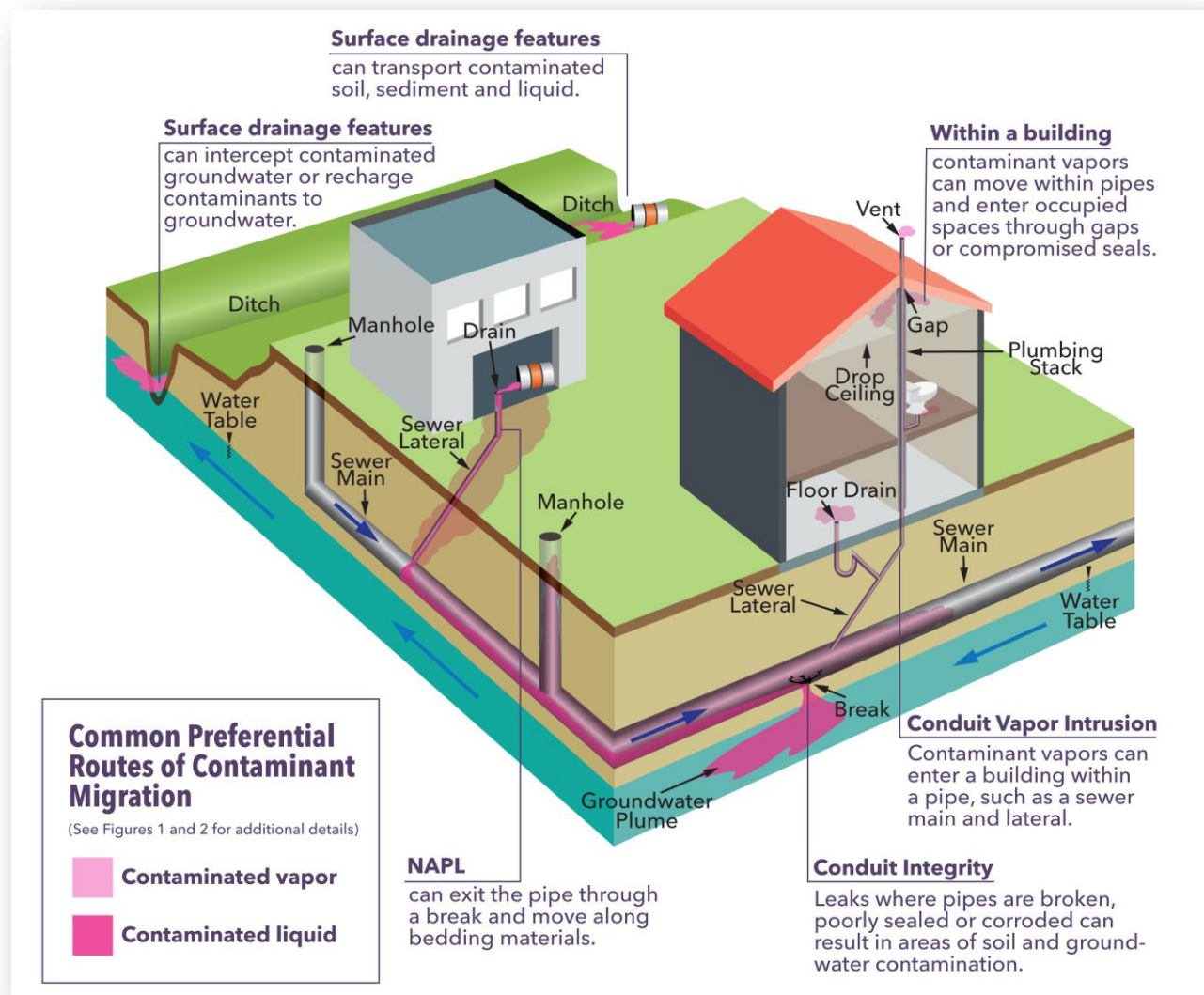


Conduit Vapor Intrusion: Application of RR-649 and RR-800

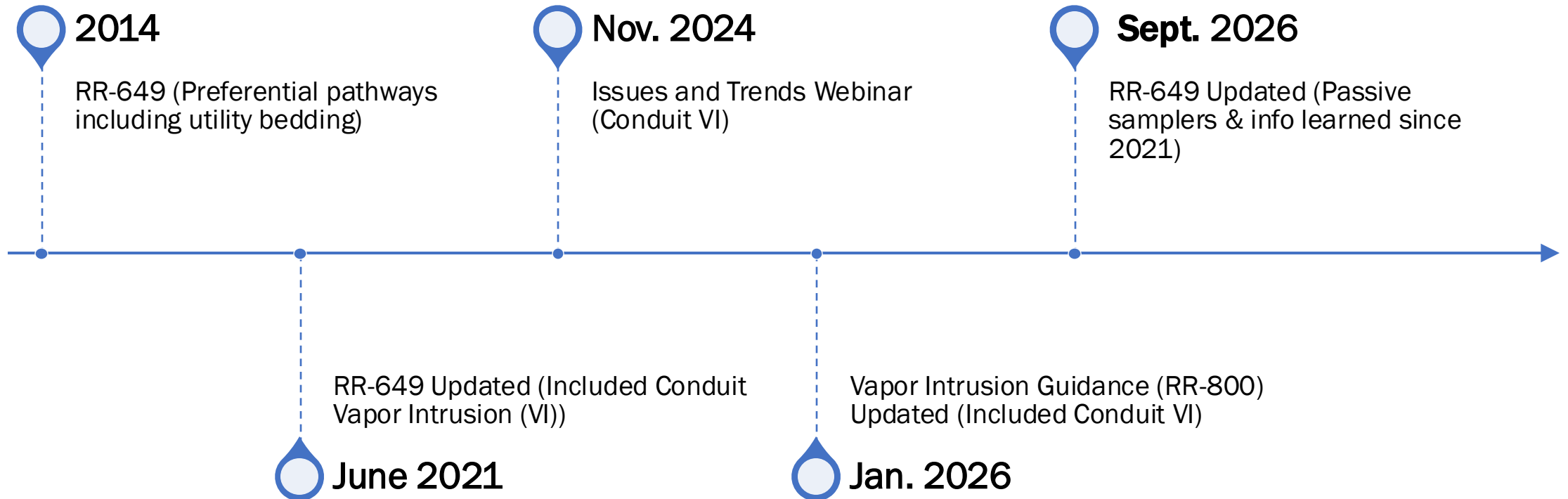
September 17, 2026

- Jim Walden, Vapor Intrusion Technical Expert
- Jennifer Borski, Vapor Intrusion Team Leader



Cover Figure: Guidance: Investigation of Human-made Preferential Pathways Including Utility Corridors (RR-649)

Timeline for RR-649





Go to dnr.wi.gov
Search: RR Training Library

Issues & Trends training sessions are hosted by the Remediation and Redevelopment Program (RR Program) and cover a variety of technical and policy issues affecting environmental professionals, local government specialists and others whose work involves assistance or oversight by.

Vapor Intrusion sessions:

- November 2024: Investigation of Vapor Intrusion Along the Conduit Pathway
- March 2026: Vapor Intrusion Guidance and Forms
- August 2026: Deep Dive into Vapor Intrusion: Application of RR-800

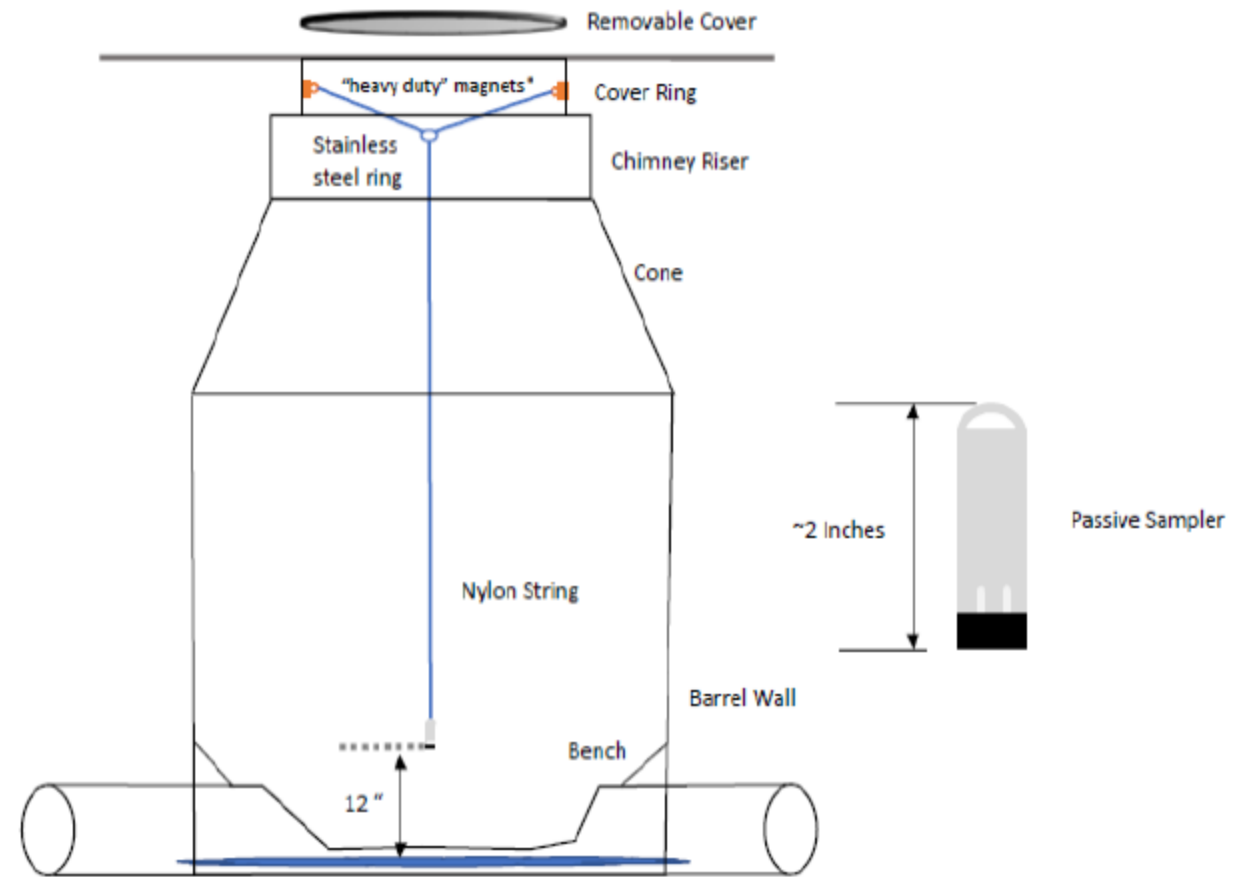


DNR Images

Conduit Sampling Methods

Passive Sewer Sampling

Figure 13. Sewer diagram



*Neodymium magnets of at least 30 lb capacity, use 2-3 per sample

From RR-800, Section 7.3.3

Passive Sorbent Sampling in a Plumbing Cleanout



DNR Images

Liquid Sampling

Liquid sampling is recommended where contaminated groundwater is entering or anticipated to enter into the sewer

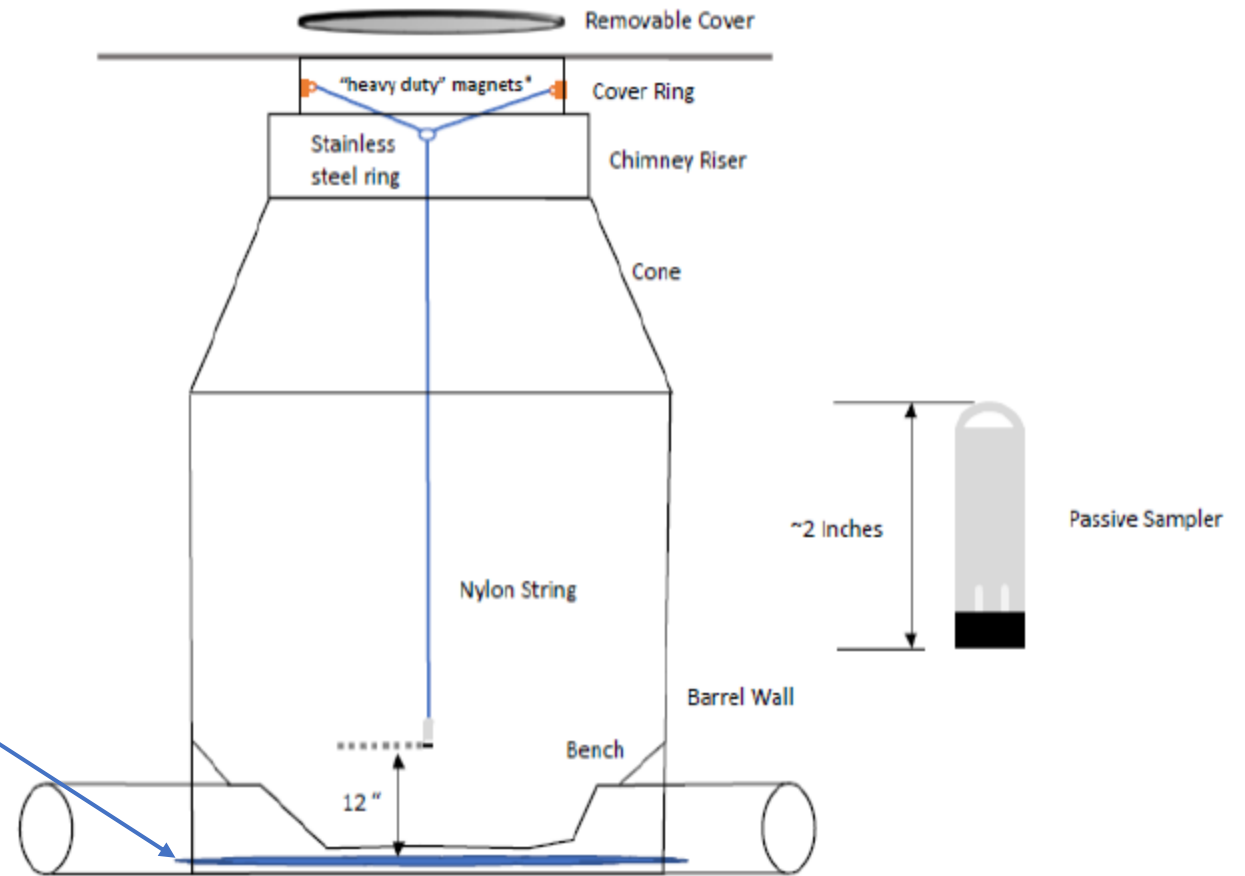
TCE: $5 \mu\text{g/L} = 1,020 \mu\text{g/m}^3$

TCE = trichloroethene

$\mu\text{g/L}$ = micrograms per liter

$\mu\text{g/m}^3$ = micrograms per cubic meter

Figure 13. Sewer diagram



*Neodymium magnets of at least 30 lb capacity, use 2-3 per sample

From RR-800, Section 7.3.3



DNR Images

Sample Source Building Conduits

Source Building Conduits

In Wisconsin as of March 2026:

- 29 of 50 (59%) of buildings sampled (cleanout, floor drain, sump) exceeded the non-residential indoor air vapor action level (VAL) for:
 - TCE ($8.8 \mu\text{g}/\text{m}^3$) or
 - PCE ($180 \mu\text{g}/\text{m}^3$)

Real-time analysis may assist with (see RR-800):

- Identifying preferential pathways
- Determining exposure
- Making health-based decisions

TCE = trichloroethene

PCE = tetrachloroethene

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

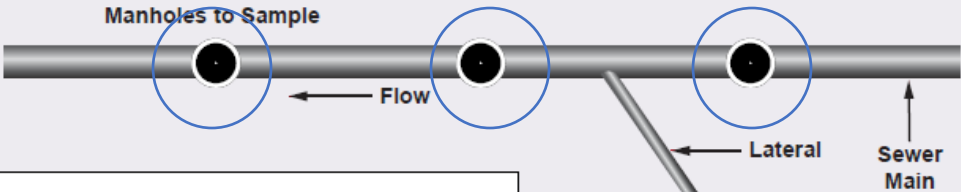


DNR Images

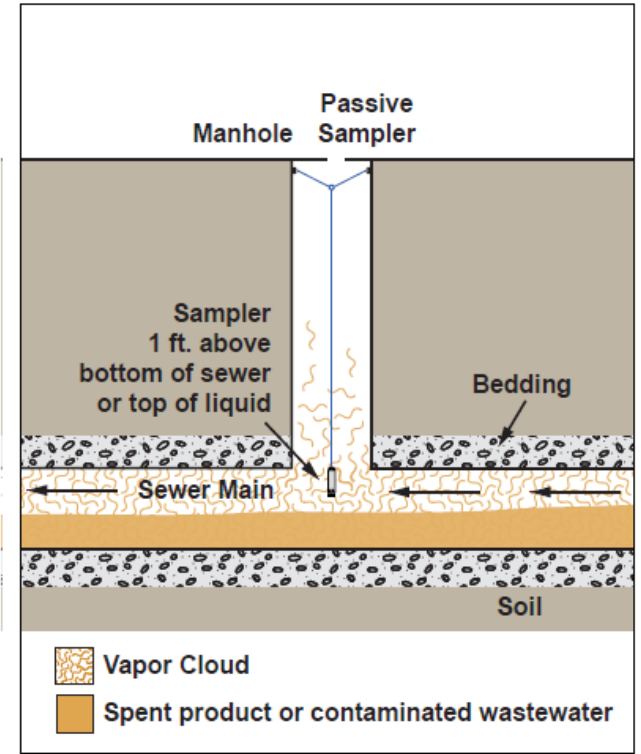
Sanitary Sewer Screening & Sampling Decisions

Initial Sewer Manhole Sampling - Sewer Lateral

Map View



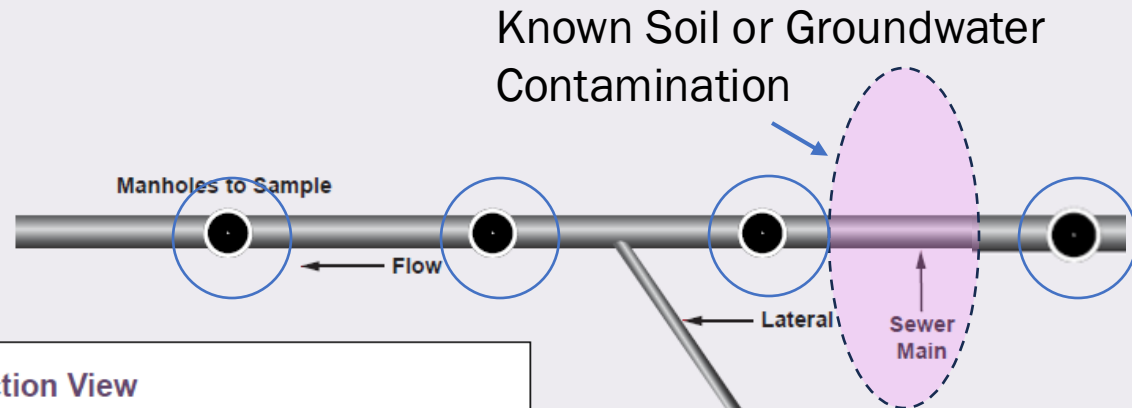
Cross-section View



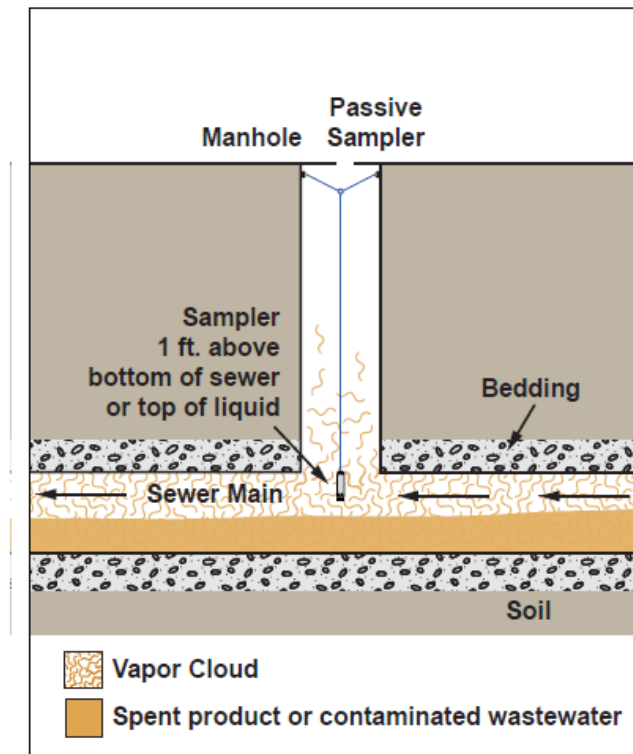
From RR-649, Figure 3 (modified)

Initial Sewer Manhole Sampling – Sewer Lateral *and* Known Soil or Groundwater Contamination

Map View



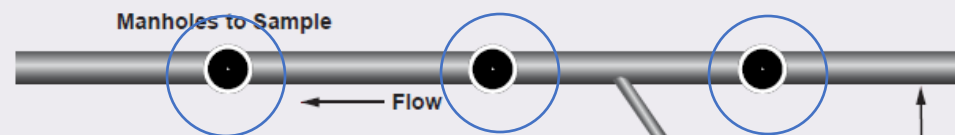
Cross-section View



From RR-649, Figure 3 (modified)

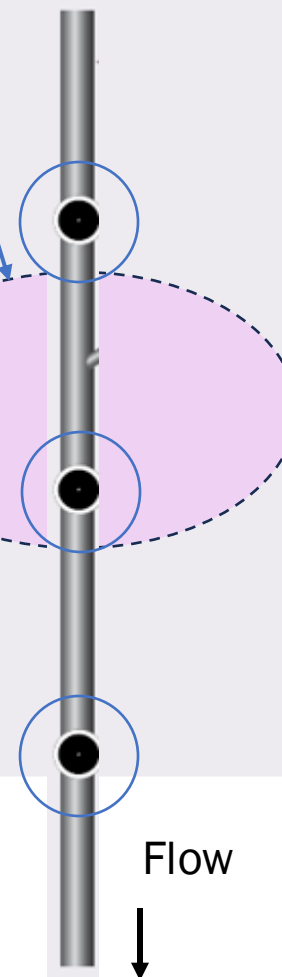
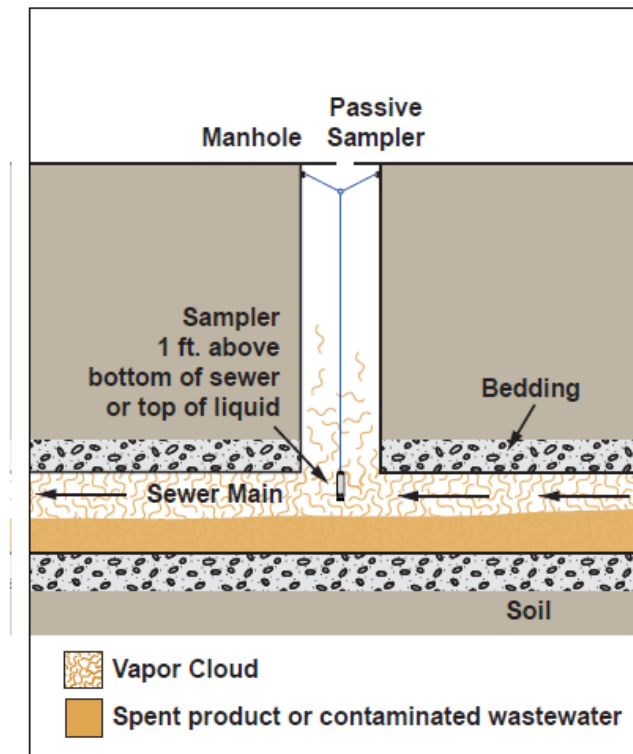
Initial Sewer Manhole Sampling – Sewer Lateral and *Separate* Known Soil or Groundwater Contamination

Map View



Known Soil or Groundwater
Contamination

Cross-section View



From RR-649, Figure 3 (modified)

Evaluation of Initial Sampling Results: Sanitary Sewer Gas Screening Level (SSGSL)



What is the SSGSL?

- Type of vapor risk screening level (VRSL) (*Introduced in 2021, RR-649*)
- Divide the indoor air vapor action level (VAL) for connected buildings (either residential or commercial/industrial) by an attenuation factor (AF).

$$\text{SSGSL} = \text{VAL} / \text{AF}$$

Attenuation factor:

- McHugh and Beckley (2018) recommended an AF of 0.03 based on tracer testing of 15 buildings
- AF is the same regardless of building use

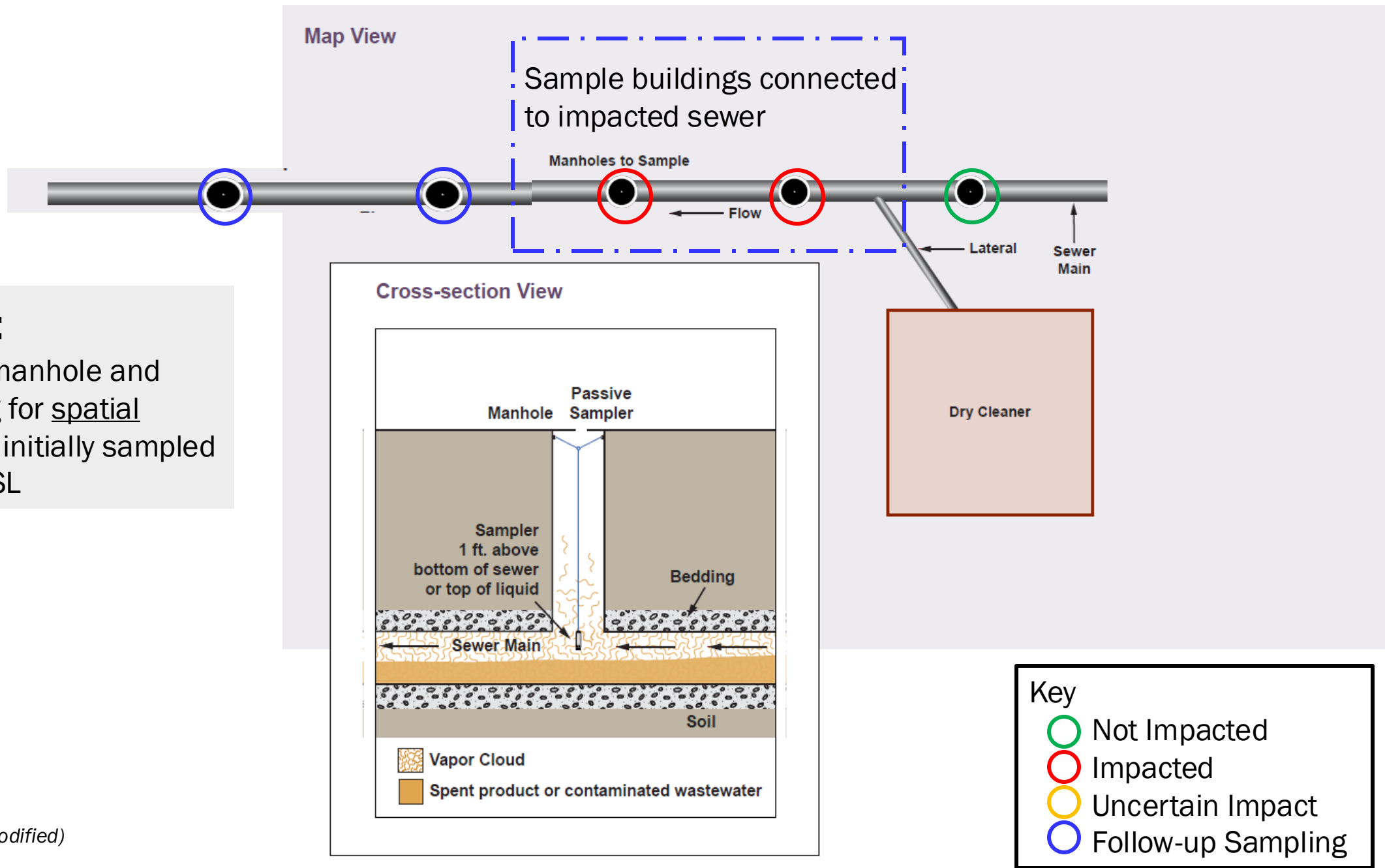
In Wisconsin: If SSGSL Not Exceeded – VAL May Still Be Exceeded

- Building plumbing (pipes, joints, traps) are poorly installed or have deteriorated over time
- Events remove water from traps
 - Evaporation of water in plumbing traps
 - Sewer main cleaning
 - Atmospheric events (wind, low pressure)
- DIY plumbing modifications

These events can occur after acceptable indoor air results are obtained.

Scenario A:

Follow-up sewer manhole and building sampling for spatial delineation when initially sampled manholes > SSGSL



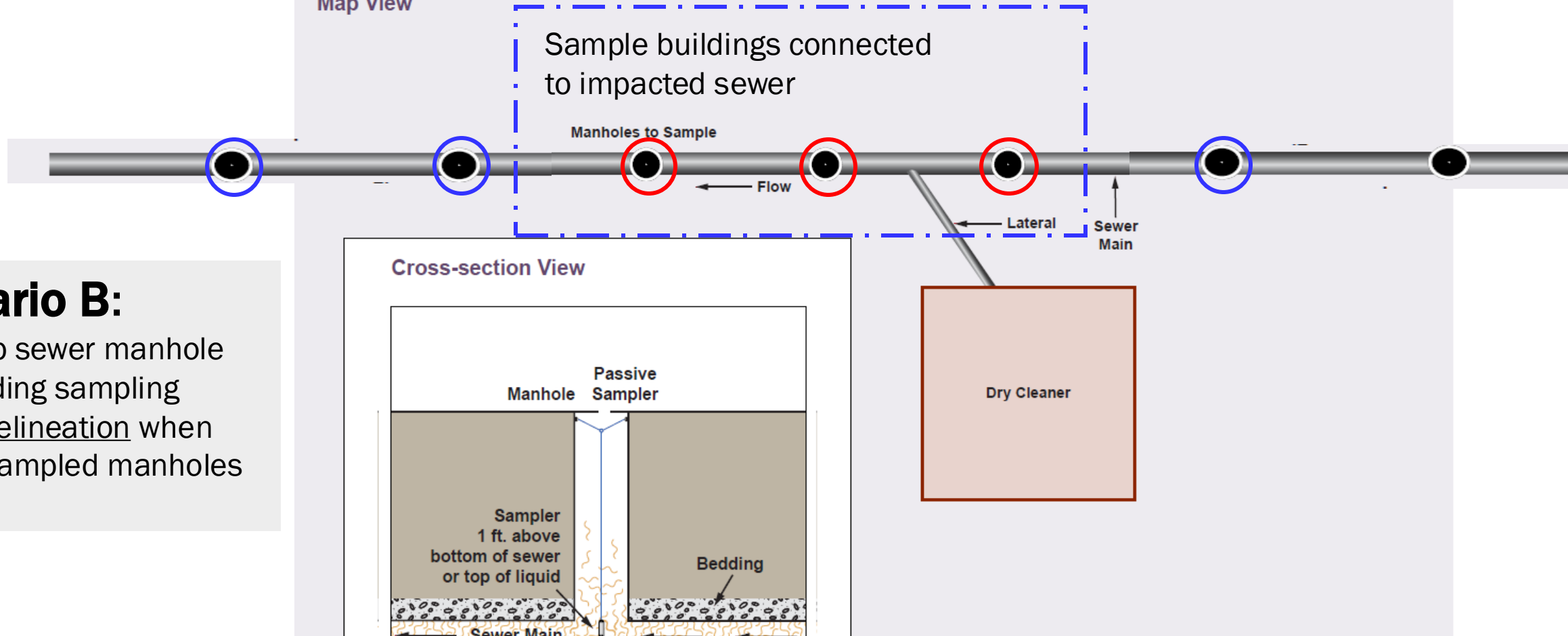
From RR-649, Figure 3 (modified)

Scenario B:

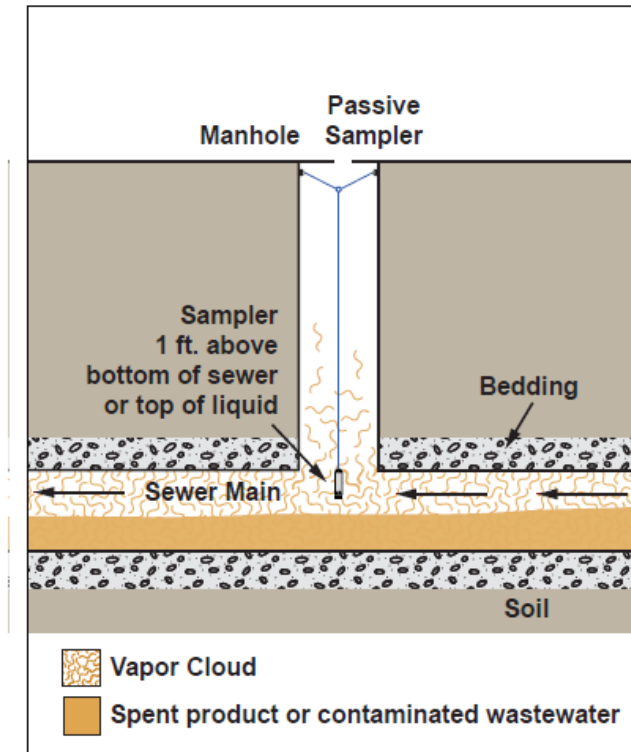
Follow-up sewer manhole and building sampling spatial delineation when initially sampled manholes > SSGSL

From RR-649, Figure 3 (modified)

Map View



Cross-section View



Key

- Not Impacted
- Impacted
- Uncertain Impact
- Follow-up Sampling

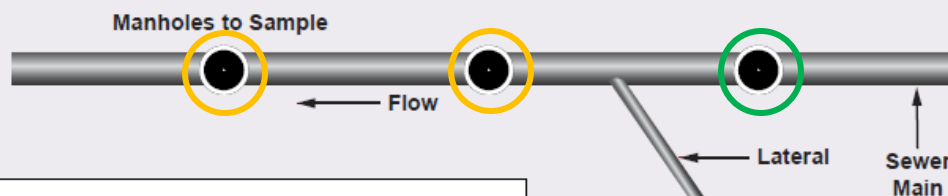
Scenario C:

Follow-up sewer manhole sampling when initially sampled manholes are > 10% SSGSL but < SSGSL

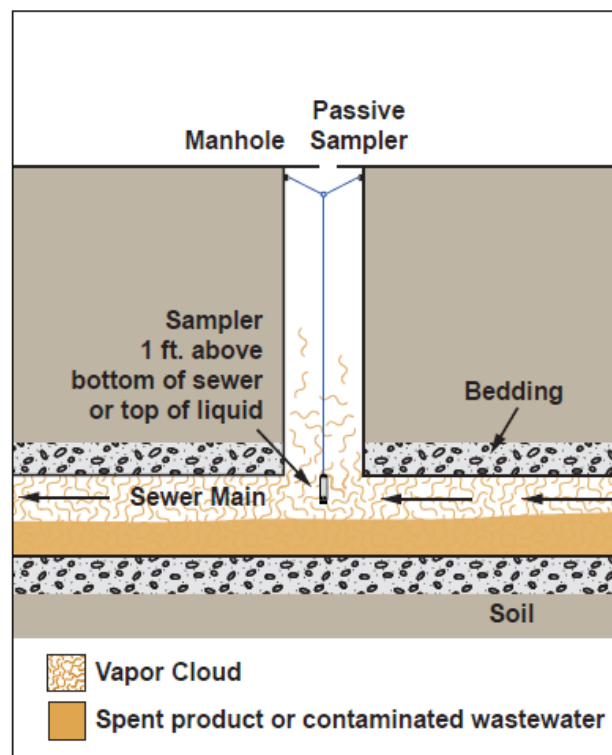
Re-sample manholes in a different season (for example winter), period of a high-water table

From RR-649, Figure 3
(modified)

Map View



Cross-section View



Key

- Not Impacted (Green circle)
- Impacted (Red circle)
- Uncertain Impact (Yellow circle)
- Follow-up Sampling (Blue circle)

More Investigation if TCE > 10% SSGSL

When the concentration of TCE in the sanitary sewer main exceeds 10% of the SSGSL, DNR recommends a more thorough evaluation of potential impact to indoor air in buildings connected to that sewer.

	Residential Setting*		Non-residential Setting**	
Contaminant	SSGSL	10% of SSGSL	SSGSL	10% of SSGSL
TCE (in µg/m ³)	70	7	290	29

*Residential Setting = any dwelling designed for human habitation, and includes educational, childcare and elder care settings (Wis. Admin. Code § NR 700.03(49g))

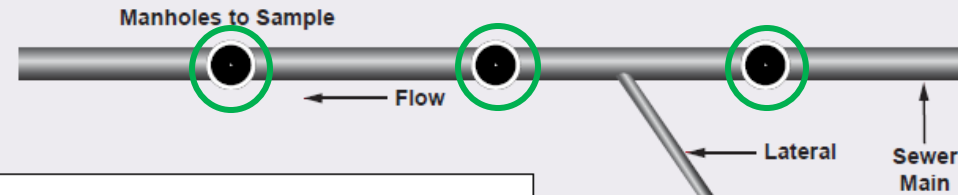
** Non-residential Setting = other than residential setting, used for commercial or industrial purposes (Wis. Admin. Code § NR 700.03(39m))

Scenario D:

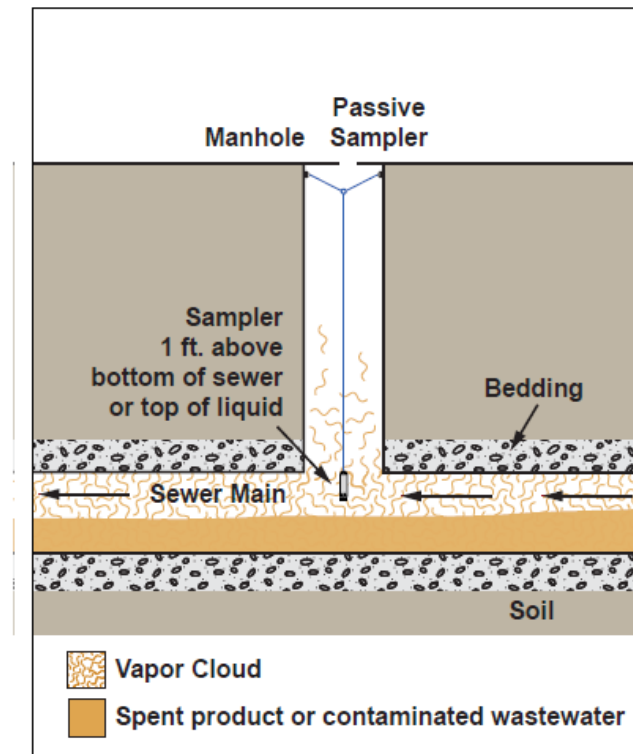
Initially Sampled Manholes < 10%
of the SSGSL and all lines of
evidence suggest no conduit VI

From RR-649, Figure 3 (modified)

Map View



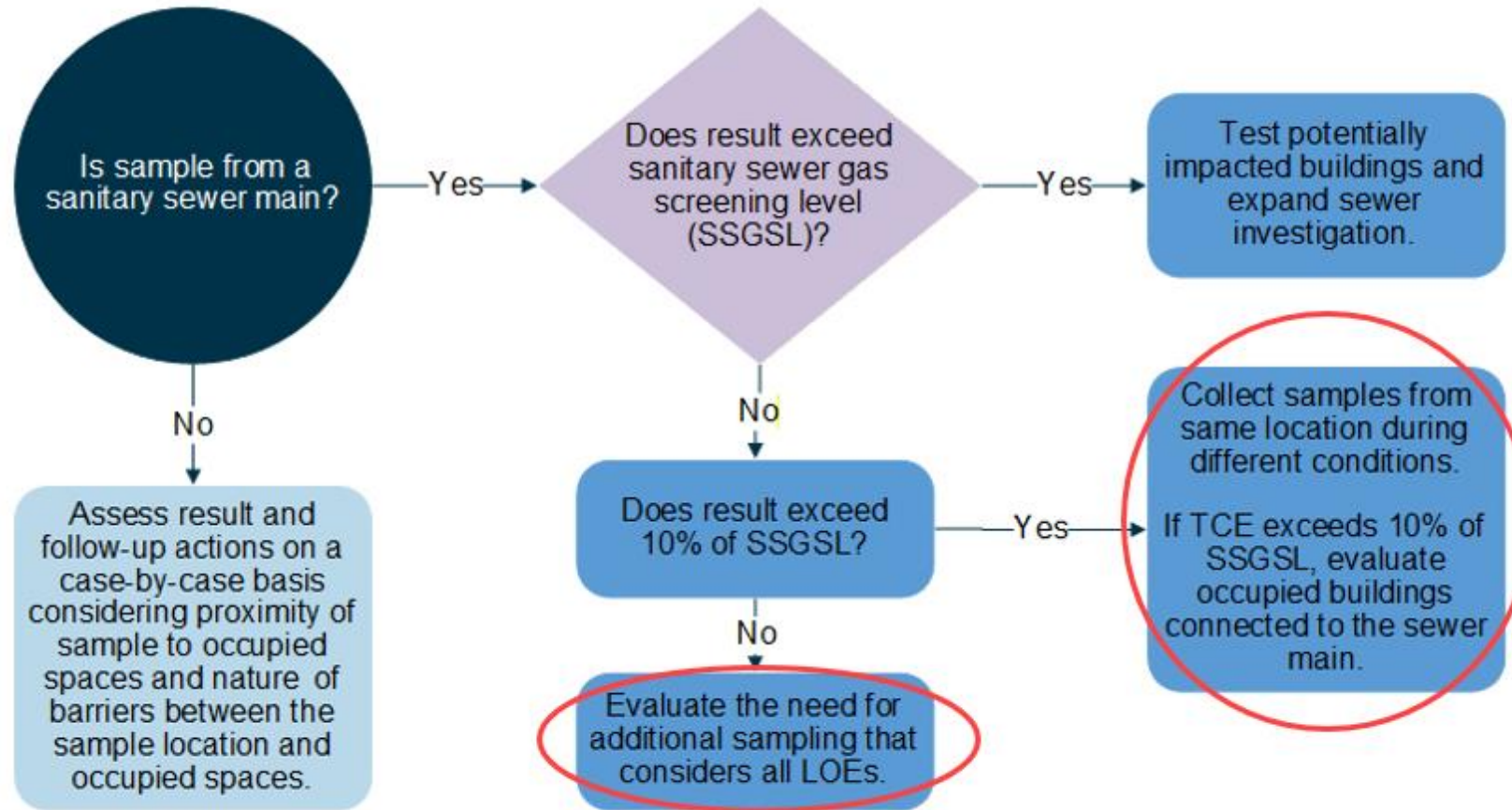
Cross-section View



Key

- Not Impacted
- Impacted
- Uncertain Impact
- Follow-up Sampling

Conduit Vapor Data Assessment and Decision Recommendations



From RR-649, Figure 4 (modified)



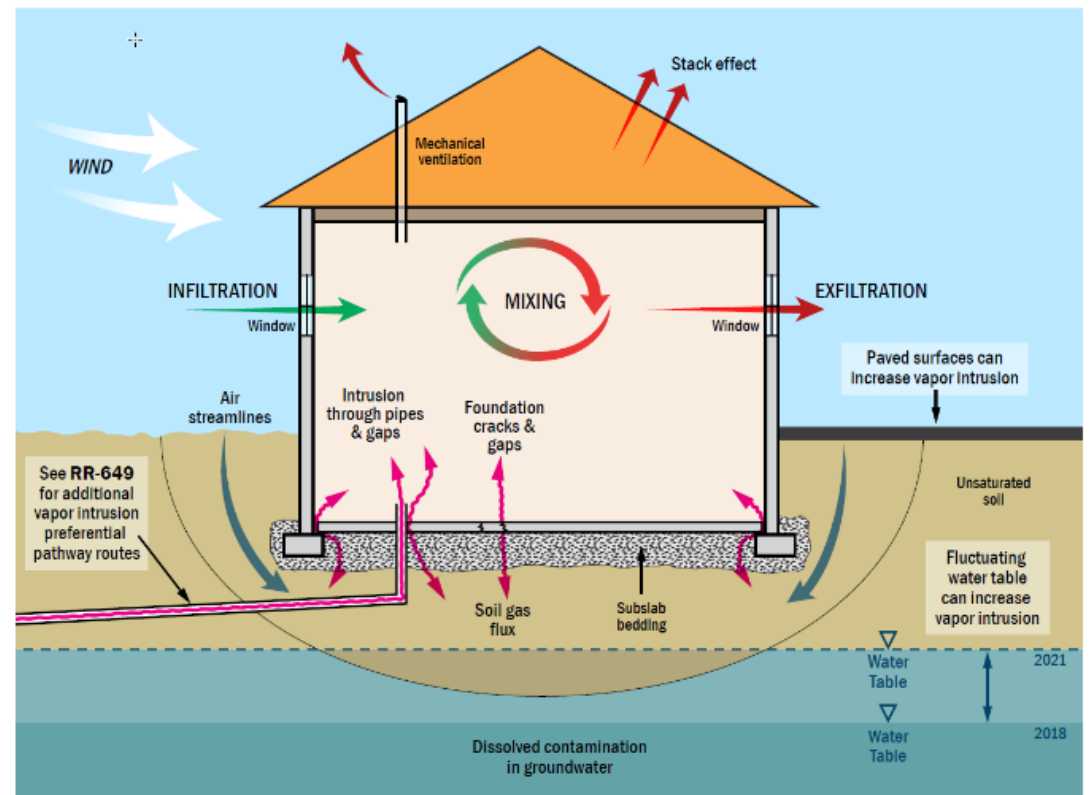
DNR Images

Off-site Building Conduit Sampling

Alternative Off-site Building Strategy – What's the Conceptual Site Model?

- Ensure the integrity of building plumbing
 - p-traps protective?
- Perform indoor air sampling
 - acute exposure happening?
- Mitigate the pathway from the main conduit
- Remediate the source

Inset for Figure A-1



From RR-800

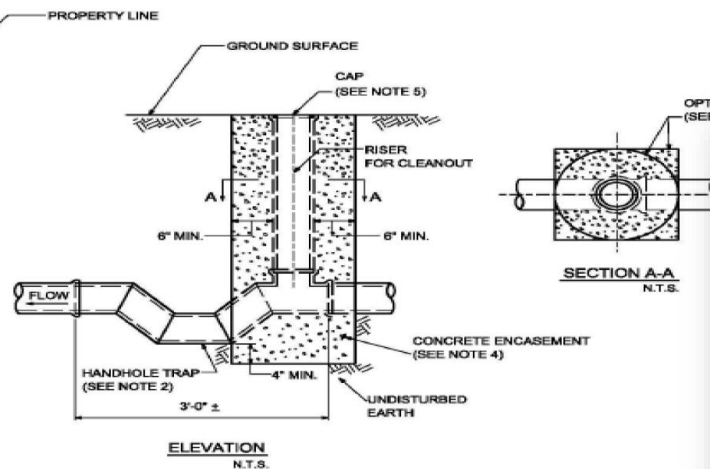


Figure F-3. Gas trap siphon
(City of San Diego, 2015)

From RR-800

Geosyntec
consultants

Photographic Record

Client:	Landex of Wisconsin, Inc.	Project No.:	TR0558H
Site Address:	1912 South 82 nd Street	Location:	West Allis, Wisconsin

Photograph 5:	
Date: May 31, 2023	
Direction: N/A	
Comments: 4-inch SDR35 vent piping is shown entering manhole MH-5175 from a newly cored hole along the sidewall. Photo shown relates to extraction point MH-5175.	

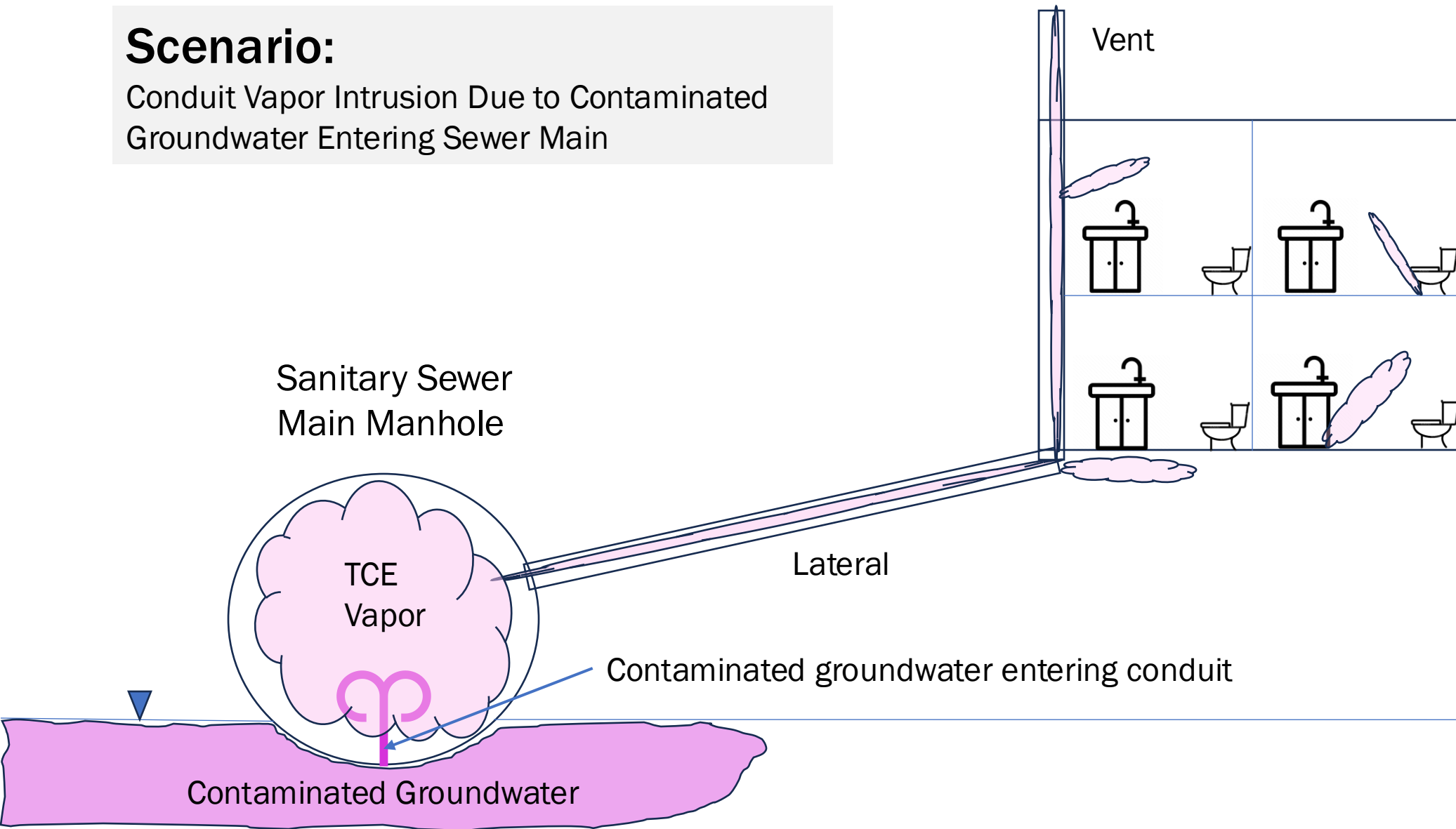
Photograph 6:	
Date: May 31, 2023	
Direction: N/A	
Comments: Sealing of the cored hole through the sidewall of the manhole MH-5175 and annulus of the 4-inch SDR35 vent piping is shown with EZ-stick joint sealant and speed plug hydraulic cement. Photo shown relates to extraction point MH-5175.	

From BRRTS

Mitigation and Remediation

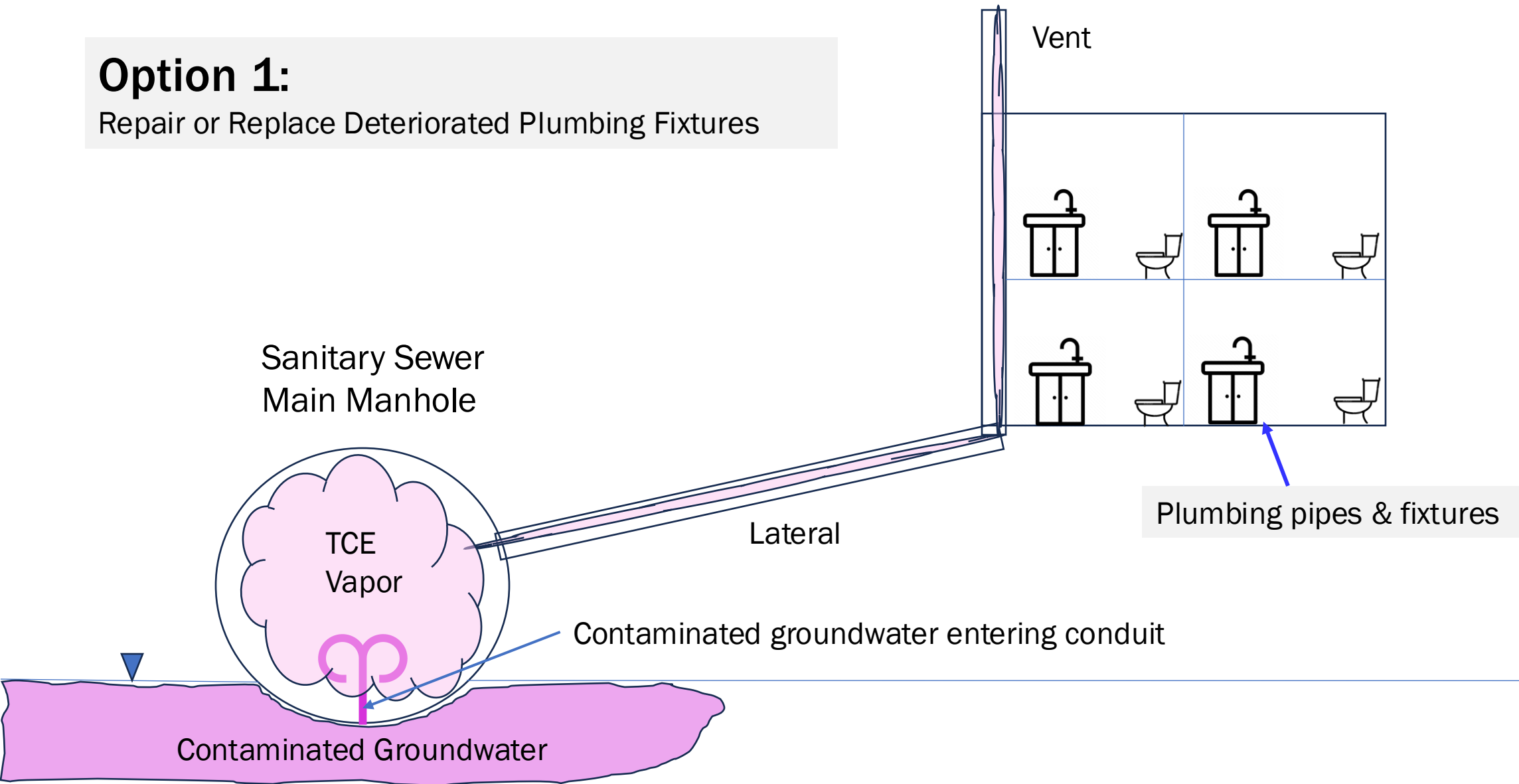
Scenario:

Conduit Vapor Intrusion Due to Contaminated Groundwater Entering Sewer Main



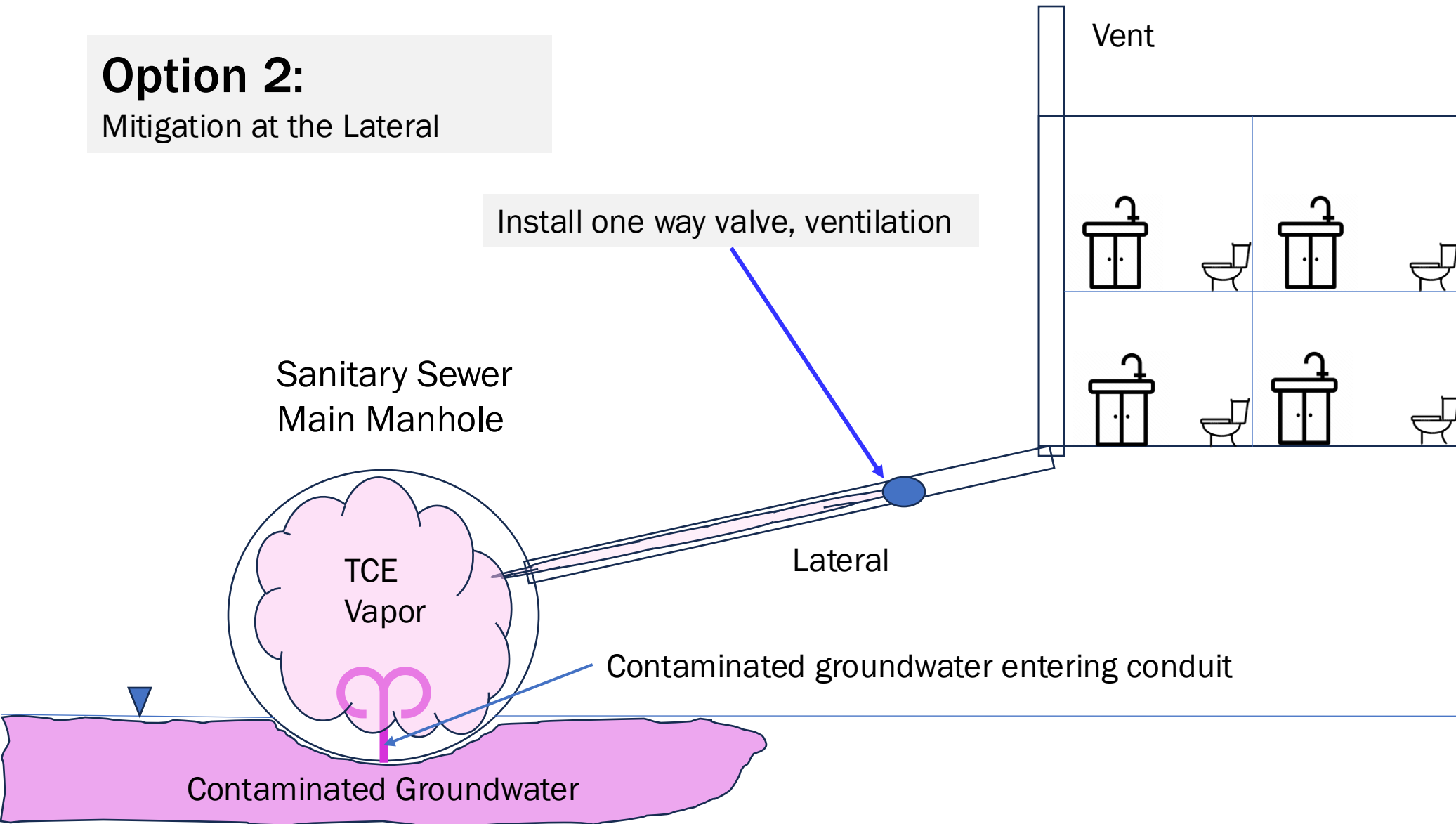
Option 1:

Repair or Replace Deteriorated Plumbing Fixtures



Option 2:

Mitigation at the Lateral



Option 3:

Ventilation at the Sewer Main

Ventilate sewer main

Sanitary Sewer
Main Manhole

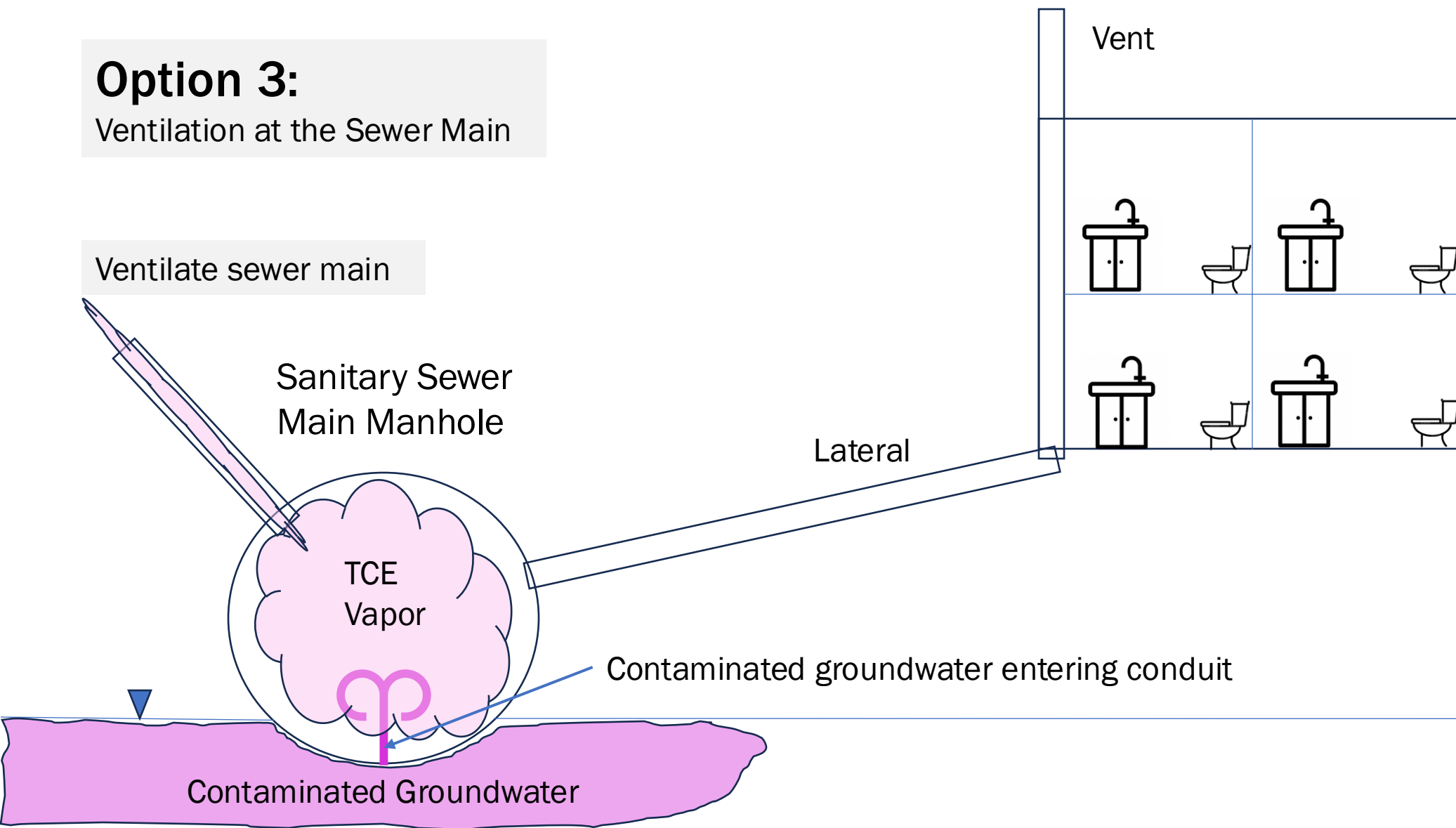
TCE
Vapor

Contaminated groundwater entering conduit

Contaminated Groundwater

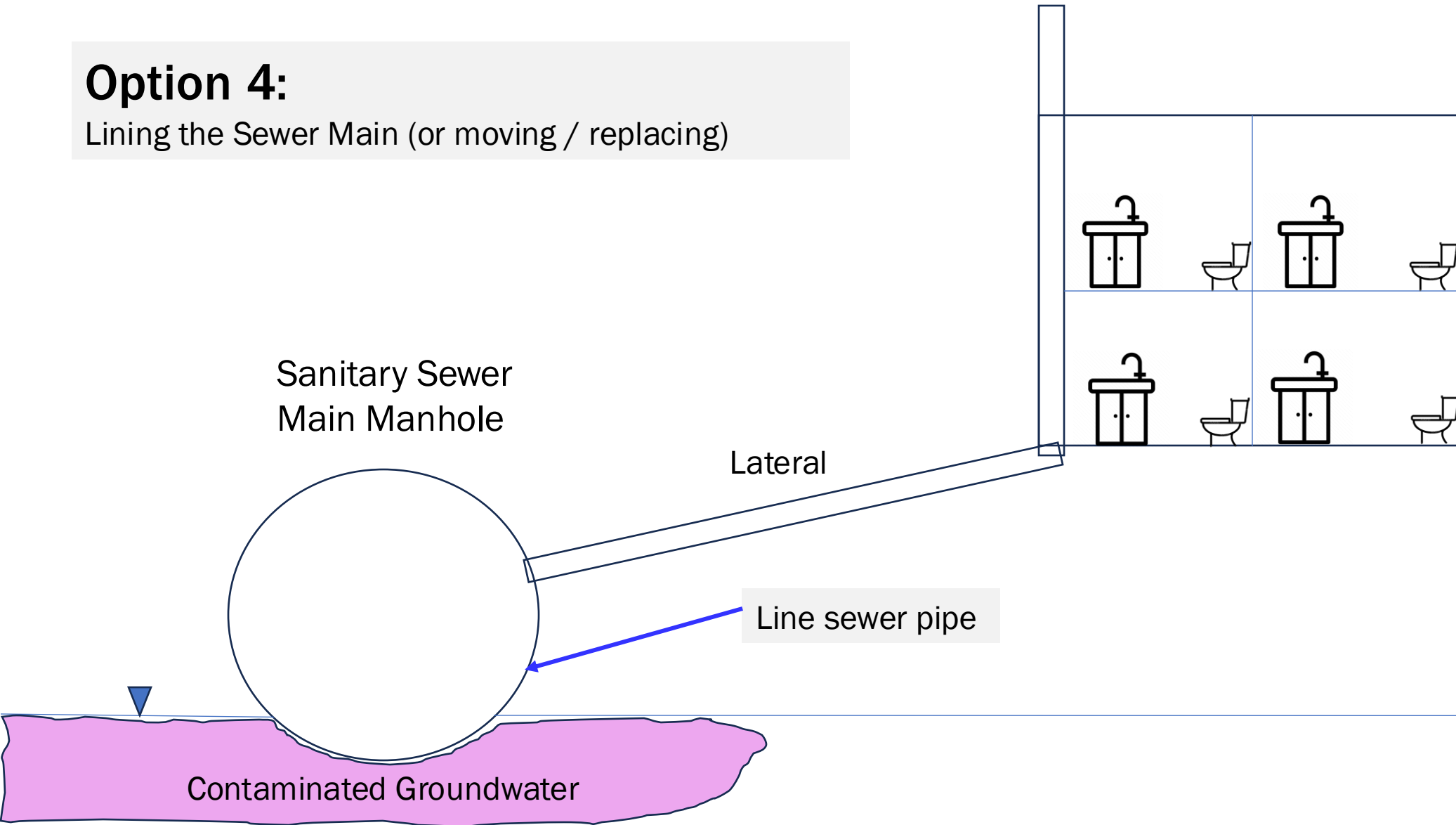
Lateral

Vent



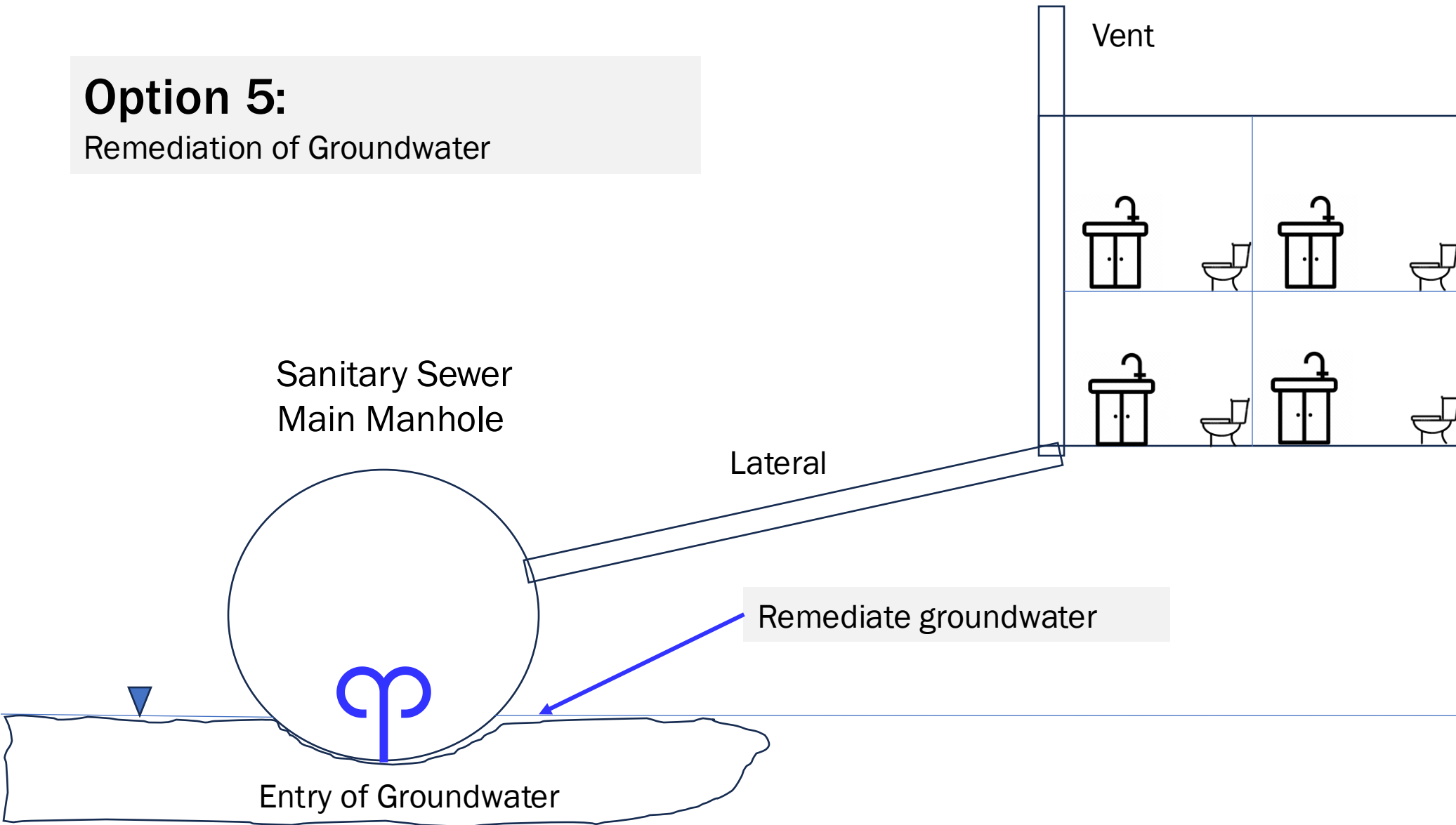
Option 4:

Lining the Sewer Main (or moving / replacing)



Option 5:

Remediation of Groundwater



Summary of Options

1. Repair or replace deteriorated plumbing fixtures
2. Mitigation at the lateral
3. Ventilation at the sewer main
4. Lining, moving or replacing the sewer main
5. Remediate groundwater

Implementing multiple options may be needed to address acute exposure and facilitate long-term protection

Conceptual Site Model & Lines of Evidence

From RR-800

Vapor Intrusion Guidance (RR-800)

Wis. Stat. ch. 292, Wis. Admin. Code chs. NR 700-799

Appendix A - General Conceptual Model for Vapor Intrusion

Related Guidance

DNR publications and forms referenced in this document include a number beginning with "RR-" or "4400-." Locate these publications and forms by visiting dnr.wi.gov and search for the number.

Find additional DNR guidance on vapor intrusion by visiting dnr.wi.gov and searching "vapor."

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Main Takeaways

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- Special consideration necessary with TCE
- Conduit vapor mitigation options evolving

DNR Recommendations

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- Develop building-specific conceptual site models for investigation & mitigation options
- Reference state-specific guidance (RR-800, RR-649)
- Utilize passive samplers for sanitary sewer mains
- Mitigate as close to source as possible
- Understand Wis. Admin. Code § NR 726.05(8)(b)1 requires a remedial action to reduce the contaminant mass and concentration of the source when vapors exceed a screening level
- Note mitigation is not a remedial action

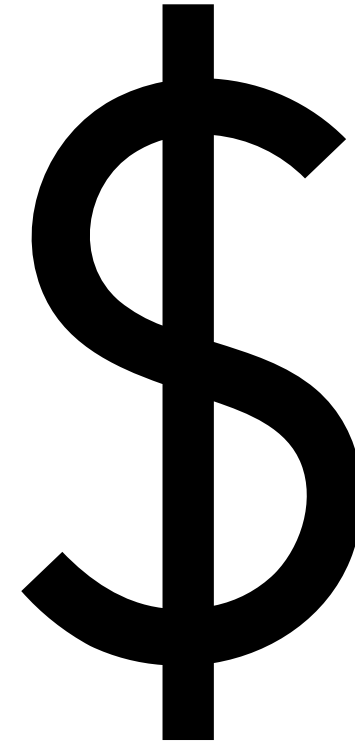
DNR Technical Assistance

Training = Simple scenarios

Real Life = Complicated scenarios

Request DNR Review (fee required):

- ☐ Work Plan
- ☐ Data Report
- ☐ Other Technical Assistance



CONNECT WITH US

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"WILD WISCONSIN:
OFF THE RECORD"

Questions?

