

Inver Grove Heights Environmental Commission
Virtual Meeting via Zoom
Thursday, April 22, 2021 at 7:00 p.m.

Meeting Agenda

NOTICE TO RESIDENTS: The Environmental Commission is taking proactive steps to prevent the spread of COVID-19 by meeting remote. People wishing to speak at a public meeting should call into the meeting using the following information: Phone number: 651-450-2471. Individuals may submit written public comments in advance of the meeting by emailing comments to Ally Sutherland (asutherland@ighmn.gov). Comments received prior to 4:00 p.m. on Wednesday, April 21, 2021, will be provided to the Commission before the Thursday, April 22, 2021, meeting.

1. Call to Order

2. Roll Call

3. Presentations - Items that do not require action.

A. Operational and Gas Migration Updates at Pine Bend Landfill

4. Announcements

A. Next Meeting - Thursday, May 27, 2021 - Virtual Regular Meeting 7:00 p.m.

B. Commissioner Applications Due Monday, May 3, 2021 at 4:30 p.m.

5. Consent Agenda - All items on the consent agenda are considered routine and have been made available to the Environmental Commission at least two days prior to the meeting. The items will be enacted in one motion. There will be no separate discussion of these items unless a Commission member or citizen so requests, in which event the item will be removed from this agenda and considered in normal sequence.

A. Minutes of Thursday, February 25, 2021 Environmental Commission Meeting

6. Public Comment - Public comment provides an opportunity for the public to address the Commission on items that are not on the agenda. Comments will be limited to three (3) minutes per person.

7. Regular Agenda - Items Requiring an Action.

8. Administrative Presentations - Items that need to be discussed without any actions.

9. Commission Comments - An opportunity for Commissions to raise additional questions or comments.

10. Adjourn

**Environmental Commission Staff Report**

TITLE: Operational and Gas Migration Updates at Pine Bend Landfill

Meeting Date:	April 22, 2021
Item Type:	Presentations
Contact:	Ally Sutherland, 651-604-8511
Prepared by:	Ally Sutherland

PURPOSE/ACTION REQUESTED

Pine Bend Landfill will present an informational presentation on updates related to operations and gas management.

PROJECT BACKGROUND

Pine Bend Landfill, operated by Republic Services, is a Municipal Solid Waste Landfill located at 2495 117th St E in Inver Grove Heights. The landfill is currently operating under existing permits received through the Minnesota Pollution Control Agency (MPCA), Metropolitan Council Environmental Services (MCES), Dakota County (County) and the City of Inver Grove Heights (City).

In 2018, Pine Bend Landfill requested City, County and MPCA approval to expand the landfill's side slope capacity. The City approved this request through the following approvals:

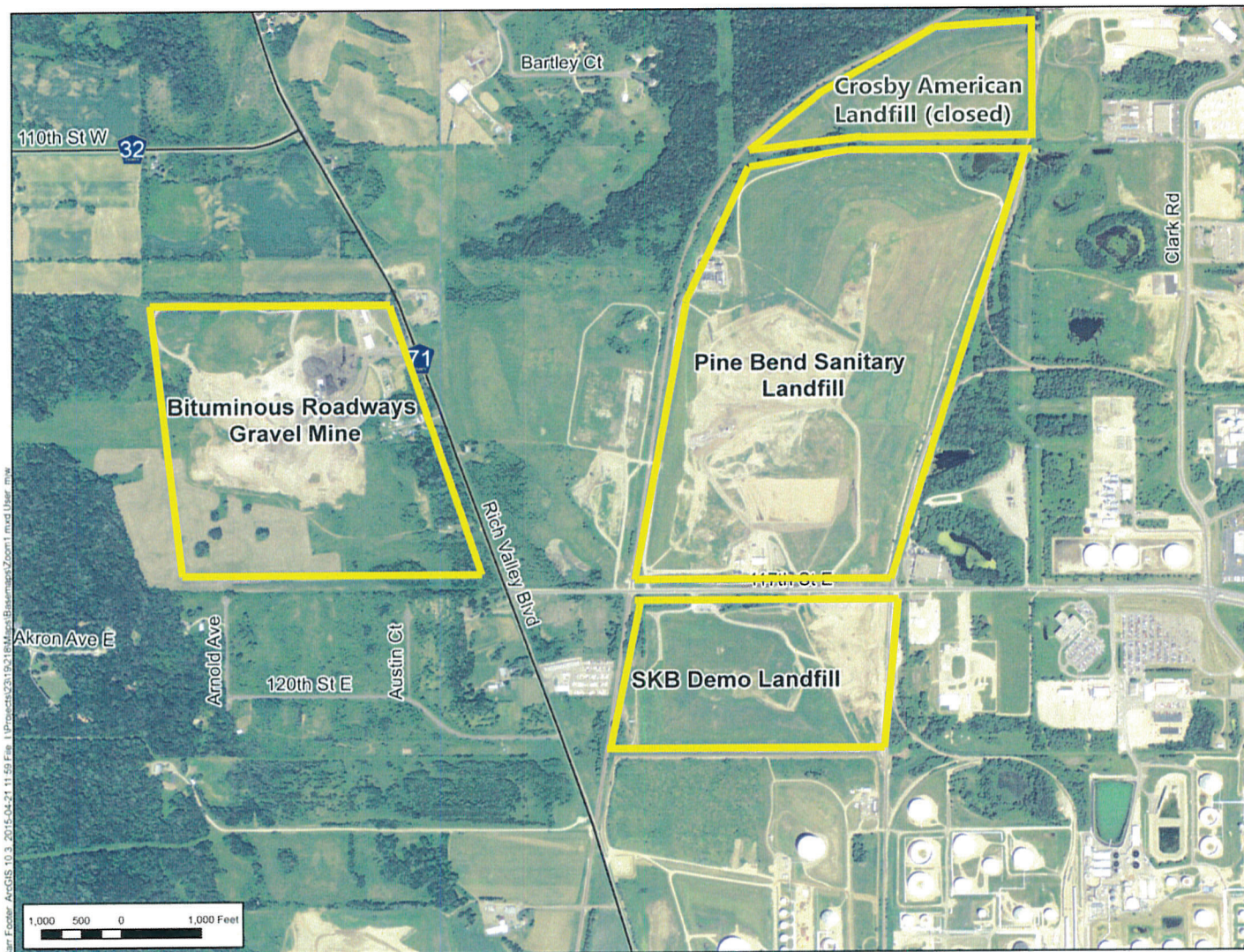
- Resolution 18-70: Resolution Amending Resolution No. 6465 Granting a Non-Conforming Use Certificate for Pine Bend Sanitary Landfill for a Sanitary Landfill (April 9, 2018)
- Memorandum of Third Restated and Amended Host Community Agreement (May 8, 2018)
- Resolution 18-69: Resolution Approving a Conditional Use Permit to Allow Side Slope Capacity Expansion of Pine Bend Landfill (May 23, 2018)

In the first quarter of the year, Pine Bend Landfill submits an Annual Report to the MPCA to show compliance with their MPCA Solid Waste Permit. Barr Engineering completes a technical review of the Annual Report on the behalf of the City for compliance with the following items:

- Conditional Use Permit
- Non-Conforming Use Certificate
- Gas/Leachate Dual Extraction System
- Landfill Gas
- Surface Water
- Financial Assurance
- Contingency Action and Closure Plans
- Groundwater Quality

In December 2020, Barr Engineering's review of Pine Bend Landfill's 2019 Annual Report concluded that Pine Bend Landfill did not demonstrate full compliance with Minnesota Rule 7035.2815 Subpart 11 related to gas management at landfills. The City has requested that Pine Bend Landfill present progress to achieve compliance at the April 22, 2021 Environmental Commission Meeting. Pine Bend will also present operational updates related to the Landfill.

ATTACHMENTS: Site Map
 Minnesota Rule 7035.2815, Subpart 11



(10) type of dedicated pump, sampling device or measuring device including manufacturer and model number, pumping capacity, dimensions, location of intake area, how secured at the desired elevation, type of material used for connecting lines or hoses, and type and location of power source.

R. Piezometers that will not be used to measure water quality must comply with items E to G, J to M, O to R, and T. They must be designed and constructed to accurately measure hydraulic head in the portion of the aquifer or formation immediately surrounding the screen or intake area and to minimize the time lag between fluctuations in head outside the piezometer and the inside water level. If the time lag is too large, the commissioner may require pressure transducers or other alternative designs to be used.

S. Surface water monitoring points must comply with the following requirements:

(1) A permanent marker must be installed on land adjacent to the sampling location. The marker must clearly identify the monitoring station. The commissioner may approve an alternate procedure if a sampling location is outside the permitted property and permission cannot be obtained to install a marker.

(2) Monitoring stations in a river or stream must be located upstream of the area of ground water discharge, downstream where the discharge has mixed with the stream flow, and within the area of maximum projected pollutant concentrations in the discharging ground water.

(3) Within 30 days after establishing a surface water monitoring station, the owner or operator shall submit to the commissioner a revised landfill plan sheet showing the location and identification of the sampling station and marker.

T. Sampling personnel must inspect monitoring points and markers each time the monitoring point is measured or sampled. The owner or operator must inspect monitoring points and markers at least annually. The owner or operator must correct damaged or obstructed monitoring points, or other conditions that interfere with the proper functioning of the monitoring point within the time periods required for monitoring wells in part 4725.1860, subpart 5, item E. The owner or operator must resurvey the elevation of the top of the casing immediately after any change or repair that may have altered its elevation. The owner or operator must revise the well construction log, the monitoring protocol under subpart 14, item H, and the facility plans to show the new elevations, previous elevations, and the date of each change in elevation and submit the revised log and plans to the commissioner within 30 days after the change or repair.

Subp. 11. Gas monitoring, collection, and treatment system. The concentration of any explosive gas must not exceed its lower explosion limit at the property boundary or 25 percent of its lower explosion limit in and around facility structures or any other on-site

monitoring point. A gas monitoring, collection, and treatment system must be designed to meet the requirements of items A to G.

A. The gas monitoring system, at a minimum, must be capable of monitoring gas build-up in a facility structure and at the property boundary. The commissioner shall establish monitoring requirements (including water quality parameters that indicate gas migration) in the permit, closure document, order, or stipulation agreement. Field inspection to detect odors and signs of vegetative stress, and portable or in-place probes to monitor explosive gases must be included in the monitoring system.

B. Gas monitoring probes must be placed between the disposal site and on-site structures or property lines. The probes must be placed no closer to the property line than the compliance boundary defined in subpart 4, item C, to allow for installation of control measures. If the owner or operator believes that monitoring probes are unnecessary or infeasible, the owner or operator shall submit reasons to the commissioner to support this belief. The commissioner will decide on the need for monitoring probes based on the waste characteristics, fill size, surrounding soils, the water table, and the proximity to occupied buildings.

C. Probe depths and locations must be based on the soils, site geology, depth of fill, water table, and depth of frost.

D. At a minimum, each mixed municipal solid waste land disposal facility must be designed and constructed with gas vents. The number and placement of the gas vents must release gas pressure in the fill area to prevent ruptures of the cover system and to encourage vertical gas migration.

E. The gas control systems must extend below the facility to the water table or to a subsurface soil capable of impeding the movement of gas. The gas control system must be located adjacent to the fill area.

F. The size of the gas collection system must be based on the volume and type of waste to be received at the site. The owner or operator must determine the need for a gas collection system and discuss in the engineering report how the need was determined. The commissioner shall review the determination during the permit review process and again at closure. Approval of a gas monitoring system without collection at the time of permitting shall not limit future requirements determined necessary by the commissioner based on the volume of gas generated at the facility, the proximity to residential or business property, or problems experienced at the facility in maintaining vegetative growth or accumulation of gas in site structures.

G. A gas monitoring program must include sampling and analysis for the amount and type of gas generated. The monitoring program must be included in the operations manual for the facility. The program must account for variation in gas generation and

migration due to climatic conditions, variation in the amount of waste in place at the facility, and the length of time the waste has been in place. The operations manual must include the techniques to be used to monitor gas at the site.

Subp. 12. **Construction requirements.** The construction requirements in items A to M must be incorporated into the project specifications for all major design features, at a minimum.

A. The owner or operator must notify the commissioner at least seven days before the day construction is expected to begin on the major design features, including phase excavation, phase construction, liner installation, monitoring well installation, and the placement of final cover.

B. The construction firm's inspector must record all procedures completed during construction at a mixed municipal solid waste land disposal facility. The record must document that design features were constructed in accordance with parts 7035.2525 to 7035.2815 and 7035.2855. This record must include pictures, field notes, and all test results.

C. The owner or operator must install a permanent benchmark on-site and show its location on the facility as-built plan.

D. The owner or operator must complete tests for compaction, Atterberg limits, grain size distribution, lab and field permeability, and field moisture density, at a minimum, on liners and final covers constructed at the facility to ensure the requirements of subparts 5 to 9 are met. The owner or operator must retain a portion of the field-molded and field-compacted samples of liners and the final cover layers until the construction certification is complete.

E. Unless otherwise noted in subparts 5 to 9, the minimum permissible cover slope is three percent and the maximum permissible cover slope is 20 percent.

F. As horizontal phases are installed, the liner must be joined to existing liners.

G. Flexible membranes must be installed during dry conditions. The seams joining membrane panels must be inspected as construction proceeds. Seams must be air tested and field seams must be tested for tensile strength. All flexible membranes must be protected after placement. The natural layer above and below the barrier layer must be free of roots, sharp objects, rocks, or other items that might puncture the liner.

H. Barrier liners constructed of in situ soils must be formed by scarifying and recompacting these soils.

I. All pipe used in constructing the leachate collection system must be tested for deformations. The allowable pipe deflection is five percent.

J. All pipes exiting the lined area must be fitted with antiseep collars.

Inver Grove Heights Environmental Commission
Virtual Meeting via Zoom
Thursday, February 25, 2021 at 7:00 p.m.

Meeting Minutes

1. Call to Order

The Environmental Advisory Commission of Inver Grove Heights met virtually via Zoom on Thursday, February 25, 2021. Chair Trenzeluk called the meeting to order at 7:00 p.m.

2. Roll Call

Present: Chair Ted Trenzeluk, Commissioners; Sarah Brass, Katherine Teiken, Patricia Todd, Larry Moehring, and Nichole Boehmke

Absent: Commissioner Robert Heidenreich (excused); Commissioners Matt Mills and Aditya Jayam

3. Presentations

4. Announcements

A. Next meeting – Thursday, March 25, 2021 – Virtual Regular Meeting 7:00pm

5. Consent Agenda

A. Minutes of Thursday, January 28, 2020 Environmental Commission Meeting

Motion by Commissioner Boehmke, seconded by Commissioner Teiken to approve the minutes from Thursday, January 28, 2020 as submitted.

Ayes: 7

Nays: 0 Motion carried.

6. Public Comment

7. Regular Agenda

A. Consider recommending City Council Approval of the City of Inver Grove Heights' Energy Action Plan

Ally Sutherland, Environmental Specialist, presented a powerpoint presentation to the Environmental Commission on the draft City of Inver Grove Heights Energy Action Plan developed by the City and the Energy Action Stakeholder Team. This ongoing initiative is in collaboration with Xcel Energy's Partners in Energy. Ms. Sutherland introduced the Xcel Energy Representatives on the call, Jamie Johnson (CEE), Tami Gunderzik (Xcel Energy), and Marisa Bayer (CEE). Information on the program was presented as follows:

What is Partners in Energy?

- Partners in Energy is a two-year collaboration with Xcel Energy to develop and implement a community's energy goals
- Built upon existing sustainability goals and a stakeholder engagement process
- Jamie Johnson noted that Inver Grove Heights is one of more than 30 Minnesota

communities to participate in Partner in Energy, including Rosemount and Hastings.

How can it help the community?

- Further existing programming goals
 - GreenStep Cities
 - Transition to Sustainable Operations Plan
- New opportunities
 - Expand and target outreach
 - Build on existing municipal actions
 - Promote sustainability in community
 - Free technical assistance & outreach resources

IGH Partners in Energy Planning Process

- Fall 2019: Commission and Council directed city staff to apply for the program
- Feb 2020:
 - Applied and Selected
 - Stakeholder engagement recruiting. 22 Community members joined the team. Representatives of City Commissions, Committee's, City Council, local education institutes; including K-12 Schools and the local Community College, business representatives, representatives of service organizations, utilities, and residents.
- July 2020: Planning Process (~7 months)
 - Stakeholder engagement workshops
 - Community online survey to collect business and residential feedback on energy needs. Over 200 responses were collected.
- Spring 2021: Implementation Process (~18 months)
 - Energy Action Plan and MOU (Memorandum of Understanding) Draft
 - Energy Action Plan and MOU approval
- April 2021: Phase 2 begins once Plan and MOU are approved. Process will continue as long as Staff sees fit. Facilitated by Partners in Energy for the first 18 months.

IGH Energy Action Plan

- 1) Baseline Data (2017-2019)
 - Partners in Energy consolidated community energy usage data to understand how the community uses energy per sector and what the related emissions are.
- 2) Energy Vision & Goals
 - The City began the planning process by creating a Vision Statement with the stakeholder team to help the planning process by reflecting on a vision for the Community's future. The Vision Statement: "Inver Grove Heights will be an innovative and engaged Community where energy choices conserve both our natural and financial resources".
 - Goals and targets are identified throughout the Plan to help meet the Vision Statement.
- 3) Implementation Work Plan
 - Identifies three focus areas of the plan: 1) Residents, 2) Large and small businesses, schools, non-profits, and places of worship, and 3) Municipal Leadership.
 - Identifies Strategies (broad plans meant to guide action)
 - Residents and businesses
 - Education & outreach of energy efficiency, renewable energy use, efficient transportation

- Defines targeted populations
- Municipal leadership
 - Seek opportunities for energy efficiency, renewable energy and efficient transportation
 - Demonstrate sustainability leadership
- Identifies Tactics (specific actions to achieve strategies)
 - Residents
 - Dedicated city webpage
 - New education material and events
 - New relationships with residents we may not reach through existing communication channels
 - Recognition program and share testimonials
 - Annual engagement opportunities
 - Businesses
 - Dedicated city webpage
 - New education material
 - 1:1 outreach to small businesses
 - Partner with business organizations
 - Recognition program and share testimonials
 - Annual engagement opportunities
 - Ms. Johnson stated the Partners in Energy Team will support the Community toward achieving goals set in the Energy Action Plan. Marketing support is one of the resources. Will work closely with City Staff and the Communications Department to create outreach material needed while implementing strategies. Materials will be cobranded and designed so messaging, design, and imagery resonates with residents, businesses, and the Community.
 - Municipality
 - Update code as needed
 - Connect developers to education and grants
 - Educated employees and facility users
 - Renewable energy and energy efficiency in existing and new facilities
 - Efficient fleet
- 4) Measuring Success
 - Visualizations are included in the plan to help with understanding what successful implementation of the Plan would look like. For example: By implementing actions for 2021 and 2022, the Community could avoid up to \$1.3 million dollars in energy costs and avoid 6,800 metric tons of Carbon Dioxide. The equivalent of taking 1,500 vehicles off the road for a year.

Support & Commitments

- Plan approval
- MOU for Partners in Energy support (18-months)
- Community Development and support
- Annual reporting of progress
- Energy Action Team & new community relationships

Energy Action Team Comments

- Ms. Sutherland requested comments from the Energy Action Team

- Why you think an energy action plan is important for our community?
- Which elements of the plan are you most excited to see implemented in our community?
- Ms. Sutherland stated Dawn Gaetke, a resident of Inver Grove Heights and a member of the Energy Action Team, wished to share comments with the Environmental Commission. Ms. Gaetke noted she was grateful to be on the committee. She stated fossil fuel energy will have to be replaced, and the fastest and most cost-effective way to transition is to reduce the amount of energy needed. That is why this Energy Action Plan is so important. It focuses on the crucial first step of reducing energy use. She stated by adopting this Plan, the City points the way in reducing costs for itself and citizens. By reducing energy use, we reduce the need to purchase of additional wind turbines, solar panels, or build larger nuclear plants in the future. We also reduce our energy bills in the process. She is also in favor of the longer-term goals of the Plan such as the electric vehicle infrastructure goals. She is happy knowing the City has recognized the need to get ready for changes on the horizon and is grateful for the opportunity to work on this. She encouraged the Council to adopt the Plan.
- Commissioner Teiken noted she was also a part of the Energy Action Team and had originally brought the program to the attention of the Environmental Commission and City Staff. She requested that City Staff set up the initial Partners in Energy informational presentation. She is pleased with how the plan turned out and felt that CEE worked hard to hear from different community voices, learn different opinions and craft them into the plan. She is supportive of the plan and feels it will provide many climate, financial and equity benefits the community.
- Chair Ted Trenzeluk thanked staff, Xcel Energy and CEE for their support of the Plan. He stated he likes that the Plan strikes a balance for a diverse community with different interests and noted that whether you want to save on energy costs or take actions for their environmental benefits there are options for you to participate. He likes that the Plan is easy to read and that it was professionally assembled with data, facts, measurements, goals, and objectives.

Next Steps

- March 1: City Council Work Session
- March 8: City Council Meeting
- Approval of Plan and Memorandum of Understanding
- April 2021: Implementation Kickoff

Commissioner Boehmke noted that the Plan recommends taking advantage of opportunities that present a high return on investment. She asked if the plan includes next steps for a business, resident, or other target audience to take beyond a recommendation? Ms. Sutherland responded that she sees the plan as an initial step to engage the community in energy topics, and to showcase that the city has resources available and encourages the community to consider taking actions to improve energy efficiency. The plan also provides opportunities for peer sharing of community members who have taken recommendations actions. Ms. Johnson noted that because return on investment can vary greatly between businesses, the Plan does not include specific actions but rather recommends businesses seek actions to improve energy efficiency based on their individual circumstance. Ms. Gunderzik noted the Plan seeks to engage businesses and get their attention on the topics in order to connect them with the tools to realize their own savings such as through receiving an energy audit or knowing to look for an energy efficient appliance when they make a purchase decision. She noted the goal is to enable the community to make a change. Chair Trenzeluk also noted that the Plan promotes connecting

with the Chamber of Commerce to help connect to businesses. Commissioner Teiken added that the goal is to promote energy efficiency but also to connect residents and businesses to specific tools to be able to do so based on their individual situation. Commissioner Boehmke noted she understands the Plan is focused on increasing awareness which is important for sustainability. Ms. Sutherland also noted that through stakeholder engagement process and community surveys the city learned although large businesses are likely to have the staff available to make informed energy decisions, small business and residents do not always have the time and knowledge to do so. It is the City's goal to help develop information and outreach tools that make informed decision making easier and quicker for businesses and residents, such as through step-by-step energy efficiency guides.

Commission Moehring noted that it can be challenging to quantify actions and measure successful implementation of plans. He asked if we can measure participation and quantify our progress at any time so we can see our progress towards goals and keep momentum. Ms. Sutherland noted that it is a great idea to be monitoring and reporting progress throughout the year and that there is a section in the Plan that discusses specifically how progress towards goals and tactics will be measured. Ms. Johnson noted that tracking progress towards goals is important to communities and that Xcel Energy is able to provide twice annual data pulls that measure progress towards goals. She noted this is provided through the 18-months of implementation and in the future. Chair Trenzeluk noted he has asked a similar question throughout the process about how to keep momentum after the 18-months of implementation support. He noted that he has been reassured by the Plan's inclusion of how to measure success and as well as how the Plan relates to GreenStep Cities. He is hopeful that the two programs will help keep momentum for the other. He also noted the Environmental Commission can be involved by requesting progress reports.

Commissioner Moehring also noted that there was significant discussion of electric vehicle adoption but not charging infrastructure and wanted to know why this is the case. Ms. Sutherland noted that the Plan includes tactics such as applying for grant opportunities to install public charging infrastructure as well as updating our city code to help promote charging infrastructure development through private development. Commissioner Teiken noted that Xcel Energy also has electric vehicle charging programs available that will be promoted to the community through this process.

Environmental Commission Recommendation

Motion by Commissioner Teiken, seconded by Commissioner Todd to recommend City Council Approval of the City of Inver Grove Heights' Energy Action Plan.

Ayes: 7

Nays: 0 Motion carried.

8. Administrative Presentations

9. Commission Comments

10. Adjourn

Motion by Commissioner Todd, seconded by Chair Trenzeluk to adjourn at 7:53 pm.

Ayes: 7

Nays: 0 Motion carried.

DRAFT

City of Inver Grove Heights Environmental Commission

Pine Bend Landfill

April 22, 2021



Pine Bend Landfill

- Republic Services Team
- Aerial Photograph
- Site History and Information
- How a Landfill Works
- Current Projects
- Gas Migration

Republic Services Team

- Tyler Kraft, General Manager, 3 years
- Chris Parker, Operations Manager, 6 months
- Aaron Janusz, Environmental Manager, 14 years
- Office Staff (2) / Operators (8) / Mechanic (1) / Scalehouse/Lab/Laborer (3)
- Tom Shustarich, Stantec (formerly Wenck), Design Engineer, 19 years

Aerial Photograph

October 2020



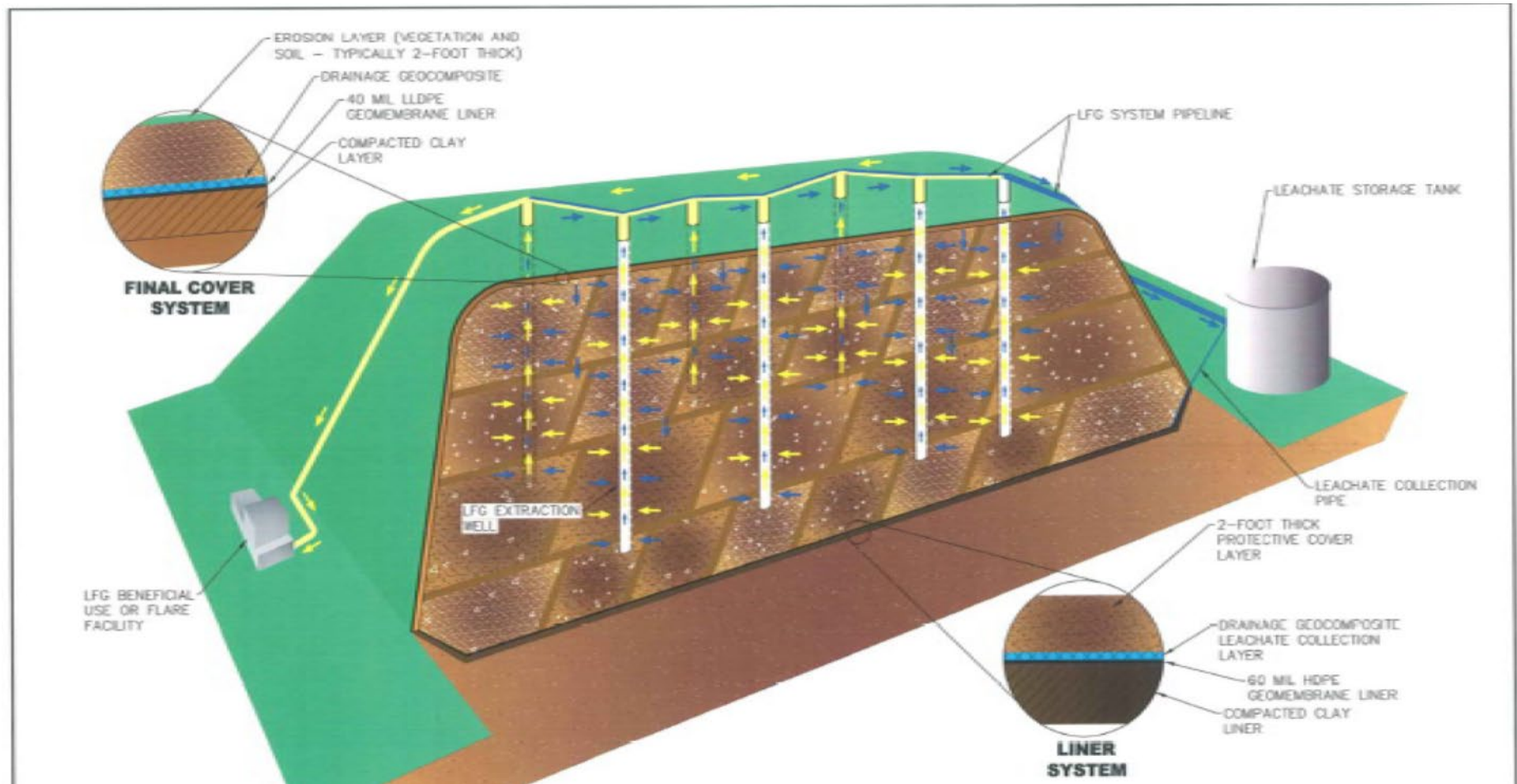
Landfill Development

- MSW Landfill
 - MPCA Permit SW-45
 - Dakota County License/Host Agreement
 - Inver Grove Heights CUP/NCUC/Host Agreement
- Landfill Started September 1971
 - Phase 1 and Phase 2 - Unlined
- Subtitle D (Engineered Landfill)
 - Phase 3 – 1986
 - Phase 4 - 1999
 - Phase 5 – 2005 (Vertical Expansion)
 - Phase 6 – 2019 (Vertical Expansion)

Landfill Information

- Total Area – 358.7 acres
 - Permitted landfill – 192.1 acres
 - Current footprint – 187.4 acres
 - Final cover area – 104.0 acres
- 2,000 tons MSW per day
- 3,000 cubic feet per minute of Landfill Gas
 - High-BTU plant
- 9,000,000 gallons of leachate per year
 - Hauled to Metropolitan Council Environmental Services (MCES) for treatment and disposal

How a Landfill Works



Current Projects

- Certificate of Need (CON)
- Phase 6D & 6B-1 Cell Construction – Sideslope Expansion
- High-BTU Plant Construction - Fortistar

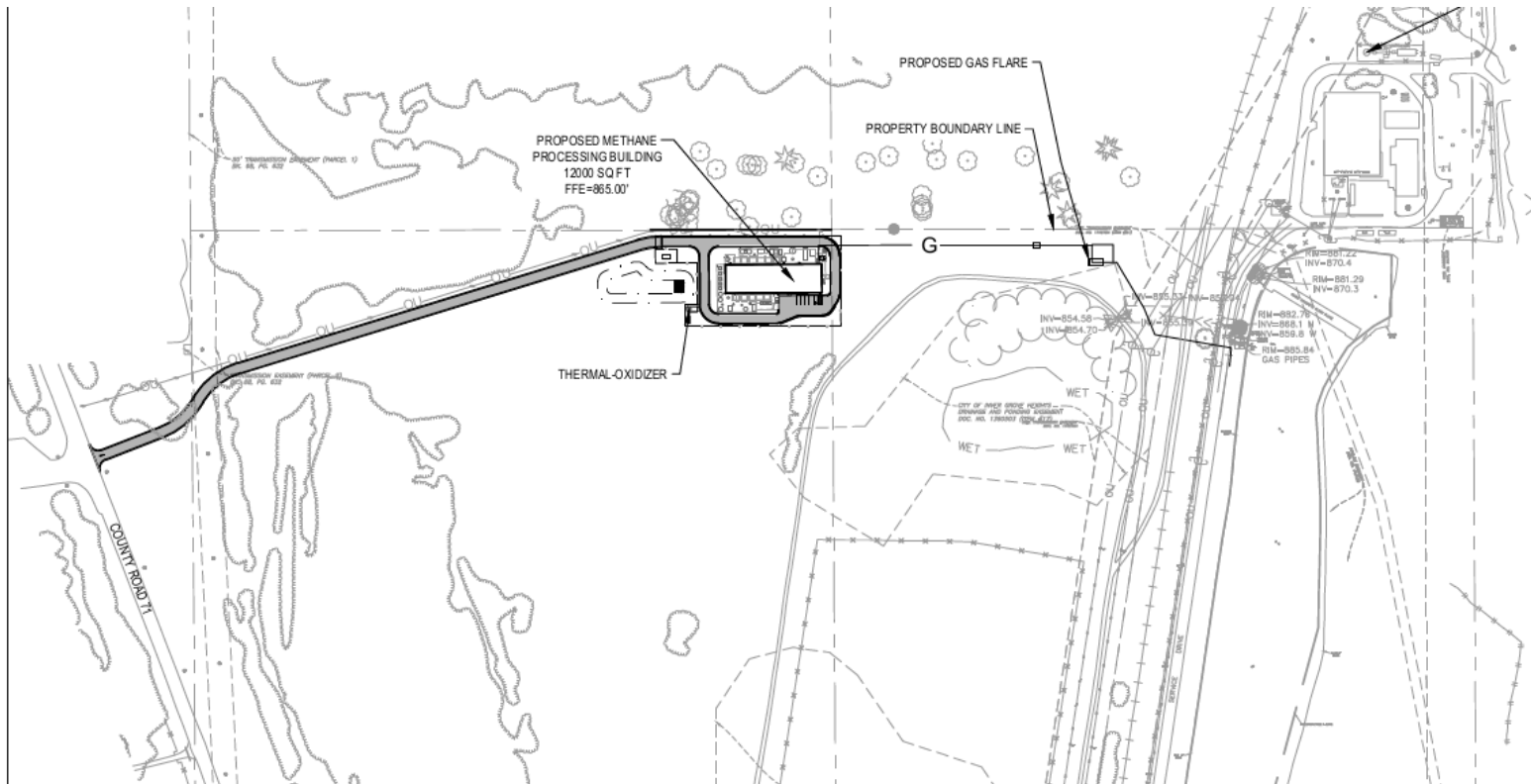
Certificate of Need (CON)

- MPCA Process - Required for MSW Airspace
- Application Submitted August 2020
- Preliminary Determinations/Public Meeting – Spring
- Finalize Early Summer

REPUBLIC
SERVICES



RNG Plant



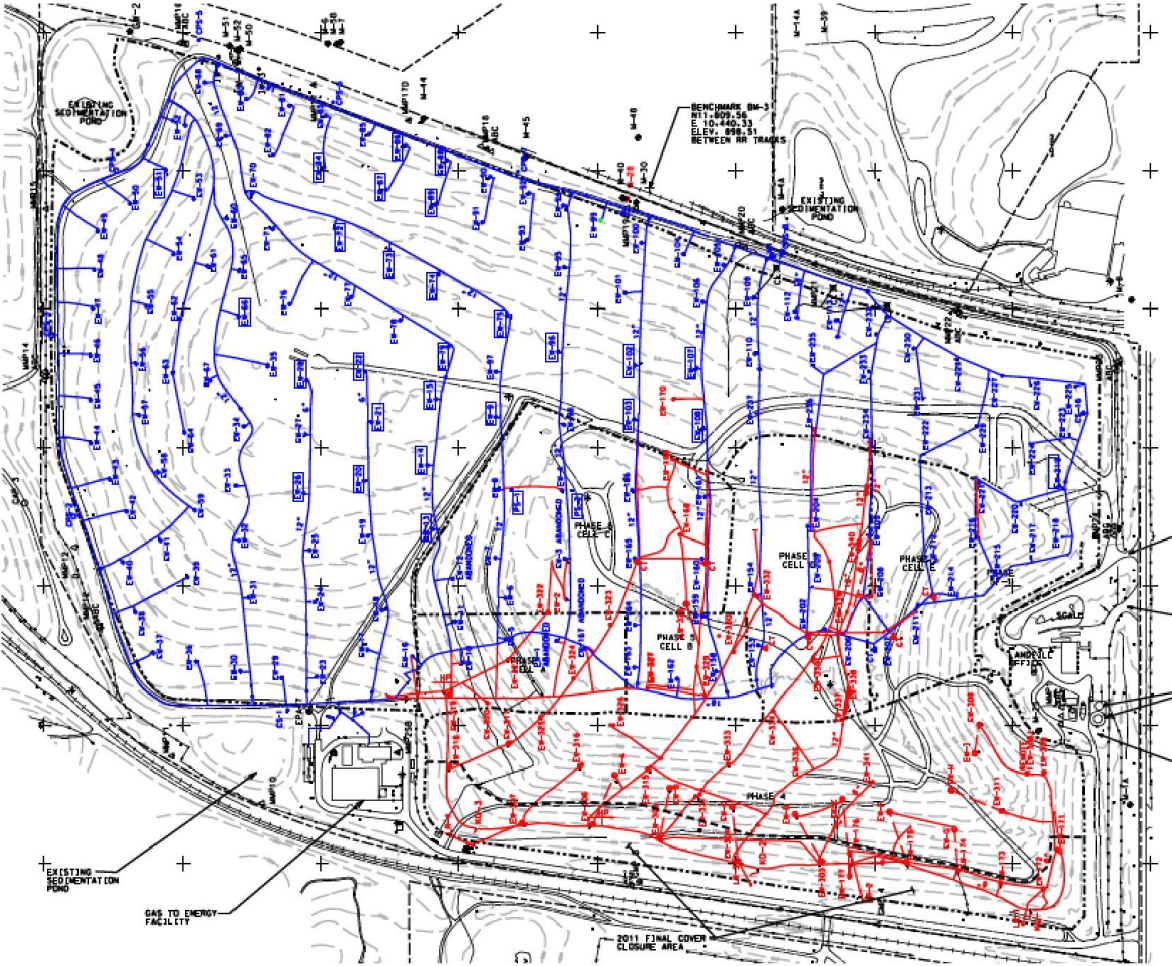
Gas Migration

MN Rule 7035.2815 Subp. 11.

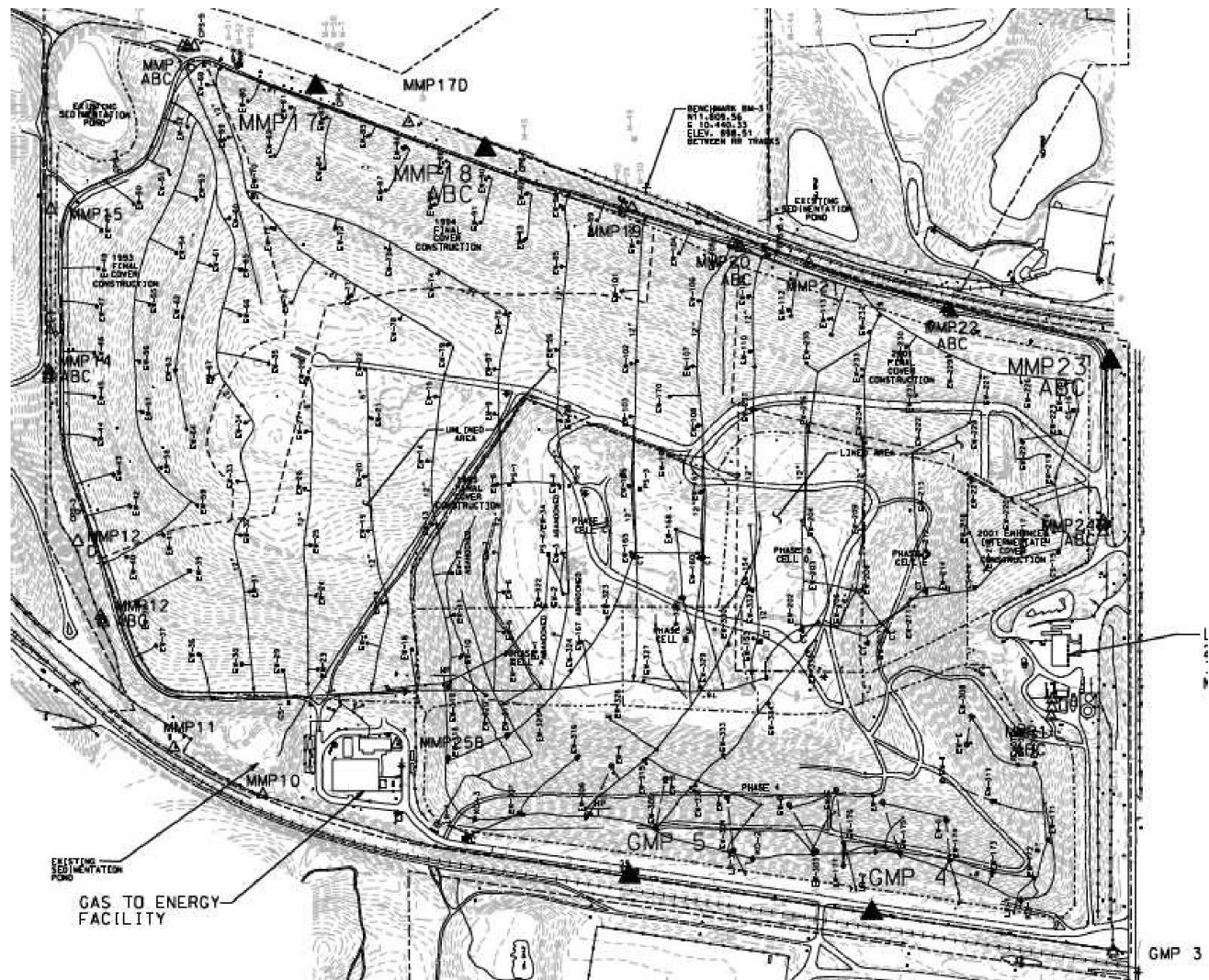
Gas monitoring, collection, and treatment system.

The concentration of any explosive gas must not exceed its lower explosion limit at the property boundary or 25 percent of its lower explosion limit in and around facility structures or any other on-site monitoring point.

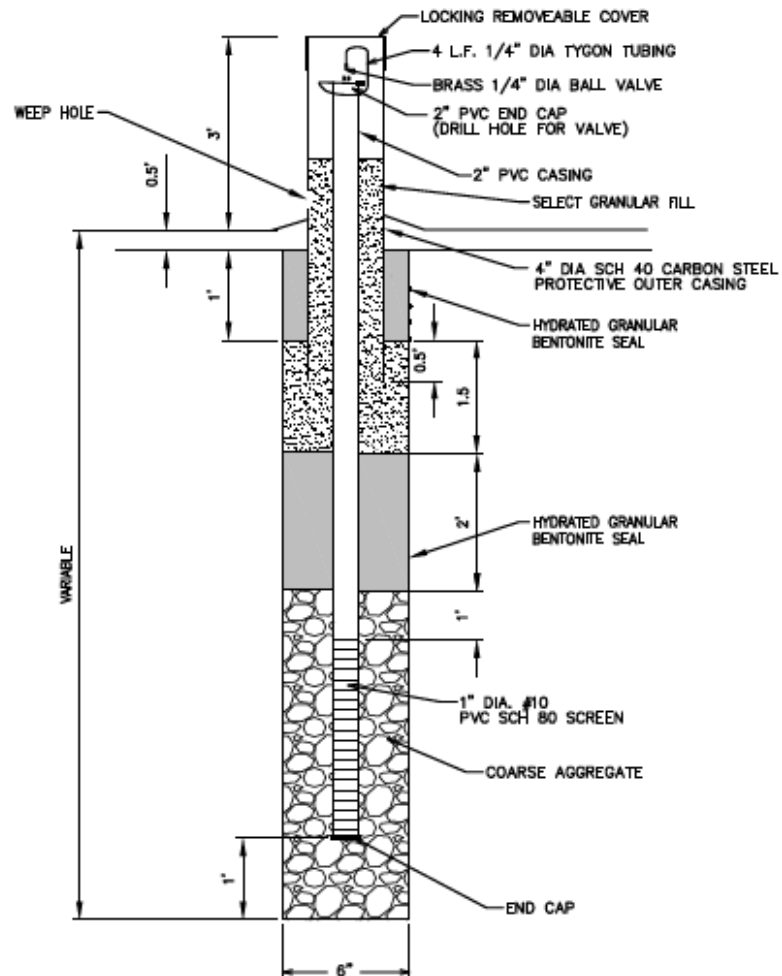
- Landfill Gas (LFG) is 50% Methane
- Methane Lower Explosive Limit (LEL) is 5%



Gas Migration – Gas Monitoring Probes



Gas Migration – Probe Detail



GAS MONITORING PROBE DETAIL

NOT TO SCALE

Gas Migration – Probe Monitoring

- 39 probes monitored quarterly
- Probes with exceedances monitored monthly
- Historical exceedances on east, south, and west side of landfill
 - Unlined area
 - Narrow buffer area
- Currently no off-site impacts
 - Recycling Center 2006 geoprobe
 - Installed building monitor
- Working with MPCA since 2006
- Currently 8 probes with intermittent exceedances

Gas Migration – IGH CUP

- April 9, 2018 Res. No. 18-69, Condition 14
- Compliance with MN Rule 7035.2815 for six consecutive months prior to January 1, 2025
- No waste acceptance if compliance is not met
- Annual updates to Environmental Commission in Q1
- Progress reports in MPCA Annual Report
- City review and comment on work plans and reports

Gas Migration - Timeline

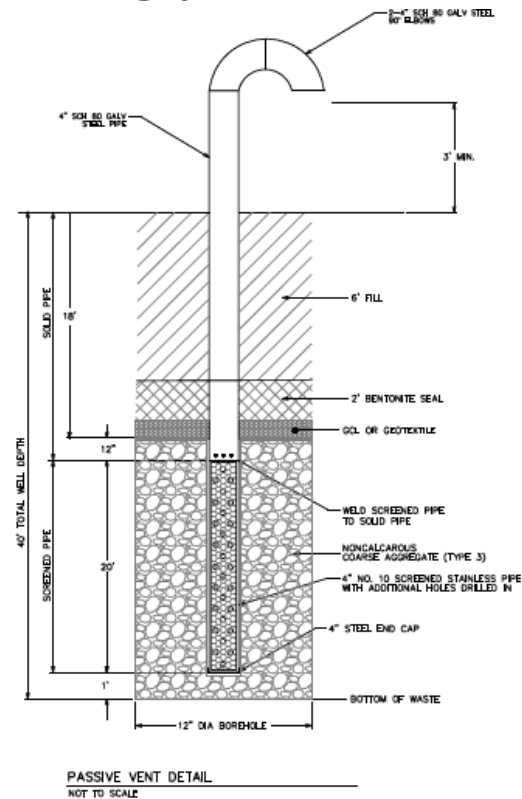
- 2006 – Geoprobe investigation and “fingerprint” analysis
 - No detections across RR tracks to the north
 - Detection near Recycling Center across RR tracks
 - Installed building monitor at Recycling Center
- 2012 – Probe evacuation
 - Apply vacuum to two probes and monitor
 - No decrease in methane concentration
- 2013/14 – Geoprobe investigation
 - East and west side
 - One exceedance on east side (Recycling Center)
 - Exceedances on West 100

Gas Migration – 2013 Geoprobes



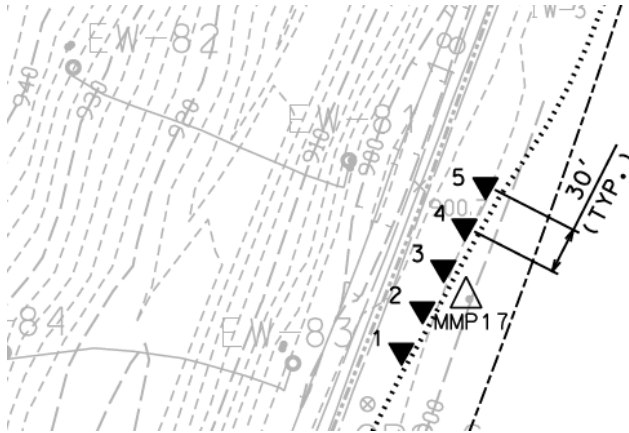
Gas Migration - Timeline

- 2015 – Geoprobe investigation and Work Plan
 - Geoprobos at 5 locations adjacent to probes
 - Proposed installing passive vents

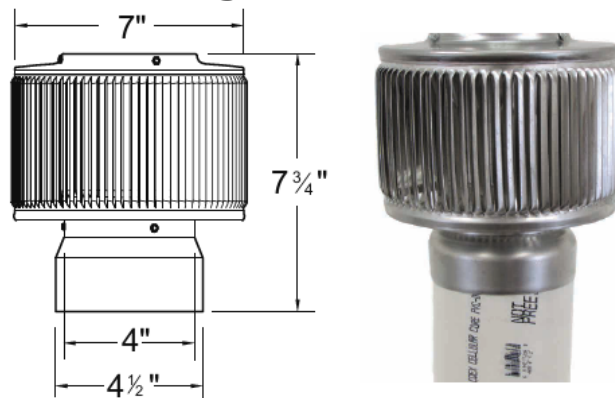


Gas Migration - Timeline

- 2016/17 – Passive Vents and Work Plan
 - Passive vents installed adjacent to MMP17

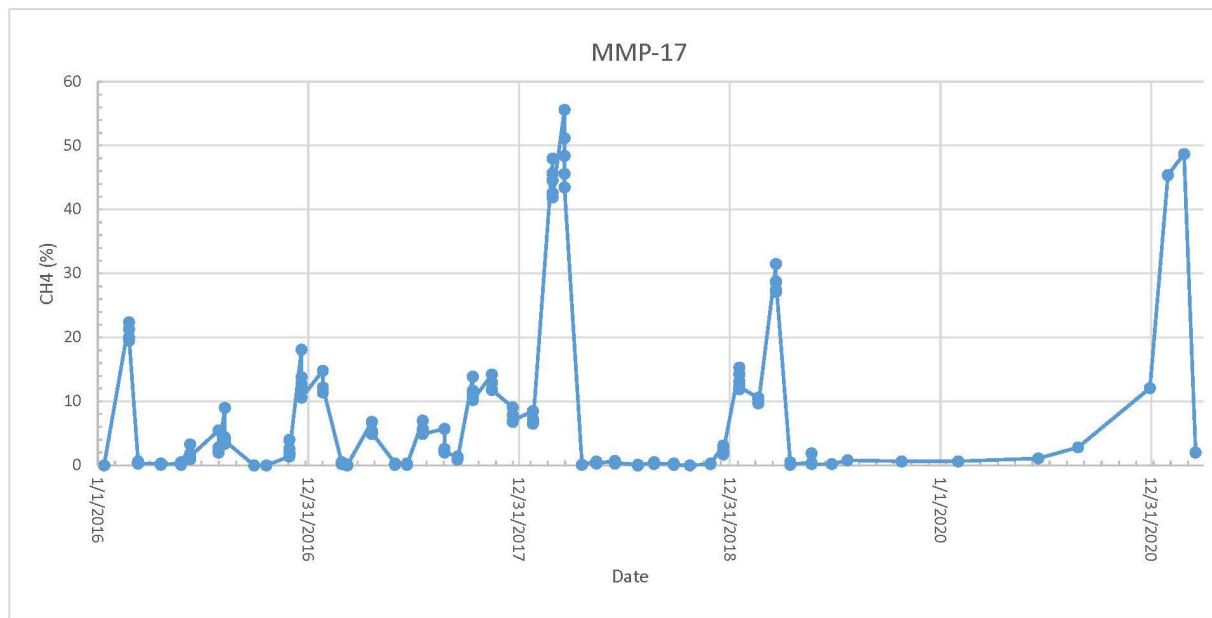


- Proposed installing wind turbines



Gas Migration - Timeline

- 2017/18 – Passive Vents and Work Plan
 - Turbines installed on passive vents at MMP17
 - Passive vents installed adjacent to MMP22 and MMP24
- 2019/20 - Monitoring



Gas Migration – Source Controls

- Active Gas Collection
 - 216 collection points – gas wells, horizontals, leachate risers
 - 2020 - Phase 4 gas header, Phase 5 horizontal collection
 - 2021 – Well redrills and piping repairs
- Phase 6 Sideslope Expansion
 - Additional liner/cover
 - Additional gas wells

Gas Migration – Summary/Next Steps

- 2021 – Report and Workplan - May
- Passive Vents
 - Probes with vents trending downward
 - Intermittent exceedances
 - Continue monitoring
- Geoprobe Investigation and Vacuum/Flare Pilot
 - Geoprobe borings at property boundary
 - Connect passive vents to vacuum source and flare

Thank You!