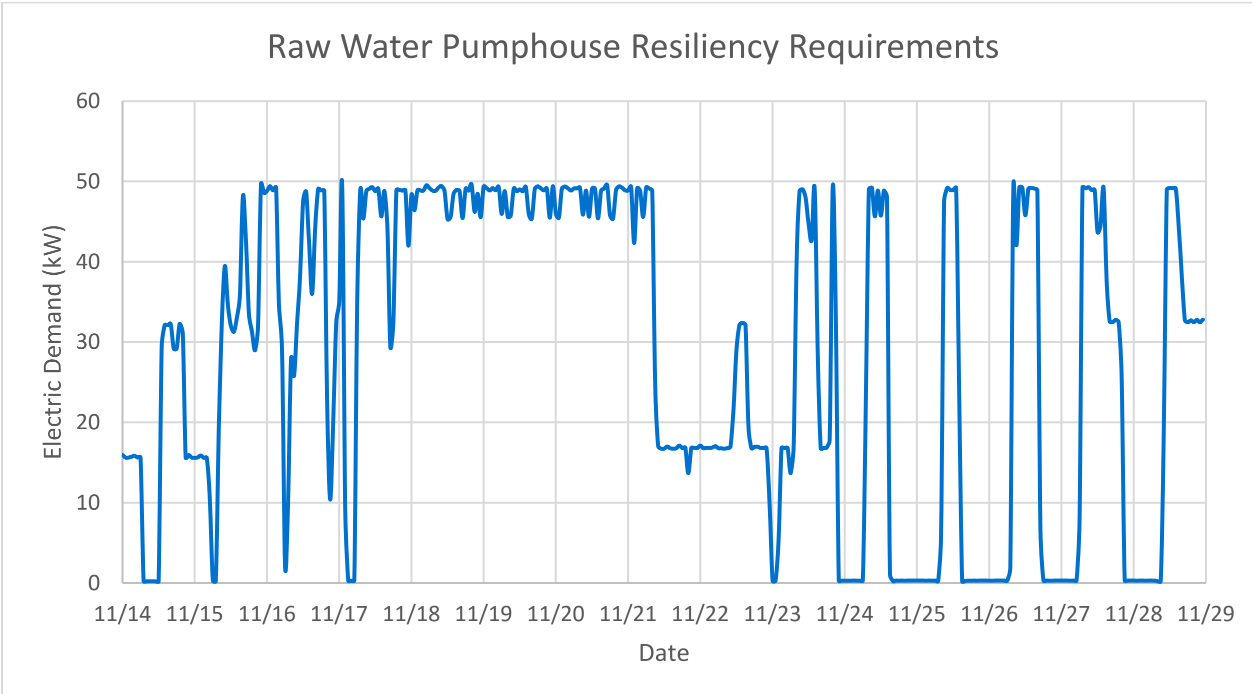
Month	Energy Purchased (kWh)	Energy Sold (kWh)	Net Energy Purchased (kWh)	Peak Load (kW)	Energy Charge	Demand Charge	Fixed Charge	Taxes	Total
January	20,459	0	20,459	52.1	$1,253	$357	$34	$56	$1,700
February	15,805	0	15,805	52.4	$968	$359	$34	$46	$1,407
March	15,536	0	15,536	35.4	$950	$243	$34	$42	$1,268
April	12,446	0	12,446	46.8	$764	$321	$34	$38	$1,158
May	10,269	0	10,269	34.8	$627	$238	$34	$31	$930
June	9,868	0	9,868	36.2	$606	$248	$34	$30	$919
July	13,700	0	13,700	32.9	$837	$226	$34	$37	$1,135
August	13,130	0	13,130	48.7	$804	$334	$34	$40	$1,212
September	10,538	0	10,538	34.2	$648	$235	$34	$31	$948
October	9,836	0	9,836	35.4	$601	$243	$34	$30	$907
November	15,428	0	15,428	49.7	$947	$341	$34	$45	$1,367
December	16,828	0	16,828	49.5	$1,031	$340	$34	$48	$1,452
Annual	163,843	0	163,843	52.4	$10,036	$3,485	$408	$475	$14,404

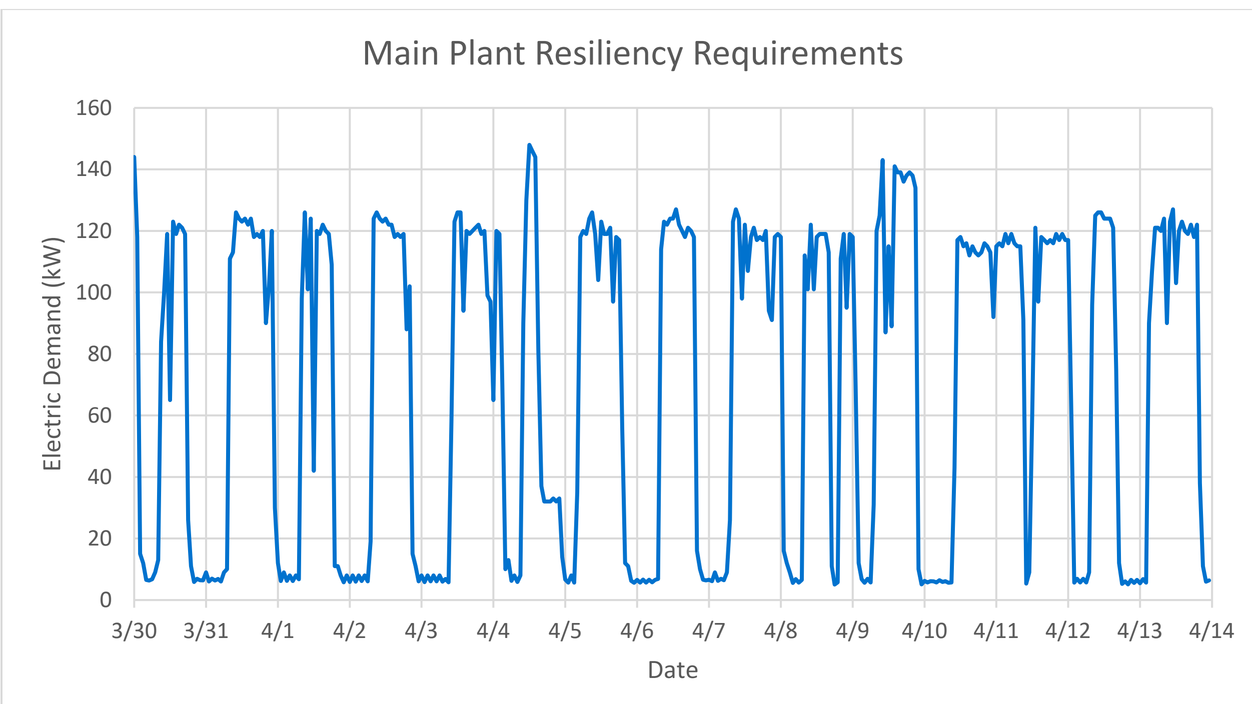
Main Plant

Month	Energy Purchased (kWh)	Energy Sold (kWh)	Net Energy Purchased (kWh)	Peak Load (kW)	Energy Charge	Demand Charge	Fixed Charge	Taxes	Total
January	46,566	0	46,566	162	$2,809	$1,062	$81	$135	$4,086
February	36,350	0	36,350	156	$2,200	$1,024	$81	$113	$3,418
March	51,177	0	51,177	151	$3,082	$993	$81	$142	$4,298
April	43,141	0	43,141	151	$2,606	$993	$81	$125	$3,806
May	36,770	0	36,770	149	$2,218	$980	$81	$112	$3,392
June	34,437	0	34,437	150	$2,093	$987	$81	$108	$3,268
July	48,017	0	48,017	153	$2,889	$1,005	$81	$136	$4,110
August	47,810	0	47,810	152	$2,889	$999	$81	$135	$4,104
September	37,863	0	37,863	146	$2,292	$961	$81	$114	$3,448
October	35,488	0	35,488	148	$2,142	$974	$81	$109	$3,306
November	36,811	0	36,811	163	$2,235	$1,068	$81	$115	$3,499
December	41,306	0	41,306	162	$2,495	$1,062	$81	$124	$3,762
Annual	495,737	0	495,737	163	$29,949	$12,107	$972	$1,467	$44,496

Hourly Load Profile(s) for Resiliency System Sizing

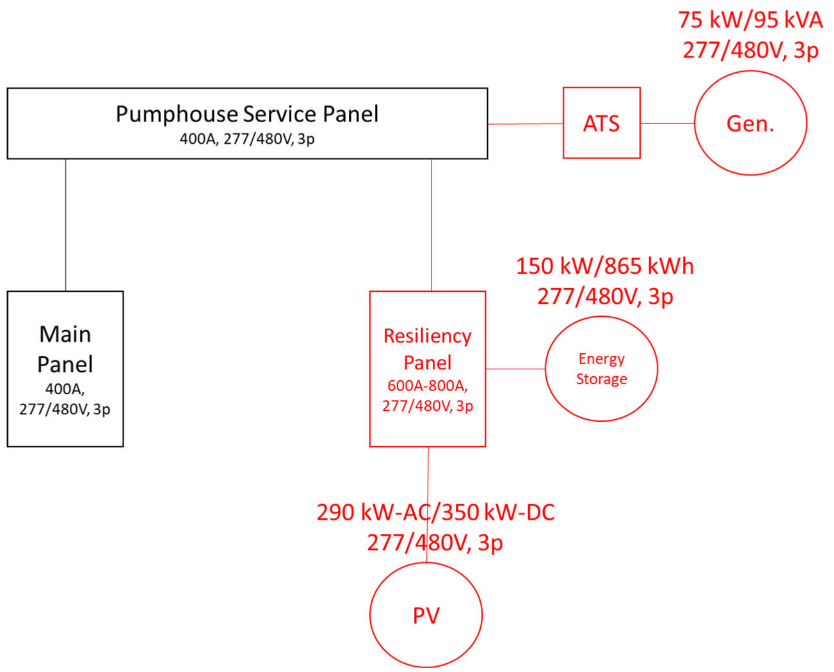
The hourly profile used for the resiliency technical feasibility analysis was based on a two-week period, which included the peak day. The gross load profile of the facility's typical operations was developed using the metered interval data. Using a correlation between the current pumping capacity and the electric demand use, the resiliency load profile for the main plant includes an additional 100 hp of pumping capacity.

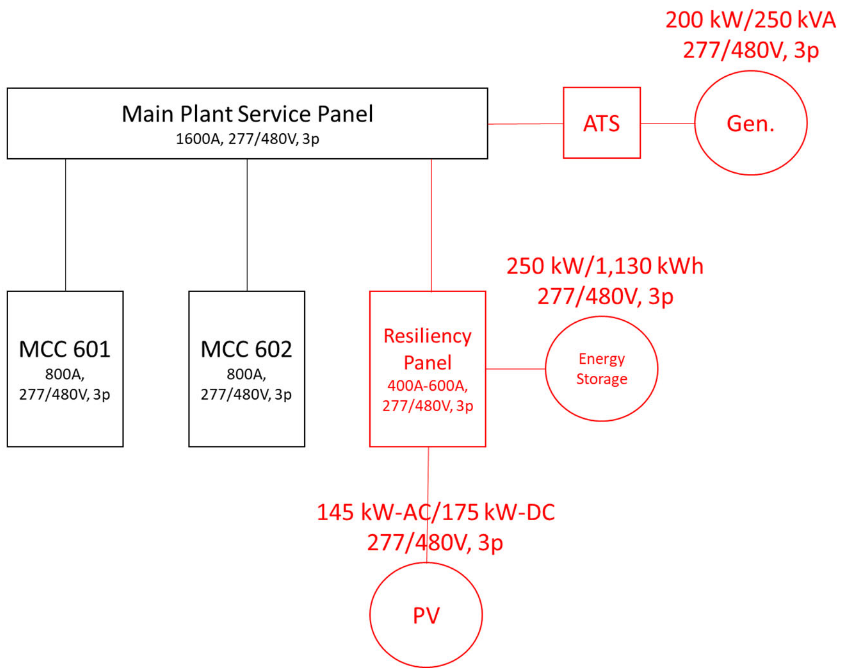

Raw Water Pumphouse Resiliency Requirements
60
50
40
30
20
10
0
Electric Demand (kW)
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
11/25
11/26
11/27
11/28
11/29
Date


Main Plant Resiliency Requirements
160
140
120
100
80
60
40
20
0
Electric Demand (kW)
3/30
3/31
4/1
4/2
4/3
4/4
4/5
4/6
4/7
4/8
4/9
4/10
4/11
4/12
4/13
4/14
Date

One-line Diagrams/Schematics

The following schematic illustrates the existing electrical panels and electrical equipment at the site and how the new comprehensive system might be connected. Modifications are marked in red. This is not intended to act as electrical engineering plans. Any electrical upgrades and sizing should be confirmed with a certified electrician and/or electrical engineer.





Controls Specifications

In order to effectively operate a Comprehensive resiliency system, whether under normal conditions or during an outage, there needs to be a practical way to control the individual resources as well as communication between system components, system operators (e.g. facility personnel), and potentially the utility. A control system would integrate the existing backup generator, new energy storage system, and solar arrays and enable the operation and management of the system. The following hierarchal multi-tiered control architecture would allow for both supervised and autonomous operation, optimization, and management:

- **Tier 1 (Component level):** Tier 1 controls include control equipment for individual components as well as facility load monitoring.
- **Tier 2 (Facility level):** These systems aggregate and control all Tier 1 systems.
- **Tier 3 (Utility supervisory control and data acquisition integration):** This tier does not communicate directly with any Tier 1 device, and instead connects the Tier 2 controls with any systems or devices outside the facility.

The control system would provide for local, as well as remote, operation and dispatch from the facility control center. The system would need to be programmable to establish parameters such as set points, algorithms, limits, etc. that are required for system monitoring and management.

Appendix B: Site Visit Data Collection Report

Sweet Home - Water Treatment Plant

Created	2021-05-06 16:42:33 UTC by Jeremy Del Real
Updated	2021-05-06 18:43:59 UTC by Jeremy Del Real
Location	,

General Information

Project/Client Name	Sweet Home - Water Treatment Plant
Site Address	1500 47th Ave Sweet Home, OR 97386
Facility Type	Potable water treatment plant
Facility Representative	Greg Springman, Public Works Director

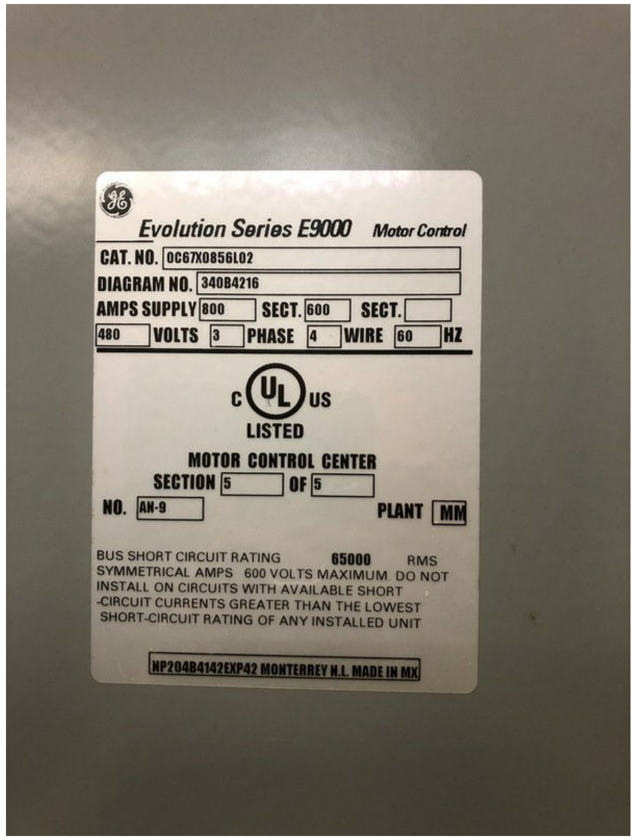
Electrical Infrastructure

Main Plant Service

Location/ID	Main Plant Service
Meter Number	74264047
Service Voltage/Phase	277/480 V, three phase
Capacity (A)	1600
Age/Condition	Fair/Average (Between 5 and 20 years)
Generation?	No

MCC 601

Subpanel Location/ID	MCC 601

Subpanel Photos	 rated for 800 amps, only utilizing 600
Submetered?	No
Subpanel Service Voltage/Phase	277/480 V, three phase
Subpanel Capacity (A)	800
Subpanel Age/Condition	Fair/Average (Between 5 and 20 years)
Generation?	No

Process-Pump motors

Type of Equipment	Process-Pump motors
Equipment Description	Pumps used for water filtration and treatment
Critical Load?	Yes

Lighting, Interior

Type of Equipment	Lighting, Interior
Critical Load?	Yes

HVAC, Packaged or Split-System Unit

Type of Equipment	HVAC, Packaged or Split-System Unit

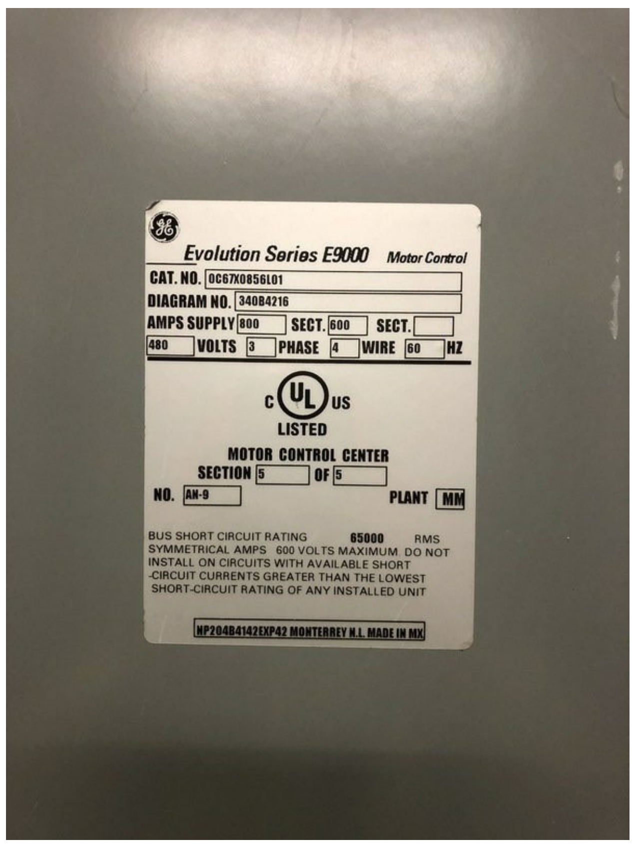
Equipment Description	DHP server room, Split AC office/conference rooms
Critical Load?	Yes

Miscellaneous (Plug Loads, etc.)

Type of Equipment	Miscellaneous (Plug Loads, etc.)
Equipment Description	includes some lab testing equipment
Critical Load?	Yes

MCC 602

Subpanel Location/ID	MCC 602
Subpanel Photos	



Rated for 800 amps, only using 600

Submetered?	No
Subpanel Service Voltage/Phase	277/480 V, three phase
Subpanel Capacity (A)	800
Subpanel Age/Condition	Fair/Average (Between 5 and 20 years)
Generation?	No

Process-Pump Motors

Type of Equipment	Process-Pump Motors
Equipment Description	Pumps used for water filtration and treatment
Critical Load?	Yes

Lighting, Interior

Type of Equipment	Lighting, Interior
Critical Load?	Yes

HVAC, Packaged or Split-System Unit

Type of Equipment	HVAC, Packaged or Split-System Unit
Equipment Description	DHP in server room, Split AC for office and conference room
Critical Load?	Yes

Miscellaneous (Plug Loads, etc.)

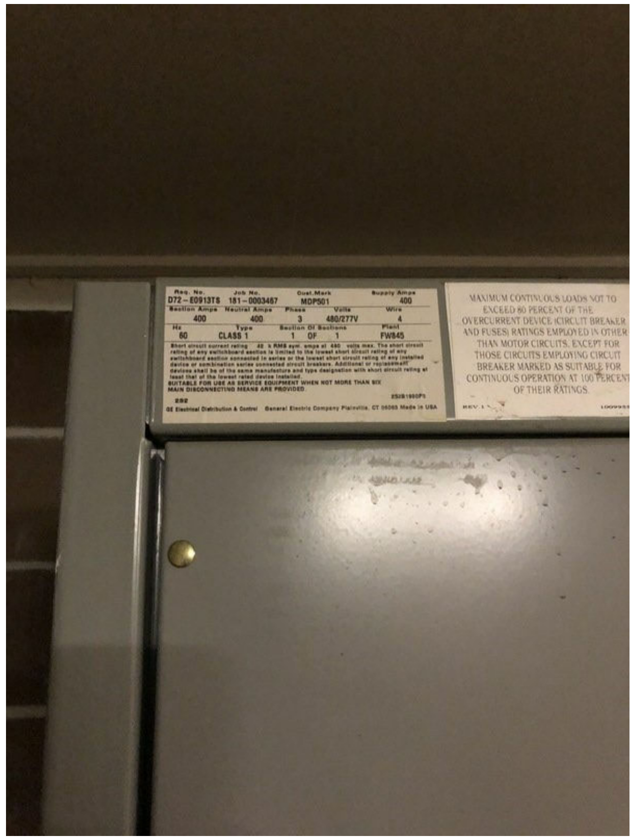
Type of Equipment	Miscellaneous (Plug Loads, etc.)
Equipment Description	includes some lab testing equipment
Critical Load?	Yes

Raw Water Pumphouse Service

Location/ID	Raw Water Pumphouse Service
Meter Number	74264046
Service Voltage/Phase	277/480 V, three phase
Capacity (A)	400
Age/Condition	Fair/Average (Between 5 and 20 years)
Generation?	No

Pumphouse Panel

Subpanel Location/ID	Pumphouse Panel

Subpanel Photos	
Submetered?	No
Subpanel Service Voltage/Phase	277/480 V, three phase
Subpanel Capacity (A)	400
Subpanel Age/Condition	Fair/Average (Between 5 and 20 years)
Generation?	No

Lighting, Interior

Type of Equipment	Lighting, Interior
Equipment Description	minimal lighting
Critical Load?	Yes

Process - Pump Motors

Type of Equipment	Process - Pump Motors
Equipment Description	Pumps used in water treatment and filtration process
Critical Load?	Yes

Distributed Generation Opportunities

Ground, Dirt Lot Between Main Plant and Pumphouse (North of Main Plant)

Area Type	Ground
Solar PV Location	Dirt Lot Between Main Plant and Pumphouse (North of Main Plant)
Orientation	South
Proximity to Potential Subpanel	within 50 to 100 yards
Potential Subpanel ID	Pumphouse Panel
Any significant shade?	No

Roof, Roof of Main Plant

Area Type	Roof
Solar PV Location	Roof of Main Plant
Orientation	South
Proximity to Potential Subpanel	50 to 100 yards
Potential Subpanel ID	MCC 601 and MCC 602
Any significant shade?	No

Energy Storage Opportunity

Exterior of pumphouse, dirt lot

Energy Storage Location	Exterior of pumphouse, dirt lot
Indoor/Outdoor	Outdoor
Energy Storage Technical Potential	Large open dirt area surrounding the pumphouse, can site close to panels (<100 ft)
Potential Subpanel ID	Pumphouse Panel

Near Main Service Panel, grass area

Energy Storage Location	Near Main Service Panel, grass area
Indoor/Outdoor	Outdoor
Energy Storage Technical Potential	Can site close to PCC (<100ft), large space for pad and large system
Potential Subpanel ID	MCC 601 and MCC 602

Energy Storage Other Notes	Large grass area, near utility transformer and main service panel

Additional/General Notes

General Notes

- How long can the main water treatment plant operate if the raw water site is offline?
- Is the holding pond identified in the flow diagram onsite at the main plant?
- Can the main plant operate off of the holding pond?

o If so, for how long?

o About once a week the timer/alarm goes off to clean filter

- Is the air wash Bldg at the main plant (air blowers?) or raw water site (compressed air?)?
- Is there any non-process loads at the plant? (e.g. lighting for small office, window AC, etc.) o Would these be critical loads in an outage?

Control computers are on these circuits so would need to have this going.

Looking for uninterrupted after transfer.

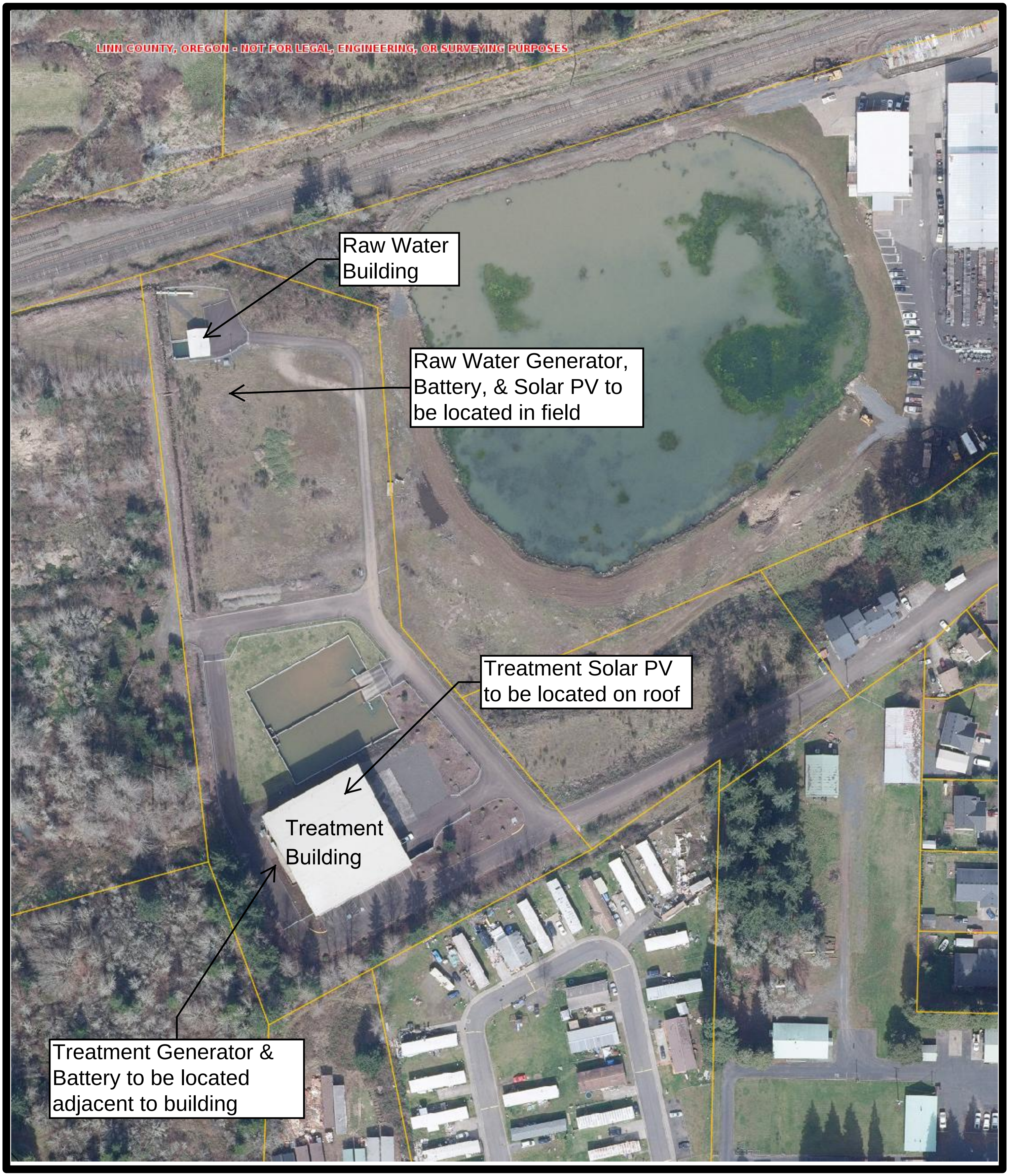
- Switch gear outside near service entrance 74264047o Near large transformer o Room for small generator (1/3 capacity) two MCCs at 500 amps each, the current switch is at about 350amps, sized for 1600 amps but only 500 amps going to each MCC
- Adding pumping capacity to plant (have HP and voltage on chart)
- Going to run 600 through each after upgrade
- Have lab, office, and conference room, server room (with own AC small DHP), split units for others (2)
- Large grass area by the large transformer and switch gear where exterior siting for storage could go.
- Also gravel area with cement pad within fence line, would have to look at it civil potential location as well
- Easement on property but can put more if needed along that property line.• MCC 601 and 602 room o Panels, scada, transformers, etc. o Service
- Raw water pumphouse: 74264046

o Has hook up for mobile generator (~100amp outlet) o Manual transfer switches existing, would like to have automatic transfer (as well as scada info) o Automatic valve (throttling valve)

- Typical operations runs two filters at a time, last three months running three
- Air blowers for secondary filtration need only one to run have second as backup
- Adding an additional 100 hp motor that will be running
- Siting would have to account that it is on a potable water source
- Large solar area on roof and ground between pumphouse and main plant (to north)• Stakeholder concerns (negligible) o Hidden away, not off highway o No neighbors in vicinity

Attachment B
Site Map

WTP Site Map



This product is for informational purposes only and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain usability of the information.

Attachment C
Site Photos

Figure 1. East side of Water Treatment Plant main building

Figure 2. Raw Water Building to the north.

Figure 3. West side of Water Treatment Building.

Figure 4. View of Raw Water Building from the Treatment Building.

Figure 5. Raw Water Building with open field.

Figure 6. Access to Raw Water Building.

Figure 7. NE side of Raw Water Building

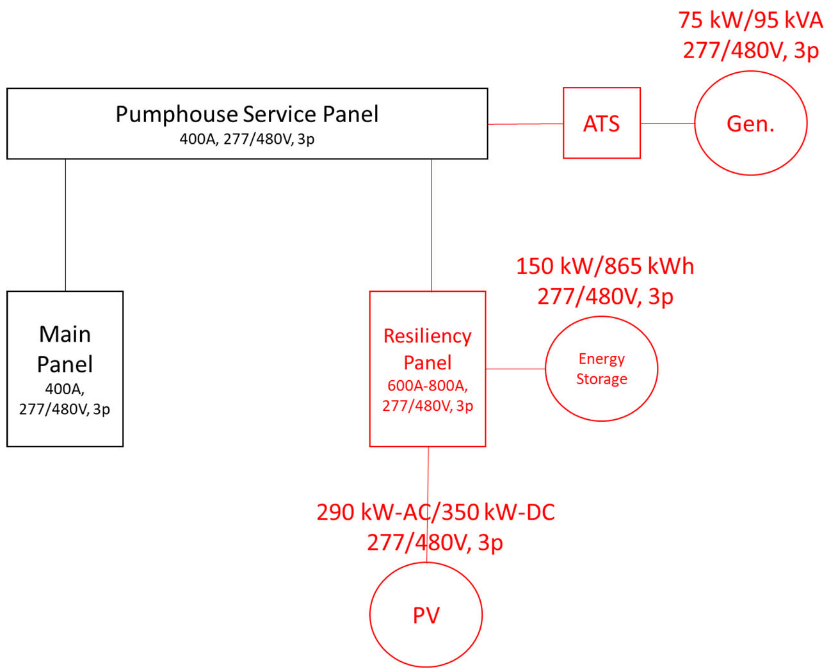
Figure 8. SE side of Raw Water Building.

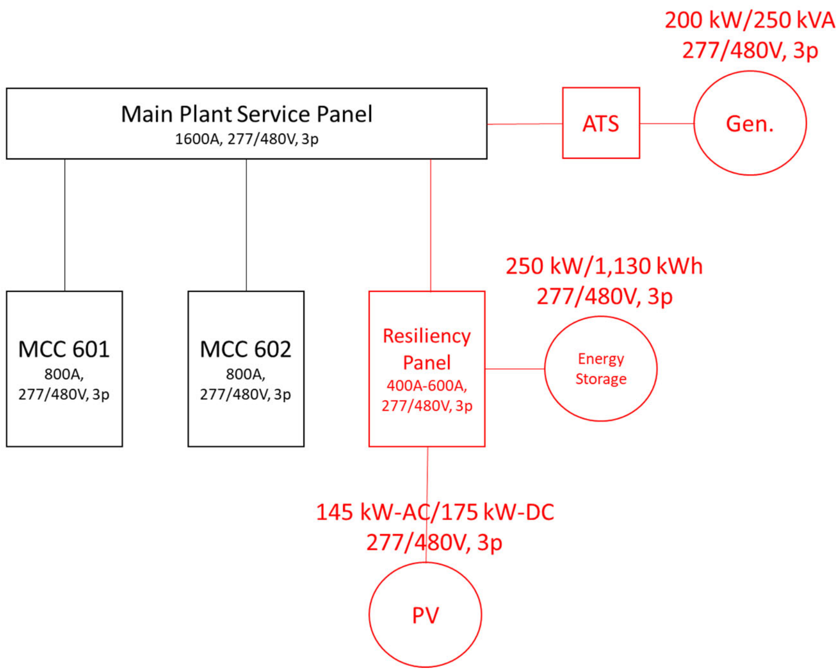
Figure 9. View of Treatment Building from the Raw Water Building.

Attachment D
One-Line Diagrams

One-line Diagrams/Schematics

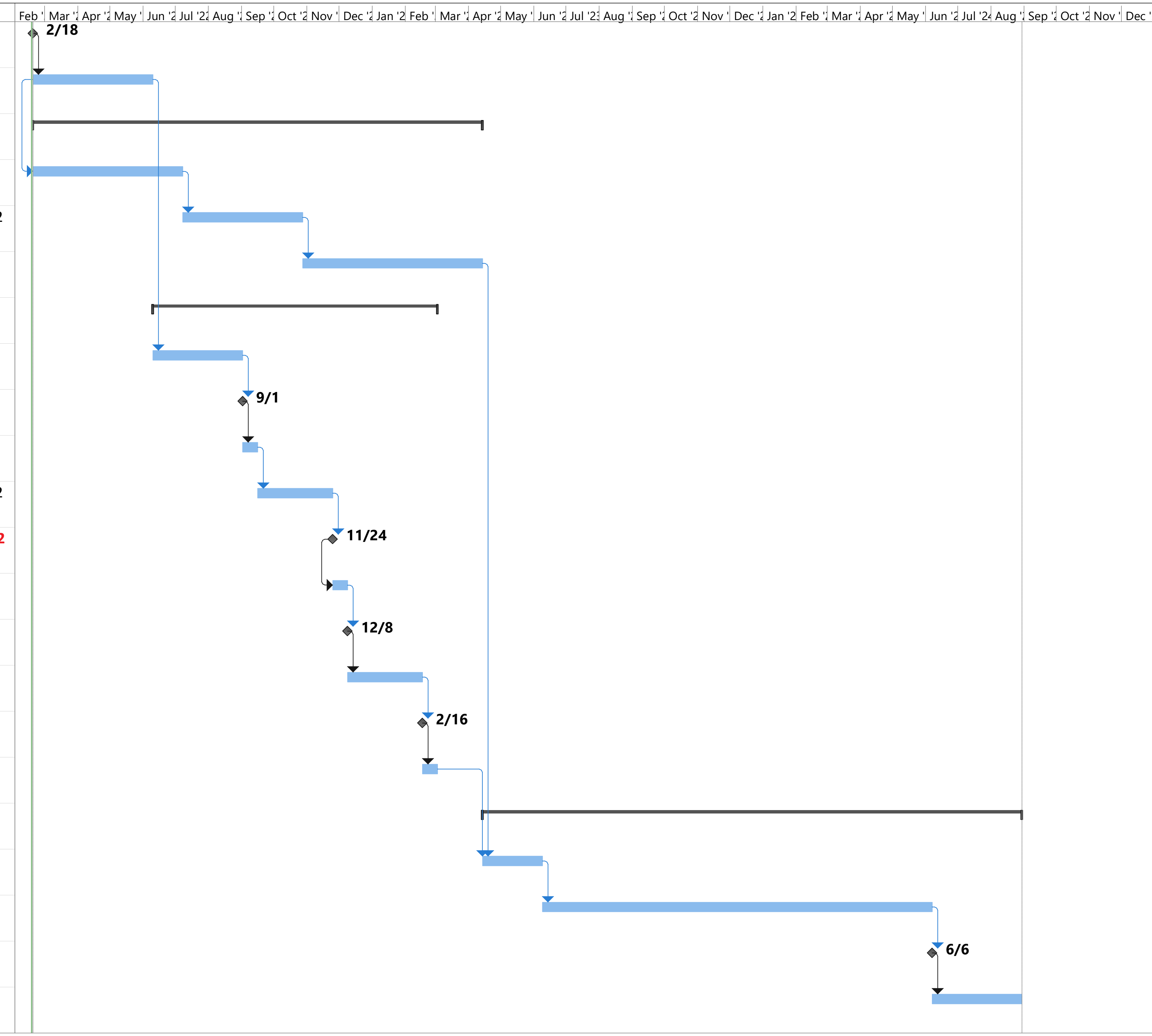
The following schematic illustrates the existing electrical panels and electrical equipment at the site and how the new comprehensive system might be connected. Modifications are marked in red. This is not intended to act as electrical engineering plans. Any electrical upgrades and sizing should be confirmed with a certified electrician and/or electrical engineer.





Attachment E
Project Schedule

ID	Task Name	Duration	Start	Finish
1	**Pacific Power Grant Resiliency Project Grant Application Submittal**	**0 days**	**Fri 2/18/22**	**Fri 2/18/22**
2	WTP Generator and Resiliency Project Alternatives Evaluation	80 days	Fri 2/18/22	Thu 6/9/22
3	**Funding**	**300 days**	**Fri 2/18/22**	**Thu 4/13/23**
4	Pacific Power Resiliency Grant Application Review/Award	100 days	Fri 2/18/22	Thu 7/7/22
5	Prepare and Submit FEMA BRIC Funding Applicatoin	80 days	Fri 7/8/22	Thu 10/27/22
6	FEMA BRIC Funding Application Review/Award	120 days	Fri 10/28/22	Thu 4/13/23
7	**Design**	**190 days**	**Fri 6/10/22**	**Thu 3/2/23**
8	Complete 30% Preliminary Design	60 days	Fri 6/10/22	Thu 9/1/22
9	Preliminary Design Report Submittal	0 days	Thu 9/1/22	Thu 9/1/22
10	**City Review Period**	**10 days**	**Fri 9/2/22**	**Thu 9/15/22**
11	Complete 60% Final Design	50 days	Fri 9/16/22	Thu 11/24/22
12	**60% Design Submittal**	**0 days**	**Thu 11/24/22**	**Thu 11/24/22**
13	**City Review Period**	**10 days**	**Fri 11/25/22**	**Thu 12/8/22**
14	**60% Design Review Workshop**	**0 days**	**Thu 12/8/22**	**Thu 12/8/22**
15	Complete 90% Final Design	50 days	Fri 12/9/22	Thu 2/16/23
16	90% Design Submittal	0 days	Thu 2/16/23	Thu 2/16/23
17	**City Review Period**	**10 days**	**Fri 2/17/23**	**Thu 3/2/23**
18	**Bidding and Construction**	**360 days**	**Fri 4/14/23**	**Thu 8/29/24**
19	Bidding, Contracts and NTP	40 days	Fri 4/14/23	Thu 6/8/23
20	Construction to Substantial Completion	260 days	Fri 6/9/23	Thu 6/6/24
21	Substantial Completion Inspection	0 days	Thu 6/6/24	Thu 6/6/24
22	Commissioning and Final Completion	60 days	Fri 6/7/24	Thu 8/29/24



City of Sweet Home, OR
February 18, 2022

\\POS-FS01\Portland\Clients\936 City of Sweet Home\50-20-01 Engineering Services\PM\2_TaskOrders_LetterProposals\LP - Sweet Home - WTP Standby Generator Alternatives Evaluation\SweetHomeWTP_StandbyGeneratorProject_PacificPowerGrantApp_Schedule_17Feb22.mpp