



# Sturgeon County Odour Control Project Update

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# Agenda

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- Project Background
- Pilot Study Findings
- Additional Odour Reduction Options
- Conclusion

# Background

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- Sturgeon County residents have been experiencing H<sub>2</sub>S odour issues at River's Gate Community since the Lift Station was commissioned in September 2017.
- Associated Engineering has been retained to help address the concerns and provide possible solutions for the County.
- Work Completed to date
  - River's Gate Gravity Main Preliminary Design – Feb 2016
  - Lift Station Sampling and Profile Review – Sep 2018
  - Odour Treatment Technology Assessment – Dec 2018
  - Odour Control Pilot Study – Spring & Summer 2019
  - Chemical Dosing Building and Permanent Odour Loggers– Fall 2019



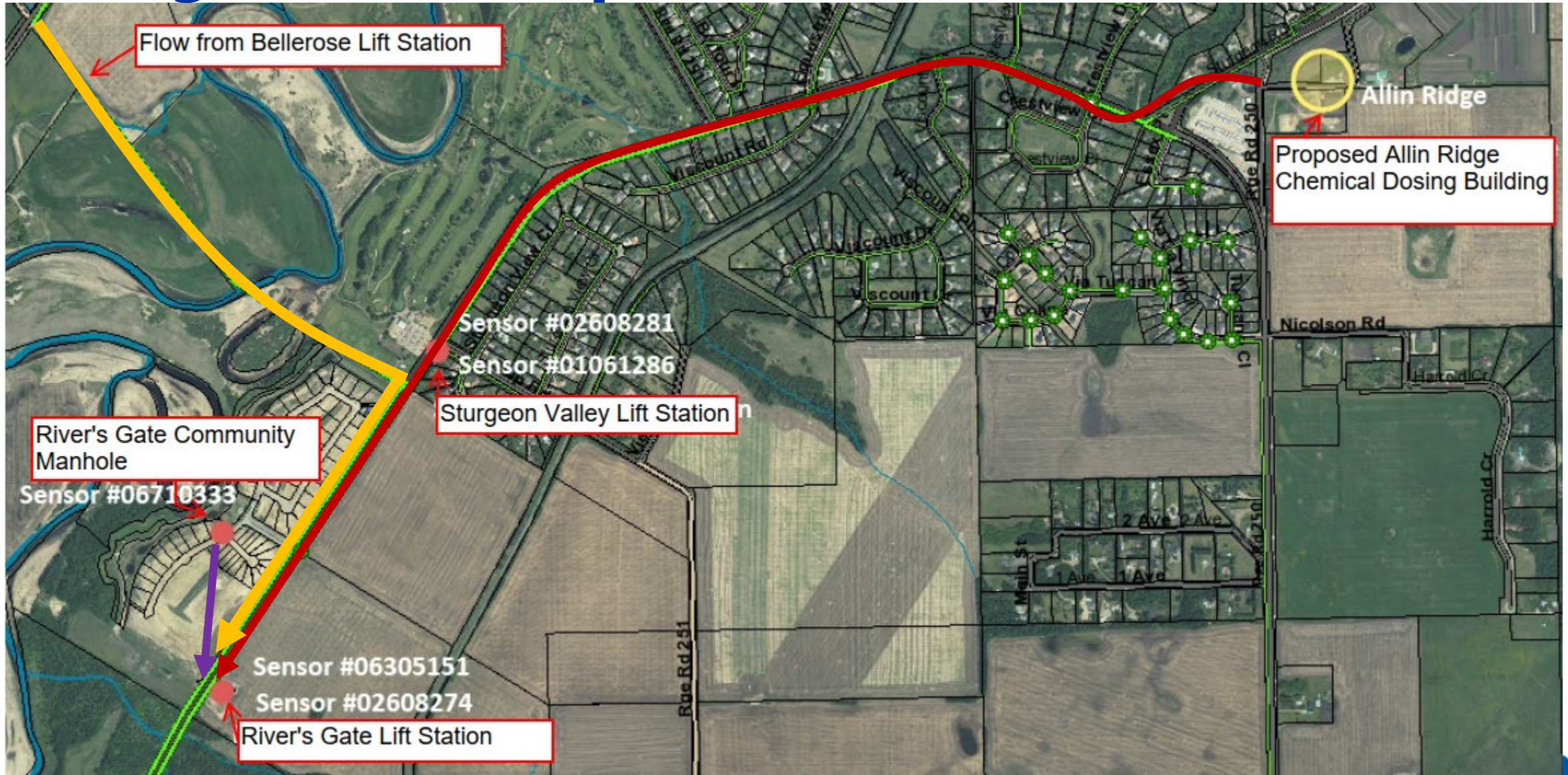
# Background – Incremental Improvements

- Focus on Cost Effective Solutions
  - Reviewed the system as a whole
  - Established the source problem areas
  - Implementing Operational Maintenance Programs and Chemical dosing in those target problem areas
- Achieved majority reduction targets in decreasing H<sub>2</sub>S levels
- Propose future upgrade solutions, as required, however they are most costly if further decrease in H<sub>2</sub>S levels





# Background - Map





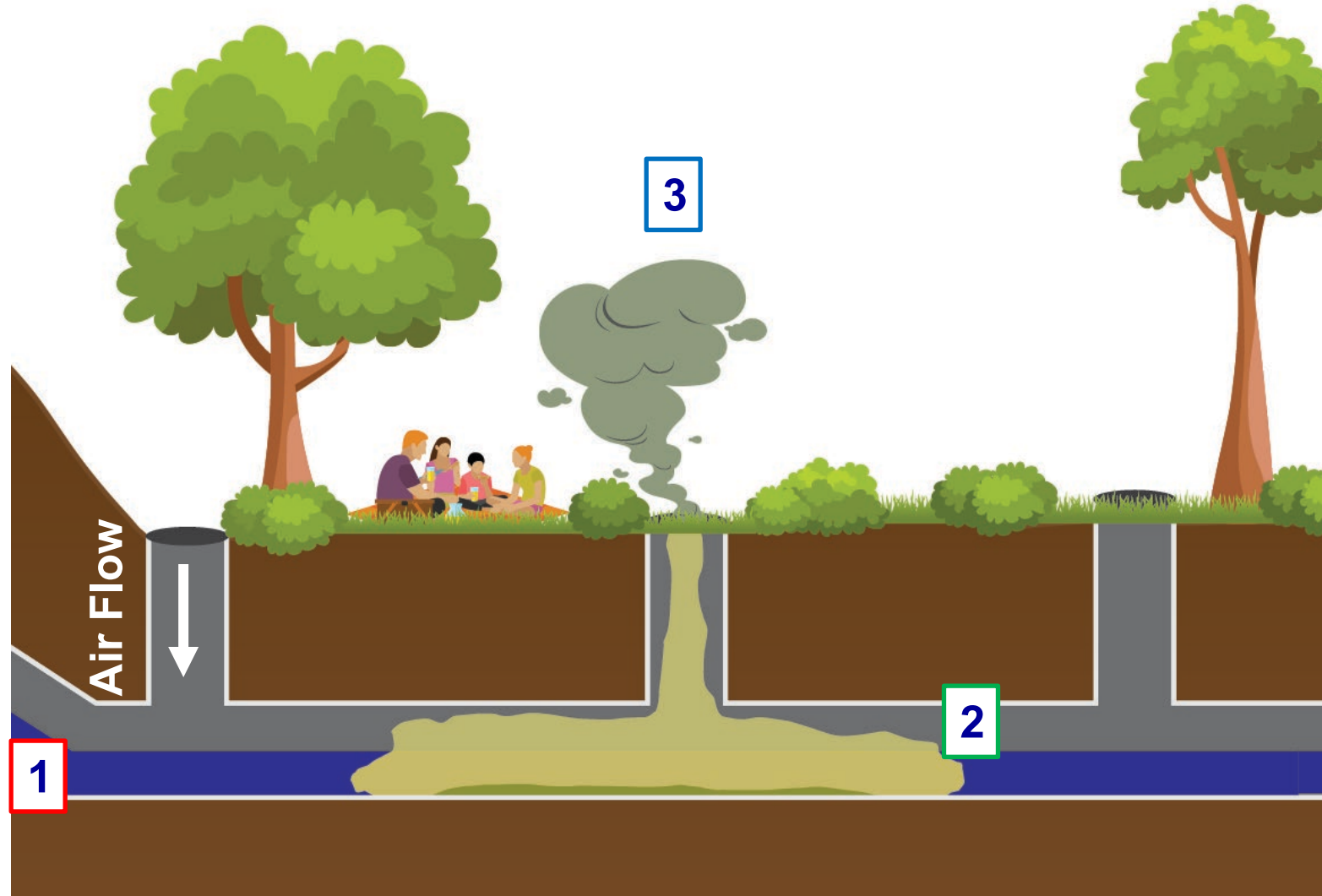
# Background – H<sub>2</sub>S Sources

## 3 Steps

1. H<sub>2</sub>S Generation

2. Dissolved H<sub>2</sub>S Escapes from Liquid

3. Sewer Gas Escapes to Outside

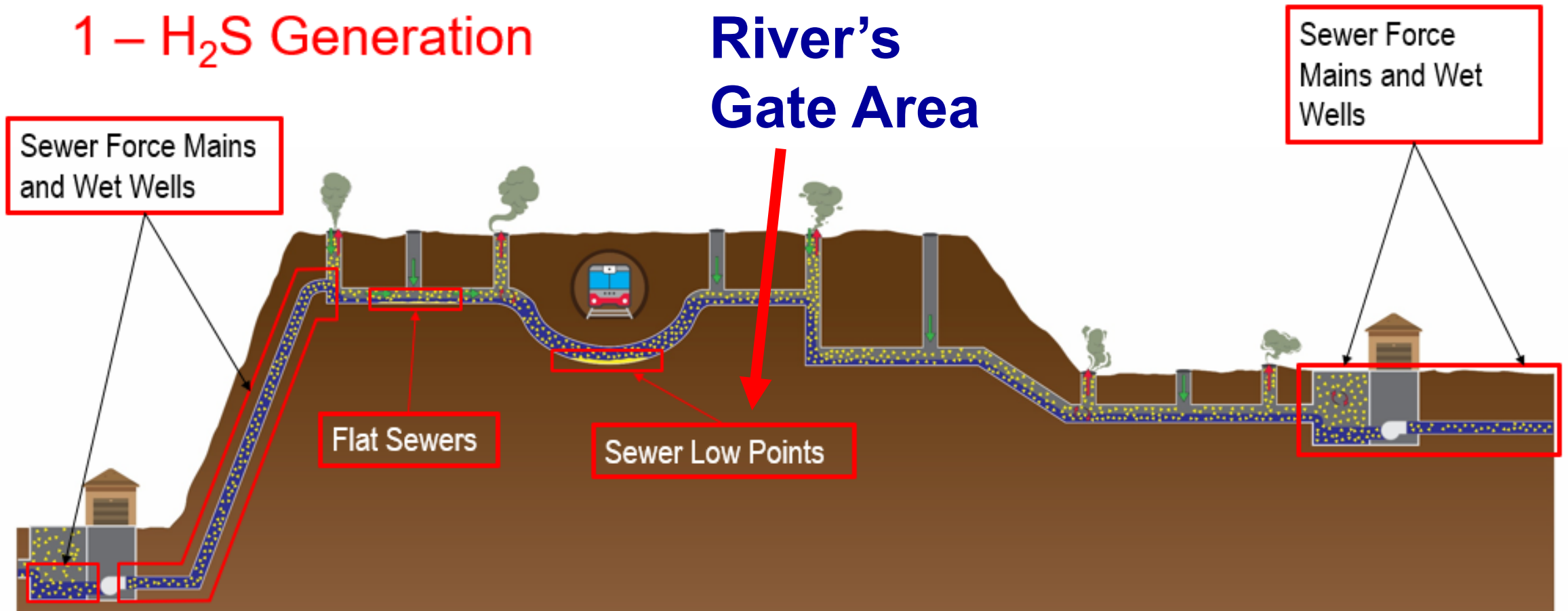




# Background – H<sub>2</sub>S Generation

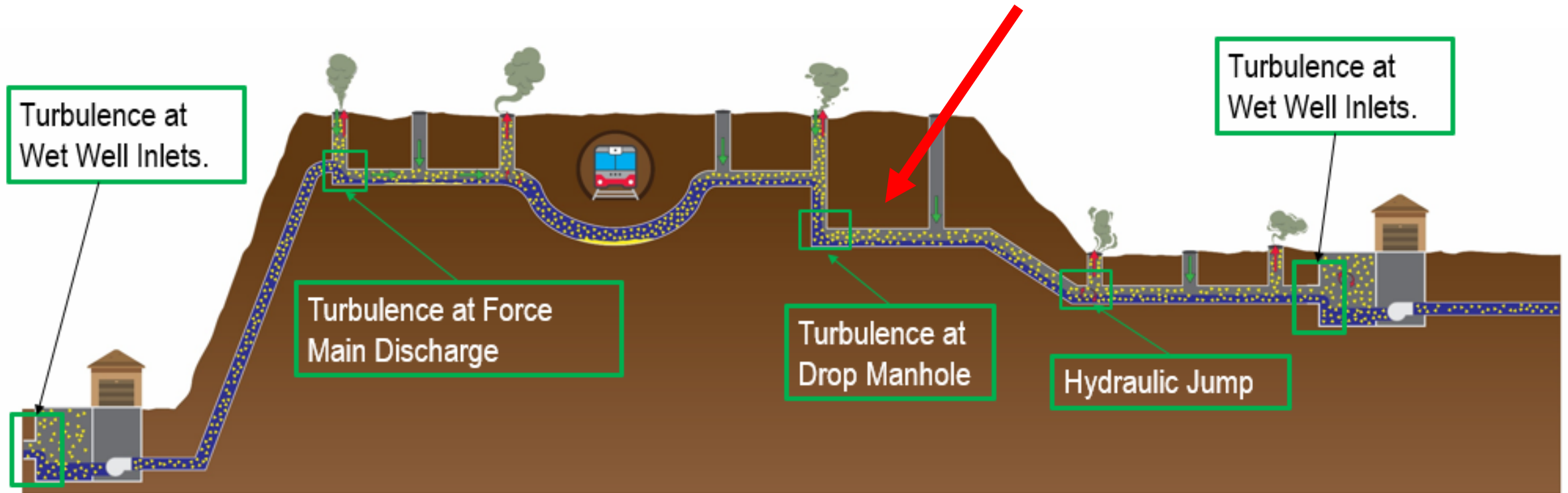
## 1 – H<sub>2</sub>S Generation

## River's Gate Area



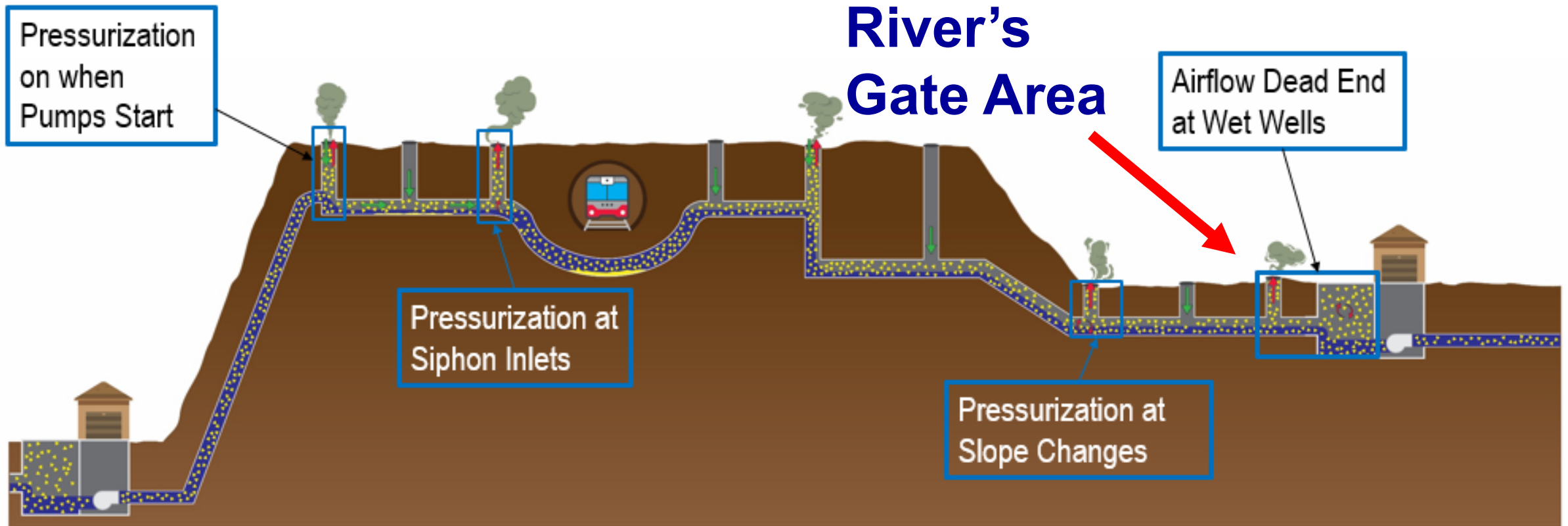
# Background – H<sub>2</sub>S Generation

2 – Dissolved H<sub>2</sub>S Escapes from liquid **River's Gate Area**



# Background – H2S Generation

## 3 – Sewer Gas Escapes to Outside





# Background

## Alberta OH&S 8 hour Exposure Limit

Concentration (ppm)	Physiological Effect
0.1 – 3	Odour Threshold
3 – 10	Offensive Odour
10 – 50	Headache Nausea Throat and Eye Irritation
50 – 100	Eye Injury
100 – 300	Conjunctivitis Respiratory Tract Irritation Olfactory Paralysis
300 – 500	Pulmonary Edema Imminent Threat to Life
500 – 1,000	Strong Nervous System Stimulation Apnea
1,000 – 2,000	Immediate Collapse with Respiratory Paralysis Risk of Death

# Pilot Study Findings

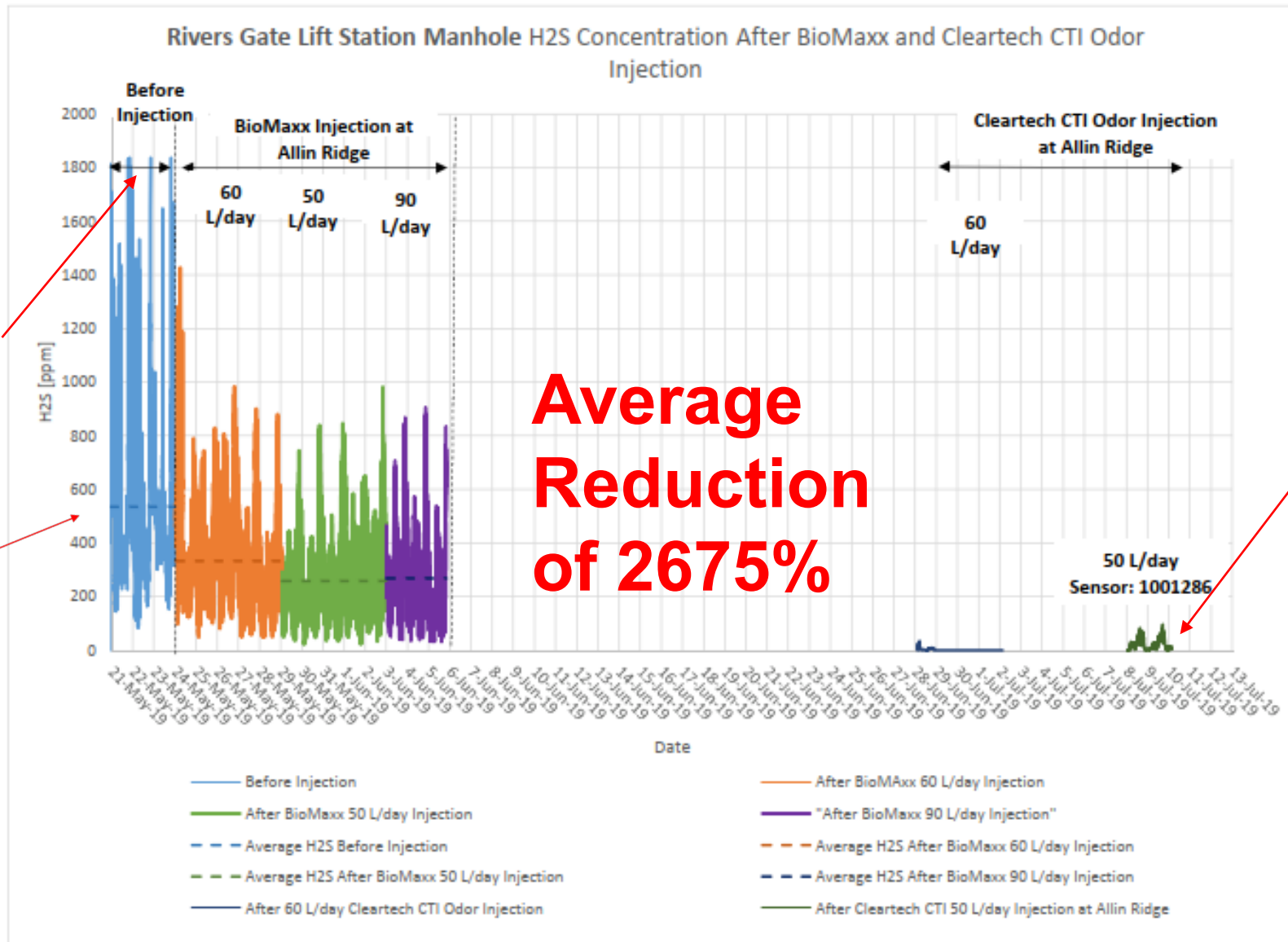
# Odour Control Pilot Study

- Tested Chemical injection at 2 locations
  - Allin Ridge
  - Sturgeon Valley Lift Station
- Temporary H<sub>2</sub>S gas monitoring at 5 locations
- Compared efficiency and dosing optimization for two products of Calcium Nitrate Solution
  - BioMaxx
  - Cleartech CTI



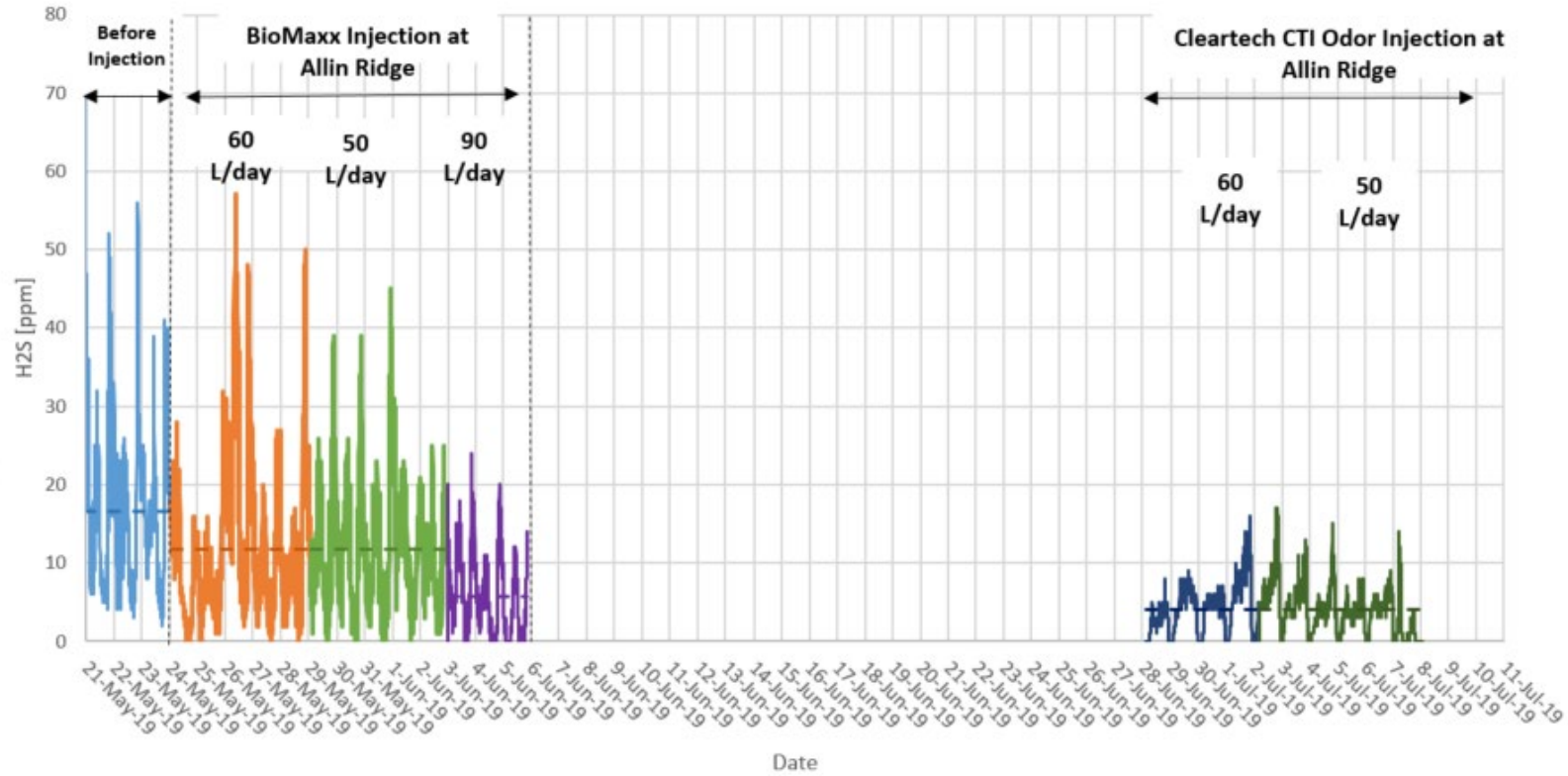


# Sturgeon Valley Lift Station Receiving MH



# Sturgeon Valley Lift Station Wetwell

Rivers Gate Lift Station Wetwell H2S Concentration After BioMaxx and Cleartech CTI Odor Injection

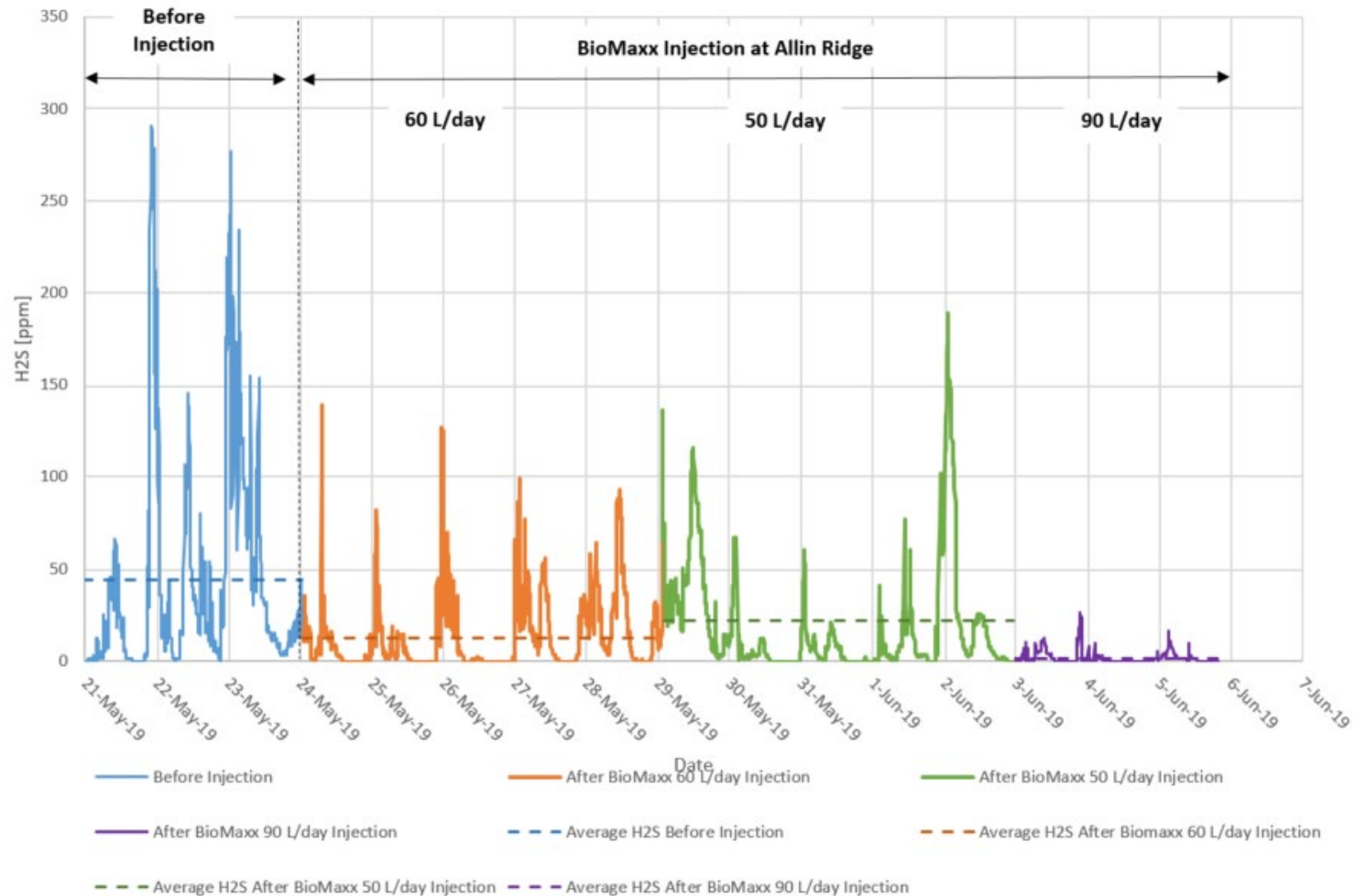


- Before Injection
- After BioMaxx 50 L/day Injection
- After BioMaxx 60 L/day Injection
- After BioMaxx 90 L/day Injection
- After Cleartech CTI Odor 60 L/day Injection
- After Cleartech CTI 50 L/day Injection at Allin Ridge
- Average H2S Before Injection
- Average H2S After BioMaxx 50 L/day Injection
- Average H2S After BioMaxx 60 L/day Injection
- Average H2S After BioMaxx 90 L/day Injection
- Average Cleartech 60 L/day Injection
- Average Cleartech 50 L/day Injection



# River's Gate Subdivision Manhole

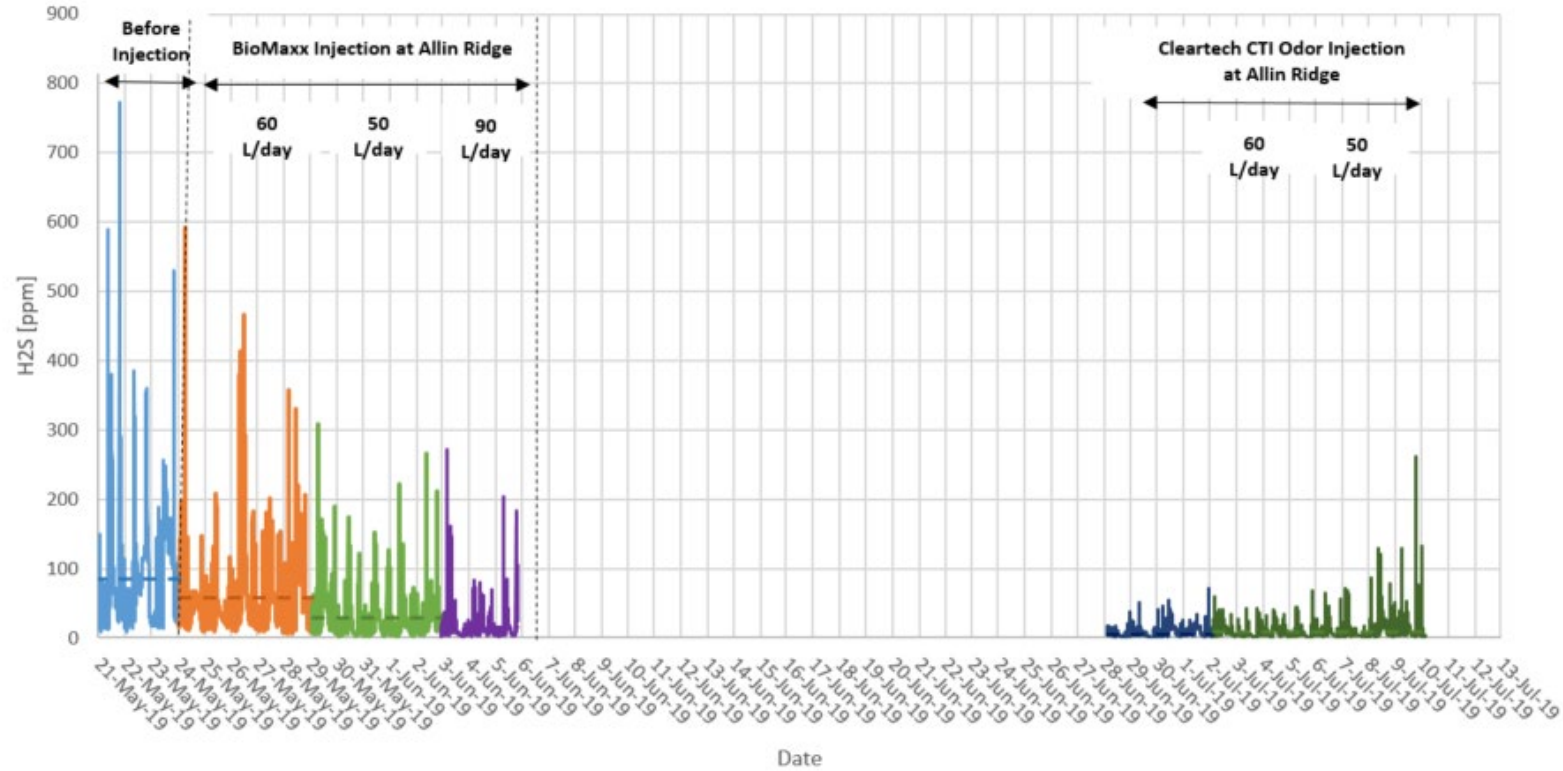
Rivers Gate Subdivision Manhole H<sub>2</sub>S Concentration After BioMaxx and Cleartech CTI Odor Injection





# Sturgeon Valley LS Wetwell

Sturgeon Valley Lift Station Wetwell H2S Concentration After BioMaxx and Cleartech CTI Odor Injection



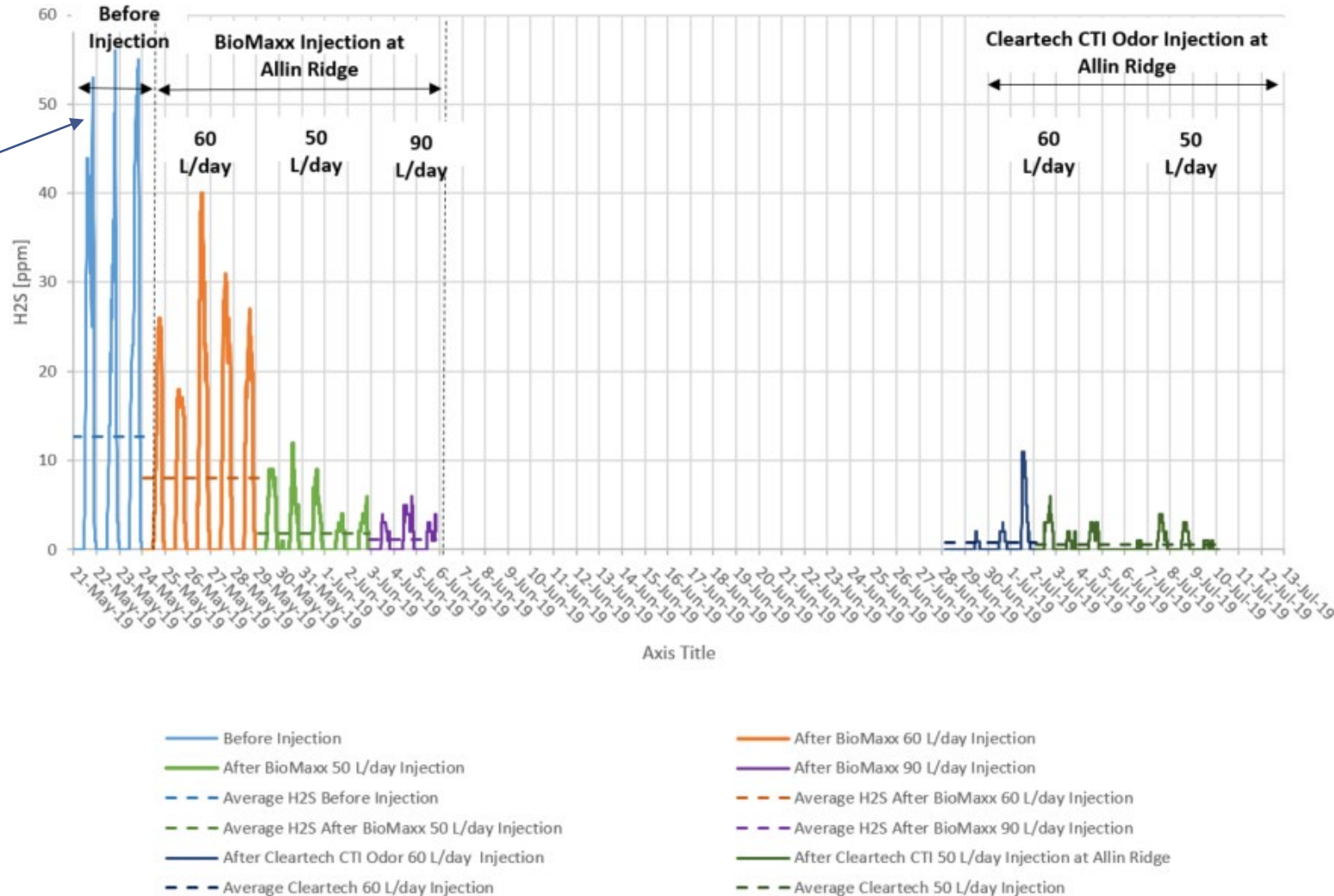
- Before Injection
- After BioMaxx 60 L/day Injection
- After BioMaxx 50 L/day Injection
- After BioMaxx 90 L/day Injection
- Average H2S Before Injection
- Average H2S After BioMaxx 60 L/day Injection
- Average H2S After Biomaxx 50 L/day Injection
- Average H2S After Biomaxx 90 L/day Injection
- After Cleartech CTI Odor 60 L/day Injection
- After Cleartech CTI 50 L/day Injection at Allin Ridge
- Average Cleartech 60 L/day Injection
- Average Cleartech 50 L/day Injection



# Sturgeon Valley LS Building

Sturgeon Valley Lift Station Building H2S Concentration After BioMaxx and Cleartech CTI Odor Injection

Operator safety concerns



# Pilot Data Summary

- Chemical injection at Allin Ridge had the greatest impact on lowering H<sub>2</sub>S and odor levels downstream → **greater contact time**
- River's Gate Lift Station Drop Manhole had the highest H<sub>2</sub>S Values → **Greatest dosing reduction from 1800ppm to 20ppm**
- Chemical injection **significantly lowers** H<sub>2</sub>S levels
  - However, **insufficient to completely eliminate odours** (below 10 ppm)



# Additional Odour Reduction Options

# Conceptual Solution Phasing

Phase	Odour Control Action	Status
Phase 1	<ul style="list-style-type: none"><li>• River's Gate Gravity Sewer Preliminary design</li><li>• Odour Characterization Study</li><li>• Odour Treatment Technology Assessment</li><li>• Chemical Injection Pilot Study</li></ul>	<b>Complete</b>
Phase 2	<ul style="list-style-type: none"><li>• Permanent H<sub>2</sub>S gas sensors and monitors</li><li>• Chemical Dosing Building</li></ul>	<b>In Progress</b>
Next Step 1	<ul style="list-style-type: none"><li>• Hydraulic Modifications (RG drop MH modification)</li></ul>	<b>Future</b>
Next Step 2	<ul style="list-style-type: none"><li>• Air Treatment at River's Gate LS</li></ul>	
Longer Term Step 3	<ul style="list-style-type: none"><li>• Sturgeon Valley Community Gravity Sewer Concept Study</li></ul>	



# Phase 2: Upgrades

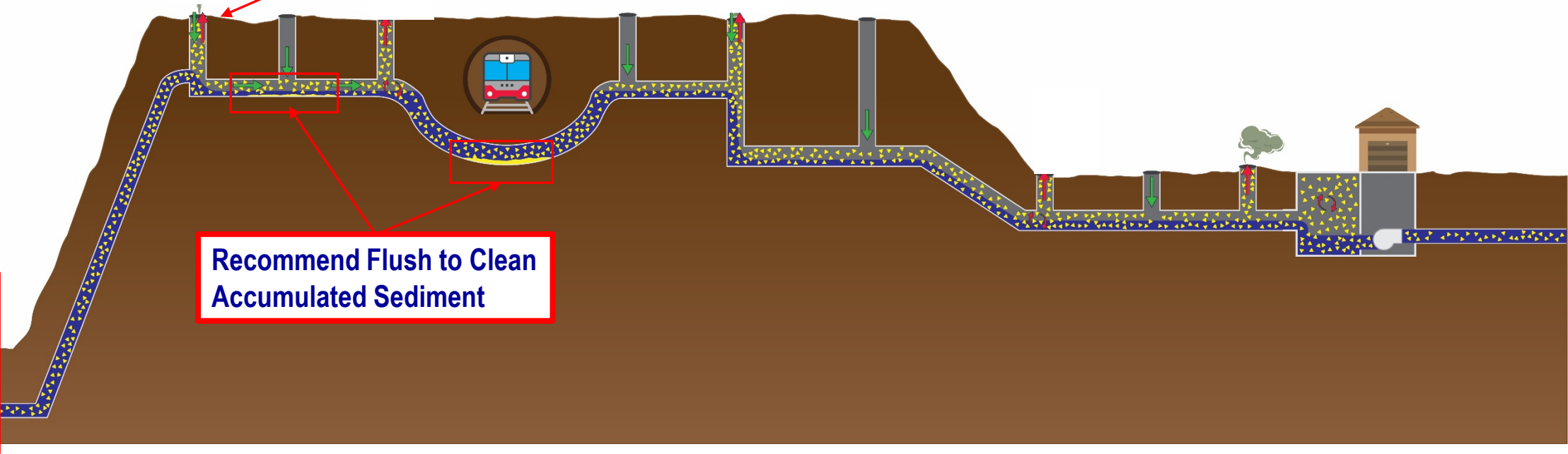
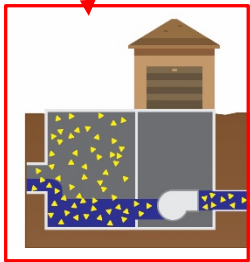
Replace  
Passive Dry  
Media Filter



Calcium Nitrate



Recommend Flush to Clean  
Accumulated Sediment



# Phase 2: Chemical Injection Building

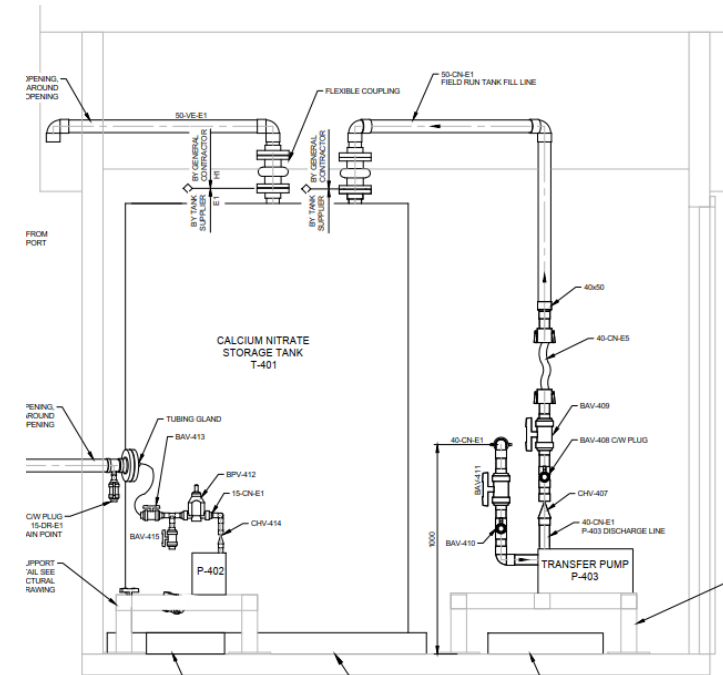
- Addresses high H<sub>2</sub>S levels and prevents generation along sewer system
- Real-time Odour Logging System at 4 Lift Stations



Example Dosing Building



Odour Logger and Transmitter



Storage Tank and Chemical Pumps



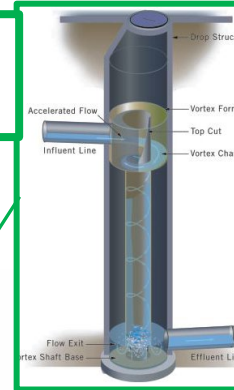
# Phase 2: 2019 Costs

<b>Construction</b>		
	<i>Odour Loggers and Monitors</i>	\$44,000
	<i>Vector Electrical Installation of Odour Loggers</i>	\$15,000
	<i>Dosing Building - Vertex</i>	\$28,000
	<i>Clartech Chemical</i>	\$43,000
	<i>Contractor Quote for Allin Ridge Dosing Project</i>	\$106,000
	<b>Sub-total</b>	<b>\$236,000</b>
<b>Engineering</b>		
	<i>River's Gate Close Out, Advisory on SRS &amp; Odour Study Pilot</i>	
	<i>Review and Technology Review</i>	\$29,000
	<i>Permanent Odour Sensors and Monitors</i>	\$10,000
	<i>Allin Ridge Dosing Building (Design &amp; Construction)</i>	\$20,000
	<b>Sub-total</b>	<b>\$59,000</b>
	<b>Contingency (5%)</b>	<b>\$14,750</b>
	<b>TOTAL</b>	<b>\$309,750</b>
	<b>Current Budget</b>	<b>\$230,000</b>
	<b>Required Budget</b>	<b>\$79,750</b>



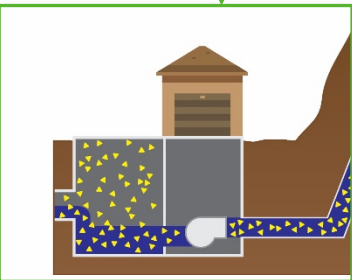
# Next Step 1 Conceptual Upgrades

Vortex Manhole Insert



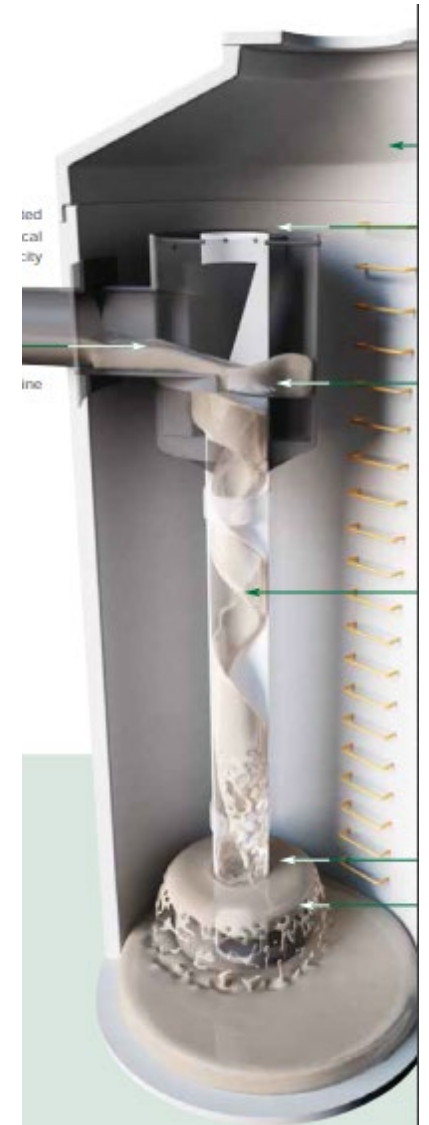
Decommission  
Sturgeon Valley  
Lift Station

Convert Force Main to  
Gravity Collection



# Next Step 1: Hydraulic Modifications

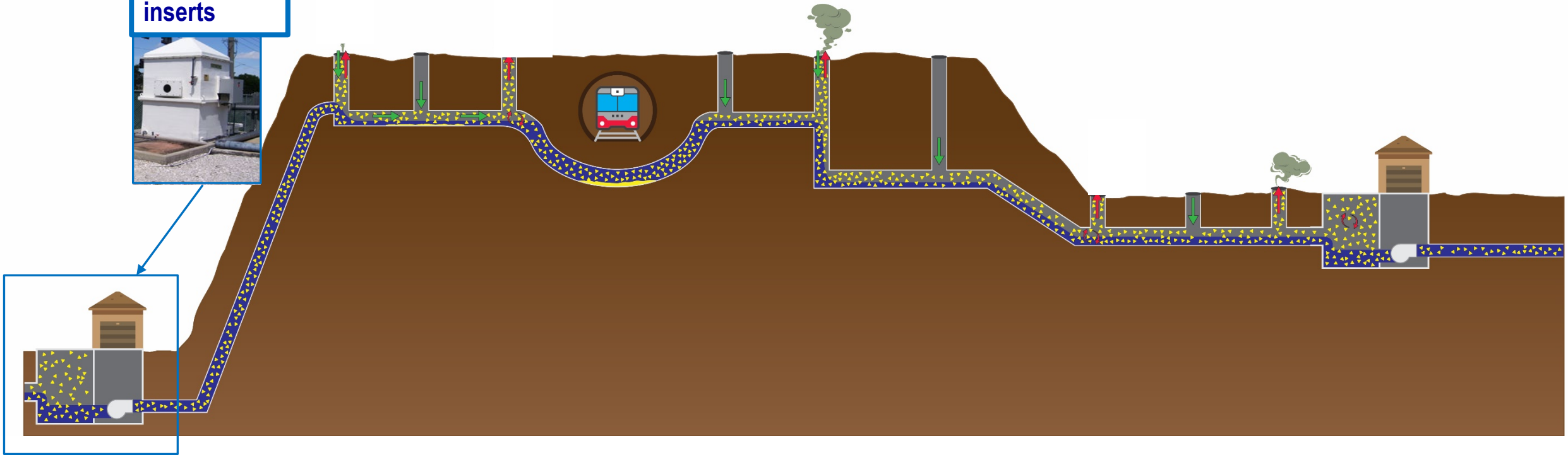
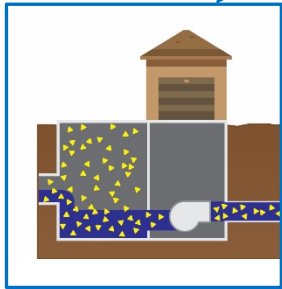
- Conceptual Upgrades
  - Convert force main to gravity collection
  - Decommission Sturgeon Valley Lift Station
  - Drop Structure upgrades at RG LS Wetwell
  - Flap-gates to prevent backflow of air to RG Community





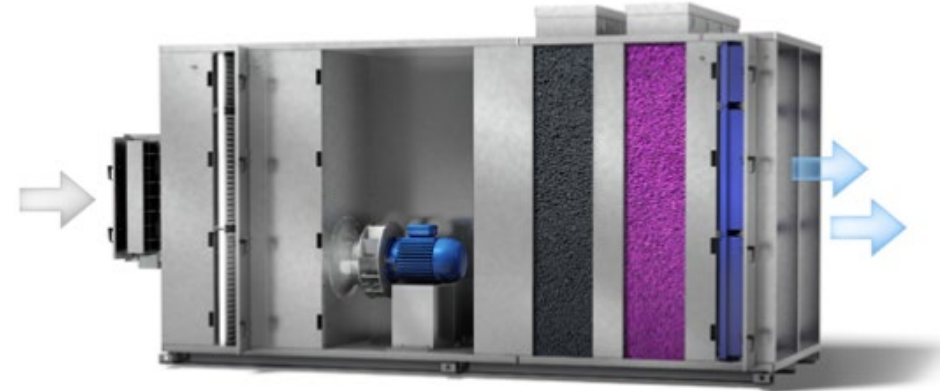
# Next Step 2: Air Treatment Upgrades

Upgrade Air Treatment at Lift Station & install manhole inserts



# Next Step 2: Upgraded Air Scrubbers

- Existing scrubbers not suitable for high H<sub>2</sub>S levels (+30 ppm)
- Available in liquid and dry media versions.
- Can be installed at lift station or manholes



# Long Term Step 3: Sturgeon Valley Gravity Sewer System

- Feasibility and concept study to convert septic tank users to a new gravity sewer system.
- Reducing sewage residence time prevents septic waste in collection system.



# Conclusion

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- Construct Chemical Dosing System – Complete by 2019
- Operationally optimize dose to mitigate Odour issues with permanent Odour Loggers – Completed by 2019
  - *Additional funds of \$80K for Phase 2 required for 2019.*
- Prioritize Next Project Steps and obtain funding – 2020 Onwards
- Improve Air Handling Unit at Rivers Gate LS







# Questions?

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