



# VAPOR INTRUSION MITIGATION CONCEPTUAL SITE MODEL CHECKLIST

## SCOPE AND INSTRUCTIONS

This checklist assumes that vapor intrusion (VI) site characterization has been completed and the user has reviewed the existing conceptual site model (CSM), confirmed key components, and determined that VI mitigation is necessary. Guidance and CSM checklists for VI site characterization are found elsewhere ([ITRC, 2007a](#); [ITRC, 2007b](#); [ITRC, 2014](#)). The purpose of this checklist is to further develop and emphasize the key considerations of the VI CSM as they relate to mitigation and to identify and characterize site and building conditions as necessary for evaluation of VI mitigation alternatives.

This checklist is a tool to guide mitigation planning and facilitate communication between interested parties. The checklist can be used in different ways. For example, it can be used as a framework for enhancing the VI CSM to include mitigation considerations. It can also be completed by the preparer of the mitigation plan, or used by the reviewer of this plan, to document information contained in mitigation plans and reports. The checklist is organized with mitigation goals at the beginning to help the user focus on site features that are relevant to development of a mitigation plan to meet those objectives. For example, a detailed building-specific evaluation may not be needed if the mitigation goals and subsurface conditions indicate that the VI mitigation effort should be focused on the chemicals of concern (COC) source area or pathway outside of the building envelope.

### 1. MITIGATION GOALS

*Identify the key mitigation goals or risk drivers. States may consider augmenting this checklist with the appropriate mitigation goals or risk drivers for their state or region.*

- Describe why mitigation is needed (e.g., primary COCs and action or risk levels in environmental media or indoor air exceeded; other drivers such as redevelopment, property transaction, or pre-emptive mitigation).

- Describe mitigation goals (e.g., rapid response requirement and basis/receptor; reduction/elimination of contaminant mass flux into building via conventional vapor intrusion and/or preferential pathway; primary or secondary subsurface source reduction needed).

- Describe the land use and land use goal (e.g., residential; commercial; industrial; mixed use).

- Have the appropriate standards and regulations been identified?  Yes  No  Unknown

If “Yes”, summarize below.

Note: It is the user’s responsibility to determine applicable federal, state, and local standards, regulations, and guidance. Be aware that some states have specific guidance for active and passive mitigation systems. Furthermore, design standards such as ANSI/AARST may apply and, in some municipalities, additional plumbing and building codes may also apply for vapor intrusion mitigation systems.

- Identify and describe the obligations of various stakeholders and logistics for site and building access when various stakeholders may be responsible for the proposed mitigation/remediation/management option (e.g., party owning the property vs. party implementing the mitigation).

## 2. SUBSURFACE CONDITIONS

*To complete this section, locate available geologic/hydrogeologic cross sections and other information to put the contamination into context. In the descriptions below, include references to site reports, as necessary, to support the discussion. Copies of figures or other information may be attached to this checklist as appropriate.*

- Describe the site geology and hydrogeology (e.g., distinct strata/soil types, moisture content, heterogeneity/homogeneity of soils and lithologic units encountered, depth and lateral continuity of confining units and transmissive units; redox potential of impacted aquifer).

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- Describe the thickness of the vadose (unsaturated) zone, depth to capillary fringe, and phreatic (saturated) zone. Include units and reference point (e.g., depth to saturated zone in feet below ground surface).

- Describe other considerations (e.g., impacts in shallow unconsolidated aquifer vs. deeper aquifers; presence of perched aquifers; seasonal water table fluctuations or changes in flow direction).

### 3. SUBSURFACE COC SOURCE

*Identify the primary or secondary COC source that the mitigation plan addresses. In the descriptions below, include references to site reports, as necessary, to support the discussion. Copies of figures or other information may be attached to this checklist as appropriate.*

- Describe the composition (e.g., chlorinated solvents, petroleum hydrocarbons, methane).

- Describe the presence and distribution of subsurface COC sources (e.g., light nonaqueous phase liquid (LNAPL), dense nonaqueous phase liquid (DNAPL), soluble plume, vadose zone soil contamination).

- Describe all impacted environmental media and extent of impacts. Include maps or cross sections, as needed.

- Describe status of source and impacts (e.g., known vs. unknown source; delineation completed vs. ongoing; plume stability).

- Describe status and frequency of source monitoring.

- Describe other considerations (e.g., age of release; remediation planned or in progress; location of underground utilities; presence of impacted media near or within utility lines).

#### 4. SITE SETTING

*Characterize contamination in context with areas and buildings where VI mitigation is needed. In the descriptions below, include references to site reports, as necessary, to support the discussion. Attachments to this checklist with, for example, copies of figures may also be provided.*

- Summarize the nature of the site and surrounding area (e.g., urban vs. rural; paved vs. unpaved; topography; presence of surface water bodies).

- Describe other considerations that may affect mitigation planning (e.g., climate [rainfall, temperature]).

- Describe proximity of contaminants in the subsurface to existing or future buildings requiring VI mitigation (e.g., contamination in contact with building; separation distance).

- Describe potential preferential pathway issues (e.g., sanitary sewer or utility tunnel intersecting contaminated groundwater or nonaqueous phase liquid (NAPL) zone).

## 5. BUILDINGS

*Locate and map out existing buildings, identify square footage, and identify areas for potential future construction if known. If multiple buildings are being evaluated, tabulation of the following for each building may be necessary. Also, building additions may need to be evaluated separately. Note that a detailed, building-specific evaluation may not be needed if the VI mitigation effort is focused on the COC source area or pathway outside of the building envelope. In the descriptions below, include references to site reports, as necessary, to support the discussion. Attachments to this checklist with, for example, copies of figures may also be provided.*

### 5.1. Structure

- Indicate current building use:

Residential

Non-Residential

If non-residential, could future use include residential?     Yes    No    Unknown

Are land use controls (LUCs), use restrictions, institutional controls, or equivalent in place?     Yes    No

Note: If current or future site use is or could be residential, the most conservative state and federal regulations apply for technology selection and design.

- Indicate structure status:

Existing construction

New construction

Potential future construction

- Describe building configuration (e.g., single-family home, apartment, multistory building, high rise office, strip mall, warehouse, attached garage, multipurpose/use building, building with additions). Include total building footprint (area) and height. Note occupancy status.

- Describe below-grade portion of the structure (e.g., finished vs. unfinished basement and suitability for occupancy, crawl space, slab on grade, pile-supported, dirt floor; foundation walls; floating slab, edge supported). Include depth below grade and thickness of slab.

- How many foundation sections (i.e., concrete pours, or change in foundation type) are present within the building?

1    2    3    4    Other: \_\_\_\_\_

Is the foundation a monolithic pour or are there post tension    Yes    No    Unknown  
reinforcement cables in the slab(s)?

If “No” explain further (for example, stem walls, monolithic footings, column pads at grade, concrete walls, block walls):

Note any unique structure conditions (for example, concrete reinforcement, wire mesh, rebar post tension slab, mud slab):

- Describe below-grade structure integrity (e.g., degraded, open, or closed joints or cracks, floor sealant present, liner present) and penetrations (e.g., floor drains, sumps, dry wells, perimeter drains; plumbing/utilities; elevator or machine pits).

- Describe sub-slab conditions (e.g., soil/fill type or types, including native/compacted soil, stone, fill material; permeability; thickness; moisture content—wet vs. dry; void spaces; existing ventilation systems or moisture barriers).

- Is the foundation in close proximity to the water table?     Yes    No
- Identify building- or fire-code requirements for sub-slab ventilation systems (e.g., for methane) or moisture barriers below foundations.

Identify data available for building. Note: measurements may be needed, depending upon mitigation option selected.

- Sub-slab soil gas
- Indoor/outdoor air
- Attenuation factor (indoor air/sub-slab concentration)
- Indoor-outdoor differential pressure
- Indoor-subslab differential pressure
- Diagnostic testing (pressure field extension range, identification of voids)

## 5.2. Interior Space

- Describe wall type (e.g., wood frame, block wall, poured, drywall).

- Describe utility systems that may present preferential pathways for VI (e.g., electrical, plumbing, communication/phone, mechanical).

- Describe special issues (e.g., elevators, stairwells, trash chutes, utilidors that may present preferential pathways for VI; exhaust fans, fume hoods that may introduce back-drafting potential; gas-fired appliances, building with multiple zones).



- Describe the heating, ventilation, and air conditioning (HVAC) system (e.g., forced air vs. radiant; equipment location(s), for example basement, crawl space, utility closet, attic, roof; source of return air, including inside air, outside air, combination; system design considerations relating to indoor air pressure). Note: positive pressure is often the case for commercial buildings, but should be verified.

## 6. DATA GAPS AND UNCERTAINTY SUMMARY

*Summarize the VI pathway described above. It is recommended that the VI pathway be described using the VI CSM Flowchart, cross sections, or sketches to illustrate the specific pathways and relevant mitigation/remediation/management option(s) to cut off the pathways.*

- List key data gaps, if any.