



# BACWA Asset Management Workshop at Central San

## Painting the Full Picture – Comprehensive Asset Evaluation

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# Today's Discussion

- 1 Plant Background
- 2 Project Background
- 3 Condition Assessment
- 4 Comprehensive Asset Evaluation
- 5 Decisionmaking
- 6 Conclusions



# 01 Plant Background



## CENTRAL CONTRA COSTA SANITARY DISTRICT

- Serves over 480,000 residents and 3,000 businesses
- Dry weather season flows currently average around 32 mgd
- During the wet season, peak hourly flows can exceed 200 mgd



# Liquid Treatment Process

Headworks



Primary



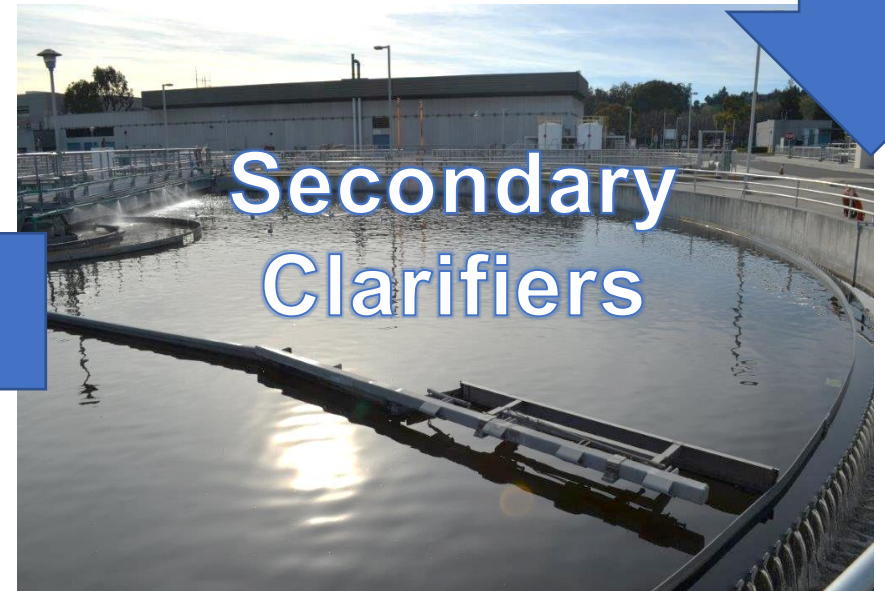
Aeration Tanks



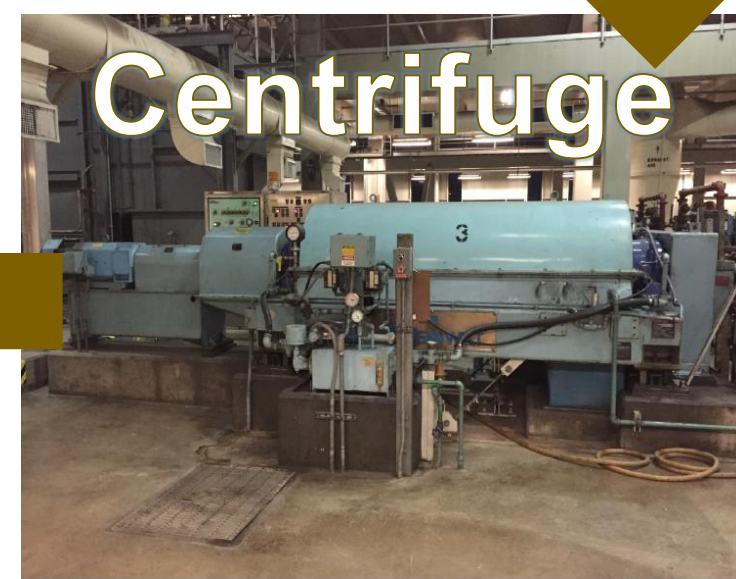
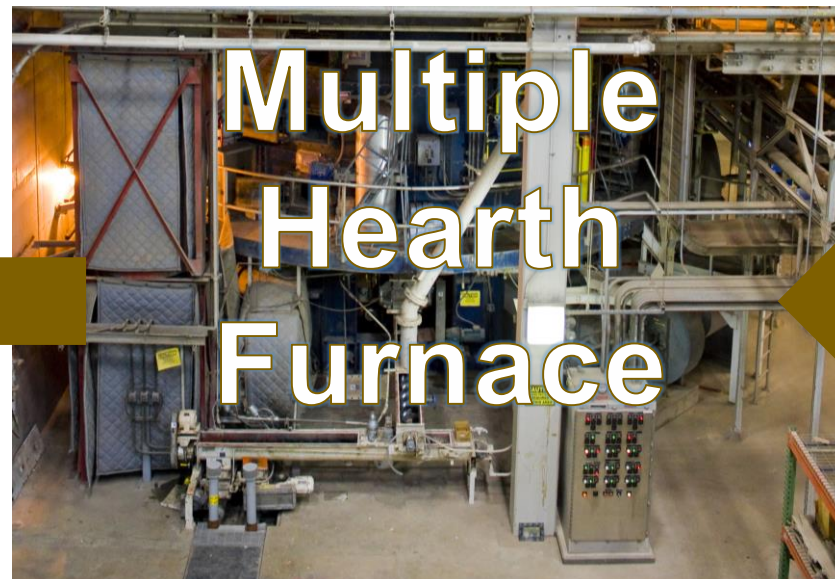
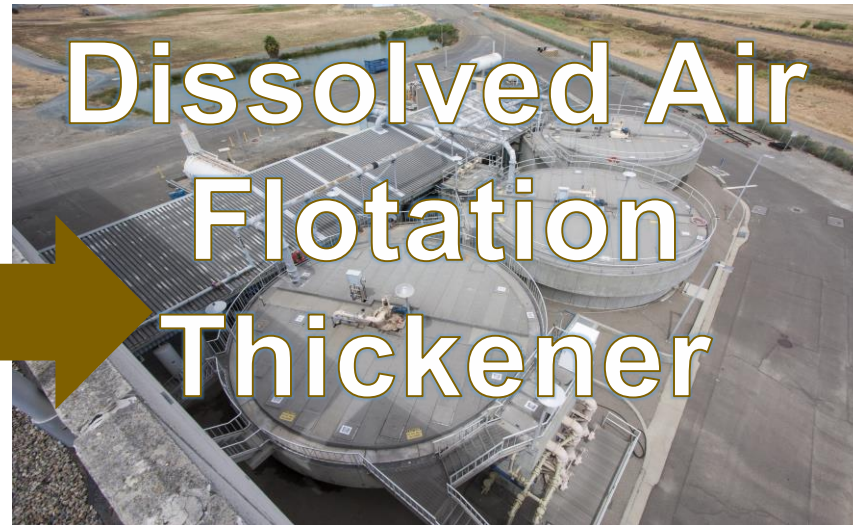
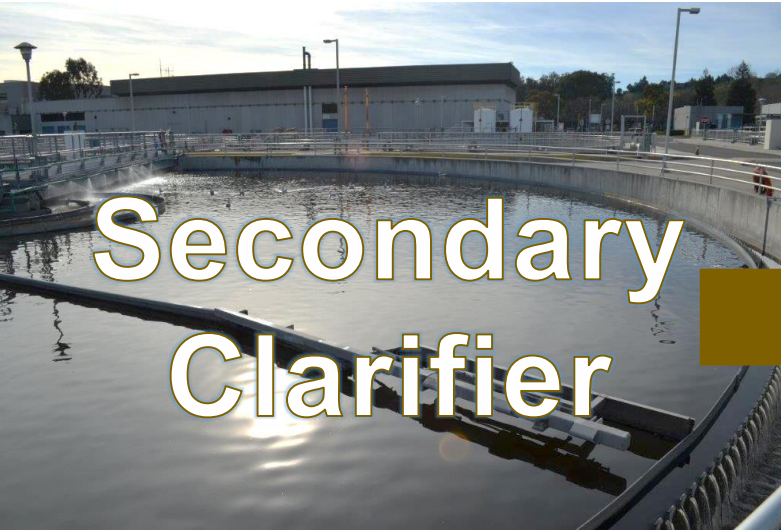
UV Disinfection



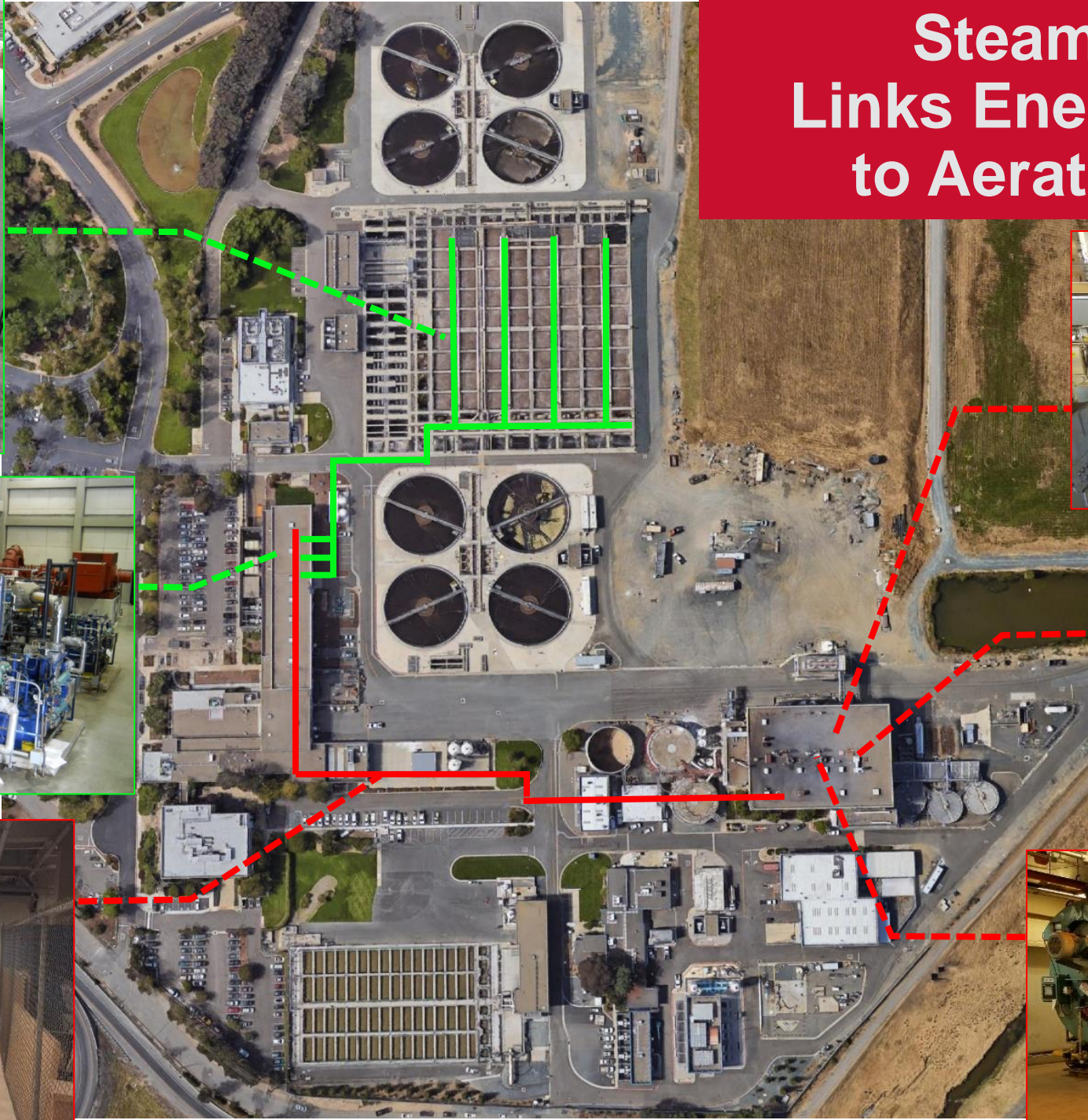
Secondary Clarifiers



# Solids Treatment Process



# Steam System: Links Energy Recovery to Aeration System





# 02 Project Background



# Steam Project (Began in 2019)

- Included steam and secondary processes, and the supporting electrical and motor control
- Developed remaining useful life (RUL) for each asset
- Results allowed for definition and prioritization of projects



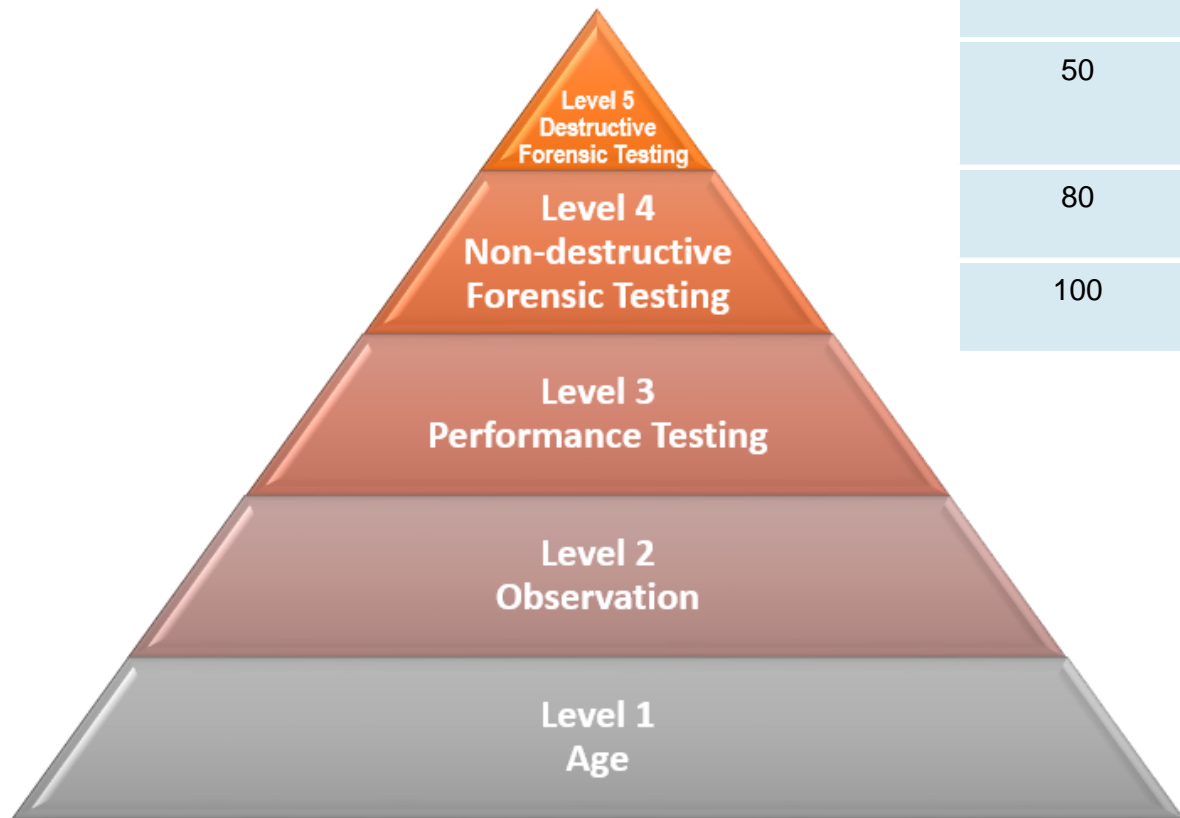
# Project Roadmap



# Levels of Condition Assessment & Scoring

Condition and POF Scoring

Central San Condition Score	HDR Condition Score	Probability of Failure (POF)	Description	Percent of Original Life	Maintenance
10	1	1	New or excellent condition	100%	Normal preventative Maintenance
30	2	3	Minor defects only	75%	Normal preventative maintenance, minor corrective maintenance
50	3	5	Moderate deterioration	50%	Normal preventative maintenance, major corrective maintenance
80	4	8	Significant deterioration	25%	Rehabilitation, if possible
100	5	10	Virtually unserviceable	1%	Replace



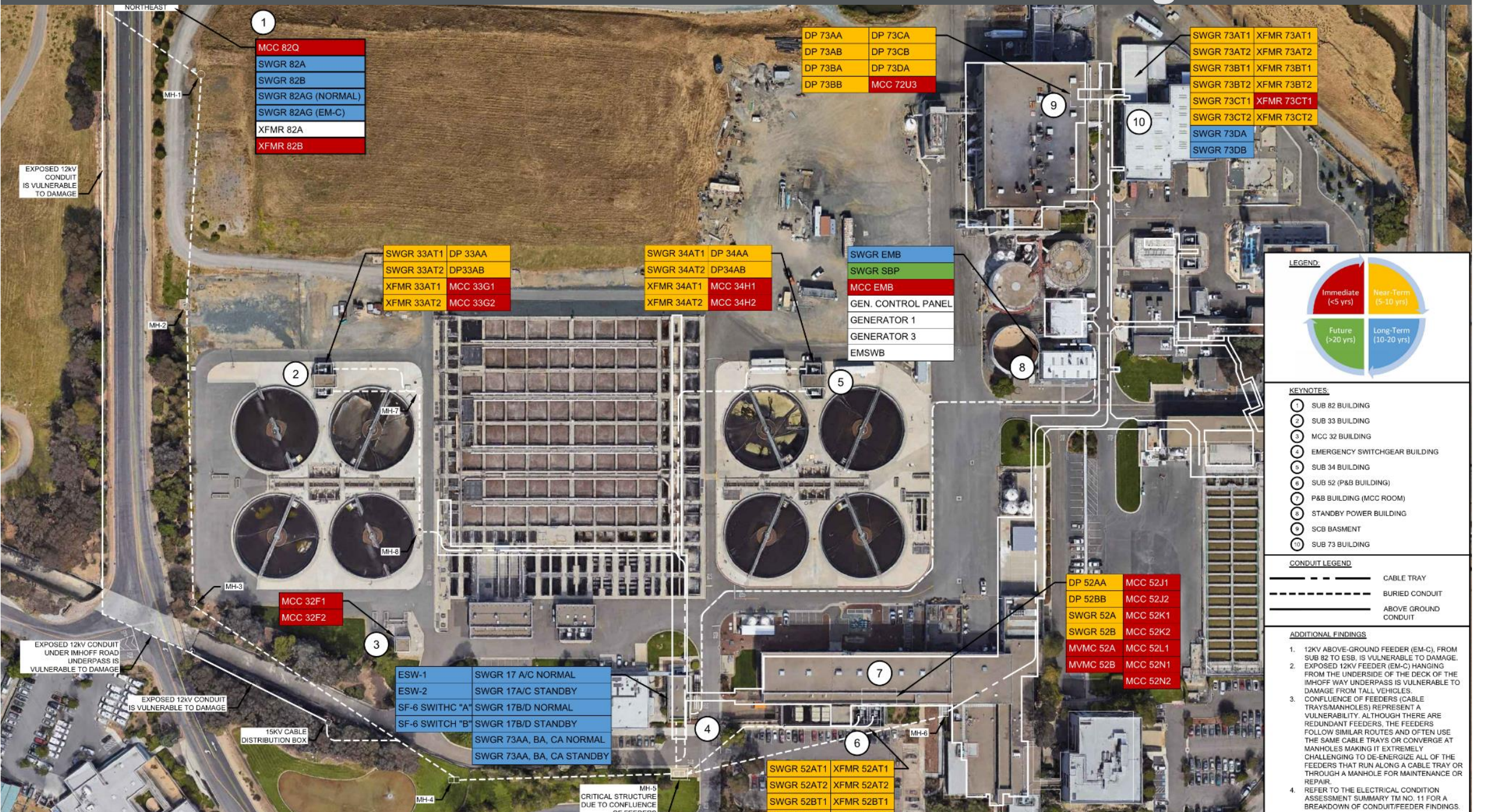


# 03 Condition Assessment

# Electrical Methodology

- Assessment of equipment and feeders, Plant-wide
- Condition = function of (age, inspection, testing)
- RUL = function of (condition, nominal lifespan)

# Condition Assessment Electrical Findings



- 1**
- MCC 82Q
  - SWGR 82A
  - SWGR 82B
  - SWGR 82AG (NORMAL)
  - SWGR 82AG (EM-C)
  - XFMR 82A
  - XFMR 82B

- DP 73AA
- DP 73AB
- DP 73BA
- DP 73BB
- DP 73CA
- DP 73CB
- DP 73DA
- MCC 72U3

- SWGR 73AT1
- SWGR 73AT2
- SWGR 73BT1
- SWGR 73BT2
- SWGR 73CT1
- SWGR 73CT2
- SWGR 73DA
- SWGR 73DB
- XFMR 73AT1
- XFMR 73AT2
- XFMR 73BT1
- XFMR 73BT2
- XFMR 73CT1
- XFMR 73CT2

- SWGR 33AT1
- SWGR 33AT2
- XFMR 33AT1
- XFMR 33AT2
- DP 33AA
- DP33AB
- MCC 33G1
- MCC 33G2

- SWGR 34AT1
- SWGR 34AT2
- XFMR 34AT1
- XFMR 34AT2
- DP 34AA
- DP34AB
- MCC 34H1
- MCC 34H2

- SWGR EMB
- SWGR SBP
- MCC EMB
- GEN. CONTROL PANEL
- GENERATOR 1
- GENERATOR 3
- EMSWB



- MCC 32F1
- MCC 32F2

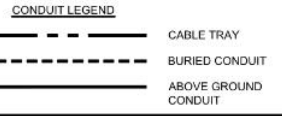
- 3**
- ESW-1
  - ESW-2
  - SF-6 SWITCH "A"
  - SF-6 SWITCH "B"
  - SWGR 17 A/C NORMAL
  - SWGR 17A/C STANDBY
  - SWGR 17B/D NORMAL
  - SWGR 17B/D STANDBY
  - SWGR 73AA, BA, CA NORMAL
  - SWGR 73AA, BA, CA STANDBY

- DP 52AA
- DP 52BB
- SWGR 52A
- SWGR 52B
- MVMC 52A
- MVMC 52B
- MCC 52J1
- MCC 52J2
- MCC 52K1
- MCC 52K2
- MCC 52L1
- MCC 52N1
- MCC 52N2

- SWGR 52AT1
- SWGR 52AT2
- SWGR 52BT1
- SWGR 52BT2
- XFMR 52AT1
- XFMR 52AT2
- XFMR 52BT1
- XFMR 52BT2



- KEYNOTES:**
- 1 SUB 82 BUILDING
  - 2 SUB 33 BUILDING
  - 3 MCC 32 BUILDING
  - 4 EMERGENCY SWITCHGEAR BUILDING
  - 5 SUB 34 BUILDING
  - 6 SUB 52 (P&B BUILDING)
  - 7 P&B BUILDING (MCC ROOM)
  - 8 STANDBY POWER BUILDING
  - 9 SCB BASMENT
  - 10 SUB 73 BUILDING



- ADDITIONAL FINDINGS**
- 12KV ABOVE-GROUND FEEDER (EM-C), FROM SUB 82 TO ESB, IS VULNERABLE TO DAMAGE.
  - EXPOSED 12KV FEEDER (EM-C) HANGING FROM THE UNDERSIDE OF THE DECK OF THE IMHOFF WAY UNDERPASS IS VULNERABLE TO DAMAGE FROM TALL VEHICLES.
  - CONFLUENCE OF FEEDERS (CABLE TRAYS/MANHOLES) REPRESENT A VULNERABILITY. ALTHOUGH THERE ARE REDUNDANT FEEDERS, THE FEEDERS FOLLOW SIMILAR ROUTES AND OFTEN USE THE SAME CABLE TRAYS OR CONVERGE AT MANHOLES MAKING IT EXTREMELY CHALLENGING TO DE-ENERGIZE ALL OF THE FEEDERS THAT RUN ALONG A CABLE TRAY OR THROUGH A MANHOLE FOR MAINTENANCE OR REPAIR.
  - REFER TO THE ELECTRICAL CONDITION ASSESSMENT SUMMARY TM NO. 11 FOR A BREAKDOWN OF CONDUIT/FEEDER FINDINGS.

EXPOSED 12KV CONDUIT IS VULNERABLE TO DAMAGE

EXPOSED 12KV CONDUIT UNDER IMHOFF ROAD UNDERPASS IS VULNERABLE TO DAMAGE

EXPOSED 12KV CONDUIT IS VULNERABLE TO DAMAGE


15KV CABLE DISTRIBUTION BOX

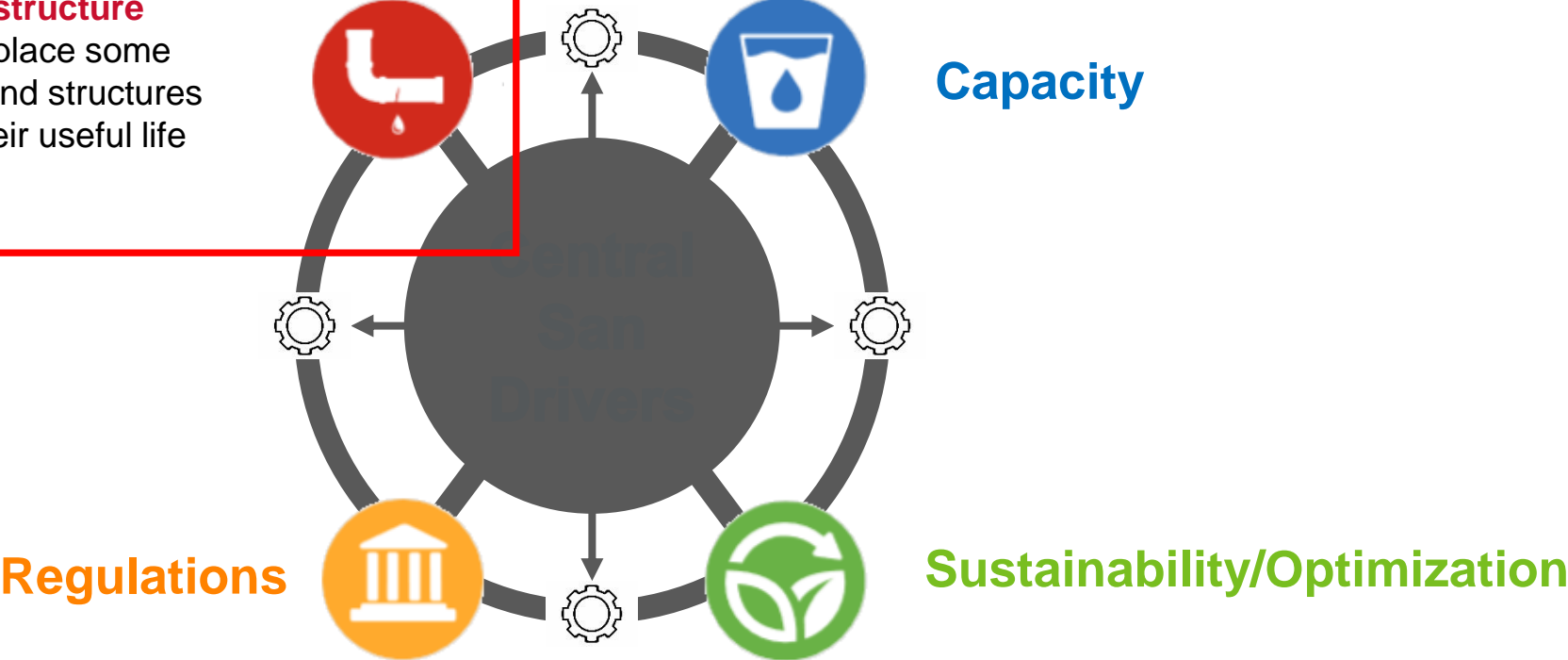
MH-5 CRITICAL STRUCTURE DUE TO CONFLUENCE OF FEEDERS



# 04 Comprehensive Asset Evaluation

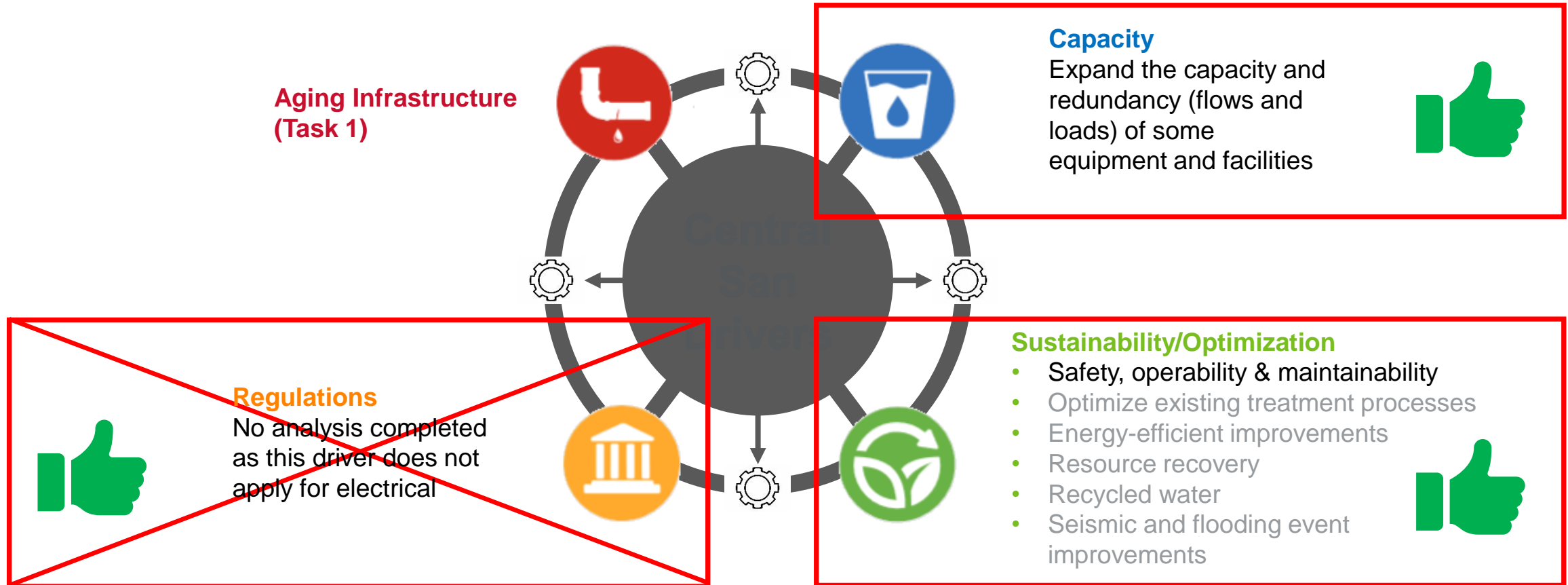
# Addressed Aging Infrastructure Driver through Condition Assessment Efforts: What about Other Drivers?

 **Aging Infrastructure**  
Repair or replace some equipment and structures to extend their useful life



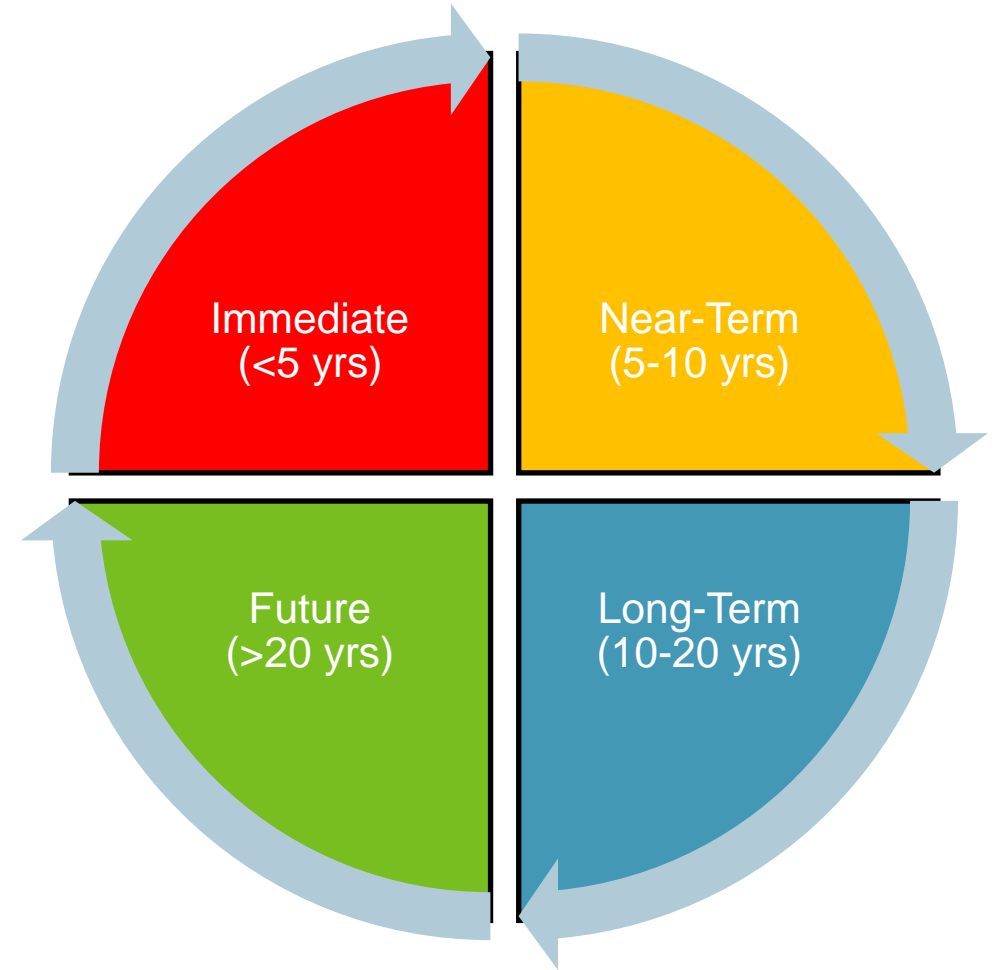


# Other Drivers Captured in this Evaluation: Referred to as the Comprehensive Asset Evaluation

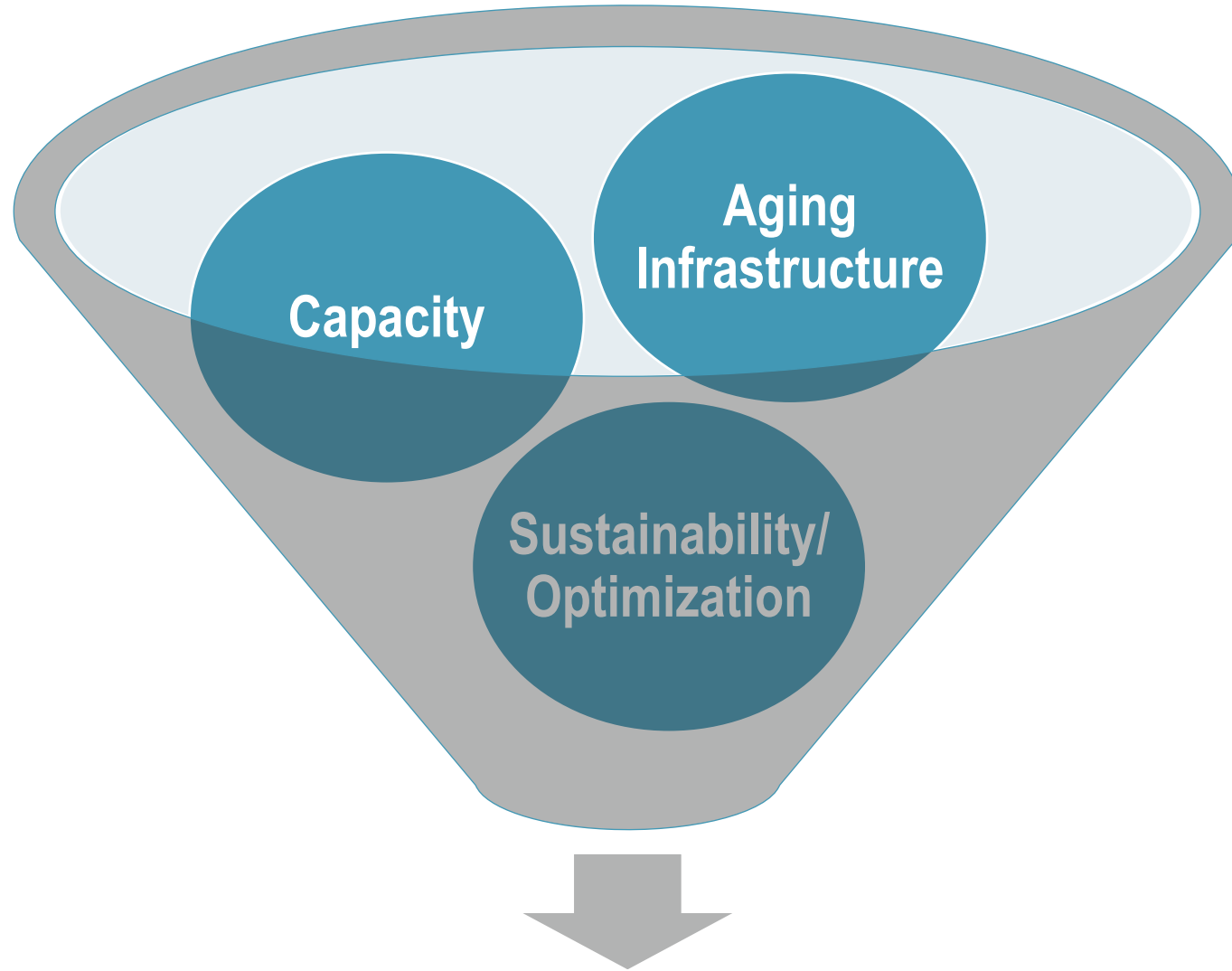


# Estimated Remaining Useful Life (RUL) Of Assets: Organized Into Four Different Groups Based On Replacement Horizons

- **Condition Assessment** RUL carried over from previous work
- **Capacity** RUL determined from data obtained during this evaluation (0.75% growth increase/year)
- **Sustainability/Optimization** RUL determined by assessing factors in the course of the evaluation



# Assigning RUL for the Comprehensive Asset Evaluation



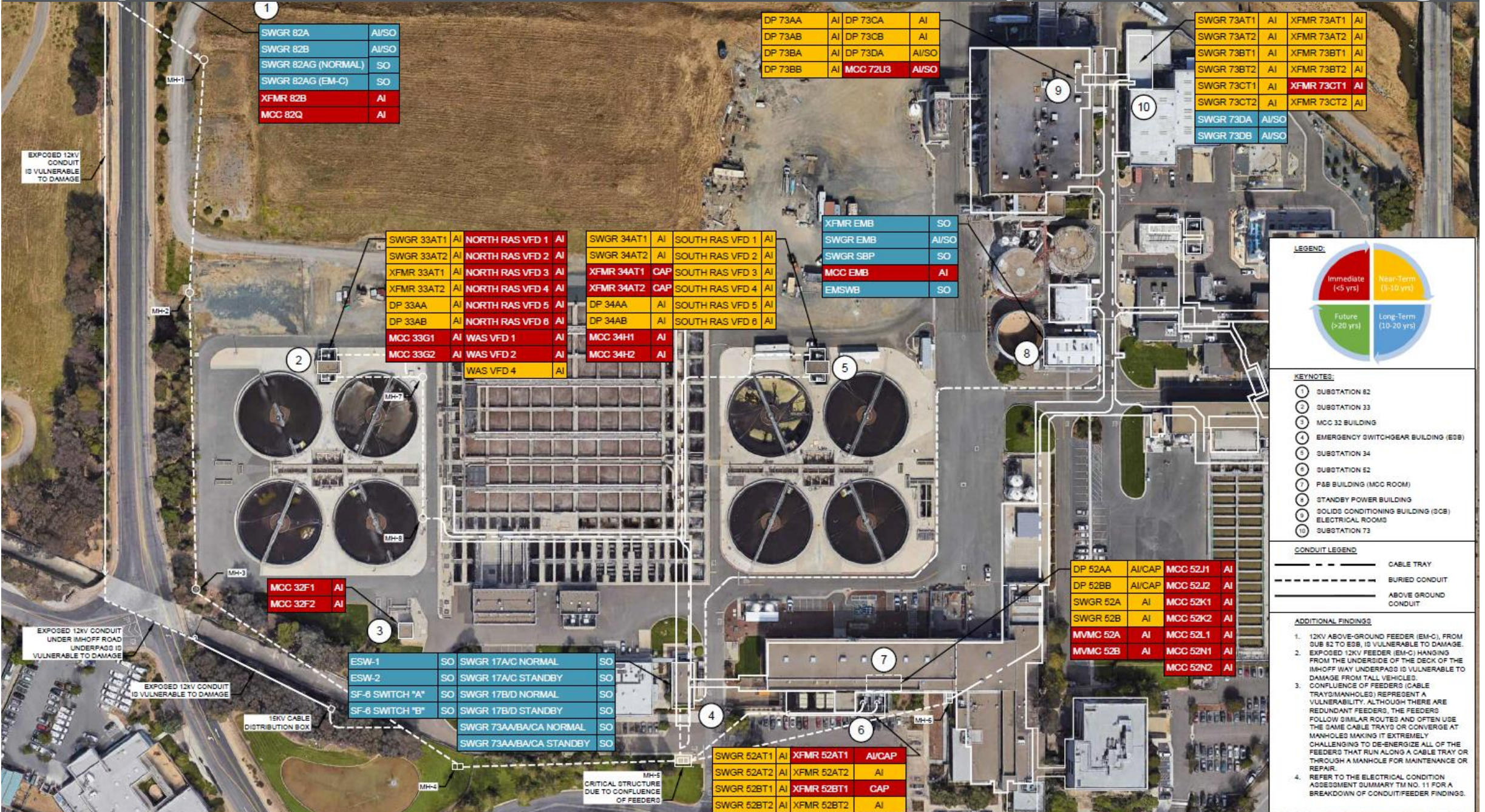
Limiting RUL Governs the Replacement Horizon

# Electrical Methodology

- Capacity: based on Load Analyses
- Sustainability: Six groups of evaluation points weighted
- Aging infrastructure (condition)

 RULS

# Comprehensive Asset Evaluation Preliminary Electrical Findings





# 05 Decision Making

# Decision Making

- RUL's
- Consider consequences of failure
- Standalone project(s)
- Packaging with process projects

# Homeruns

- Common language-RUL's
- Methodology/weighting endorsed by O&M
- Scalable
- Avoided common missteps
- Comprehensive/Plant-wide
- Long view
- As built





# 06 Conclusions

# Conclusions

- This approach can serve as a template for other agencies to make informed business decisions regarding aging infrastructure.
- CAE builds upon condition assessment results to systematically capture other drivers (capacity and sustainability/optimization).
- The CAE process can ideally help a treatment plant fast track optimization efforts, identify opportunities to extend RUL of major assets when cost effective, and define near and long-term capital improvement projects in a simple and easy to communicate way.