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Building an Innovation Program

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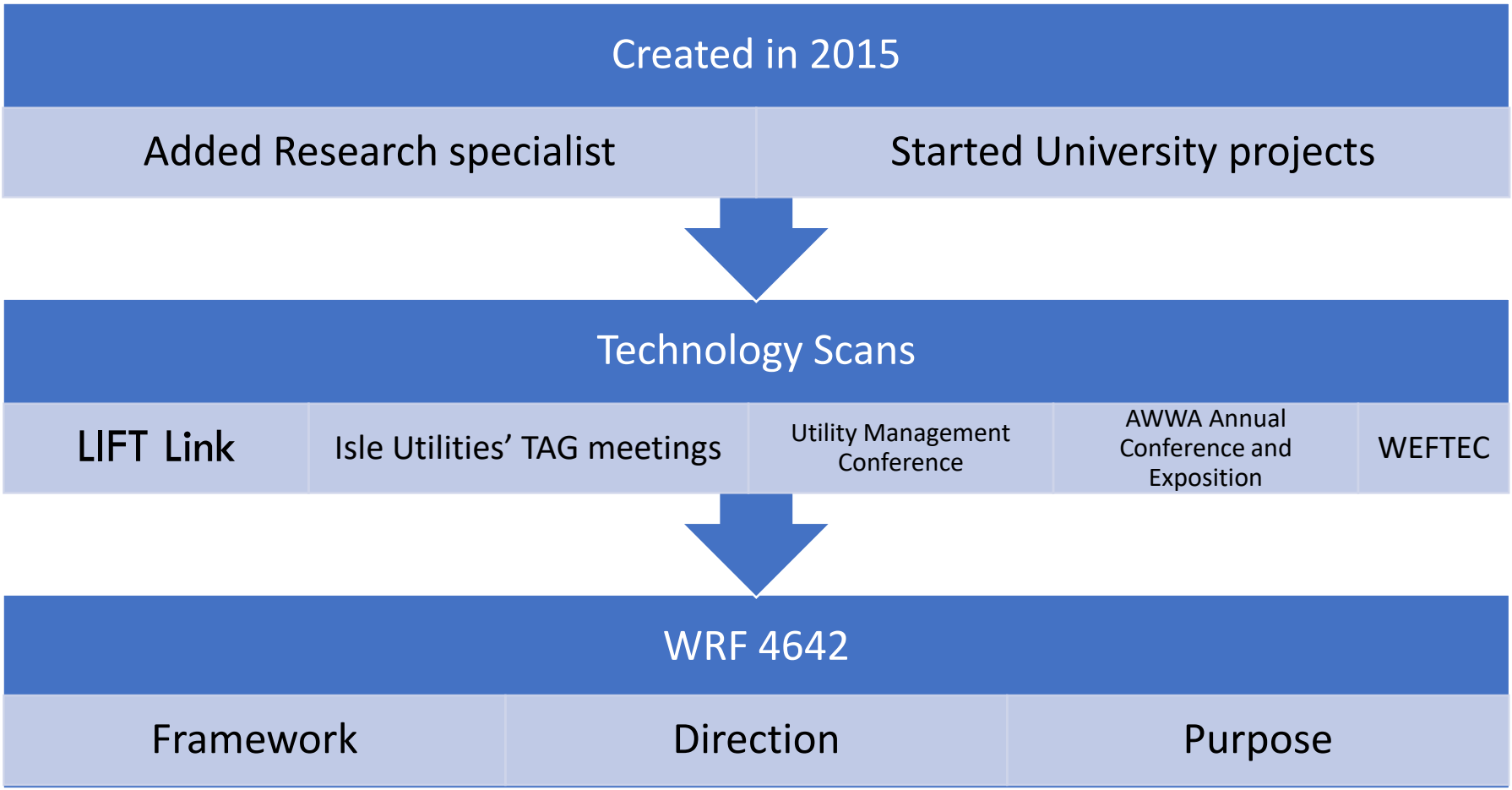
Director, Office of Innovation and Research

Agenda

- Development of the Innovation Program
- Changing Culture to Support Innovation
- Pilot Projects
  - Plant Initiatives
  - System Initiatives
- Other Research Partners

Building an Innovation Program



Building an Innovation Program

WRF 4642 Utility Innovation Framework

Results-oriented. Tangible and intangible improvement aligned with leadership and organizational philosophy.

People-oriented. Ideators, mentors, adopters leading initiation and application of innovation.

Ecosystem-oriented. Environment encouraging growth and maturation of ideas.

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Eight Key Business Disciplines

1. **Visualize** - maintain a long view that empowers and inspires innovation
2. **Focus** - define challenges that guide investment
3. **Develop** - invest resources in new ideas
4. **Evaluate** - test concepts in scaled and relevant applications
5. **Engage** - motivate, enable and reward stakeholders
6. **Reach** - utilize resources outside of the organization
7. **Communicate** - capture and convey defining success stories
8. **Evolve** - implement concepts and measure impact

Vision for the Innovation Program

Bringing ideas to life!

OFFICE VISION

To be THE world-class innovation and research program.

OFFICE MISSION

Inspire people to discover, nurture, and apply breakthrough innovations.

OFFICE PRIORITIES

- Improve operational efficiency
- Empower Employees
- Increase sustainability of our infrastructure
- Develop new products and services
- Expand our partnerships
- Share our knowledge and expertise to benefit the industry

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Focus of the Innovation Program

Spend Customer Dollars Wisely	• Reduce Expenses • Upgrade Sustainability • Improve Efficiency
Transform Employee Engagement	• Engage Employees • Change culture • Solve problems
Optimize Infrastructure	• Water and Sewer Pipe Networks • Water Filtration Plants • Water Resource Recovery Facilities

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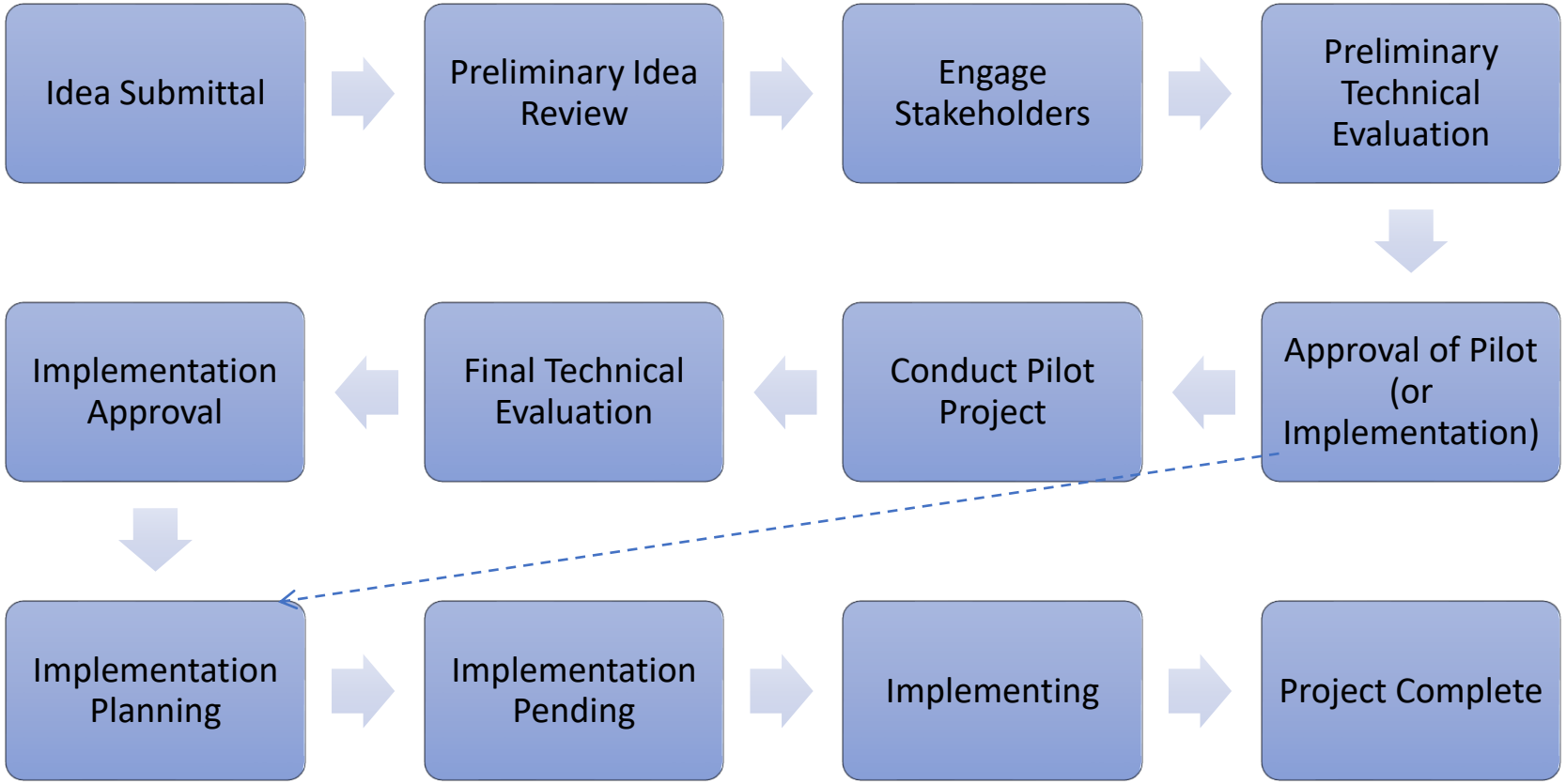
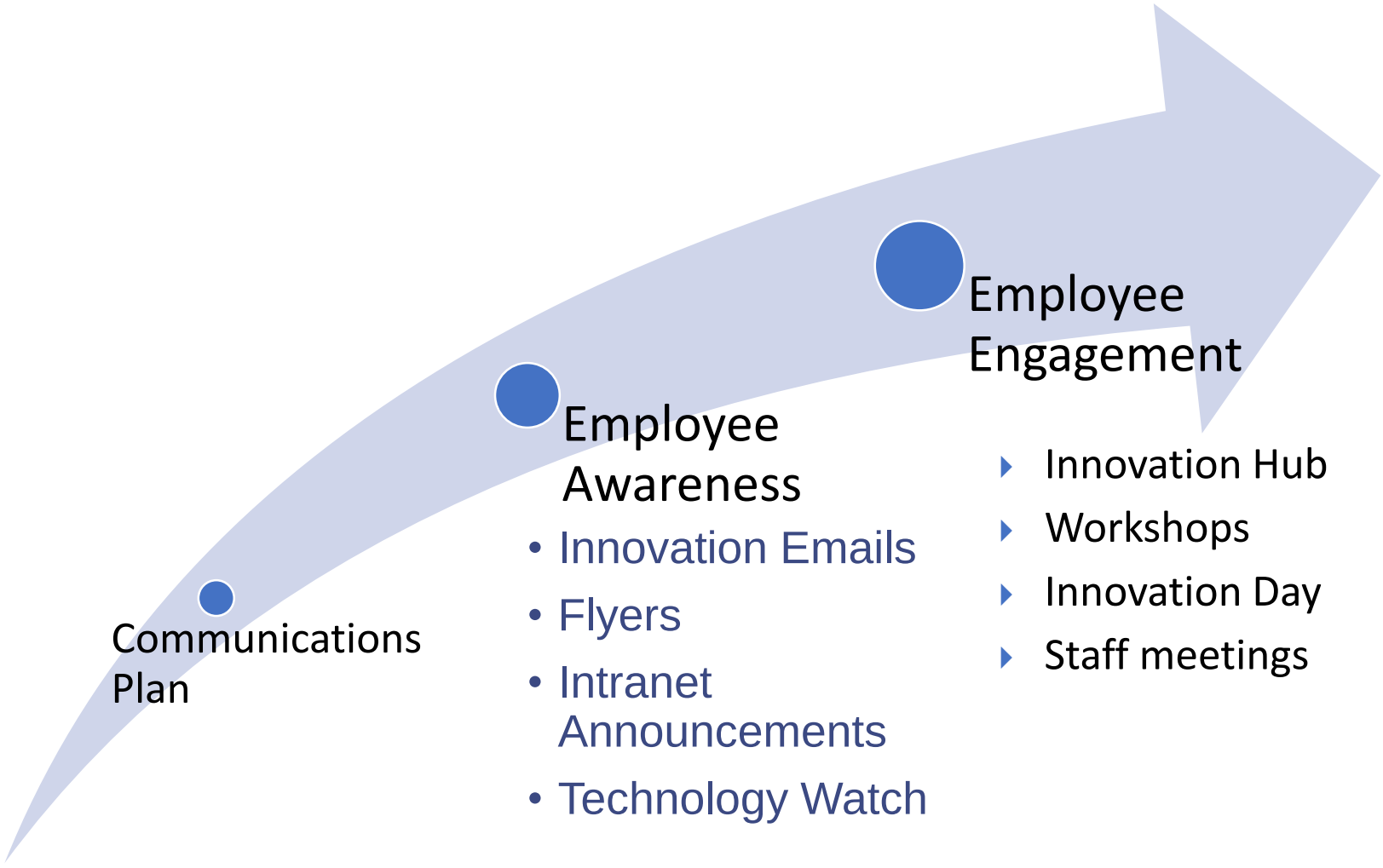
Developing Capability

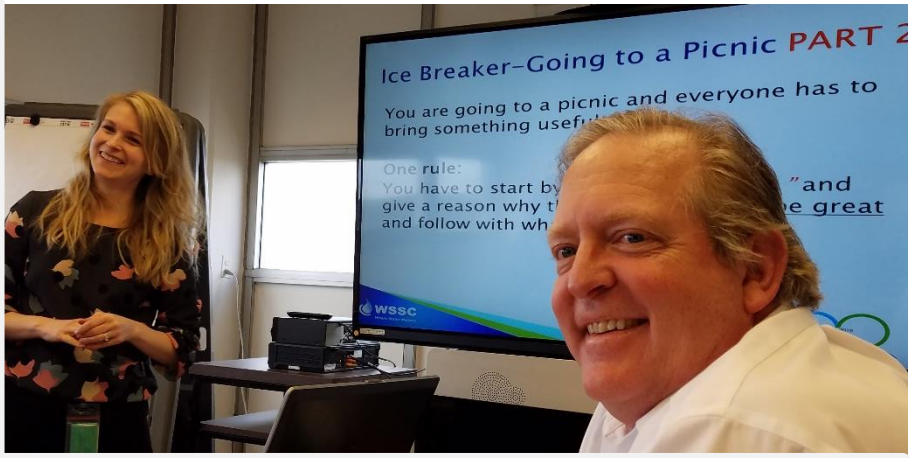
Idea Tracking Process



Building an Innovative Culture



Changing Culture – Brain Storming Workshops



Innovation Hub

- Online tool developed though e-Builder for employees to submit new and innovative ideas.
- Process provides:

  - Idea Tracking
  - Expert & End-User Evaluation
  - Pilot or Lab Testing
  - Implementation Support

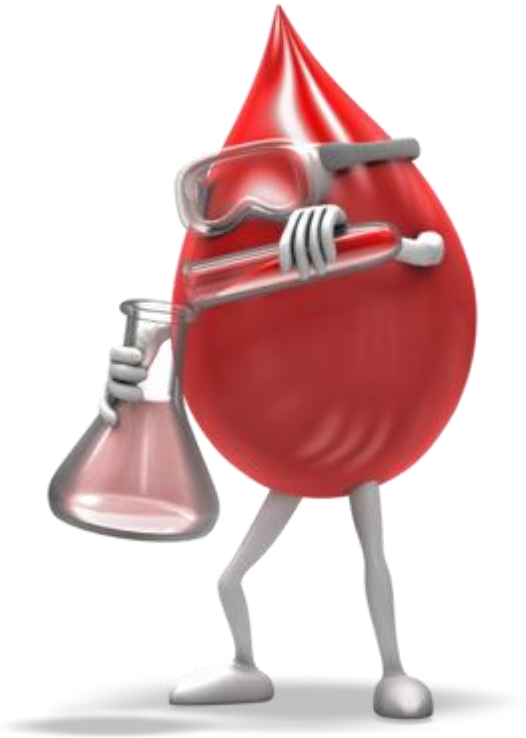
  - Specific Evaluation Criteria
  - Level of Impact
  - Best Chance of Success

Innovation Day 2019

Innovation Day 2019 Word Cloud

Plant Pilot Projects

- Enhanced Biological Phosphorus Removal
  - Seneca Plant
  - Parkway Plant
- Peracetic Acid Disinfection
  - Parkway Plant
- Bio-filtration
  - Potomac WFP



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Enhanced Biological Phosphorus Removal (EBPR)

Challenge:

- Alum for phosphorus removal a major chemical expense (~$0.9 mil/yr for WSSC)
- Generates inert solids (no methane gas at Piscataway).

Idea:

- Use microorganisms (fermenting PAOs) to remove P.

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Enhanced Biological Phosphorus Removal (EBPR)

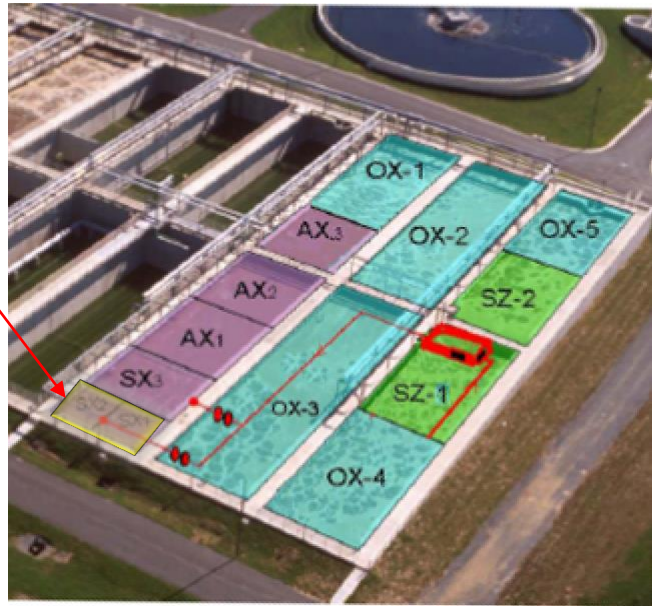
Method: Fermentation zone

Benefits:

45% drop in alum use ~$115K/yr

15% reduction solids hauling

Improve Piscataway Bio-Energy facility performance



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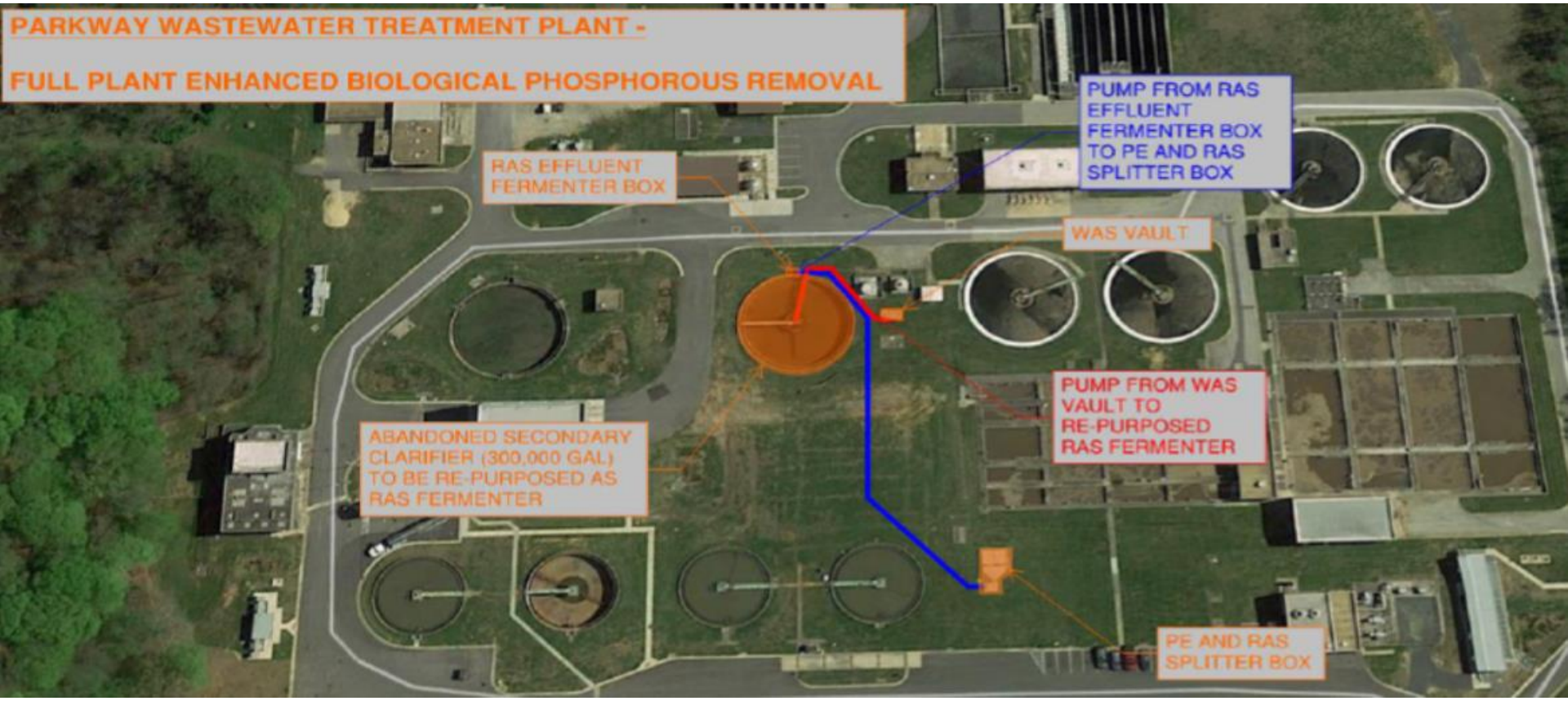
Enhanced Biological Phosphorus Removal (EBPR)

- **Pilot testing of sidestream EBPR at full-scale for Parkway – 2020**



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Peracetic Acid (PAA) Disinfection - Parkway

Challenge:

- Chlorine is used for disinfection (*E. coli*) at Parkway (UV all other plants)
- Creates chlorinated disinfection byproducts (DBPs)
- Requires de-chlorination prior to water return to stream

Idea:

- Use natural chemical, Peracetic Acid, to disinfect wastewater

Peracetic Acid (PAA) Disinfection - Parkway

- Pipe Reactor Pilot test 7/16/2018 thru 8/3/2018

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Peracetic Acid (PAA) Disinfection - Parkway

- BENEFITS

"Organic" chemical	• Does not persist in environment. • Lower toxicity to aquatic life. • Breaks down to acetic acid, CO_2, H_2O.
Out performs Chlorine	• More powerful oxidant • Does not form chlorinated Disinfection By-Products (DBPs) • No need for dechlorinating agent
Saves Money	• Less maintenance • Longer shelf-life (9-12 months) • PAA price continues to drop (new production facilities)

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Biofiltration – Potomac Plant

- Problem: Elevated Disinfection Byproducts (DBPs) and Manganese (Mn).
- Impact: Treatment strategies for DBPs & Mn conflict. Biofiltration can reduce chlorine chemical cost & remove more organics than chlorinated filters.
- Status: Ongoing pilot study. Converted 2 of 32 filters to biofilters. Monitoring key water quality parameters & filter operational performance.

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Pipe System Pilot Projects

- Trenchless Pipe Rehabilitation
- Automated Water System Flushing
- Artificial Intelligence for Pipe Condition Assessment
- Sewer Condition Monitoring
- Sludge Stabilization and Disposal
- Pressure Transient Monitoring

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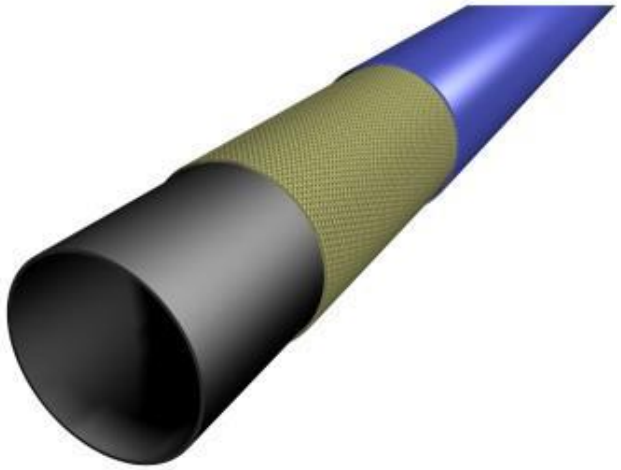
Pilot Project: Primus Line

Problem: High Pressure Trenchless Pipe Rehab

Impact: Water or Sewer pipe replacement where location makes work difficult

Status: Contracting with vendor for bridge crossing



Pilot Project: Automated Flushing

- Problem: - Low Chlorine Residual, Discolored water complaints
- Automated flushing systems improve water turnover and ensure quality of water delivery
- Status: One standard unit installed; flushing on a timer

Pilot Project: Automated Flushing

- Installing one intelligent unit
  - Monitoring chlorine and turbidity
  - Flushing on measuring low parameters
  - Self sustaining power via internal turbine
  - Different manufacturer

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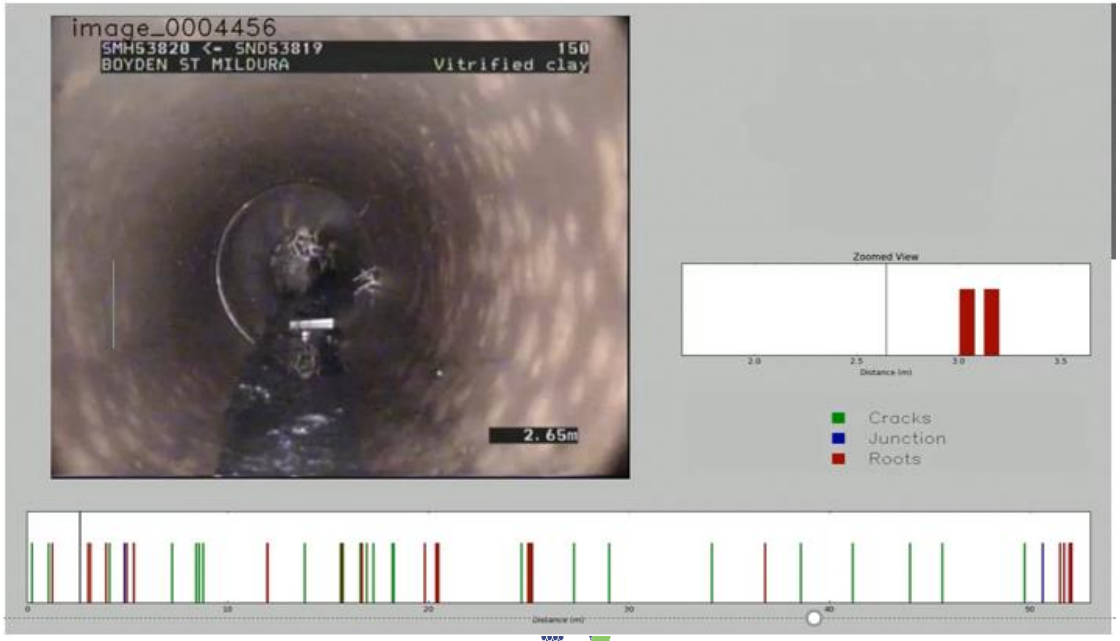
Pilot Project: AI for pipe condition assessment

- Problem: Reduce time to evaluate CCTV
- Impact: Can use Artificial Intelligence to evaluate CCTV video and track changes over time
- Status: Preliminary discussions with vendors

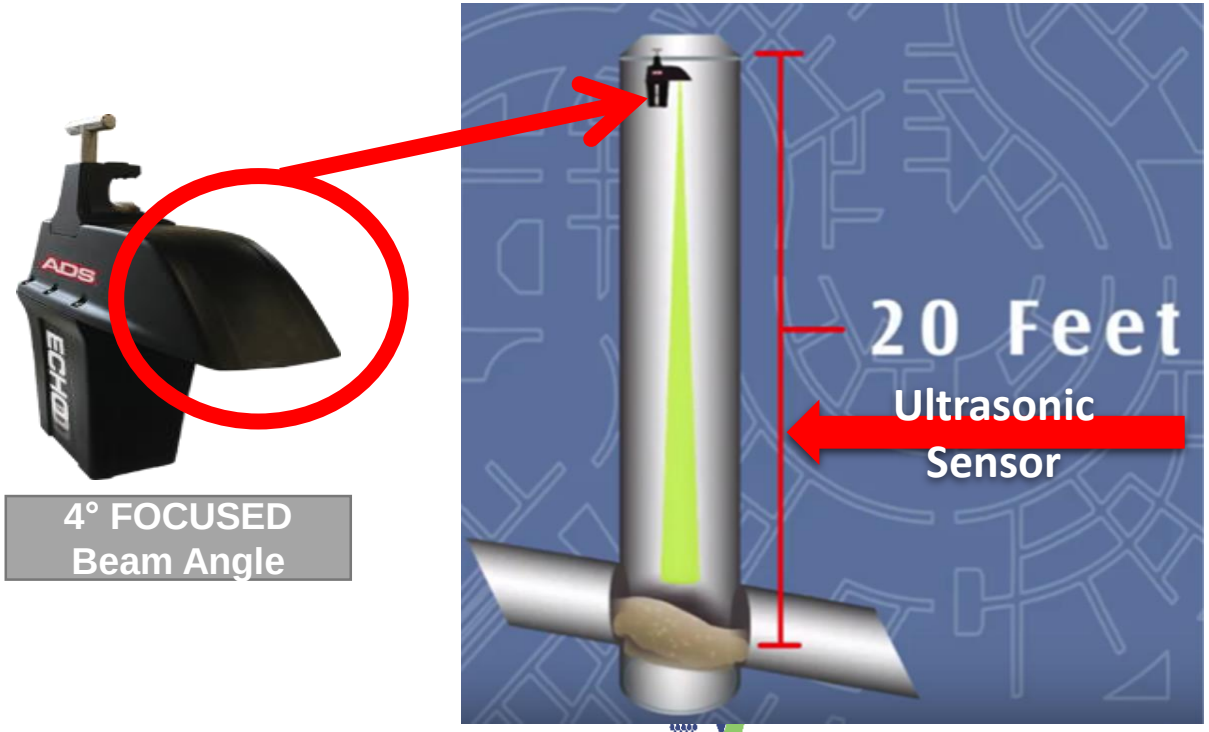


Pilot Project: ADS ECHO Sewer Assessment

Problem: Pipe Blockage Assessment

Impact: Optimize maintenance schedule for sewer mains; predict blockages with AI

Status: Installation soon in sewer network



Pilot Project: Drone Technology

Problem: Assessing Remote Areas Quickly

Impact: Drones have the potential to help with activities like trunk walks, emergency leak investigations, routine monitoring, and water quality sampling

Status: Pilot will start soon for trunk walks

Pilot Project: Metaflo Soil Stabilizer

Problem: Disposal of wet sludge from vac trucks

Impact: Solidifying sludge will allow for disposal of vac truck sludge in Depot Spoils bins, potentially saving time and money.

Status: Pilot complete, economic evaluation ongoing

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Pilot Project: Pressure Transient Monitoring

Problem: Pressure transients can increase WM breaks

Impact: Identifying and mitigating pressure transients in our system has the potential to reduce water main breaks and extend the life of our pipe.

Status: Pilot testing of Syrinix is ongoing.

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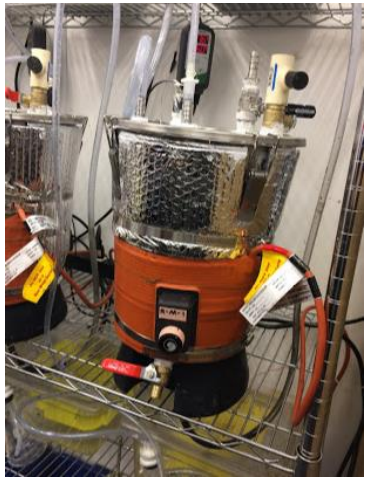
Research Partners – External Reach

- Virginia Tech
  - CAWRI; corrosion/discolored water
- Rutgers University
  - Biofiltration; other proposals forthcoming
- Dalhousie University - Biofiltration
- University of Kansas - Supported rDON proposal
- Bucknell University – Bio-Energy
- JHU – PAA pilot; Shared algae data; algae sampling
- UMD – PCB data



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Research Partners – External Reach

(Continued)

- Black and Veatch – EBPR
- Arcadis – Biofiltration; innovation program
- Stantec – PAA Disinfection
- Brown and Caldwell – Biogas proposal

Questions?

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