



Integrated Odor Control Plan Report DRAFT

November 04, 2020

Kimley»»Horn



Project Background: Odor Concerns

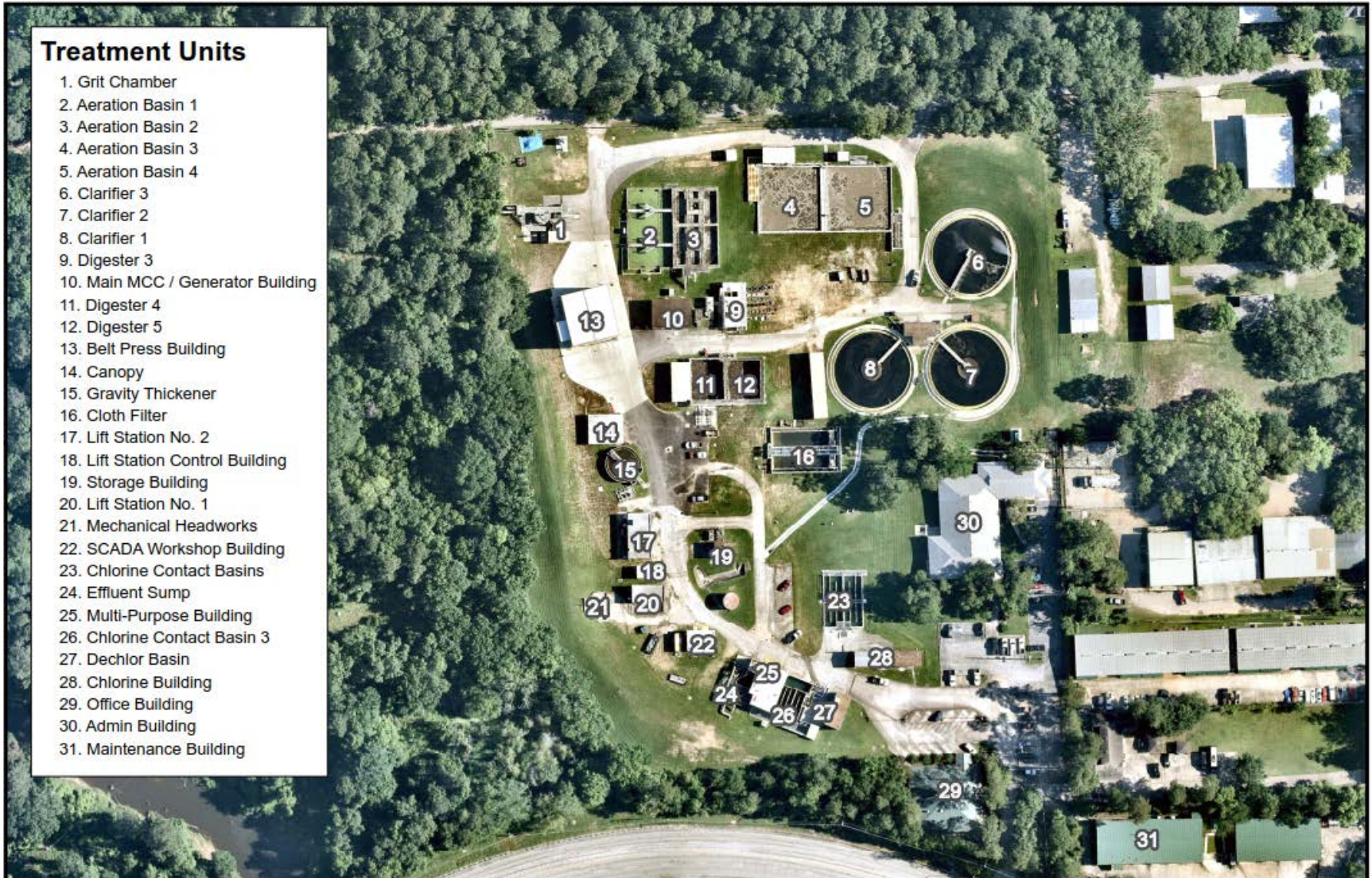


Project Background: WWTF1 Site



Treatment Units

1. Grit Chamber
2. Aeration Basin 1
3. Aeration Basin 2
4. Aeration Basin 3
5. Aeration Basin 4
6. Clarifier 3
7. Clarifier 2
8. Clarifier 1
9. Digester 3
10. Main MCC / Generator Building
11. Digester 4
12. Digester 5
13. Belt Press Building
14. Canopy
15. Gravity Thickener
16. Cloth Filter
17. Lift Station No. 2
18. Lift Station Control Building
19. Storage Building
20. Lift Station No. 1
21. Mechanical Headworks
22. SCADA Workshop Building
23. Chlorine Contact Basins
24. Effluent Sump
25. Multi-Purpose Building
26. Chlorine Contact Basin 3
27. Dechlor Basin
28. Chlorine Building
29. Office Building
30. Admin Building
31. Maintenance Building



Project Background

SJRA Actions Taken to Date

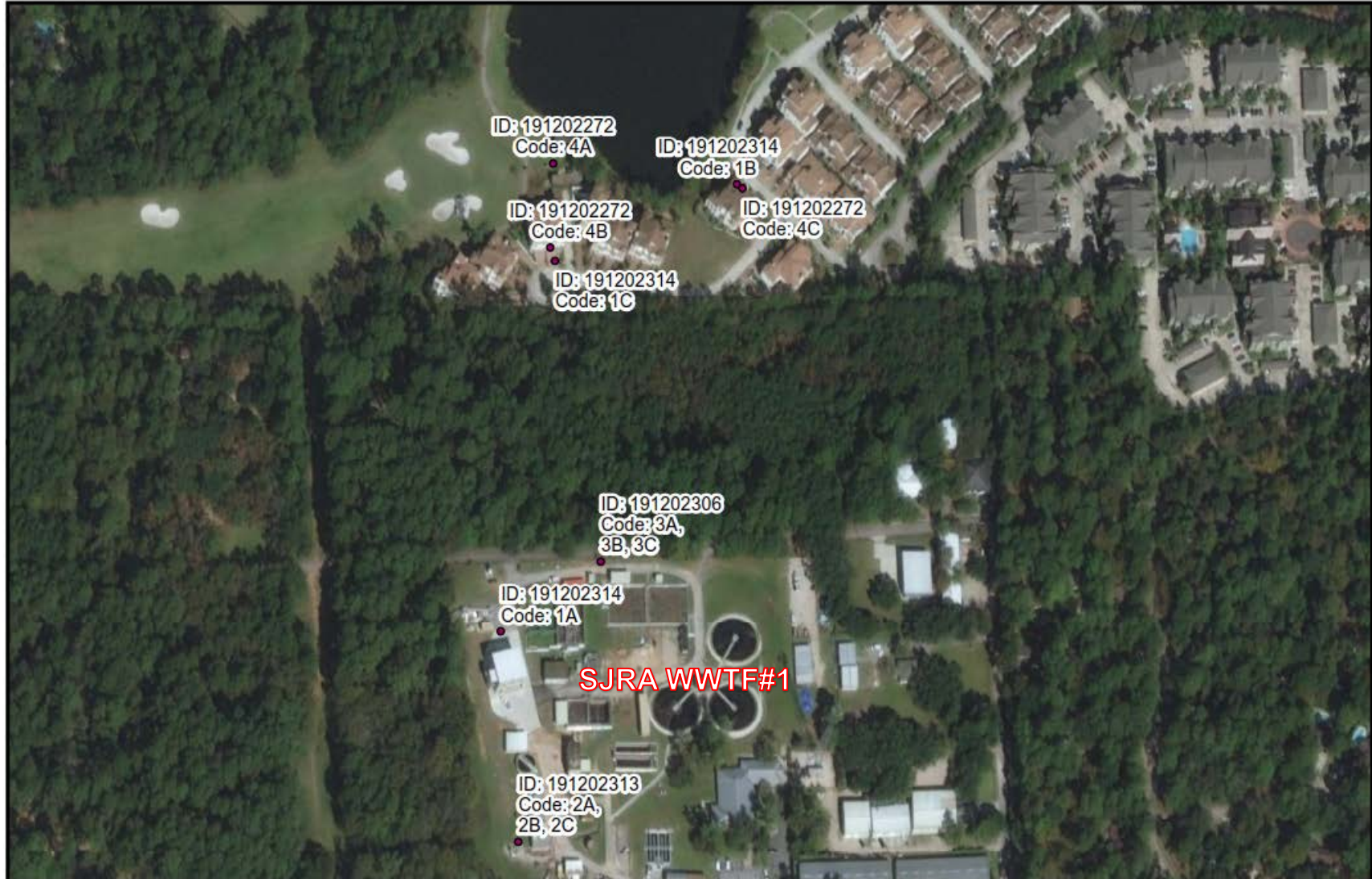
- Mitigation Efforts
- Perkins Study
- Community Outreach
- Data posted to SJRA Website

Data Collection/Sampling

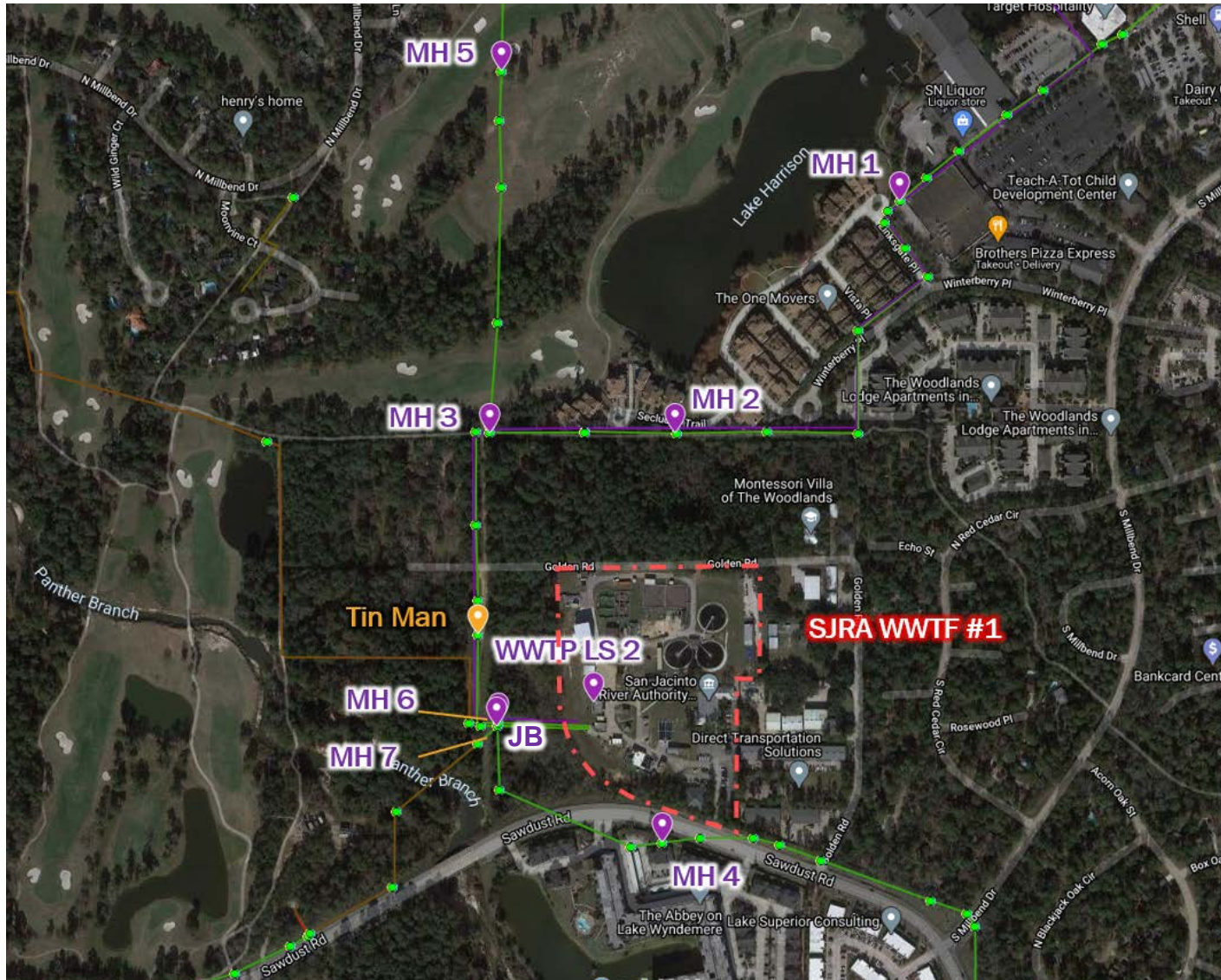
- Existing Odor Sensor Data
- Collection System (inside the pipes)
 - Odor Grab Sampling
 - H₂S Monitoring
 - Differential Pressure Monitoring
 - Dissolved Sulfide Grab Sampling
- WWTF
 - Field Olfactometry
 - Odor Grab Sampling
 - Lab Panel Testing



Existing Odor Sensor Locations



Collection System Monitor/Sample Locations

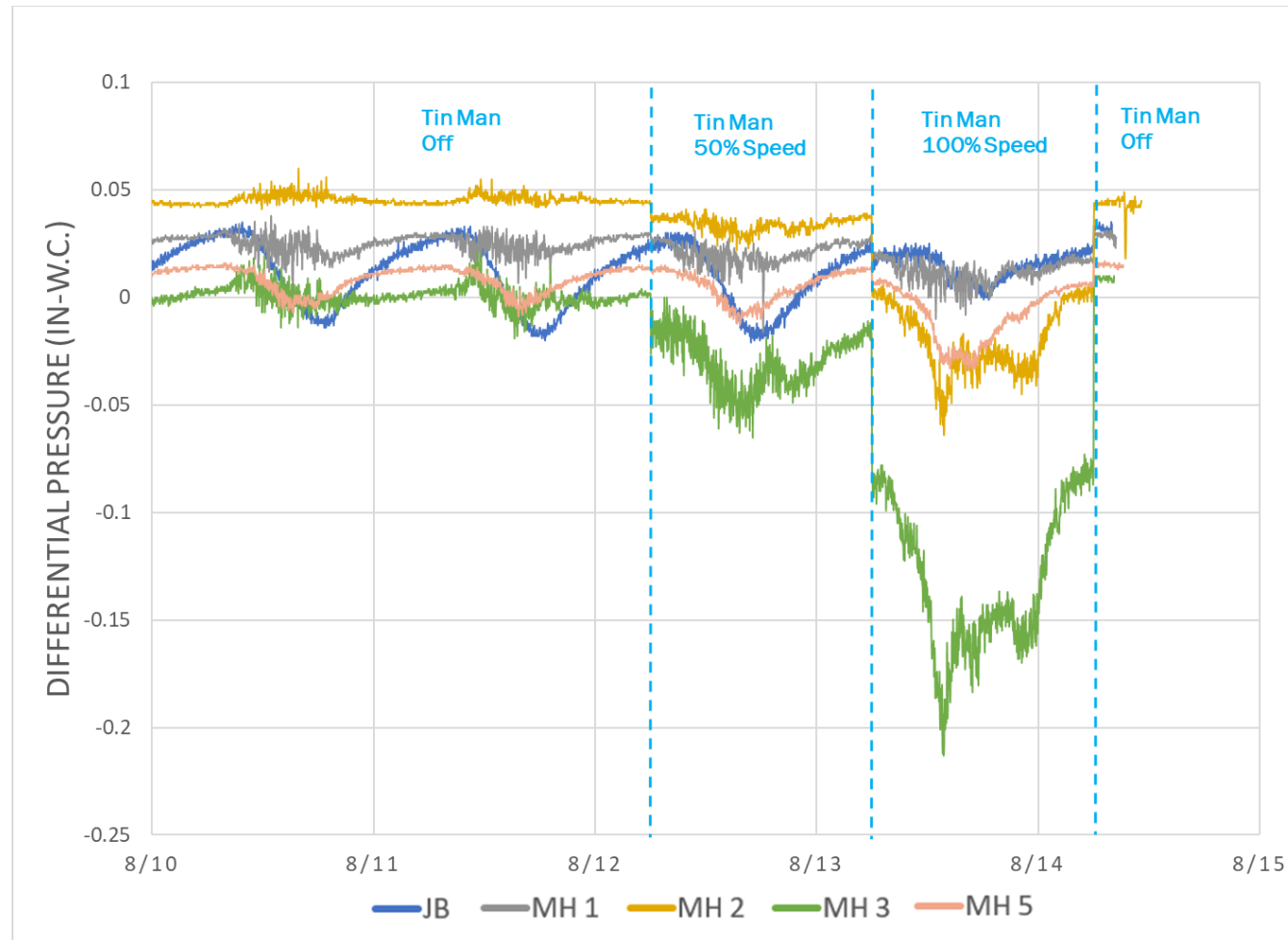


WWTF1 Sample Locations



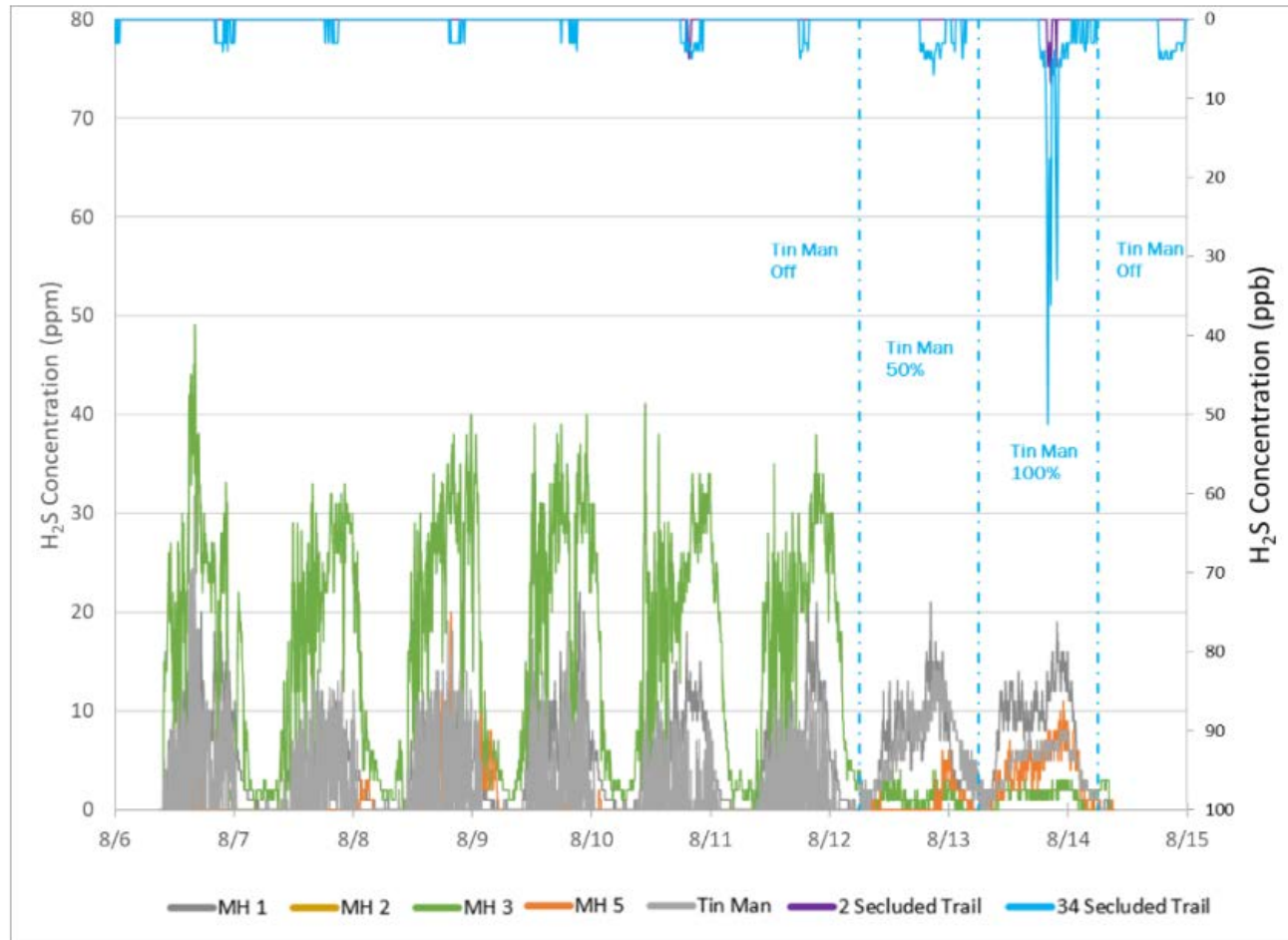
Collection System Results

Differential Pressure Data (internal)



Collection System Results

Collection System H₂S (internal) vs. Ambient H₂S at Secluded Trail (above ground)



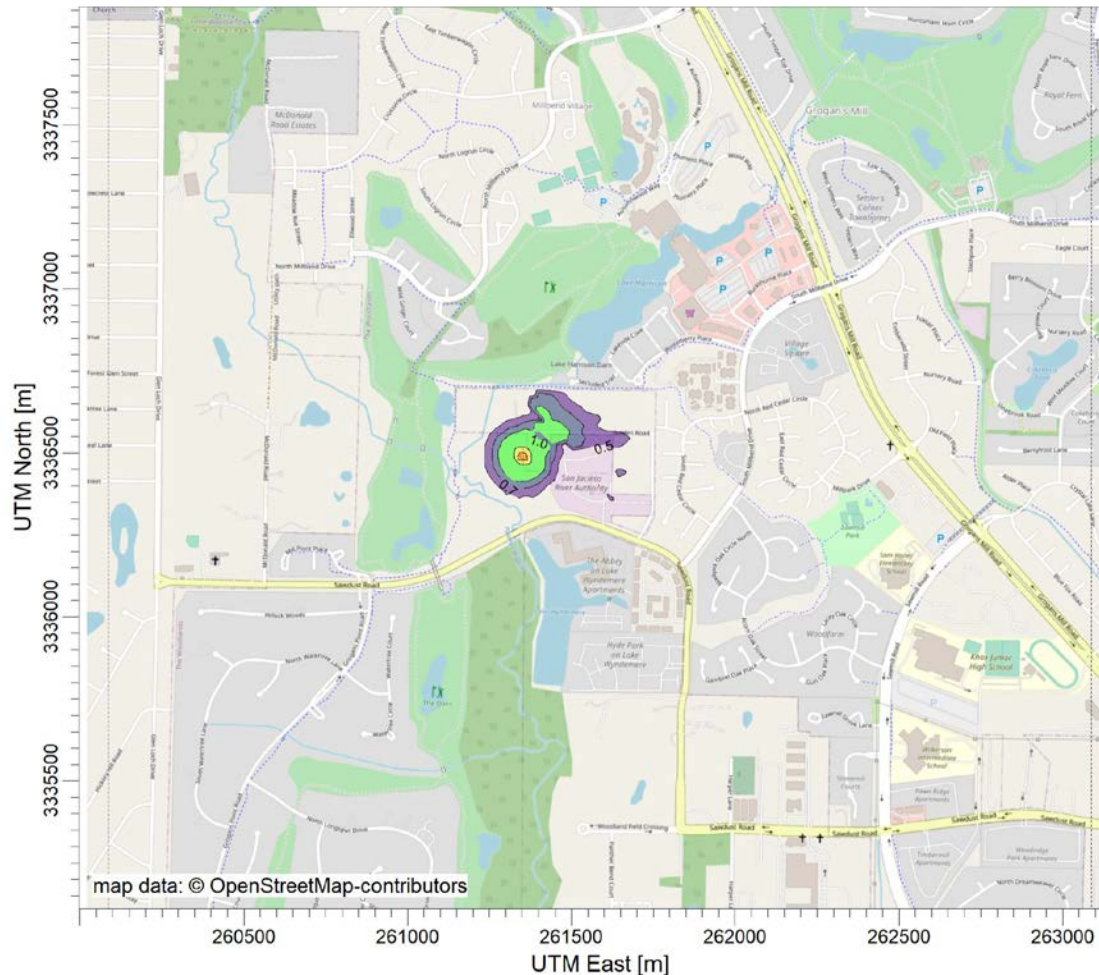
Dispersion Modeling

Model Development

- Calculates relative detection of any odor from a source (not only H₂S).
- Model Inputs: Odor Concentration data, Odor Emission rates, Weather data (Four Years), Topography data.
- Model replicates the study area as a grid of cells.
- Odor dispersion within each cell is calculated based on the “worst case scenario”, or the conditions that would result in the highest perceived odor concentration within that cell from a source.
- Since each cell is “worst-case”, the model represents a theoretical condition, not a typical occurrence.
- Maps of the model data were truncated below detectable values. This can appear as discontinuous plumes, but any gaps are visual only.

Dispersion Modeling: Tin Man

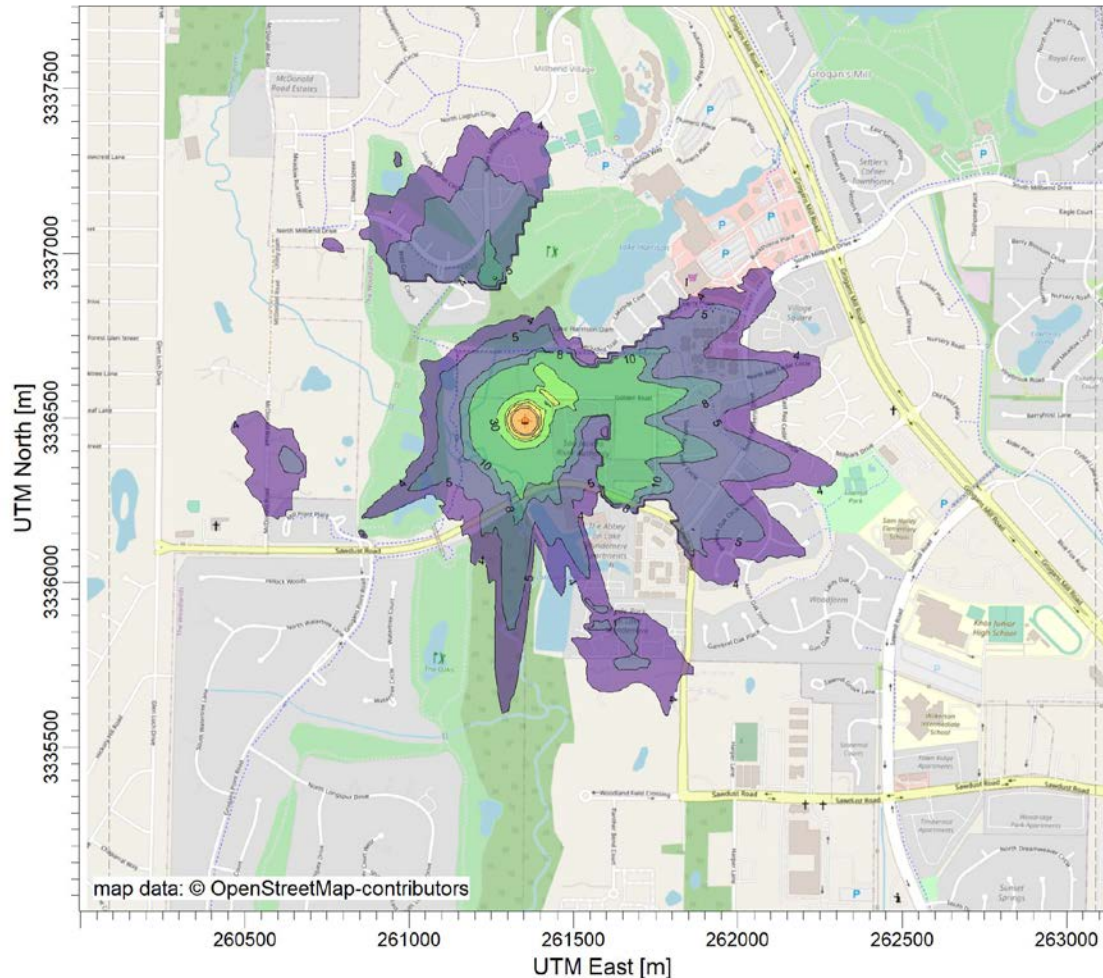
Tin Man Off (Passive Discharge)



Note:
Dispersion
Model
represents the
instantaneous
“worst case
scenario” at
each point in
the model –
not a typical
occurrence.

Dispersion Modeling: Tin Man

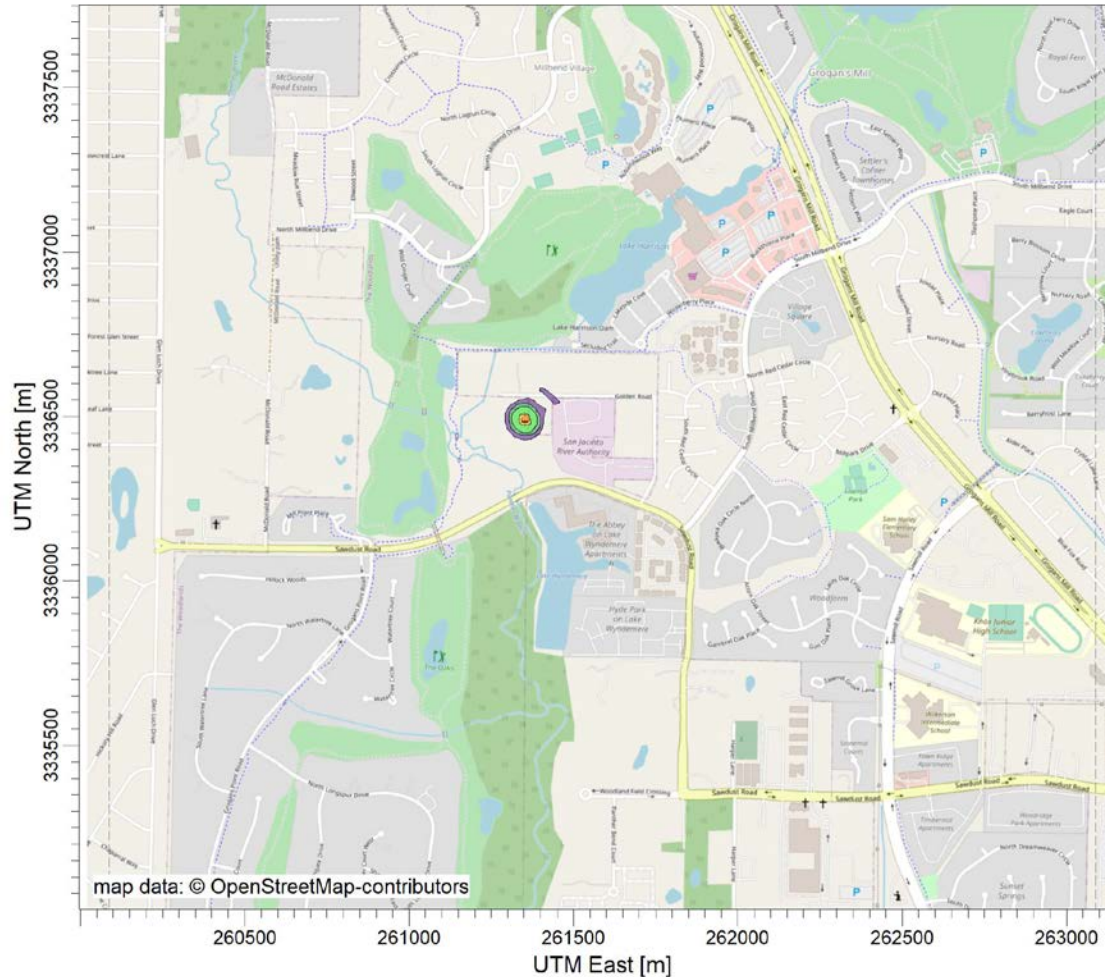
Existing Conditions: Tin Man 100% On (Active Discharge)



Note:
Dispersion Model represents the instantaneous “worst case scenario” at each point in the model – not a typical occurrence.

Dispersion Modeling: Tin Man

Proposed Conditions: Tin Man 100% On with Treatment



Note:
Dispersion Model represents the instantaneous “worst case scenario” at each point in the model – not a typical occurrence.

Collection System Conclusions

Atmospheric

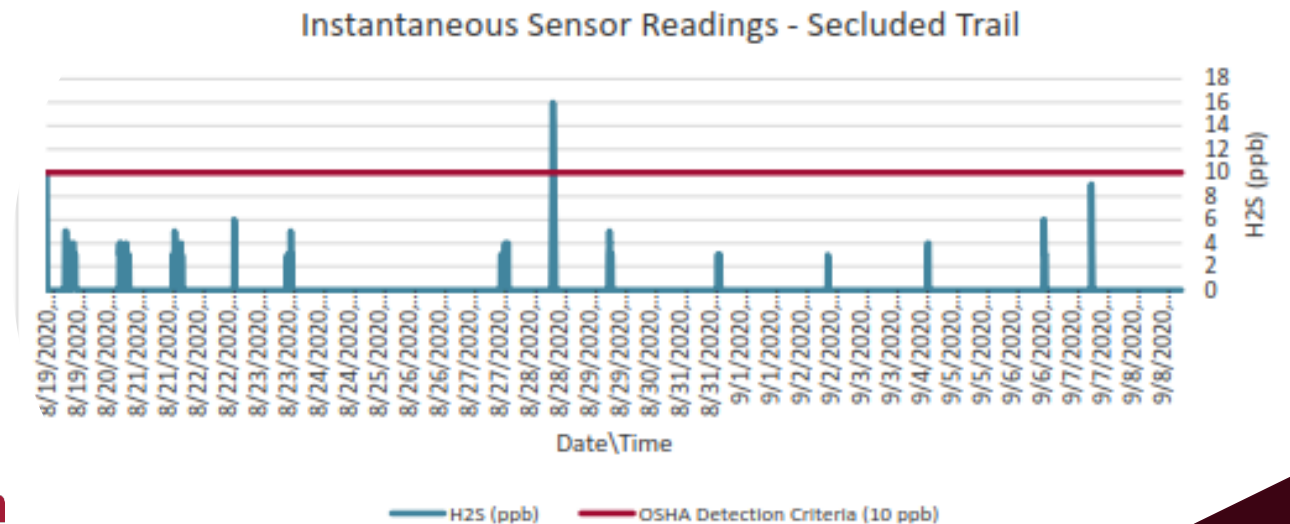
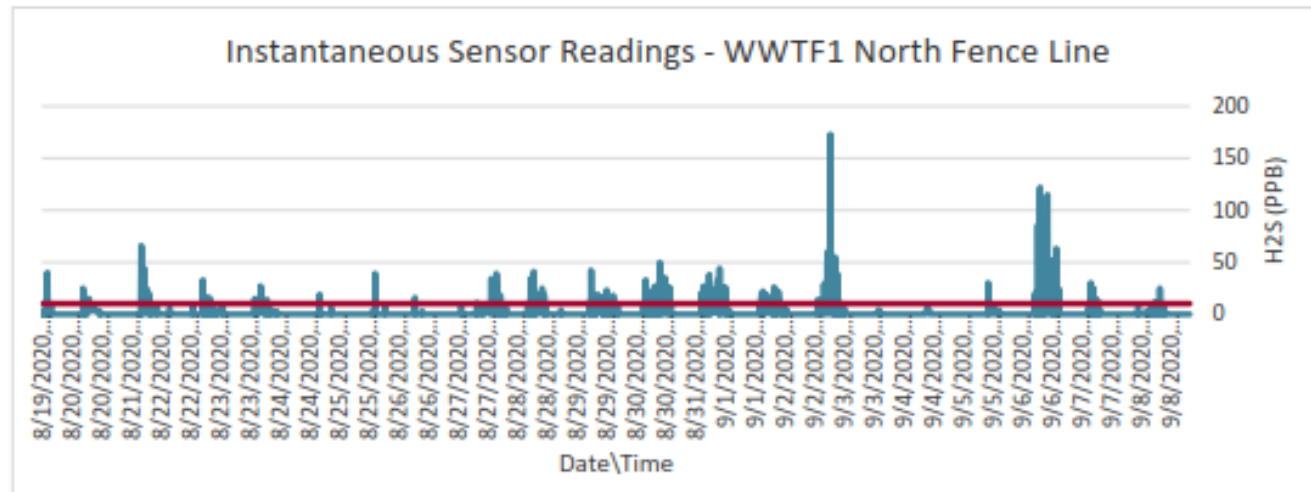
- No significant atmospheric discharges (leaks) detected within the collection system in the study limits.
- There is a correlation of H₂S system peaks with atmospheric H₂S increases at Secluded Trail.
- Data suggests Tin Man structure discharge during operation (100% on) can increase atmospheric H₂S at Secluded Trail under certain environmental and system conditions.

Tin Man

- Tin Man operation has a positive effect on creating an internal vacuum condition at Secluded Trail.
- Turning the Tin Man off (passive discharge) limits odor detection to the fringes of Secluded Trail.
- Treatment of the Tin Man structure operational discharge has a significant positive impact on odor generation that limits odor detection to the WWTF northern fence line.

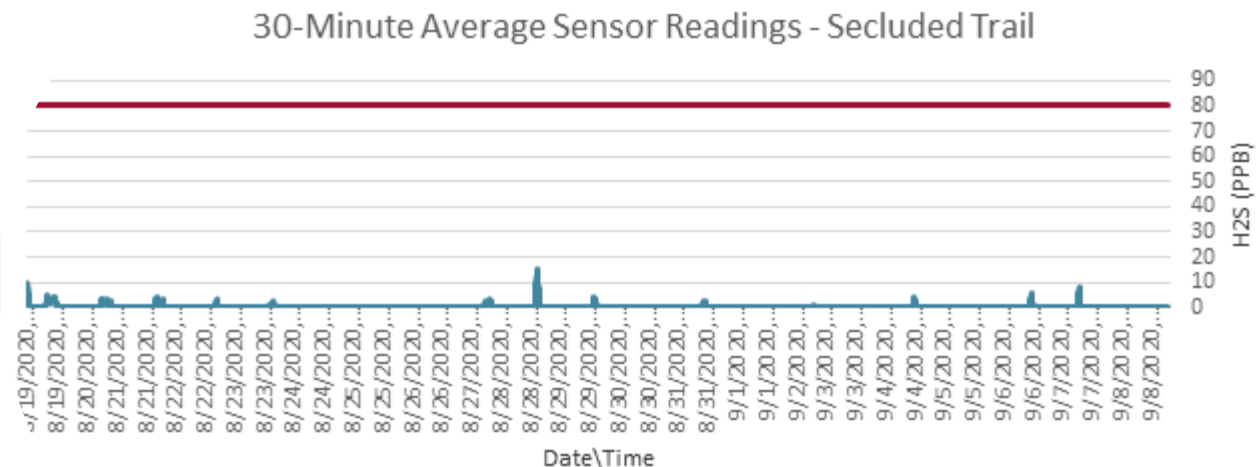
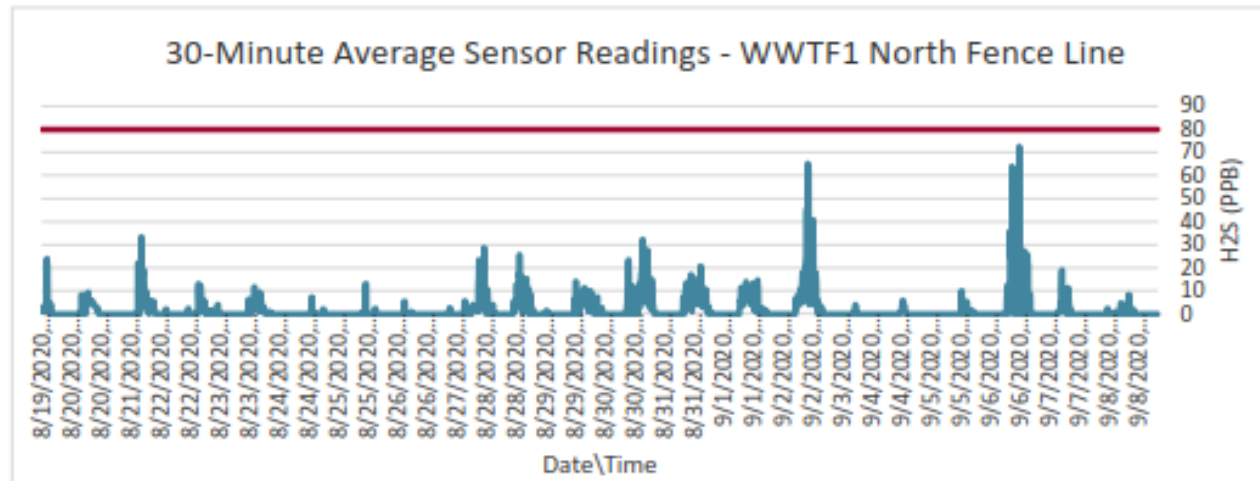
WWTF1 Results

Sensor Data: Instantaneous



WWTF1 Results

Sensor Data: 30-Minute Average



WWTF1 Results

WWTF Process Ranking for Odor Generation

Processes
That Were
Further
Evaluated

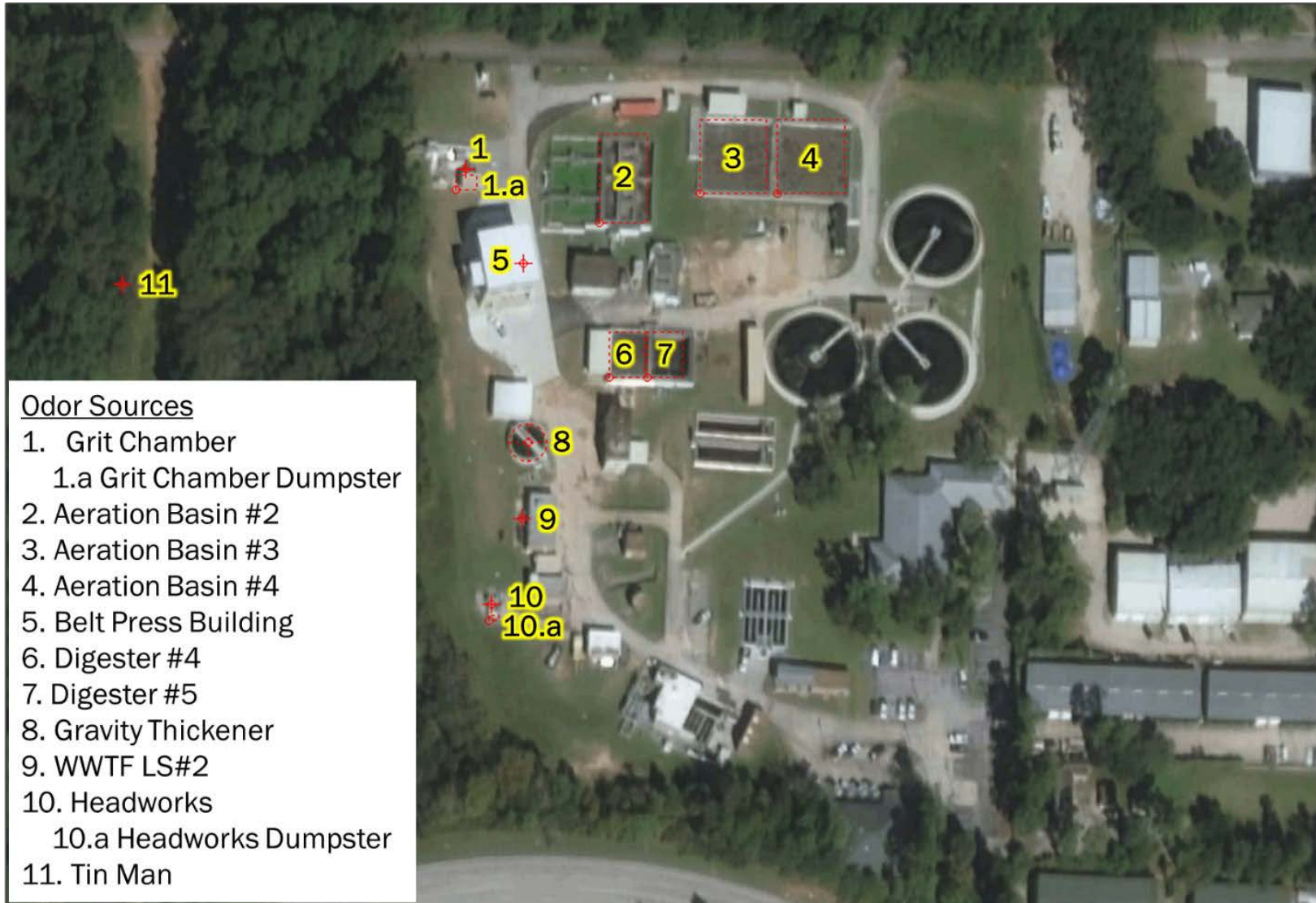


Unit	Score (0-5)
Digesters	3.9
Aeration Basins	3.5
Grit Chamber	3.2
Gravity Thickener	3.2
Headworks	3.1
Cutoff Evaluation Value	3.0
Belt Press	2.6
Lift Stations	2.5
Clarifiers	2.1
Chlorine Contact Basin	2.0
Filters	2.0
Dechlorination Basin	1.9

Ranking Factors:

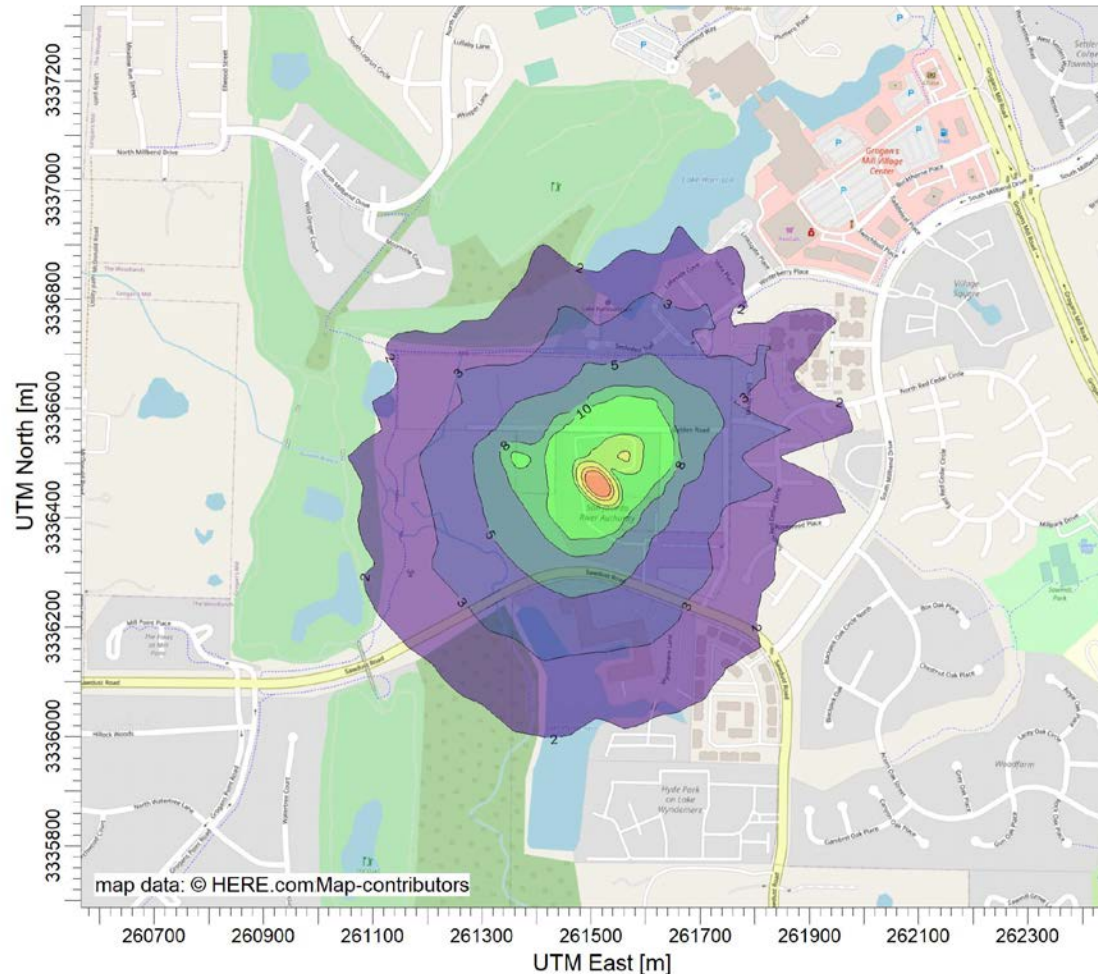
- Sampled Odors Onsite
- Potential for H₂S Generation
- Volume of Odor Generation
- Frequency for Potential Odors
- Existing Odor Control
- Distance to Communities

Dispersion Modeling: WWTF1



Dispersion Modeling: WWTF1

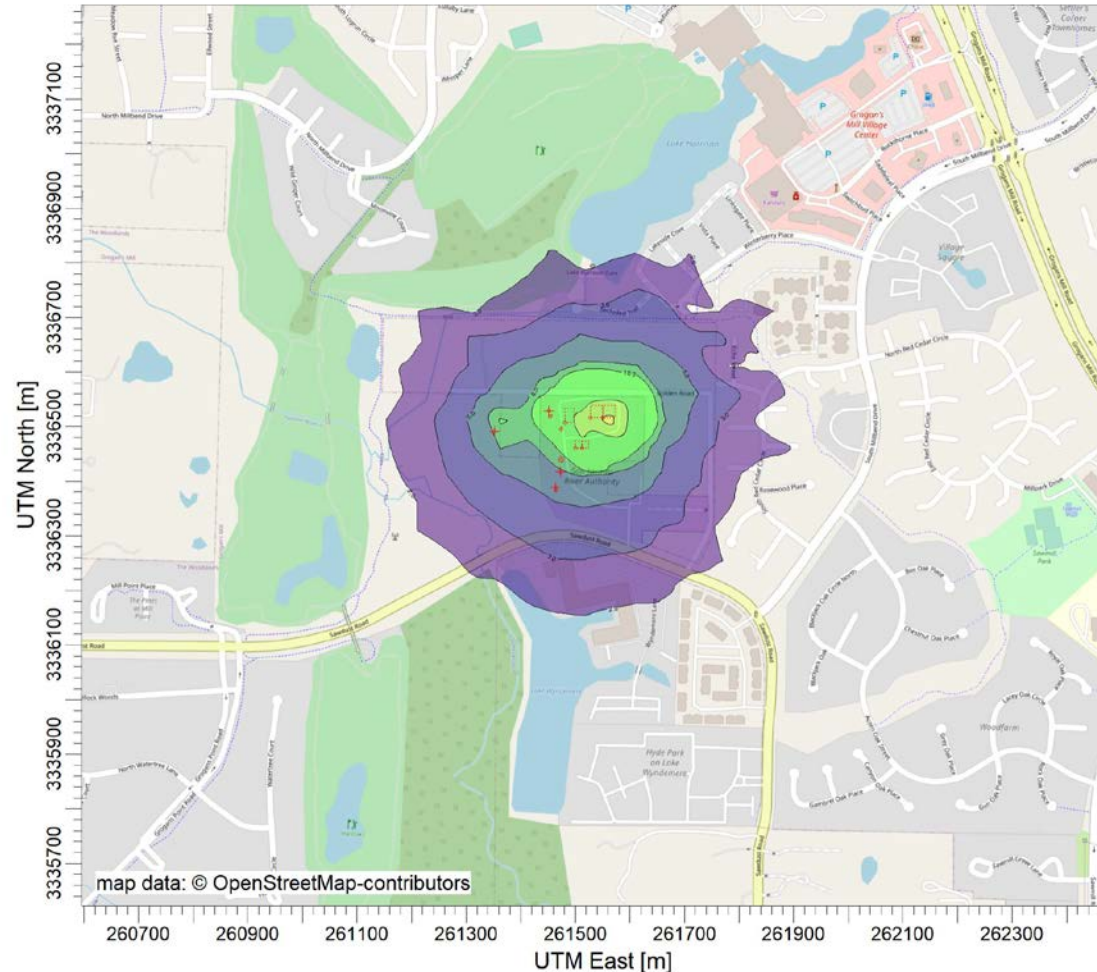
Existing Conditions



Note:
Dispersion Model represents the instantaneous “worst case scenario” at each point in the model – not a typical occurrence.

Dispersion Modeling: WWTF1

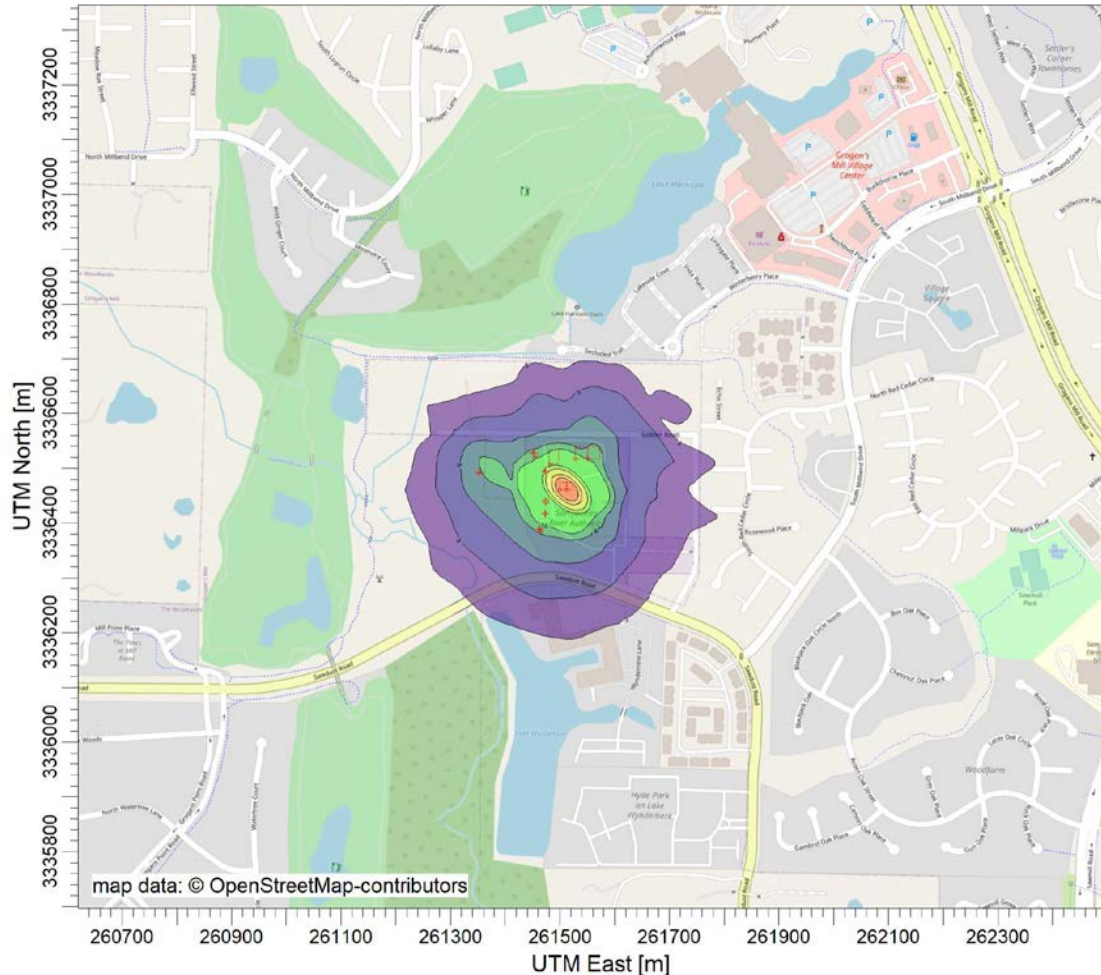
Proposed Conditions: Digester Treatment



Note:
Dispersion Model represents the instantaneous “worst case scenario” at each point in the model – not a typical occurrence.

Dispersion Modeling: WWTF1

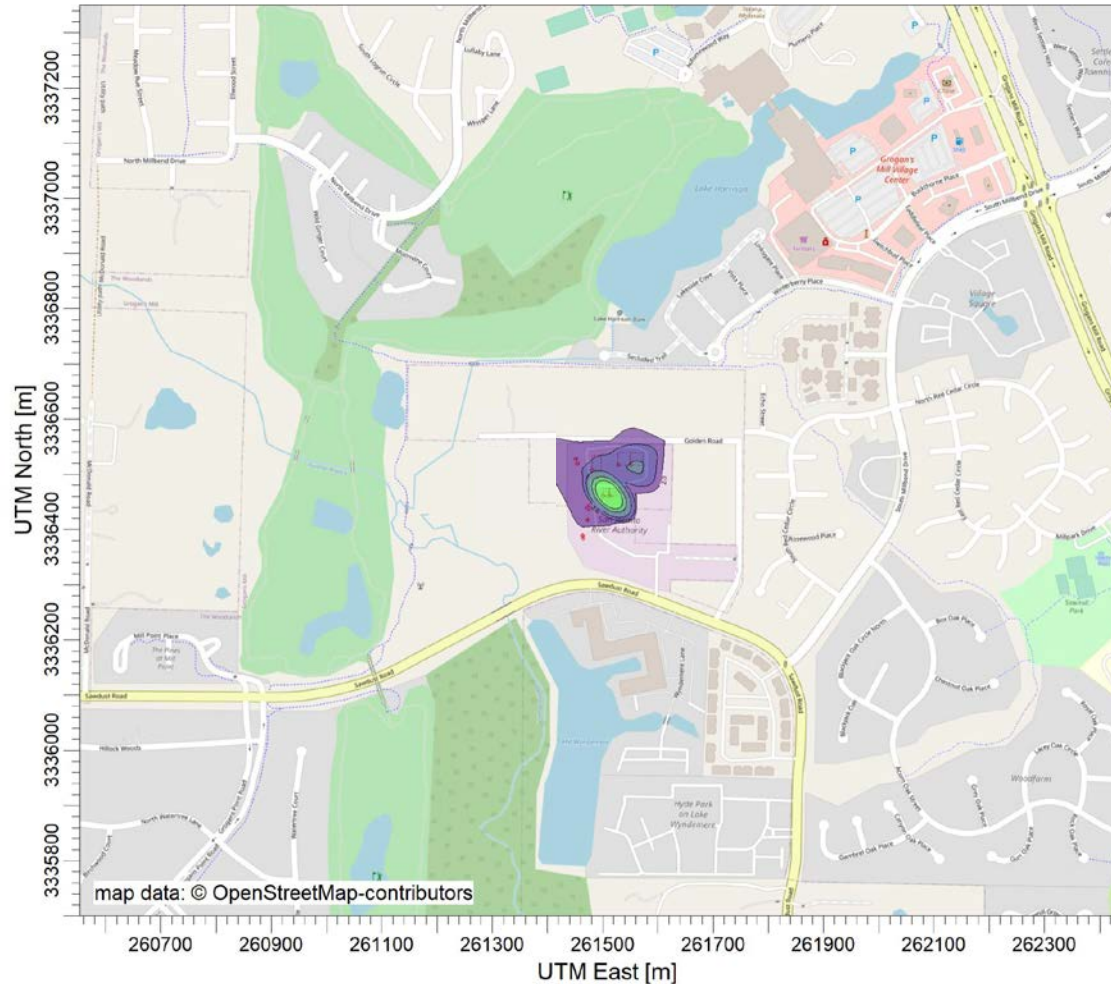
Proposed Conditions: Aeration Basin Treatment



Note:
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Dispersion Modeling: WWTF1

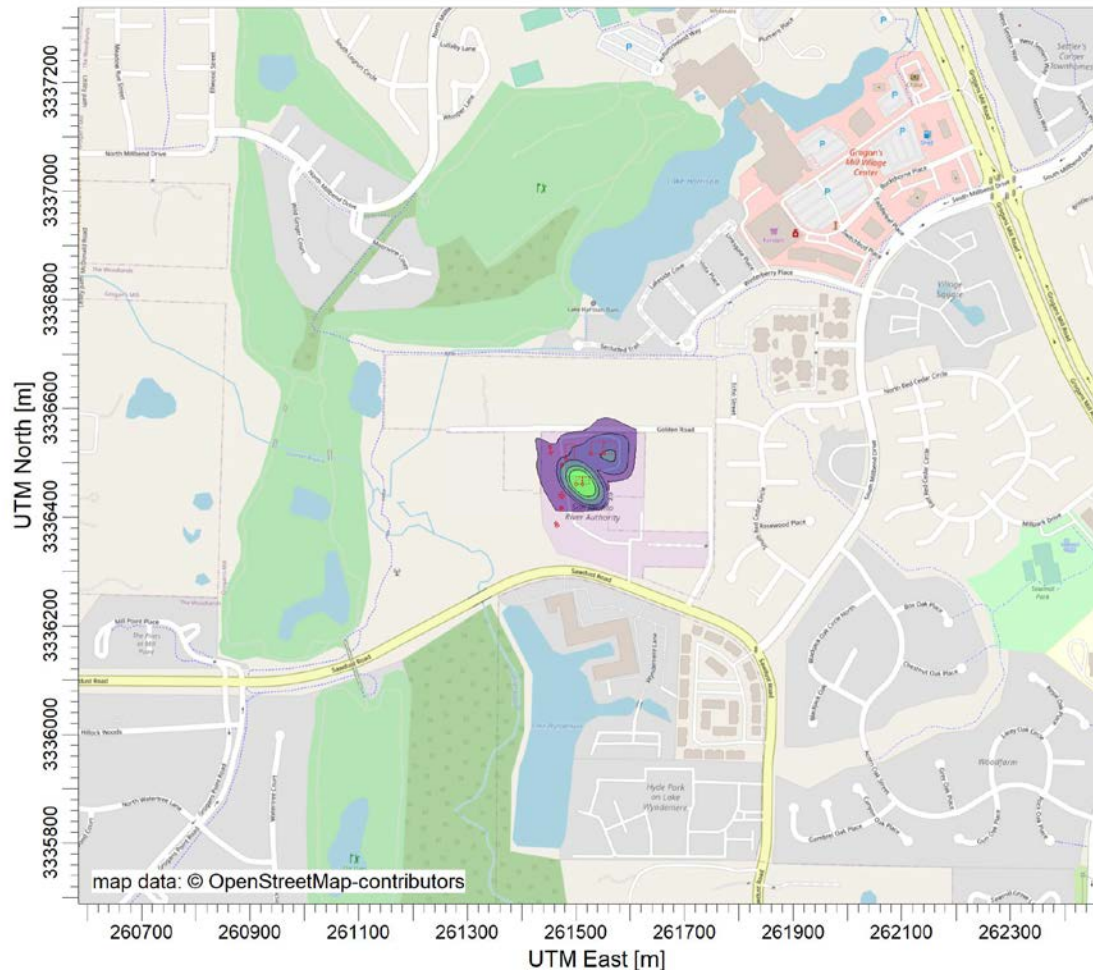
Proposed Conditions: Digester and Aeration Basin Treatment



Note:
Dispersion Model represents the instantaneous “worst case scenario” at each point in the model – not a typical occurrence.

Dispersion Modeling: WWTF1

Proposed Conditions: Digester, Aeration Basin, Grit Chamber, Headworks, Thickener



Note:
Dispersion Model represents the instantaneous “worst case scenario” at each point in the model – not a typical occurrence.

WWTF1 Conclusions

Odors

- WWTF1 does not exceed the TCEQ maximum threshold value for odor detection and is compliant with TCEQ requirements for odor generation.
- WWTF1 processes generate odors that can be detectable within Lakeside Cove under certain environmental and facility conditions.

Treatment

- Both Digester treatment and Aeration Basin treatment each have a positive impact on odor generation that limits odor detection of facility processes to the fringes of Secluded Trail.
- Combined Digester and Aeration Basin treatment has a significant positive impact on odor generation that limits odor detection of facility processes to the WWTF north fence line.
- Treatment of the Grit Chamber, Headworks, and Thickener have virtually no positive impact on odor generation/detection outside the boundaries of the WWTF property.

Note: Treatment of any type does not guarantee either odor generation elimination or complete odor detection elimination outside the WWTF property.

Cost Estimates for Odor Treatment

Capital Cost Estimate Components:

- Odor treatment equipment/cover estimates solicited directly from vendors.
- Piping sized for flow rates and lengths for logical unit locations onsite.
- Electrical and structural modifications (when needed).
- Engineering design and construction management (20%).
- Contingency (35%).

Operation & Maintenance (O&M) Cost Estimate Components:

- Power use.
- Water use (when needed).
- Media/Chemical costs.
- Personnel addition (when needed).
- Contingency (35%).

Note: O&M Cost Estimates projected as a 20-Year Present Worth Value

Cost Estimates for Odor Treatment

Item No.	Item Description	Capital Cost	O&M Cost (20-Year)	Total PW Cost
1A	Digester Biotrickling Filter (Building)	\$ 15,671,000	\$ 1,069,000	\$ 16,740,000
1B	Digester Biotrickling Filter (Cover)	\$ 3,038,000	\$ 2,524,000	\$ 5,562,000
2A	Aeration Basin Carbon Filter (Building)	\$ 45,260,000	\$ 7,962,000	\$ 53,222,000
2B	Aeration Basin Carbon Filter (Cover)	\$10,277,000	\$ 3,848,000	\$ 14,125,000
3	Grit Chamber Biotrickling Filter (Building)	\$ 12,555,000	\$ 769,000	\$ 13,324,000
4	Gravity Thickener Biotrickling Filter (Building)	\$ 6,324,000	\$ 945,000	\$ 7,269,000
5	Headworks Biotrickling Filter (Building)	\$ 4,046,000	\$ 547,000	\$ 4,593,000
6	Tin Man Biotrickling Filter	\$ 1,318,000	\$ 585,000	\$ 1,903,000

Treatment Cost Estimates: Most Impactful

Item No.	Item Description	Capital Cost	O&M Cost (20-Year)	Total PW Cost
1B	Digester Biotrickling Filter (Cover)	\$ 3,038,000	\$2,524,000	\$ 5,562,000
2B	Aeration Basin Carbon Filter (Cover)	\$10,277,000	\$3,848,000	\$14,125,000
6	Tin Man Biotrickling Filter	\$ 1,318,000	\$ 585,000	\$ 1,903,000
TOTAL		\$14,633,000	\$6,957,000	\$21,590,000

FUNDING CONSIDERATIONS

Financial Considerations

WWTF 1 Tin Man Biotrickling Filter

Total Cost = \$1,318,000

- Engineering = \$ 130,000
- Construction = \$1,188,000

Cash call (assessment) to MUDs

MUD 1 = \$ 80,400

MUD 46 = \$229,300

MUD 6 = \$ 95,000

MUD 47 = \$209,500

MUD 7 = \$106,400

MUD 60 = \$122,600

MUD 36 = \$ 59,500

MUD 67 = \$124,500

MUD 39 = \$ 58,000

Metro = \$203,900

MUD 386 = \$28,900

New bond issue

Too small, issuance costs would be unreasonable

Financial Considerations

WWTF 1 Tin Man Biotrickling Filter

Temporary use of funds from 2017 Bond Issue

- Capital only, must be repaid
- WW only = \$0.01/1000 generates \$29,000
- \$0.46/1000 (9.8%) rate increase over one year
 - Impact to average monthly residential bill* = \$2.76
- \$0.23/1000 (4.9%) rate increase over two years
 - Impact to average monthly residential bill* = \$1.38
- \$0.15/1000 (3.3%) rate increase over three years
 - Impact to average monthly residential bill* = \$0.45

*Note: Based on 6,000 gallon average per household

Financial Considerations

WWTF 1 Digester, Aeration Basins and Tin Man

Total Cost = \$15,000,000

- Engineering = \$ 1,500,000
- Construction = \$13,500,000

Cash call (assessment) to MUDs

MUD 1 = \$ 915,000

MUD 46 = \$2,610,000

MUD 6 = \$1,081,000

MUD 47 = \$2,384,000

MUD 7 = \$1,210,000

MUD 60 = \$1,396,000

MUD 36 = \$ 677,000

MUD 67 = \$1,417,000

MUD 39 = \$ 660,000

Metro = \$2,321,000

MUD 386 = \$329,000

Financial Considerations WWTF 1 Digester, Aeration Basins and Tin Man

New Bond Issue

- Annual interest rate = 2.9%
- Annual debt service = \$911,000
- WW only = \$0.01/1000 generates \$29,000
- \$0.31/1000 (6.8%) rate increase over 25 years

Additional annual O&M cost = \$300,000

- \$0.10/1000 (2.2%) rate increase

Impact to average monthly residential bill = \$2.46

*Note: Based on 6,000 gallon average per household

Financial Considerations

Similar Study for WWTFs 2 & 3

Estimated Fee = \$400,000

Cash call (assessment) to MUDs

MUD 1 = \$24,300

MUD 46 = \$69,600

MUD 6 = \$28,800

MUD 47 = \$63,600

MUD 7 = \$32,300

MUD 60 = \$37,200

MUD 36 = \$18,100

MUD 67 = \$37,800

MUD 39 = \$17,600

Metro = \$61,900

MUD 386 = \$8,800

Temporary use of R & R Funds

- Must be paid back
- WW only = \$0.01/1000 generates \$29,000
- \$0.14/1000 (3%) one year rate increase

Financial Considerations

WWTFs 1, 2 and 3

Digester and Aeration Basins

Total Cost = \$45,000,000

- Engineering = \$ 4,500,000
- Construction = \$40,500,000

Cash call (assessment) to MUDs

MUD 1 = \$2,745,000

MUD 6 = \$3,243,000

MUD 7 = \$3,630,000

MUD 36 = \$2,031,000

MUD 39 = \$1,980,000

MUD 46 = \$7,830,000

MUD 47 = \$7,152,000

MUD 60 = \$4,188,000

MUD 67 = \$4,251,000

Metro = \$6,963,000

MUD 386 = \$987,000

Financial Considerations WWTFs 1, 2 and 3 Digester and Aeration Basins

New Bond Issue

- Annual interest rate = 2.9%
- Annual debt service = \$2,740,000
- WW only = \$0.01/1000 generates \$29,000
- \$0.95/1000 (20.5%) rate increase over 25 years

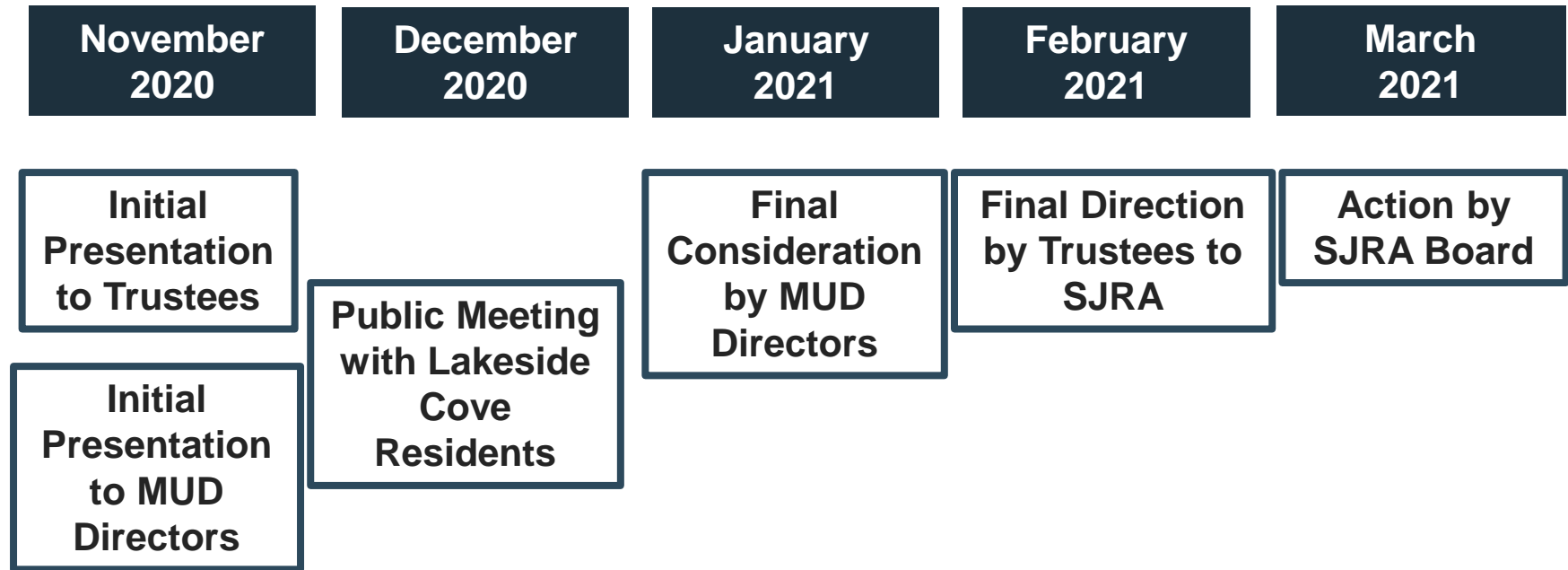
Additional annual O&M cost = \$900,000

- \$0.30/1000 (6.6%) rate increase

Impact to average monthly residential bill = \$7.50

*Note: Based on 6,000 gallon average per household

Potential Odor Concern Schedule





Thank You.

Kimley»»Horn

