



Back River WWTP: Odor Action Plan

February 26, 2026

A Collaborative Effort between MDE, Baltimore
City, & Baltimore County

Back River WWTP - Action and Results

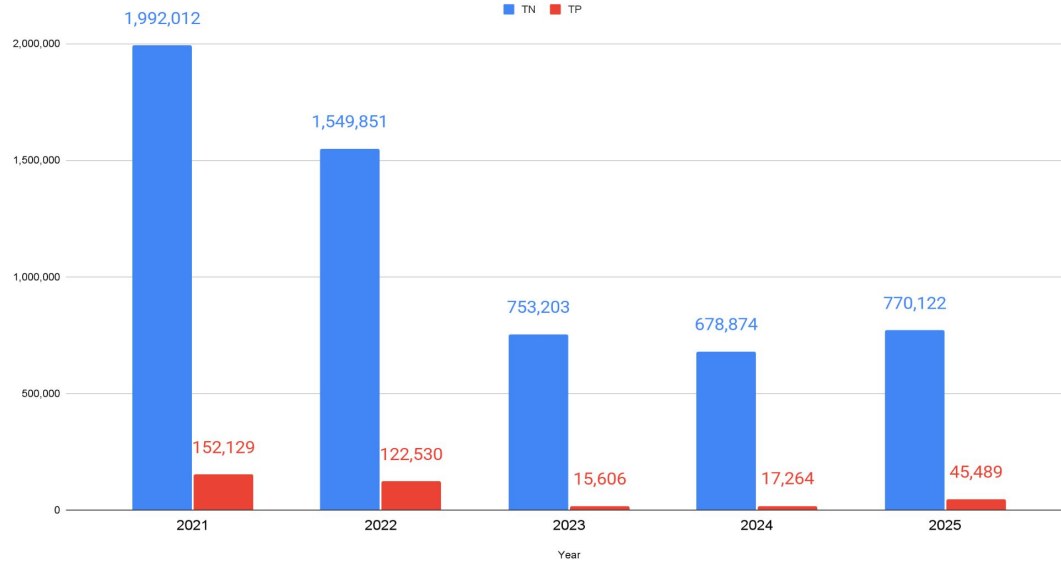


- Discharge levels compared to 2021:
 - ~60% reduction in nitrogen loads
 - ~80% reduction in phosphorus loads
 - Confirmed by University of Maryland
 - Compliance with discharge limits
- Corrective Actions on schedule
 - Included significant capital improvements of major process trains
 - Primary settling tanks
 - Egg shaped digester
 - Sand Filters
- Environmental Projects
 - \$1.7 million penalty reinvested into 21 community projects
- Additional State and Federal Investment
 - Loans and grants totaling \$32.6 million for infrastructure upgrades and repairs
- Odor response team



Back River WWTP Compliance Summary

Total Nitrogen and Total Phosphorus Annual Loads



2025 average:

2.19 mg/l total Nitrogen

0.09 mg/l total Phosphorus



Outfall 001 (end of pier)



Continued Inspection & Monitoring

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-0004

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)
NAME: BACK RIVER WWTP
ADDRESS: 8201 EASTERN AVENUE
BALTIMORE, MD 21224
FACILITY: BACK RIVER WWTP
LOCATION: 8201 EASTERN AVENUE
BALTIMORE COUNTY, MD 21224

DMR Mailing ZIP CODE: 21202
 MAJOR (SUWA MD): 15-CP-0581
 External Outfall

MD0021555 001-A
 PERMIT NUMBER DISCHARGE NUMBER

MONITORING PERIOD
 MM/DD/YYYY MM/DD/YYYY
 12/01/2025 12/31/2025

ATTN: NICHLOS H. FRANKOS, P.L.T. MGR.

No Discharge ☐

PARAMETER	QUANTITY OR LOADING			QUALITY OR CONCENTRATION			NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
	VALUE	VALUE	UNITS	VALUE	VALUE	UNITS			
Oxygen, dissolved [DO]	*****	*****	*****	7.3	*****	*****	mg/L	Three per Day	Grab
00300 1 0 Effluent Gross BOD, 5-day, 20 deg. C	*****	*****	*****	5 INST MIN	*****	*****	mg/L	Three per Day	Grab
	SAMPLE MEASUREMENT	1254	1876	lb/d	*****	< 2	2	mg/L	Daily
00310 1 0 Effluent Gross pH	*****	*****	*****	11000 MX MO AV	16000 MX WK AV	*****	10 MX MO AV	15 MX WK AV	24 Hour Composite
	SAMPLE MEASUREMENT	*****	*****	lb/d	*****	7.1	*****	8	SU
00400 1 0 Effluent Gross Solids, total suspended	*****	*****	*****	6.5 MINIMUM	*****	8.5 MAXIMUM	*****	Three per Day	Grab
	SAMPLE MEASUREMENT	235	494	lb/d	*****	< 1	< 1	mg/L	Daily
00530 1 0 Effluent Gross Solids, total suspended	*****	*****	*****	11000 MX MO AV	16000 MX WK AV	*****	10 MX MO AV	15 MX WK AV	24 Hour Composite
	SAMPLE MEASUREMENT	*****	*****	lb/mo	*****	*****	*****	*****	Calculated
00530 1 1 Effluent Gross Solids, total suspended	*****	*****	*****	Req. Mon. MO TOTAL	*****	*****	*****	*****	Calculated
	SAMPLE MEASUREMENT	*****	*****	325666	lb/yr	*****	*****	*****	Calculated
00530 1 2 Effluent Gross Nitrogen, total [as N]	*****	*****	*****	3959228 CUM TOTL	*****	*****	*****	*****	Calculated
	SAMPLE MEASUREMENT	*****	*****	*****	*****	2.1	*****	mg/L	Monthly
00600 1 0 Effluent Gross	*****	*****	*****	*****	*****	*****	*****	mg/L	Monthly
	SAMPLE MEASUREMENT	*****	*****	*****	*****	*****	*****	*****	Calculated

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER: Matthew Garbark, Director of Public Works
 Rayford McEachern
 TELEPHONE: (410)396-9820
 DATE: 11/28/2024

TYPED OR PRINTED: SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT: AREA CODE: NUMBER: MM/DD/YYYY:

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
 The December 2025 cover letter, discharge monitoring report and monthly operations report are attachments with this submission. The quarterly W.E.T. and quarterly IPCB reports are also attached to this submission.

EPA Form 3320-1 (Rev.01/06) Previous editions may be used. 02/25/2026 Page 1

WSA will continue to routinely inspect the Back River WWTP on a regular basis and investigate complaints

- Last year WSA Compliance inspected the site 10 times.
- DMR data is analyzed monthly to ensure Compliance with discharge permit requirements
- Starting in 2026, Inspections will be posted to our website directly.
 - [Back River MDE Webpage](#)
- Previous inspections are on the Open Data Portal
 - [Open Data Portal - Inspections](#)



Inspection Findings



MDE conducted an unannounced inspection on February 20, 2026 to investigate complaints regarding alleged biosolid handling issues and solids entering the Back River. Inspection was conducted by our wastewater and biosolids staff.

WSA Findings

- Complainant provided photo (left) and stated solids entered the waterway. MDE verified with City staff that picture was taken of wastewater within the treatment process and not the Back River.
- High influent flows due to a combination of rain and snowmelt caused solids to carry over to the DNF facility.
- This required a bypass of the DNF Facility several times in the past two weeks.
- Bypassed water is being directed to the sand filters keeping nutrient levels low



Back River WWTP- transfer pad area 150ft x 120ft for sewage sludge truck loading. Its liner and base system consists of a 10-mil vapor retarder, a 6-inch #57 stone base course, and geotextile fabric. No strong odors observed.



Back River WWTP pad area for sewage sludge truck loading. Pad is sloped to the rear for stormwater collection. Operations appeared in line for its planned use and activity.



Back River WWTP- 2 lagoons for temporary sewage sludge storage. Each lagoon approximately 370ft x 250ft. Liner system for the lagoons consists of compacted subgrade, geotextile fabric, 12 inches aggregate base, prime coat, and 3 inches concrete, tack coat, and a 2 inch lift of hydraulic-mix bituminous concrete.

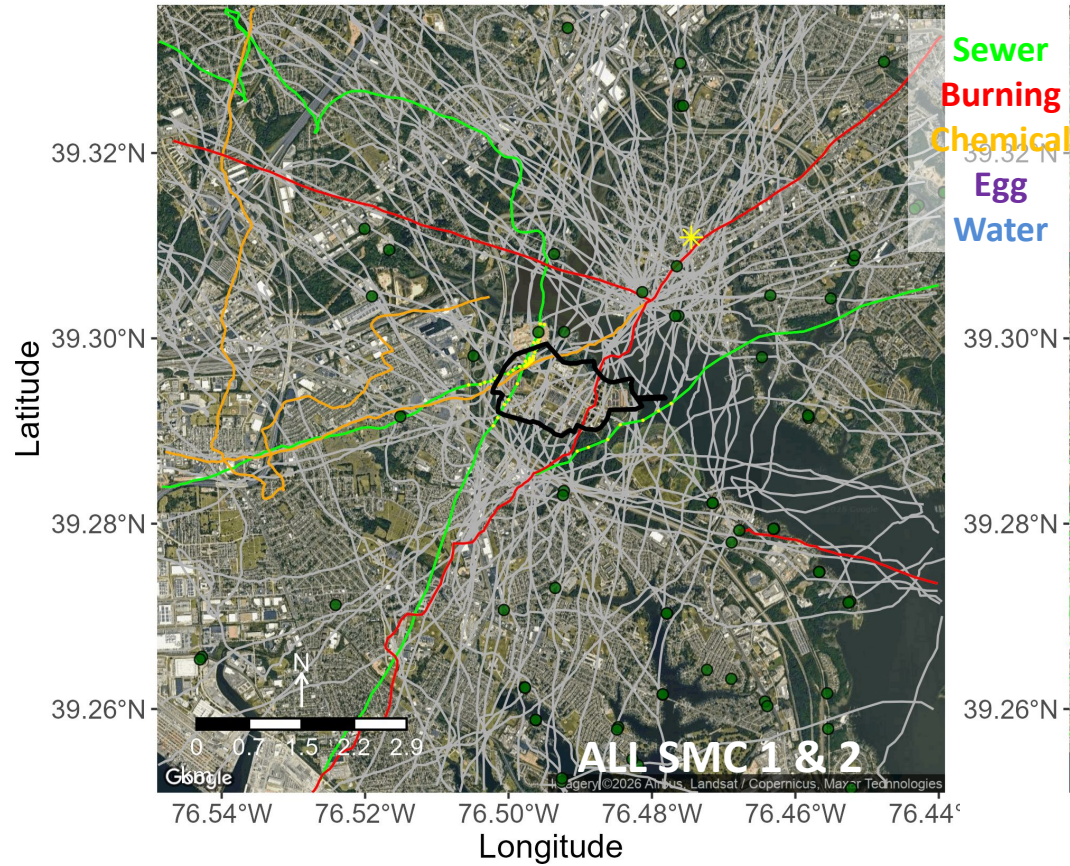


Back River WWTP Lagoon for Sewage Sludge Storage. Operations appeared in line for its planned use and activity. Much capacity is left in the lagoons to accommodate temporary sewage sludge. No strong odors observed.

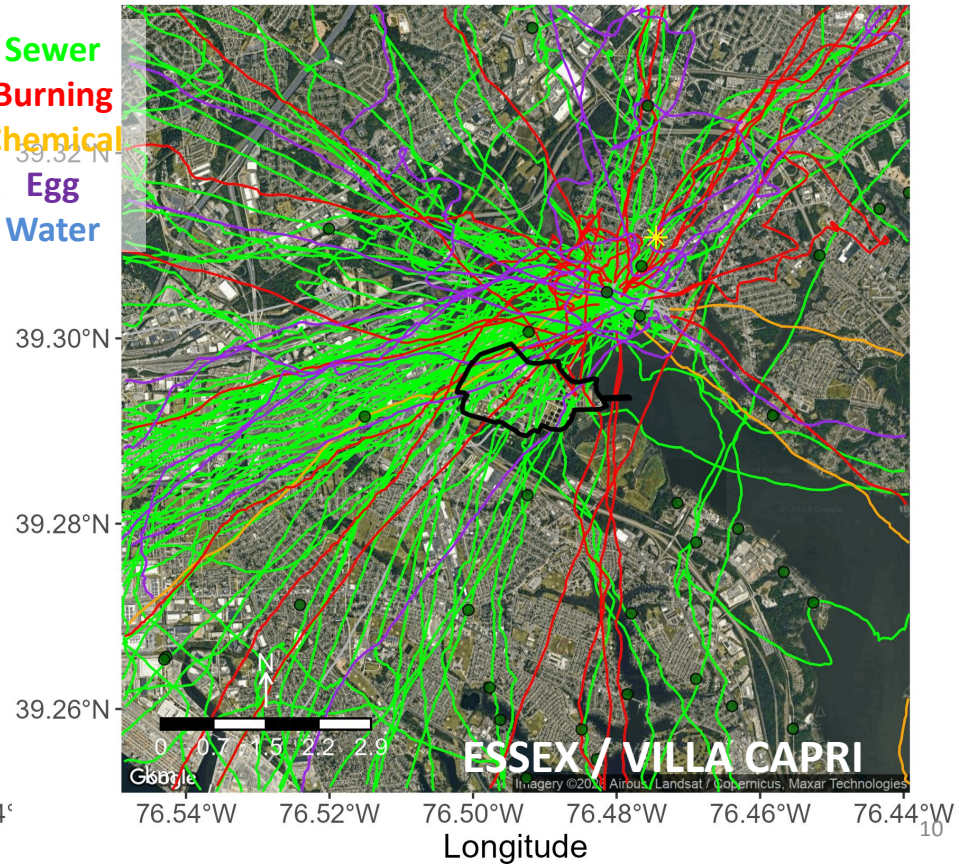


“Smell MyCity” Campaign: “Not Bad” vs “Bad” odors

SmellMyCity Reports (1 & 2) with Smell Path
All Reports

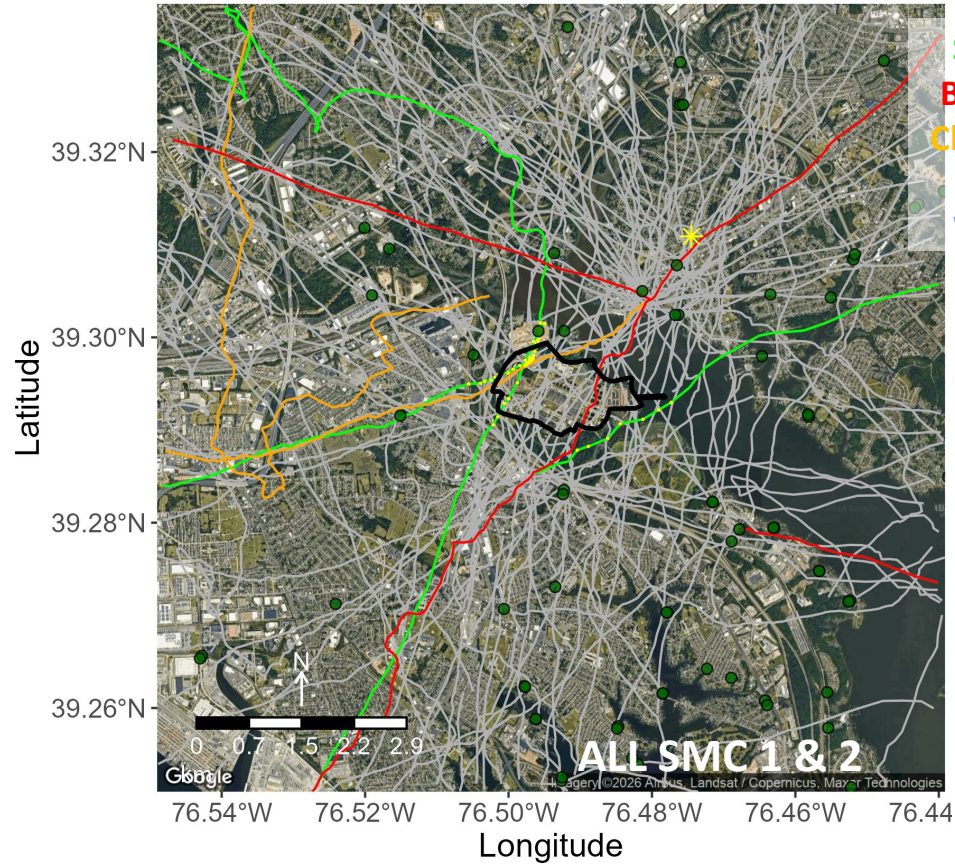


SmellMyCity Reports (4+) with Smell Path
Villa Capri & Essex

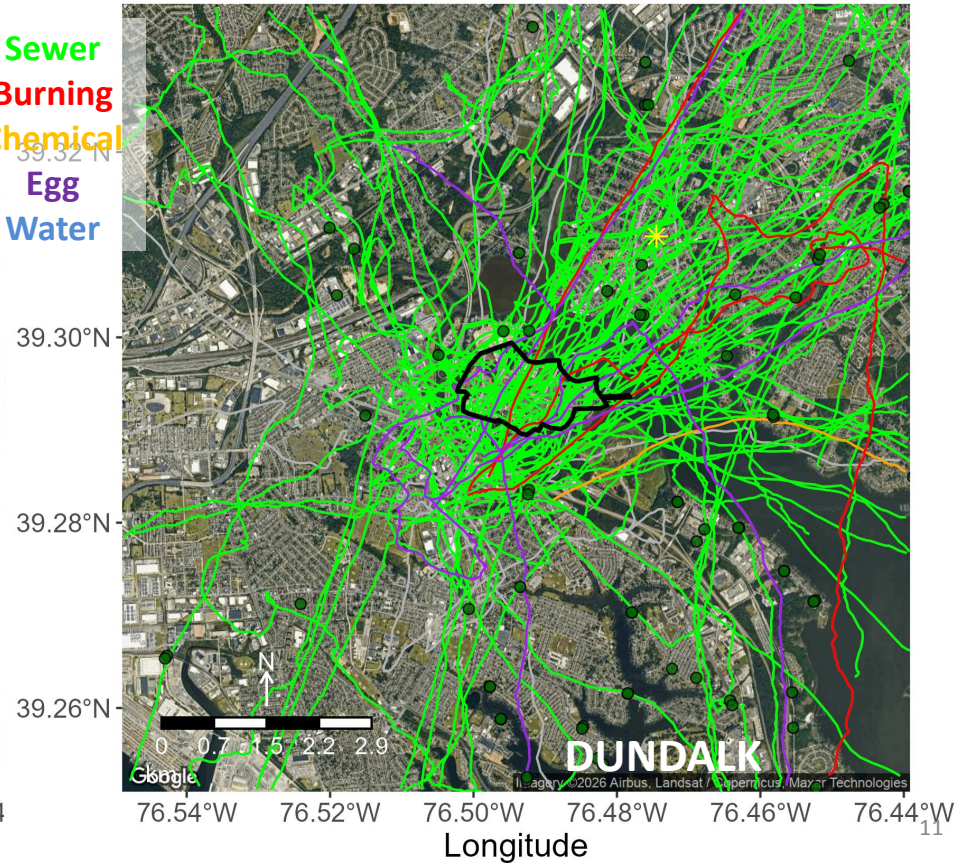


“Smell MyCity” Campaign: “Not Bad” vs “Bad” odors

SmellMyCity Reports (1 & 2) with Smell Path
All Reports

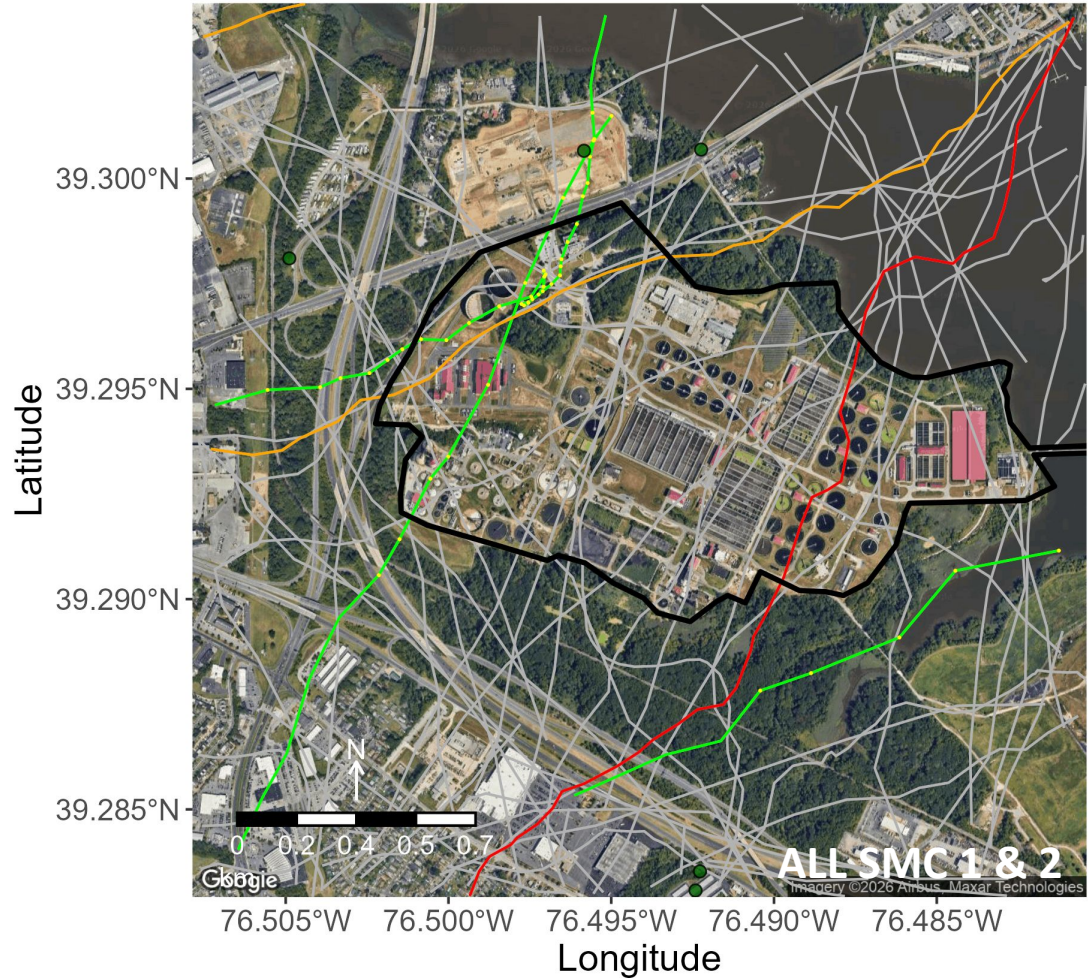


SmellMyCity Reports (4+) with Smell Path
North Pt Blvd & Dundalk



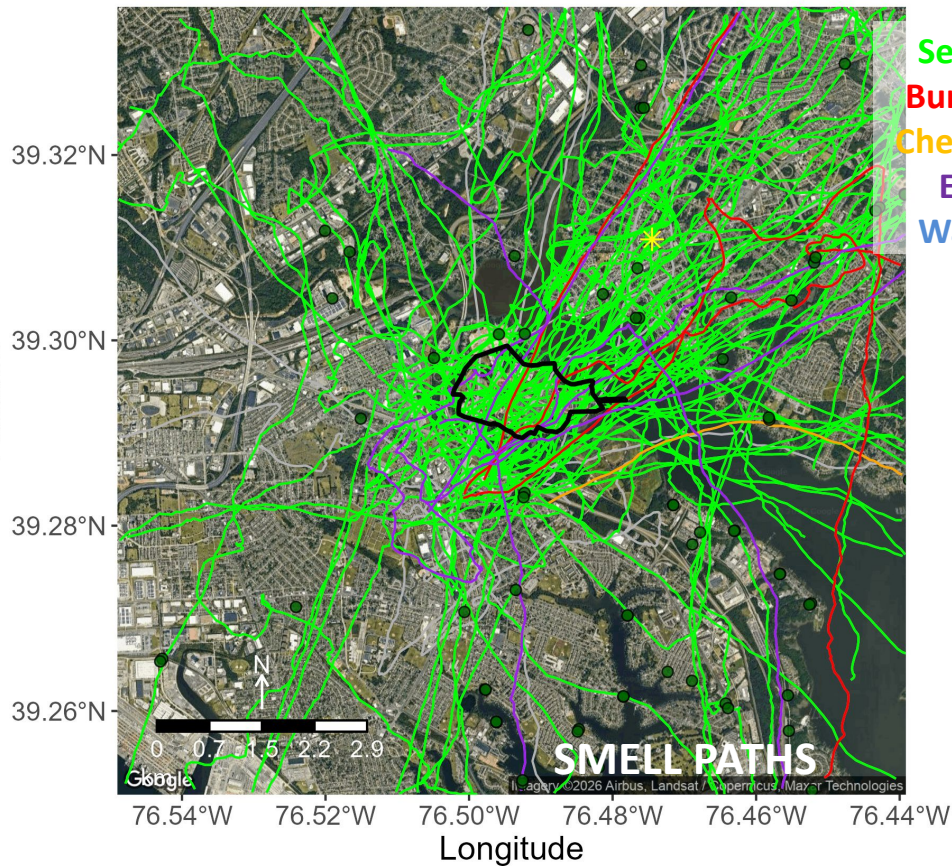
Zoom-In

SmellMyCity Reports (1 & 2) with Smell Path
All Reports

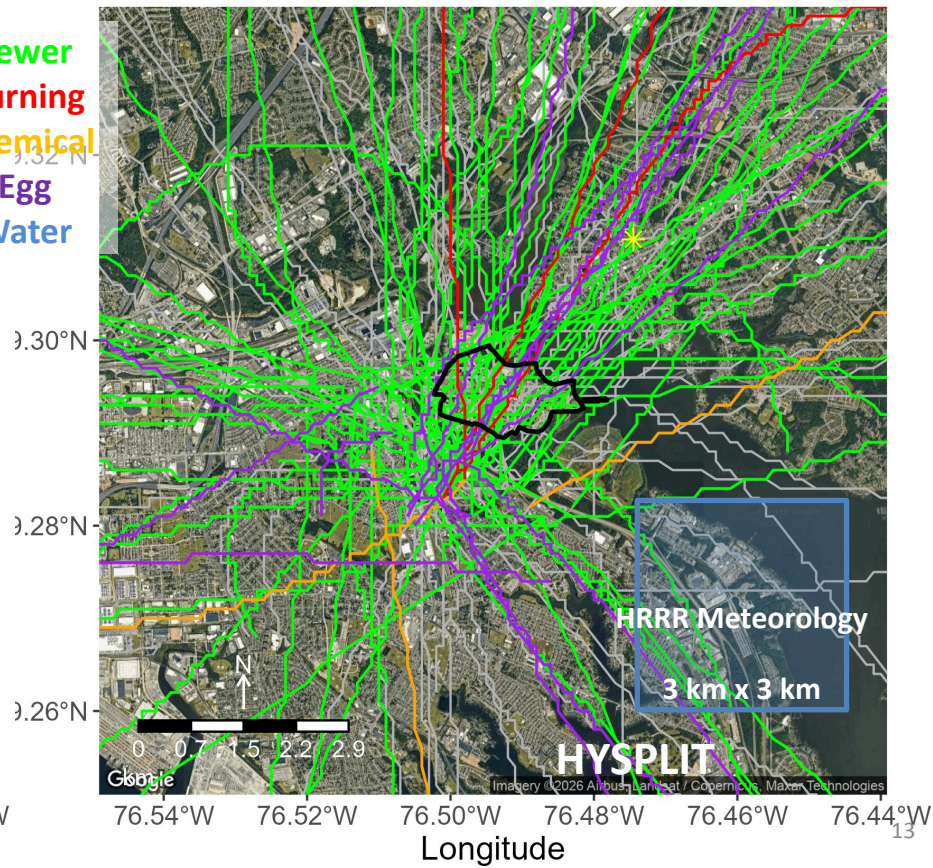


Dundalk Smell Paths Redone using (HYSPLIT) Weather Model Data

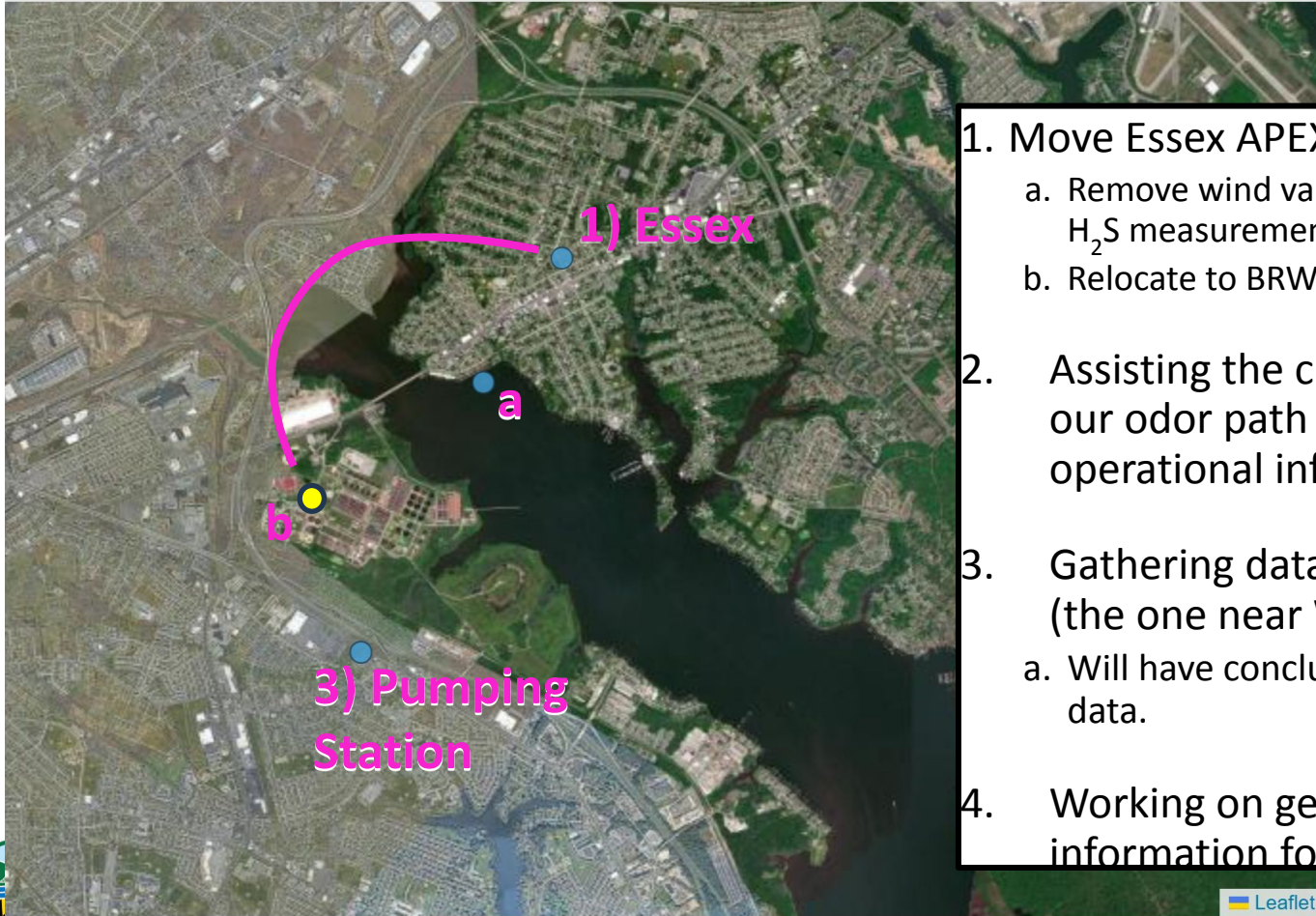
SmellMyCity Reports (4+) with Smell Path
North Pt Blvd & Dundalk



SmellMyCity Reports (4+) with HYSPLIT Path
North Pt Blvd & Dundalk



MDE Next Steps



1. Move Essex APEX to WWTP ?
 - a. Remove wind vane only from Villa Capri – H_2S measurements remain
 - b. Relocate to BRWWTP
2. Assisting the city as they compare our odor path results against their operational information.
3. Gathering data at a pumping station (the one near Walmart)
 - a. Will have conclusions as we get more data.
4. Working on getting additional wind information for Dundalk.

Odor Source Identification Progress

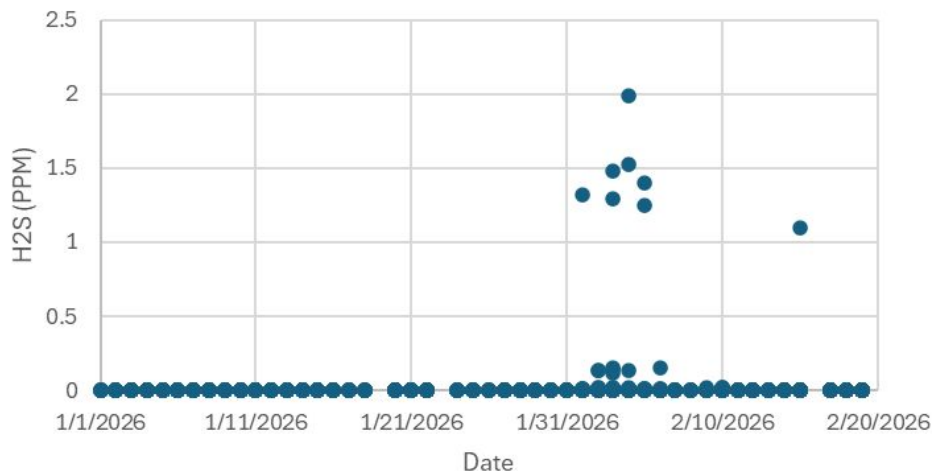
Identify, Map and Mitigate

Tech Services Group

February 24, 2026



Odor Samples: January 1, 2026 -February 19, 2026



Review of odor monitoring data indicates that the most recent elevated spikes occurred in the vicinity of the in-ground digesters. Several readings exceeded 1 ppm, with peak values approaching 2 ppm. These elevated concentrations are attributed to activities associated with Sanitary Contract 992, specifically the rehabilitation and cleaning of three in-ground digesters scheduled for the next phase of the project. Disturbance of residual materials during cleaning operations likely contributed to the temporary increase in odor readings.

Objective Analysis and Monitoring Approach

Baltimore City

Odor complaints are systematically tracked and analyzed, including:

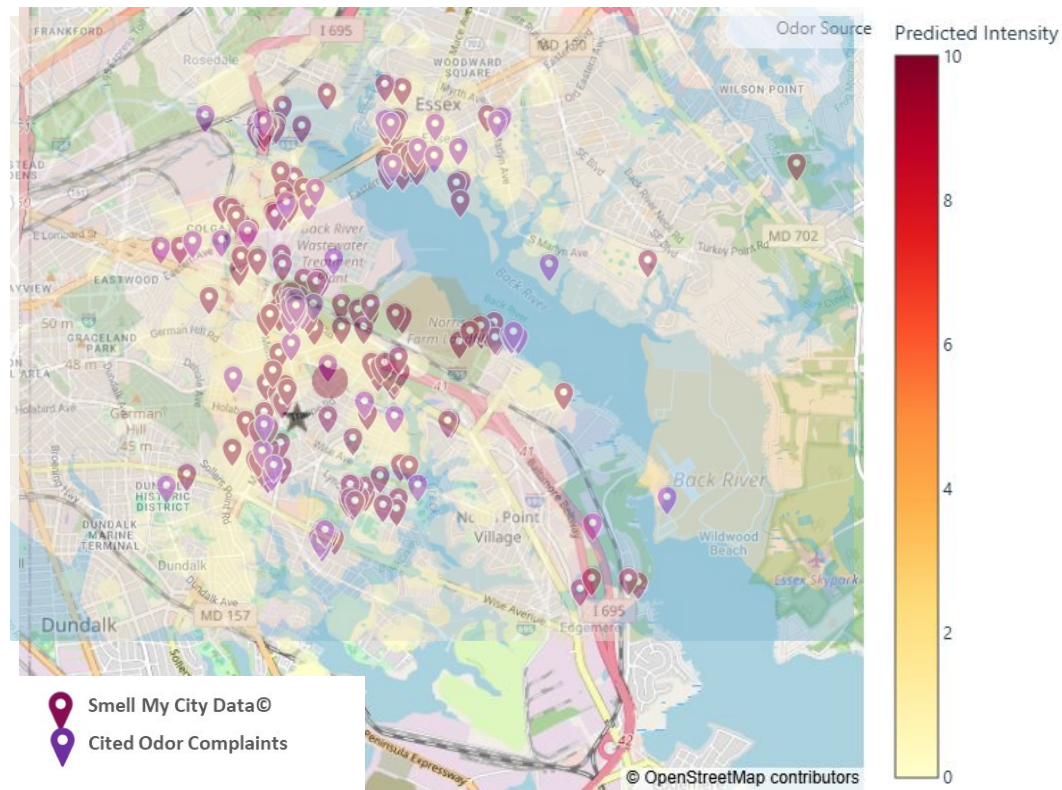
- Date, time, location, and reported intensity (MDE, Call- ins, and Smell My City databases).

Environmental and meteorological conditions are evaluated (using NOAA and MRCC):

- Wind speed and direction.
- Humidity and atmospheric conditions.
- Field-based observations and odor logs are collected by trained staff (taking samples on all three shifts).

Air monitoring and sampling are conducted:

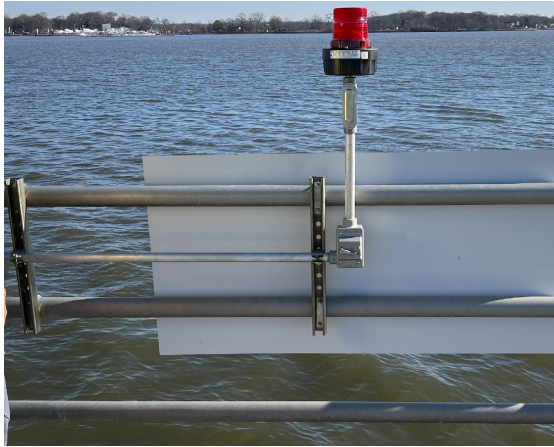
- Hydrogen sulfide (H₂S) monitoring (using Jerome J605 meters.)
- 9 On-site and 18 off-site sampling locations.



Analytical Methods:

- Calculated odor-origin and back-trajectory analysis (Gaussian Plume Model).
- Correlation of complaint patterns with wind conditions and plant operations.

Process Flow During Partial Bypasses and Visual Indicators



December 2023: Install of the Back River WWTP bypass light.



April 2025: Changed the Back River WWTP bypass light to be consistent with Patapsco WWTP light preventing confusion of the pier's red proximity lights.

What is does bypass mean?

A bypass establishes an alternative pathway that allows flow to move outside the standard treatment process while still

~~receiving treatment through downstream systems.~~

What type of bypasses does the plant undergo?

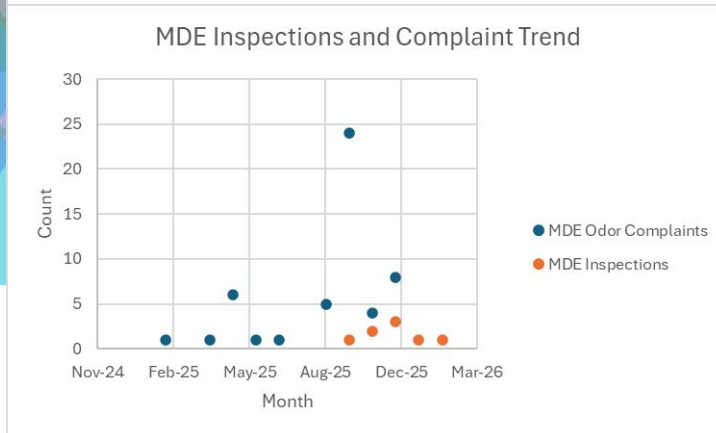
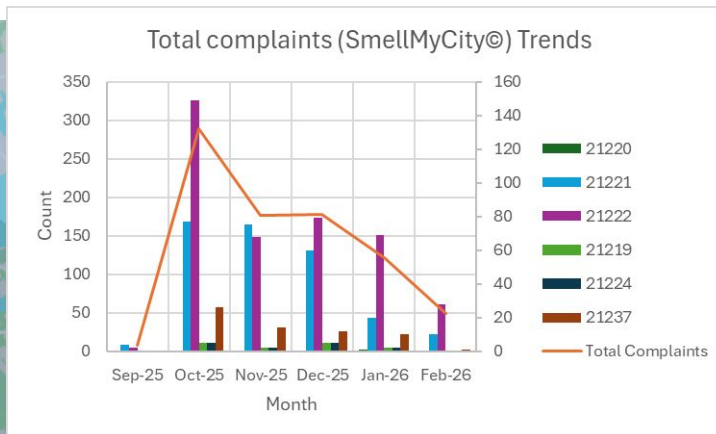
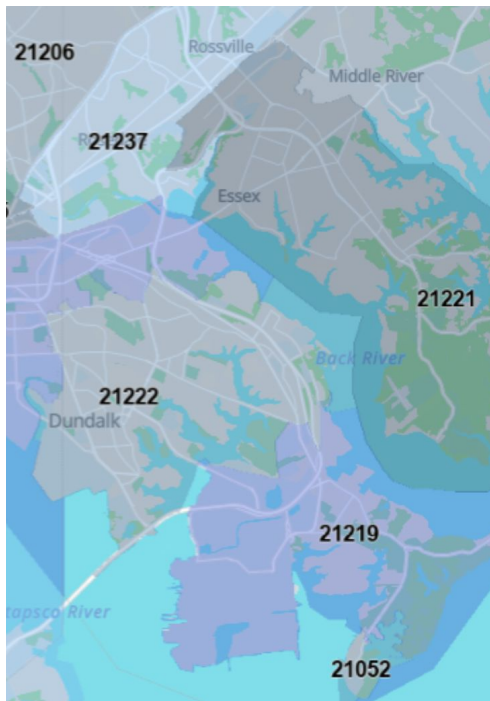
Headwork Partial Bypass

Denitrification Filter Partial Bypass:

When the denitrification filters (DNF) are partially bypassed, only a portion of the total flow avoids biological nitrogen removal. The remaining flow continues to receive full denitrification treatment. As a result, overall nitrogen removal efficiency is reduced but not eliminated.

- A most of the flow continues through the DNFs, maintaining biological nitrogen removal.
- The bypassed portion relies on downstream physical and chemical processes for partial nitrogen reduction and disinfection.
- Sand filters provide redundant solids and phosphorus removal for bypassed flow.
- Pre- Dosing in Sand Filters with chemical disinfection, sodium hypochlorite oxidizes nitrites (more than nitrates), providing limited supplemental nitrogen reduction.

Odors Complaint Analysis



Complaint Trends:

- Complaints are decreasing over time but do not indicate odors are fully eliminated or identify their exact source.
- Dundalk area (south and southwest of the plant) consistently has the highest number of complaints compared to Essex and Middle River (north and northeast).
- Peak complaints occurred during last October's seasonal transition, suggesting temperature and wind speed influence odor dispersion toward the south and southwest.
- Essex complaints show a linear decline, indicating odors are not traveling north or northeast, consistent with wind rose data over the past 4 months.
- October vs. November Essex complaints are similar despite differing wind patterns, suggesting factors beyond wind direction affect complaints.
- Prevailing winds over the last 5 months are generally from the west.
- Sample spikes during in-ground digester clearing confirm that sampling is effectively identifying odor events.

Complaint Intake Process and Documentation Form

All complaints, whether submitted by community members or regulatory agencies, are formally logged using the Odor Complaint Intake Form.

- Consistent and complete documentation
- Clear identification of the issue, location, and time of occurrence
- Assignment of responsibility for investigation and follow-up
- Regulatory compliance and audit readiness
- Transparent tracking through resolution

The Odor Complaint Intake Form serves as the official record of the concern, the actions taken, and the final disposition. This structured approach promotes accountability, timely response, and continuous operational improvement.



Back River Wastewater Treatment Plant

Community Odor Complaint Intake Form

SECTION A – COMPLAINT INTAKE (Complete Immediately)

Date Received: _____ Time: _____
Received By (Staff Name): _____
Complaint ID / Tracking # (Office Only): _____
Caller Information (if provided):
Name: _____
Phone: _____ Email: _____
Odor Location (Address / Nearest Intersection): _____

City / Area: _____
Odor Event Details:
Date Noticed: _____ Time Noticed: _____
Duration: _____ Frequency (if applicable): _____
Odor Type (check all that apply):
☐ Sewage ☐ Rotten Egg / Sulfur ☐ Chemical ☐ Trash / Decay ☐ Other: _____
Odor Intensity (circle one): 1 2 3 4 5
Weather Conditions (if known):
Wind Direction / Speed: _____
Precipitation / Surface Conditions: _____

Additional Caller Comments:

SECTION B – REGULATORY & LEADERSHIP CONTACT (If Applicable)

☐ Complaint originated from Maryland Department of the Environment (MDE)
MDE Contact Name / Title: _____
Requested Actions (sampling, readings, summary): _____

Expected Response Timeframe: _____
☐ MDE Onsite ☐ Offsite Only ☐ County Response Area

Complaint Intake Process and Documentation Form

Following intake and initial review, each complaint is formally evaluated, and response actions are recorded.

- Clear documentation of investigation steps and findings
- Identification of root cause, if applicable
- Defined corrective and preventive actions
- Assignment of responsible personnel
- Regulatory compliance and audit traceability

The Complaint Response Form serves as the official record of how the concern was addressed, resolved, and communicated. This structured documentation ensures accountability, defensibility, and continuous process improvement.

*The forms are printed double-sided to ensure all documentation related to each complaint remains consolidated in a single record.



Back River Wastewater Treatment Plant

Community Odor Complaint Response Form

SECTION C – SOP DIRECTIVE: REQUIRED NEXT STEPS (DO NOT SKIP)

Immediately After Intake (select one):

- ☐ Notify Operations Supervisor I/ II (on call)
- ☐ Notify Plant Manager
- ☐ Notify Technical Services Group (formally the Operations Engineer Group)
- ☐ Notify County (if complaint located in County)
- ☐ Continue escalation until contact is made

If Sampling is Directed by Supervisor:

- ☐ Confirm safety and site accessibility
- ☐ Confirm sampling can be completed within timeframe
- ☐ Follow two-person rule when required
- ☐ Do **not** sample if $H_2S > 10$ ppm, weather is severe, or access is unsafe

Before Entering the Field:

- ☐ Supervisor notified of intent, locations, and duration
- ☐ H_2S meter on and functioning
- ☐ Sampling equipment charged
- ☐ Lighting, vehicle, and communication devices verified working
- ☐ Weather and environmental conditions reviewed

During Sampling:

- ☐ Maintain situational awareness and escape routes
- ☐ Avoid confined spaces and unlit hazards
- ☐ Send real time updates only through designated supervisor (if required)

Post-Sampling:

- ☐ Notify supervisor sampling is complete
- ☐ Log readings and observations
- ☐ Report hazards or abnormal conditions
- ☐ Recharge and return equipment

SECTION D – CLOSEOUT

Investigation Initiated: ☐ Yes ☐ No

Sampled Data (circle one): _____ ppb/ppm

Sampled Time (circle one): _____ am/pm

Wind Direction / Speed: _____

Precipitation / Surface Conditions: _____

Investigated Odor Type noticed (check all that apply):

☐ Sewage ☐ Rotten Egg / Sulfur ☐ Chemical ☐ Trash / Decay ☐ Nothing

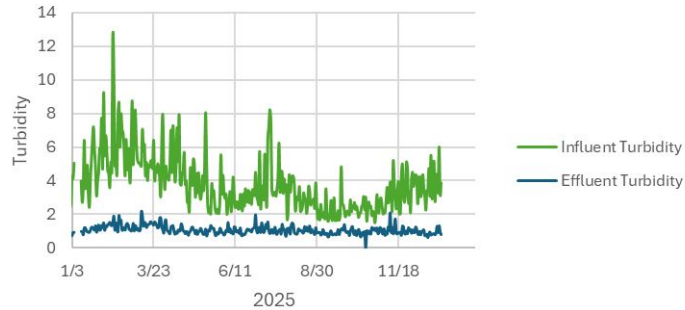
Odor Intensity (circle one): 1 2 3 4 5

Summary of Findings / Actions:

Date Closed: _____ Closed By: _____

Contact for county

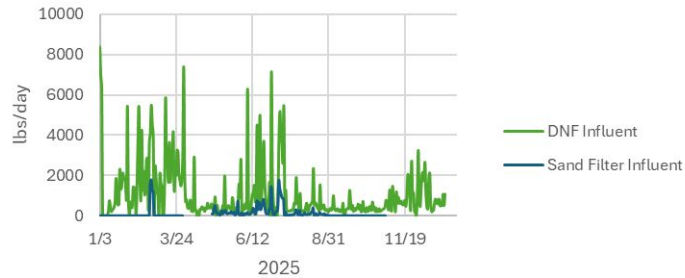
Denitrification Filters (DNF):
Turbidity Trends (Influent & Effluent)



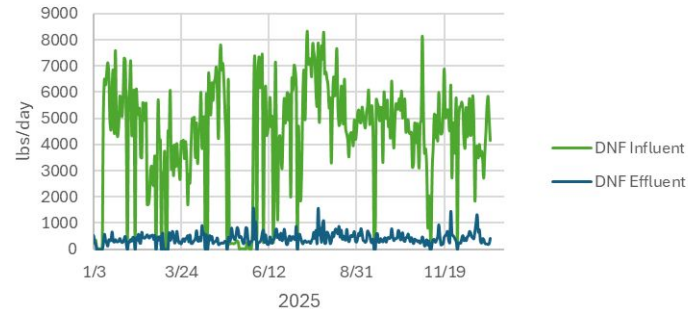
Denitrification Filter Efficiency:

- These graphs show the 2025 influent and effluent flows of the Denitrification Filters, highlighting their dual function of nitrogen removal via microorganisms and solids capture.

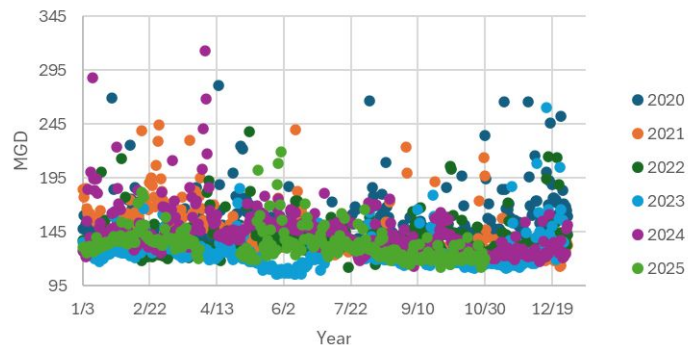
Influent Loadings Comparison
Denitrification Filters (DNF) and Sand Filter:
Ammonia (NH_3)



Denitrification Filters (DNF) Loadings:
Nitrate (NO_3) Removal Performance



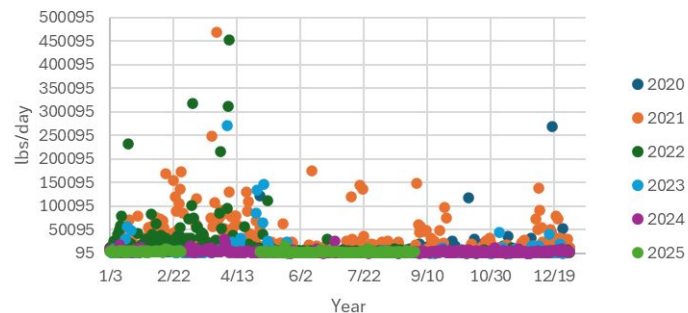
Sand Filters Influent Flows



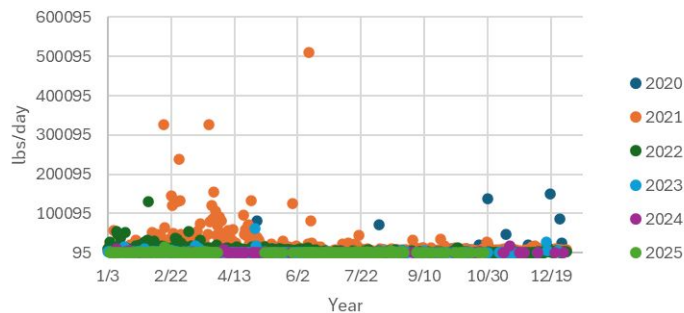
Sand Filters Efficiency:

These graphs show the total influent flow to the sand filters and illustrate solids capture efficiency by comparing influent and effluent, providing a clear measure of filter performance.

Sand Filter Influent Loadings: Suspended Solids (SS)



Sand Filter Effluent Loadings: Suspended Solids (SS)



Leadership, transparency, and regional coordination

Baltimore City

The City is committed to protecting community quality of life and addressing odor complaints promptly and responsibly.

Odor management efforts prioritize regulatory compliance and proactive coordination with MDE and County partners.

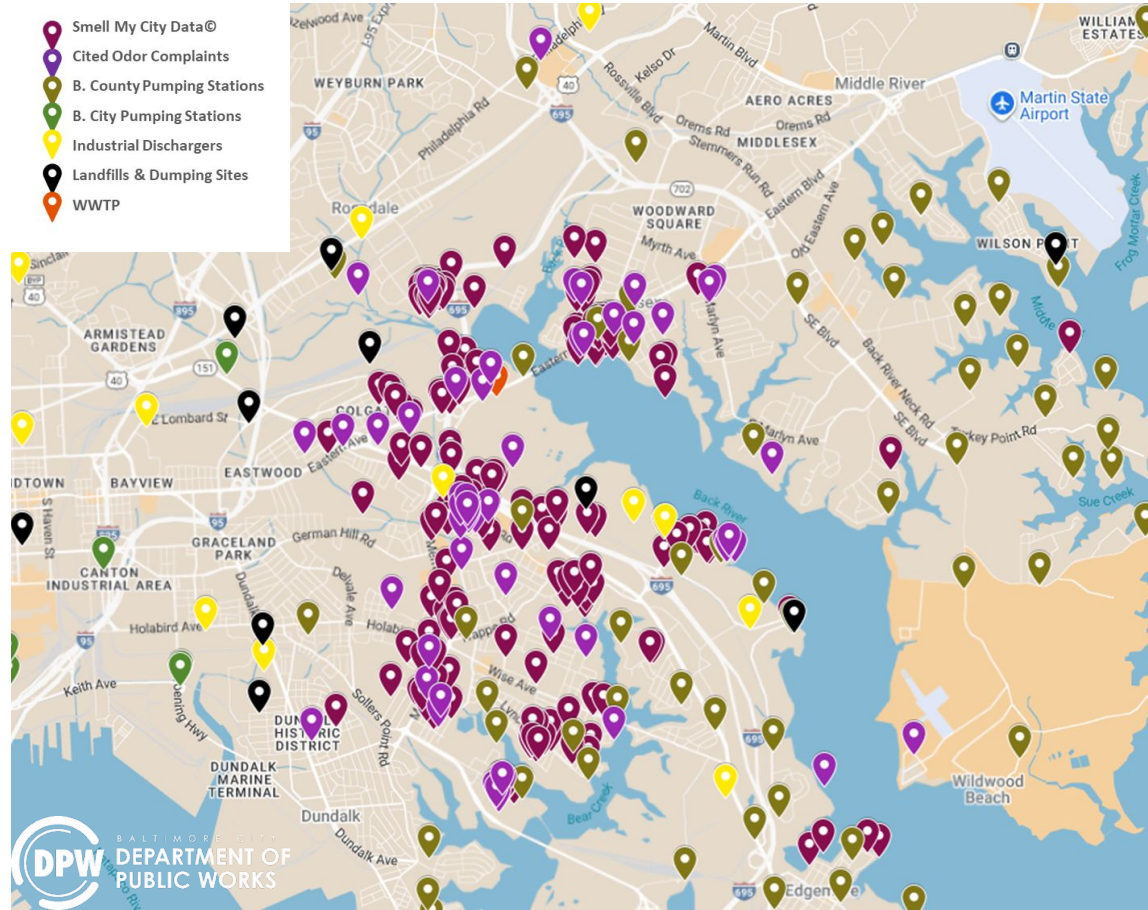


The City recognizes the complexity of odor impacts in the area, which includes multiple potential sources:

- 29 Industrial facilities
- 86 combined Landfills and dump sites
- City 11 wastewater pumping stations
- City 2 wastewater treatment plants (WWTP)

As owner and operator of the WWTP, the City:

- Actively evaluates plant operations as a potential Contributor(s).
- Participates collaboratively in regional odor assessments.
- Supports evidence-based evaluation



Mitigation Measures and Ongoing Improvement

Baltimore City

The City has implemented multiple odor-reduction measures, including:

- Operational and process adjustments.
- Improved handling, storage, and timing of odor-generating process areas.
- Enhanced housekeeping and maintenance practices
- Optimization to odor control systems (BioAir Filters and Hydrogen Peroxide dosing).
- Staff training and standardized response protocols.
- Improve Understanding of All Potential Odor Sources and Their Key Indicators.

Early Outcomes:

- Improved response and investigation timelines.
- Enhanced understanding of complaint patterns.
- Increased confidence in odor-source correlation analysis.

Continuing Next Steps:

- Continued monitoring and data sharing with MDE and County partners.
- Targeted mitigation actions based on verified data and findings.
- Ongoing engagement with the community and regulators.



Odor Identifier tool

Baltimore County Updates



County Updates

- Baltimore County has continued passive monitoring at several stations.
- Includes several visits per day, along with the use of a PID (“sniffer”) at several locations
 - Still no significant findings to date
- Coordination with MDE and Baltimore City to provide access to Pump Stations rapidly
 - No calls received for access to date



Back River Home

Operations

Air monitoring

Sludge

Work group

Documents

Back River Wastewater Plant

