



Introduction to vapor intrusion map templates

The Minnesota Pollution Control Agency (MPCA) has prepared five map templates for use on vapor intrusion (VI) projects within the Minnesota Environmental Response and Liability Act (MERLA) programs including Superfund, the Voluntary Investigation and Cleanup (VIC), Resource Conservation and Recovery Act and Site Assessment programs.

The five VI map templates include:

1. Vapor intrusion potential sources and receptors
2. Proposed soil gas investigation
3. Vapor intrusion area of concern
4. Vapor mitigation decisions
5. Vapor mitigation area

The VI map templates provide:

- Guidance on the VI investigation and mitigation processes
- A public communications tool
- A consistent project management reporting format and tracking tool

Creating and updating the maps during each stage of the VI investigation and vapor mitigation process will assist in determining the necessary next steps for the investigation and/or mitigation. The maps are intended to be iterative and will likely require updating and revising as more information becomes available during the investigation and mitigation work.

Deliverables

The MERLA programs require delivery of the current applicable maps in PDF format, as well as the original source GIS data, map templates, and metadata. Not all of the map templates may be applicable for all sites.

Map requirements for all maps

Use clean and simple cartographic elements. Maps should have a simple north arrow, scale bar, street labels, legend, and title bar. Include other information as needed, including author, file path, date and other notes.

Create the legend – using standardized symbols and color

All maps should be created using the symbol types as shown in the template maps. To assist the map creator, the site remediation symbols are stored in an ESRI style file.

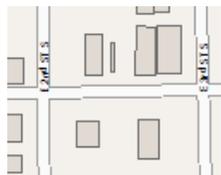
The style file is available from the MPCA. Learn more about how to load a style file via ArcGIS help. Click [here](#) for more information.

Utility corridor locations are not a required component of the maps unless they have been identified as a preferential vapor migration pathway towards building receptors. If utility corridors are identified as preferential vapor pathways, they should be added to the appropriate maps.

Buildings		
	Sensitive populations (daycares, schools, hospitals, elderly hou...	 Buildings
	Commercial/industrial properties	 Garage/shed
	Residential properties	 Parcels
	Buildings2	
	Garage/shed	
	Parcels	
Completed pathway		
	Completed pathway investigation in process	 Investigation complete, no vapor pathway identified
Known environmental conditions		
	Area of uppermost groundwater contamination above available...	 100 ft buffer of known source/REC
	Source area	 Vapor intrusion area of concern
	Mitigation area	
Mitigation		
	Mitigation installed, system verified	 Mitigation system installed, system not verified
	No mitigation required	 Mitigation system required
Sampling		
	Access denied	 Needs additional sampling, interim decision is no mitigati...
		 Needs sub slab sampling

Base maps

The preferred base map has custom styled street lines and drawn building footprints. This is shown below and in the map templates.

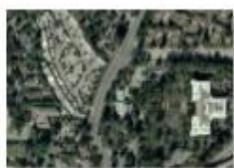


Custom base map made from hand drawn (digitized) building polygons, background color and two street shapefiles.

The two base maps below can be used to hand draw the building footprints in geographical information system software. Other out-of-box base maps include open street map or air imagery (examples below). There are some scenarios in the early stage of the investigation where these base maps are an option. To define building mitigation status for each property at a larger site requires building footprints and the preferred custom base map.



OpenStreetMap



Imagery

Understanding and creating metadata

All layers for these maps must have metadata. Metadata includes summary information about the data layer including how it was developed, what sources were used and descriptions of the fields in the attribute table. Metadata is important for determining suitability of the data for your use. To learn more about the components of metadata, how to use the editor, and the importance of metadata, please read more at the Minnesota Geospatial Information Office (MNGeo) website: <https://gisdata.mn.gov/dataset/minnesota-metadata-editor> .

Template 1 – Vapor intrusion potential sources and receptors

Required map elements include:

- All known environmental conditions associated with the site
- Potential building receptors and building usage

What constitutes a known environmental condition?

A known environmental condition refers to the presence of a hazardous substance released to the environment or conditions indicative of a release of hazardous substances to the environment. Known environmental conditions can be identified from a review of historic reports (Phase I/II ESAs) or current site investigation data. One or more known environmental conditions may be present at a site. Common known environmental conditions include:

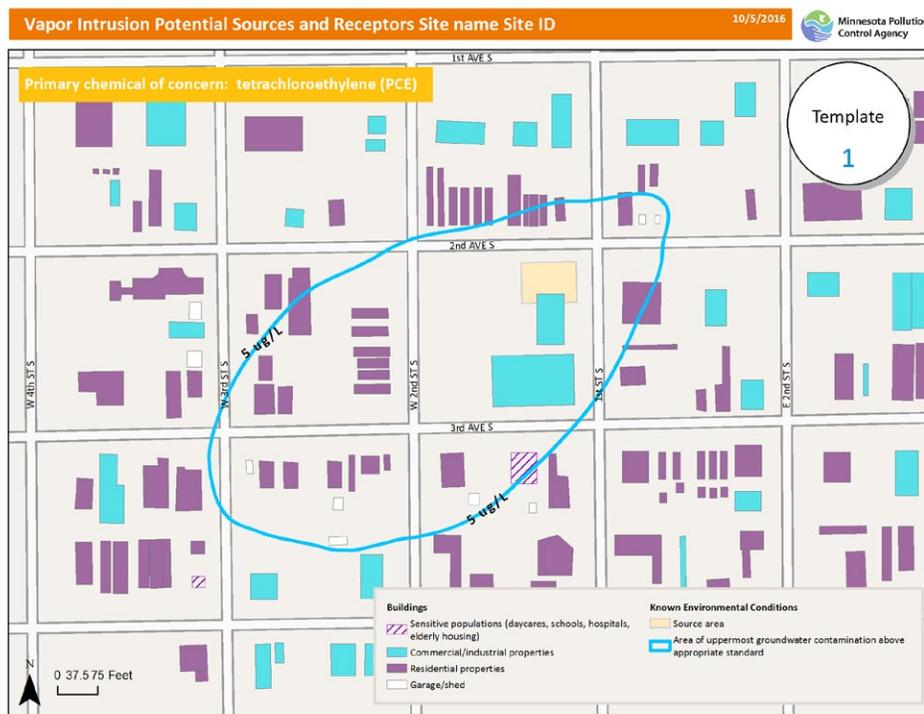
- Known and suspected releases
- Shallow groundwater contamination by vapor forming chemicals
- The presence of vapor forming non-aqueous phase liquids (NAPL)

How do I determine building usage?

A walking receptor survey should be conducted to determine building usage (residential, commercial, industrial, etc.) for potential building receptors within a minimum 100-foot buffer of all known environmental conditions. A desktop building receptor survey using available on-line databases can be conducted to help facilitate the walking receptor survey. Building polygon and zoning information is also often available through existing city or county sources.

How do I determine if a sensitive population is present?

The Minnesota Department of Health (MDH) recognizes that certain individuals may be sensitive to vapor intrusion. To determine if a sensitive individual is present at a building, an information sheet titled “Your Health and Vapor Intrusion” (<http://www.health.state.mn.us/divs/eh/hazardous/topics/vapintrusensid.pdf>) should be provided to the property owner when requesting access and when notifying owner/tenants that mitigation is required. The MDH will then notify the MPCA that a sensitive individual is present for evaluation of expedited action.



Template 2 – Proposed soil gas investigation

Required map elements include:

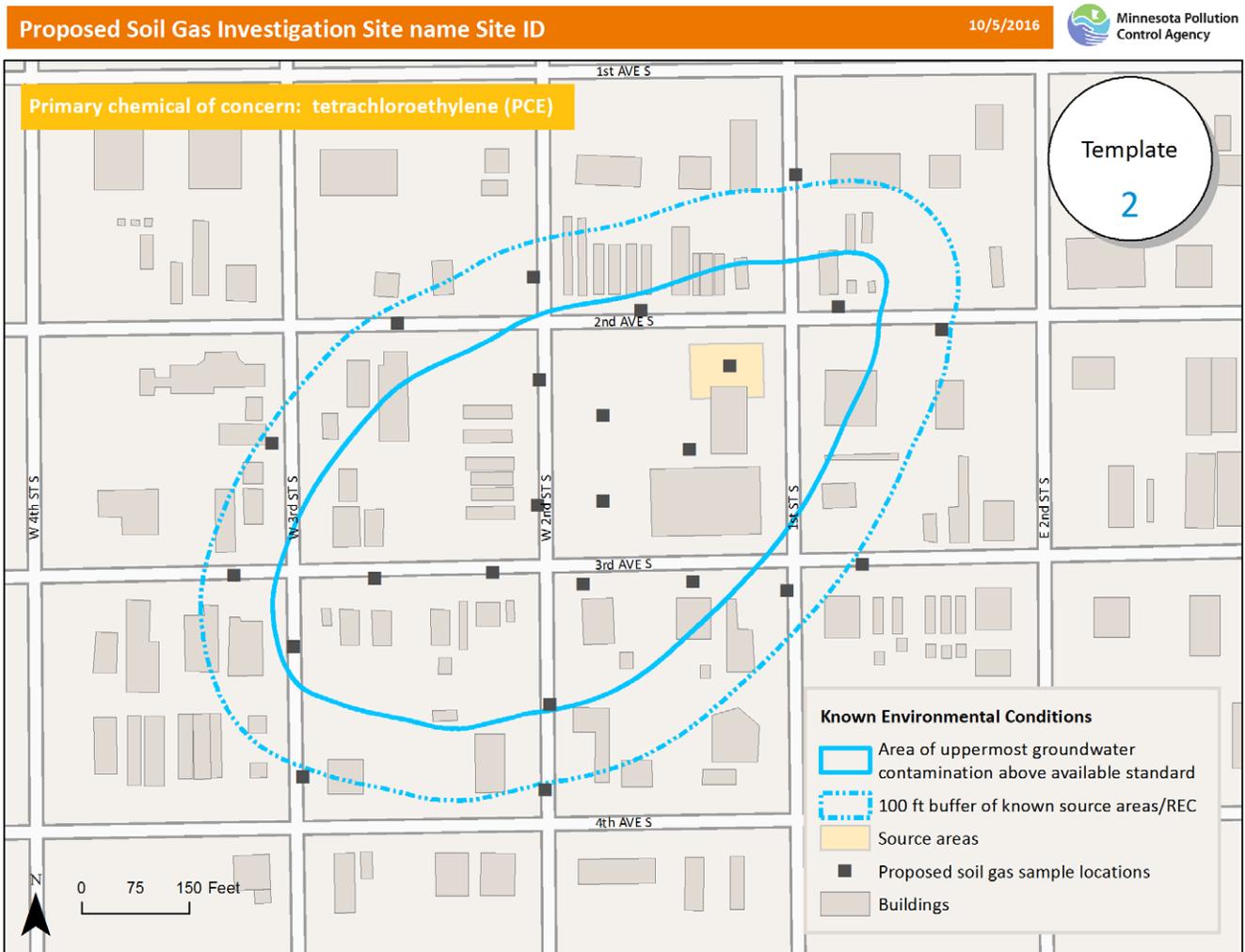
- Proposed soil-gas sample locations
- 100-foot buffer around known environmental conditions
- Known environmental conditions
- Building polygons

How are soil-gas sample locations selected?

The goal of the soil-gas sampling is to define the horizontal extent and magnitude of soil-gas impacts and develop a vapor area of concern focused on potential building receptors. The soil-gas sample locations are selected to determine an area where building-specific vapor intrusion investigations are required. The initial round of proposed soil-gas sampling is typically conducted on the site property and within the road right-of-way based on readily available property access.

How is the 100-foot buffer determined?

The 100-foot buffer is interpolated based on all known environmental conditions. If there are multiple known environmental conditions in different areas of the site that do not fall within each other's 100-foot buffer area, multiple buffers will be required.



Template 3 – Vapor intrusion area of concern

Required map elements include:

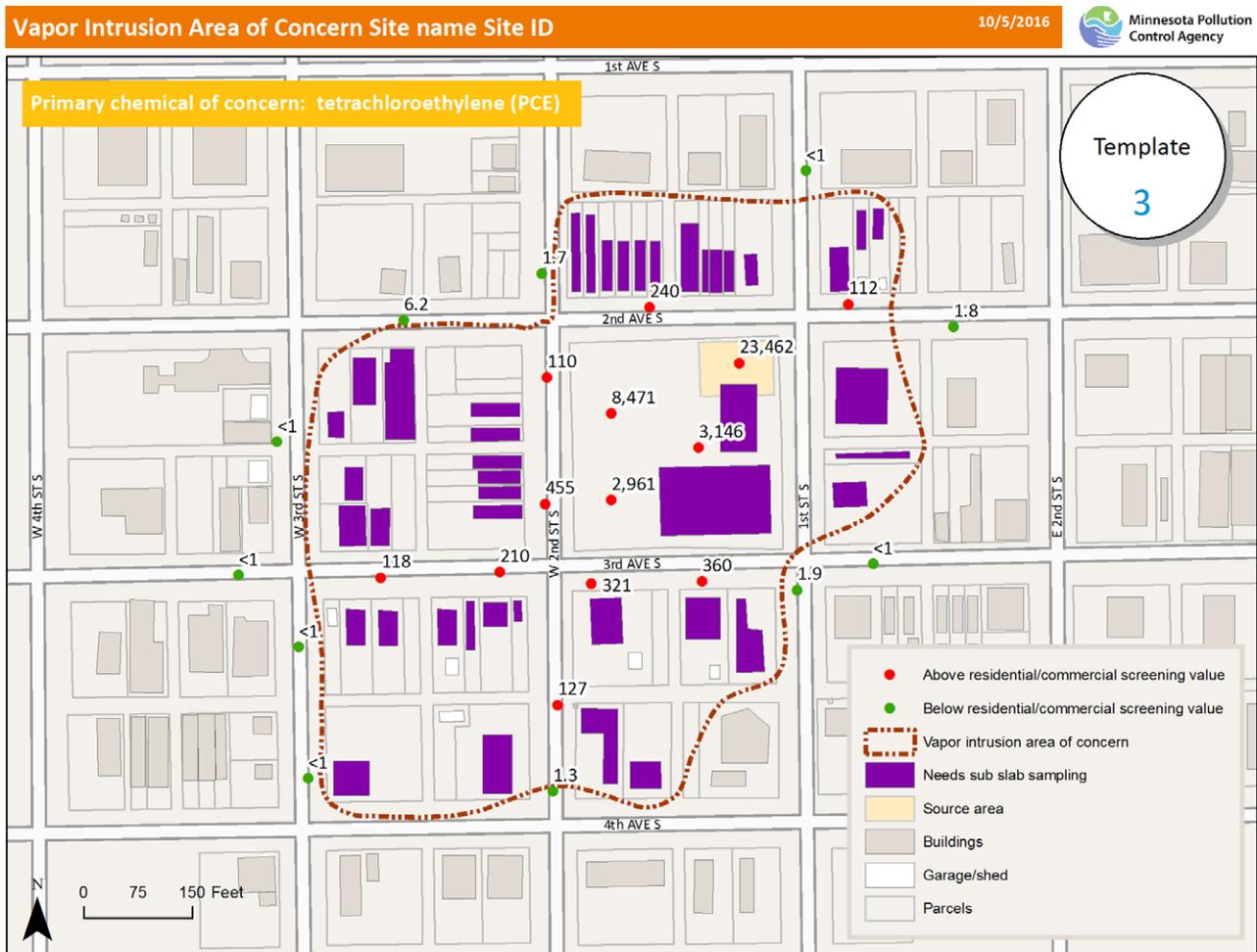
- Soil-gas sampling results
- Vapor intrusion area of concern
- Building polygons with color-coding to identify buildings needing sub-slab sampling
- Parcel lines
- Source area

How do I determine the vapor intrusion area of concern?

The initial VI AOC is developed based on the results of soil-gas sampling and the locations of building receptors. The soil-gas sample locations with test results below applicable screening levels (33X ISVs for contaminants of concern) are used to define the outer boundary of the VI AOC. The initial VI area of concern will likely change as the investigation work progresses. All inhabitable buildings within the vapor AOC require a building specific VI assessment including sub-slab sampling.

How do I obtain the parcel information?

Parcel information is typically available from the city, county, or from LiDAR projects.



Template 4 – Vapor mitigation decisions

Required map elements include:

- Vapor intrusion area of concern
- Buildings (garage/shed) and parcel lines
- Sampling
 - Needs sub-slab sampling
 - Needs additional sampling, interim decision is no mitigation needed
 - Access denied
- Mitigation
 - Mitigation required/not yet installed
 - Mitigation installed, system not verified
 - Mitigation system installed, system verified
 - No mitigation needed
- Completed pathway
 - Completed pathway investigation in process
 - Investigation complete, no vapor pathway identified

How do I determine the building mitigation status?

The building mitigation status is determined based on the sub-slab sampling results. If contaminant concentrations in the sub-slab are greater than 33X the applicable ISV(s), active building mitigation or completed pathway evaluation (for commercial/industrial buildings only) is required.



Template 5 – Vapor mitigation area

Required map elements include:

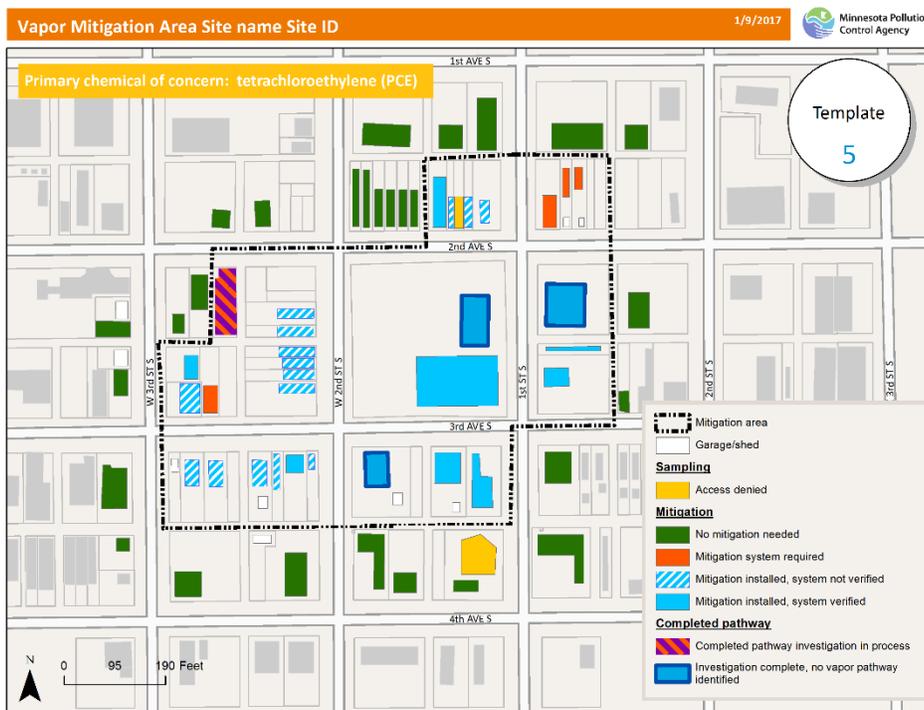
- Mitigation area
- Buildings (garage/shed) and parcel lines
- Sampling
 - Access denied
- Mitigation
 - Mitigation required/not yet installed
 - Mitigation installed, system not verified
 - Mitigation system installed, system verified
 - No mitigation needed
- Completed pathway
 - Completed pathway investigation in process
 - Investigation complete, no vapor pathway identified

What is the vapor mitigation area?

The vapor mitigation area defines the area where active mitigation is required for building receptors. All buildings designed and conditioned for permanent human occupancy within this area require active vapor mitigation or completed pathway evaluation (for commercial/industrial buildings only). Examples of buildings not designed and conditioned for permanent human occupancy include detached, unconditioned garages and storage sheds.

How is the vapor mitigation area determined?

The building mitigation area is determined based on sub-slab sampling results. The initial vapor mitigation area may change in the future, if the groundwater contaminant plume is not stable and/or the vapor plume migrates. Sentinel groundwater and soil-gas monitoring points should be installed if the contaminant plume is not demonstrably stable.



GIS resources from the MPCA

The MPCA provides the following in a zipped file on our website for download:

- A demonstration geodatabase to store GIS data in
- 5 MXDs as map GIS templates
- 5 PDFs as exports from the GIS
- A style sheet for exact symbology

If you have questions regarding the GIS map templates, please call 1-800-657-3864 or 651-296-6300 and ask for the GIS Remediation Division Support.

If you have questions regarding vapor intrusion policy, please call Minnesota Pollution Control Agency Remediation Division at 651-757-2040 or email vaporinfo.pca@state.mn.us.