King County

West Point Power Quality Improvement Project

Wastewater Treatment Division

August 25, 2021

Problem Statement & Objective

Problem statements

1. Voltage sags lead to secondary and plant bypasses
2. Power outages lead to plant bypasses

Objectives

1. Expeditiously identify, design, and implement mitigation measures to prevent bypasses caused by voltage sags
2. Implement measures to mitigate bypasses caused by a power outages

West Point Power Reliability and Quality

PURSUING SOLUTIONS TO HEAVY RAIN AND POWER DISRUPTIONS

All but one of the bypasses that have occurred since February 2017 were the result of a combination of:

Intense rainfall causes a surge of stormwater to rush into our system.

Strong windstorms cause power disruptions that trigger equipment shutdowns

Understanding these causes allows us to pursue viable solutions:

Regulatory Driver

Washington Department of Ecology Administrative Order 19477

- Requires action to stop unpermitted discharges of wastewater at West Point Treatment Plant caused by disruptions in power

- Directs King County to design and implement near-term power modifications

King County Emergency Declaration

- Emergency Declaration issued on 2/25/2021

- To perform the work required by the emergency declaration, WTD initiated the West Point Emergency Power Quality Improvement Project to:

    1. Identify and evaluate effective solutions
    2. Recommend preferred solution
    3. Design solution
    4. Implement solution design
    5. Start-up and commission solution

Sag Mitigation Technologies

- 5 technologies were evaluated for effectiveness
- All technologies required considerable space
- All technologies are physically heavy and require significant foundational work
- All solutions have similar durations
- The preferred solution was selected based on effectiveness and ability to implement quickly

Preferred Solution

Online Uninterruptible Power Supply (UPS)

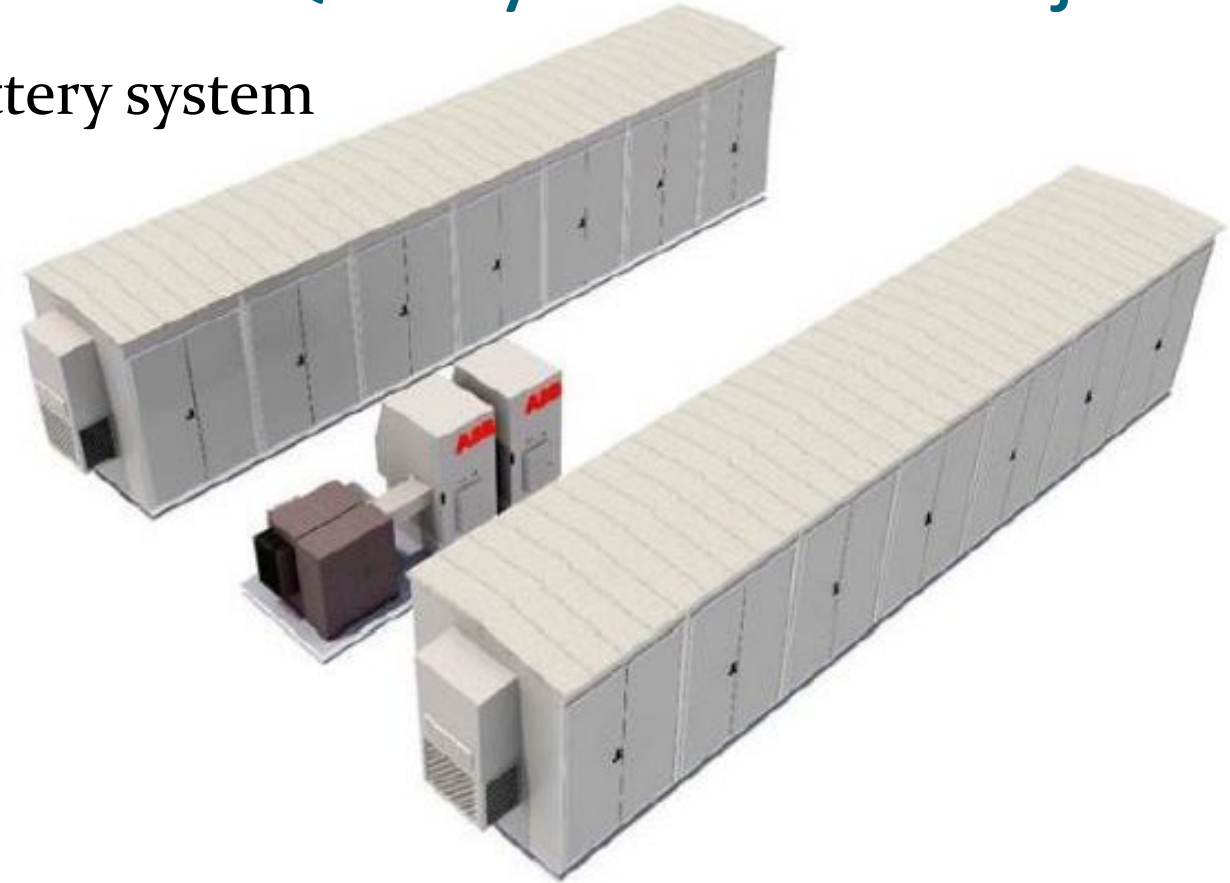
- Highly effective at mitigating sags
- Could ride-through minor outages and transfers to secondary feed
- New building would house voltage sag mitigation equipment, transformers, HVAC, fire suppression, and building systems
- Class 5 construction cost estimate at $60M

Schedule - Building

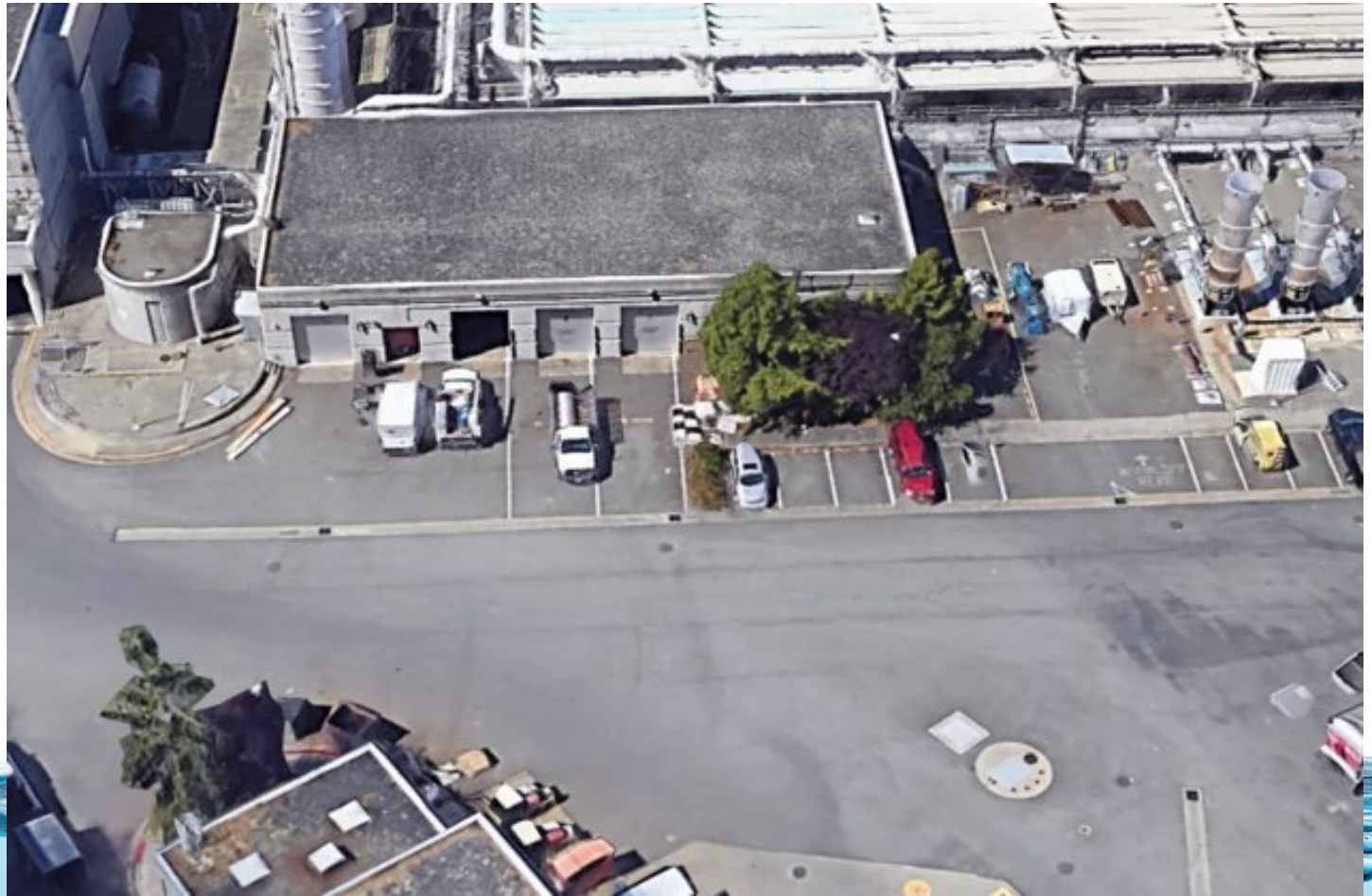
- Building required to house equipment
- Critical path leads through permitting building

West Point Power Quality Initiative Project

- Example large battery system



Building 713

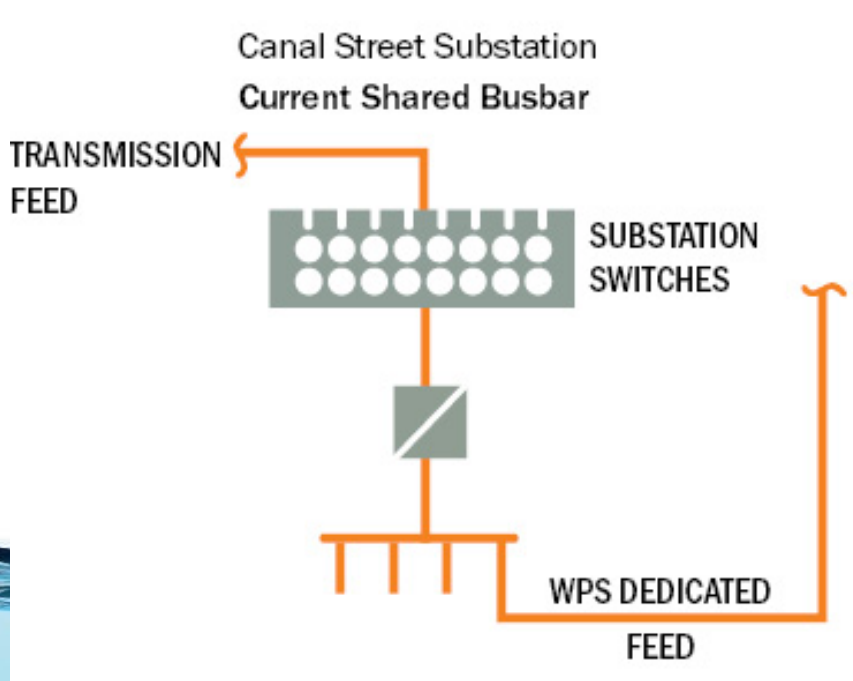


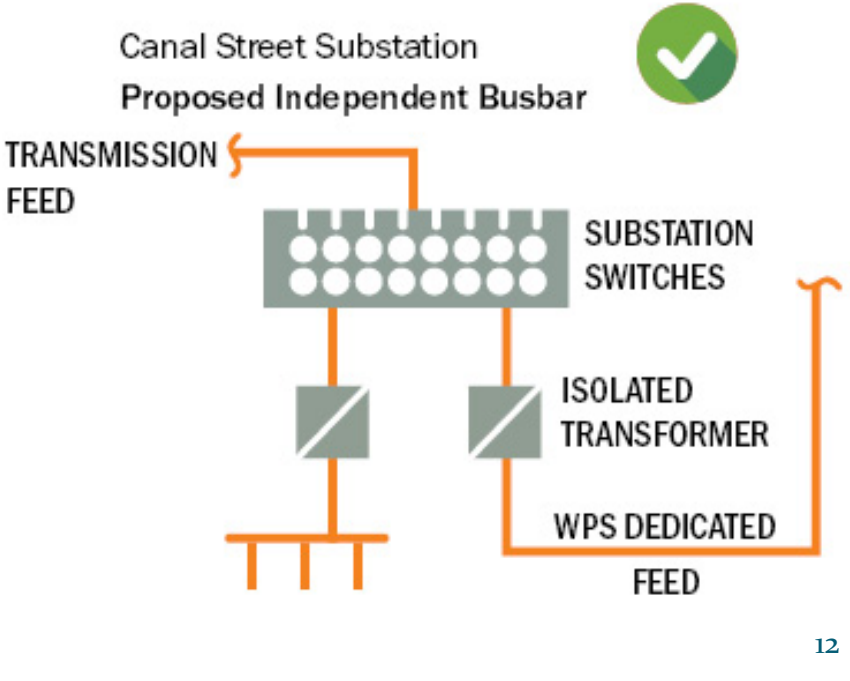
Schedule Acceleration

- Procured contractor to participate in design phase and plan construction
- Developing separate construction packages to initiate demo and earthwork
- Early procurement of equipment
- Thorough communications with Seattle Department of Construction and Inspection (SDCI)
  - Working with Seattle Mayor's office to expedite permitting

Near-Term Solutions
SCL Isolate Transformer to WPTP

Isolating WPTP's Canal feed transformer and busbar will vastly reduce the depth of sags





Near-Term Solutions

- Reprogram SCADA to be reduce auto-shutdowns
- Optimize the Nidec drives to be more resilient to sags
  - Requires hydraulic analysis to ensure surges and transients are not created
- All near-term measures will significantly reduce sag induced bypasses before the wet season 2021/22

Long-Term Solutions

- Working with Seattle City Light (SCL) to provide a second, dedicated distribution feed from Broad Street
- SCL developing a high-level scope and milestone schedule for design and construction

Next Step

- Optimize schedule to accelerate project delivery
- Continue final design of preferred solution
- Coordination with SDCI on expedited permitting
- Optimize Nidec drives and start hydraulic modeling
- Coordination with SCL on a second dedicated feed

Thank You

Bruce Kessler, Deputy Director
Wastewater Treatment Division
206-477-5501
bruce.kessler@kingcounty.gov