

Case Study

Reducing Electrical Risk with Partial Discharge Insights for Water Utilities



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How One Water Utility Reduced Asset Failure Risk with Partial Discharge Insights

Partial Discharge (PD) is an early indicator of insulation deterioration in high-voltage assets. Detecting PD early helps water utilities reduce failure risk, improve reliability and enable more proactive asset management.



Reduce
failure risk



Improve
reliability



Enable more proactive
asset management

Introduction

A major Australian water utility engaged our experts to carry out Partial Discharge (PD) testing across critical 11kV electrical infrastructure supplying a large water treatment operation. The objective was to gain greater visibility of hidden insulation risks, improve network reliability and explore how continuous PD monitoring could support a more proactive maintenance strategy.

The project focused on identifying early-stage electrical insulation deterioration before it could develop into unplanned outages, asset failures or operational disruption.

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The Challenge

Electrical infrastructure in water treatment facilities operates continuously in demanding environments where reliability is critical. Hidden insulation defects can remain undetected for years before resulting in:

- Unplanned outages.
- Equipment failure.
- Safety incidents.
- Operational disruption.
- Increased maintenance costs.

The utility wanted to:

- Assess the condition of key high-voltage assets without taking systems offline.
- Identify whether any PD activity was present across the network.
- Establish a benchmark for future condition trending.
- Understand the feasibility of continuous PD monitoring on long HV feeder systems.

The Approach

We completed a non-intrusive PD survey across:

- 11kV overhead feeder systems.
- Indoor 11kV switchboards.
- Cable transition points between underground and overhead infrastructure.

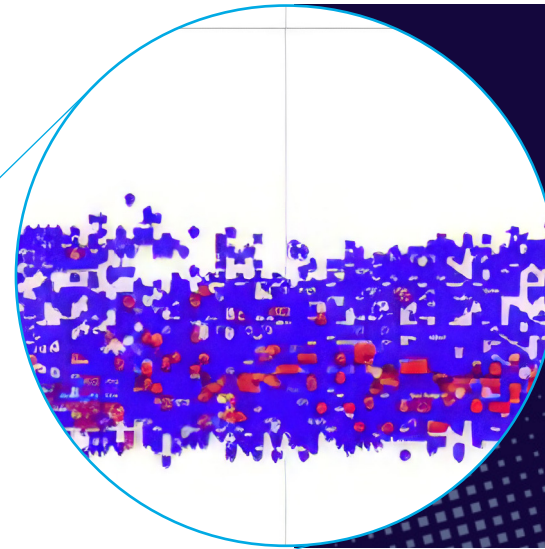
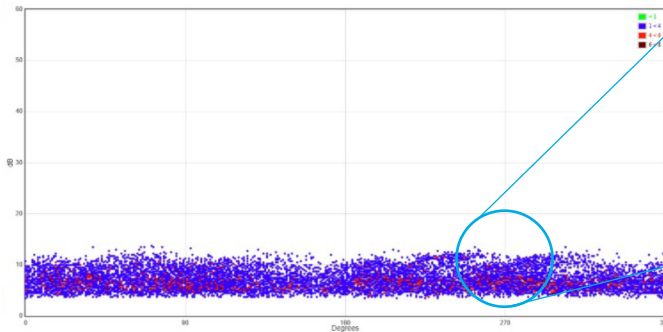
The assessment used multiple complementary PD detection techniques, including:

- Transient Earth Voltage (TEV).
- Ultrasonic.
- Ultra High Frequency (UHF).

Using multiple technologies allowed engineers to detect different types of insulation degradation and discharge activity while assets remained energised and operational.

What the PD Assessment Revealed

During testing, engineers identified low-level TEV activity associated with one incoming 11kV cable connected to a switchboard incomer. The phase-resolved PD pattern displayed characteristics consistent with possible internal void-type discharge activity.



13 dBmV early-stage PD indication detected before failure occurred

Further investigation showed no corresponding PD activity at the cable transition pole, helping narrow the likely location of the issue closer to the switchroom environment.

These findings demonstrated:

- The presence of a potential developing insulation issue.
- The ability to detect early-stage defects before failure occurs.
- The value of PD testing as part of a predictive maintenance strategy.

The survey also confirmed that no active PD was detected across the overhead feeder systems or the wider switchboard population at the time of testing.

This provided the utility with:

- A baseline condition benchmark.
- Increased confidence in asset performance.
- Evidence to support targeted maintenance prioritisation.
- Greater visibility of network health across critical infrastructure.

Moving from Reactive to Predictive Maintenance

One of the key outcomes of the project was demonstrating how PD assessment can support a transition from reactive maintenance to condition-based asset management.

Instead of relying solely on:

- Time-based inspection cycles.
- Age-based replacement strategies.
- Failure-driven maintenance.

The utility could now begin using PD data to:

- Track asset condition over time.
- Monitor defect progression.
- Prioritise intervention based on risk.
- Take action before an unexpected failure occurs.

The Role of Continuous PD Monitoring

As part of the project, we also assessed the feasibility of installing 24/7 PD monitoring across the 11kV feeder network.

The proposed monitoring solution would enable:

- Continuous surveillance of critical HV assets.
- Early detection of evolving PD activity.
- Faster identification of insulation deterioration.
- Improved maintenance planning.
- Reduced operational risk.

The assessment demonstrated that permanent monitoring was technically viable across the utility's long-distance feeder network and could significantly improve long-term asset visibility.

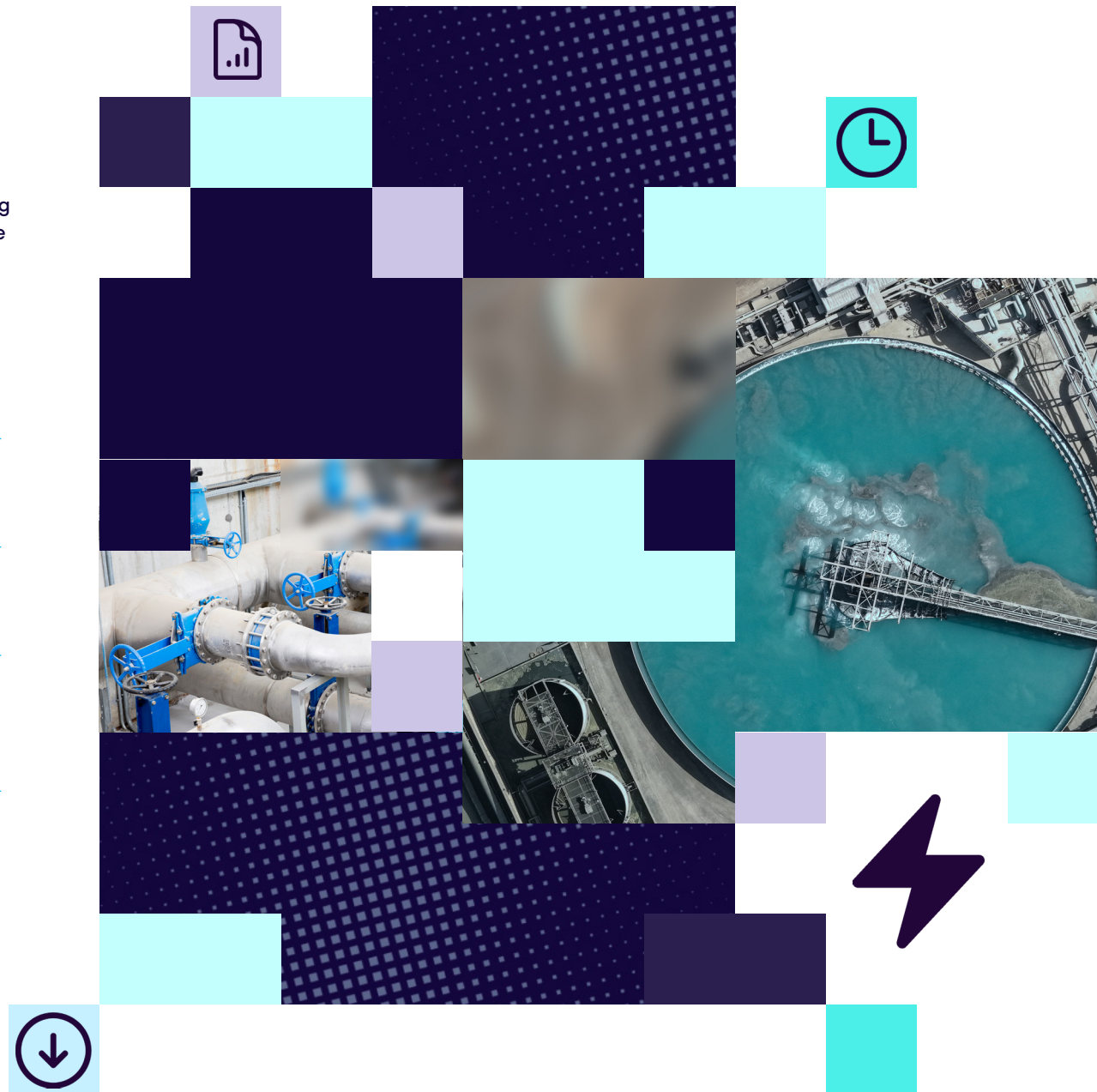
Key outcome

Over 40 high-voltage assets were surveyed using non-intrusive PD technology providing the utility with a complete baseline for future condition monitoring.

The Outcomes

One of the key outcomes of the project was demonstrating how PD assessment can support a transition from reactive maintenance to condition-based asset management.

- **Improved Asset Visibility –**
The utility gained a clearer understanding of the condition of critical HV infrastructure and established a baseline for future PD trending.
- **Early Risk Identification –**
Potential insulation degradation was identified before it could develop into a major operational issue.
- **Increased Network Reliability –**
The project supported more proactive decision-making around maintenance and asset management.
- **Reduced Operational Risk –**
Continuous PD monitoring was identified as a practical strategy for reducing the likelihood of unplanned failures and improving system resilience.



Why PD Matters for Water Utilities

Water utilities rely on continuous electrical supply to maintain pumping, treatment and distribution operations. Even minor insulation defects can escalate into major failures if left undetected.

PD assessment provides utilities with:

- Early warning of insulation deterioration.
- Greater confidence in asset condition.
- Improved maintenance prioritisation.
- Reduced risk of outages and operational disruption.
- A pathway towards predictive maintenance strategies.

Non-intrusive PD testing and monitoring can help water utilities improve reliability, extend asset life and make more informed asset management decisions.



Which PD product is best for me



Astute® HV Monitoring

Keeping a cautious eye on your HV assets through continuous partial discharge monitoring.



UltraTEV® Plus²

The UltraTEV® Plus² is the most advanced PD detection instrument on the market.



Partial Discharge Solutions Comparison

Customer Need / Scenario	Astute® HV Monitoring	UltraTEV® Plus²
Critical assets where outages are very costly	✓	✓
Continuous 24/7 monitoring required	✓	
Periodic/manual inspections only		✓
In-house maintenance team available	✓	✓
Portable handheld solution needed		✓
Expert interpretation and reporting needed	✓	
I'd like to own and operate equipment myself	✓	✓
A service which can be outsourced or operated with internal knowledge	✓	
Early fault alerts and remote alarms needed	✓	
Ideal for routine maintenance rounds		✓
Suitable for condition-based maintenance strategies	✓	✓
Minimal extra training requirement for customer		✓
Suitable for large multi-site HV networks	✓	✓
Best for large multi-site HV networks	✓	
Lower upfront investment preferred		✓
Long-term asset health trending required	✓	✓
Temporary or one-off assessments required		✓
Excellent for proactive asset management	✓	✓

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