

Conceptual Site Models ...

What's your view?

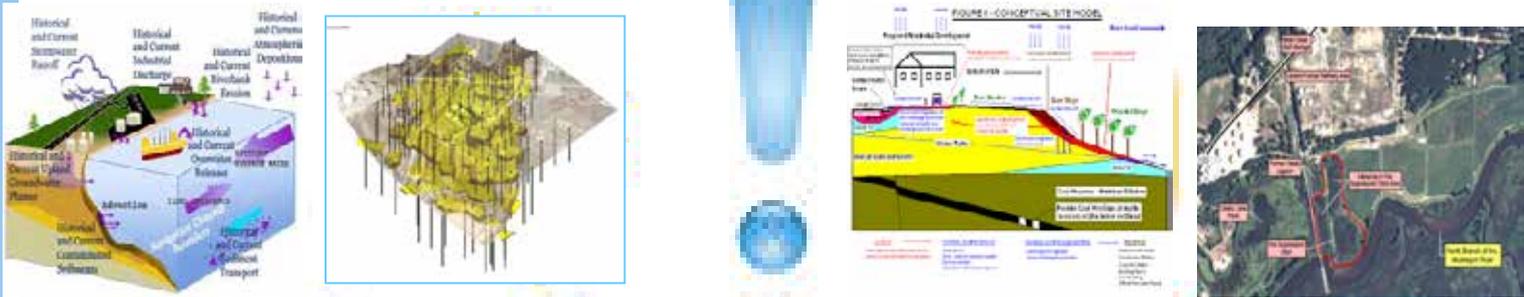
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What is a Conceptual Site Model (CSM)?

A tool for organizing and communicating information



Data Produced in Many Formats



DEQ MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY ENVIRONMENTAL LABORATORY

CHW 80-INDS EFFLUENT (4-8-80 194814)

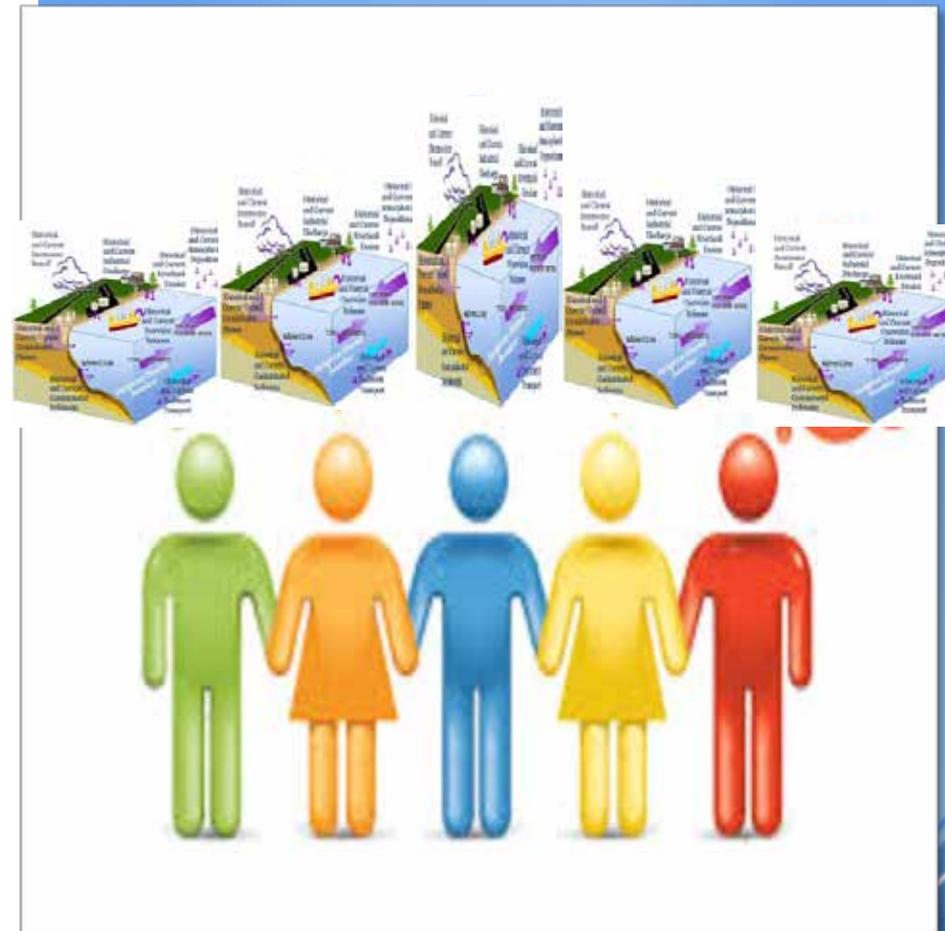
Organic/Inorganic	Rate	ML	Conc	Volume	Adjusted Conc	OT/Week	Notes
129-71-8	1.23	Triethyl-Dioxane					
98-09-4	1.23	Triethyl-Dioxane					
108-07-8	ND	1,1,1-Trichloroethylene	1.0	10/5	1	10/10/80	10/10/80
71-43-2	ND	Benzene	1.0	10/5	1	10/10/80	10/10/80
100-41-4	ND	Chloroform	1.0	10/5	1	10/10/80	10/10/80
118-06-2	ND	Ethyl-Dioxane	1.0	10/5	1	10/10/80	10/10/80
118-06-2	ND	1,1,1-Trichloroethylene	1.0	10/5	1	10/10/80	10/10/80
98-09-4	ND	1,1,1-Trichloroethylene	1.0	10/5	1	10/10/80	10/10/80
108-07-8	ND	Benzene	1.0	10/5	1	10/10/80	10/10/80
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118-06-2	ND	Ethyl-Dioxane	1.0	10/5	1	10/10/80	10/10/80



Goal: Everyone Sees the Same Image

- A written and/or illustrative representation of the physical, chemical and biological processes that control the transport, migration and actual/potential impacts of contamination (in soil, air, groundwater, surface water and/or sediments) to human and/or ecological receptors.

(Source: New Jersey Department of Environmental Protection "Technical Guidance for Preparation and Submission of a Conceptual Site Model")



CONCEPTUAL SITE MODEL

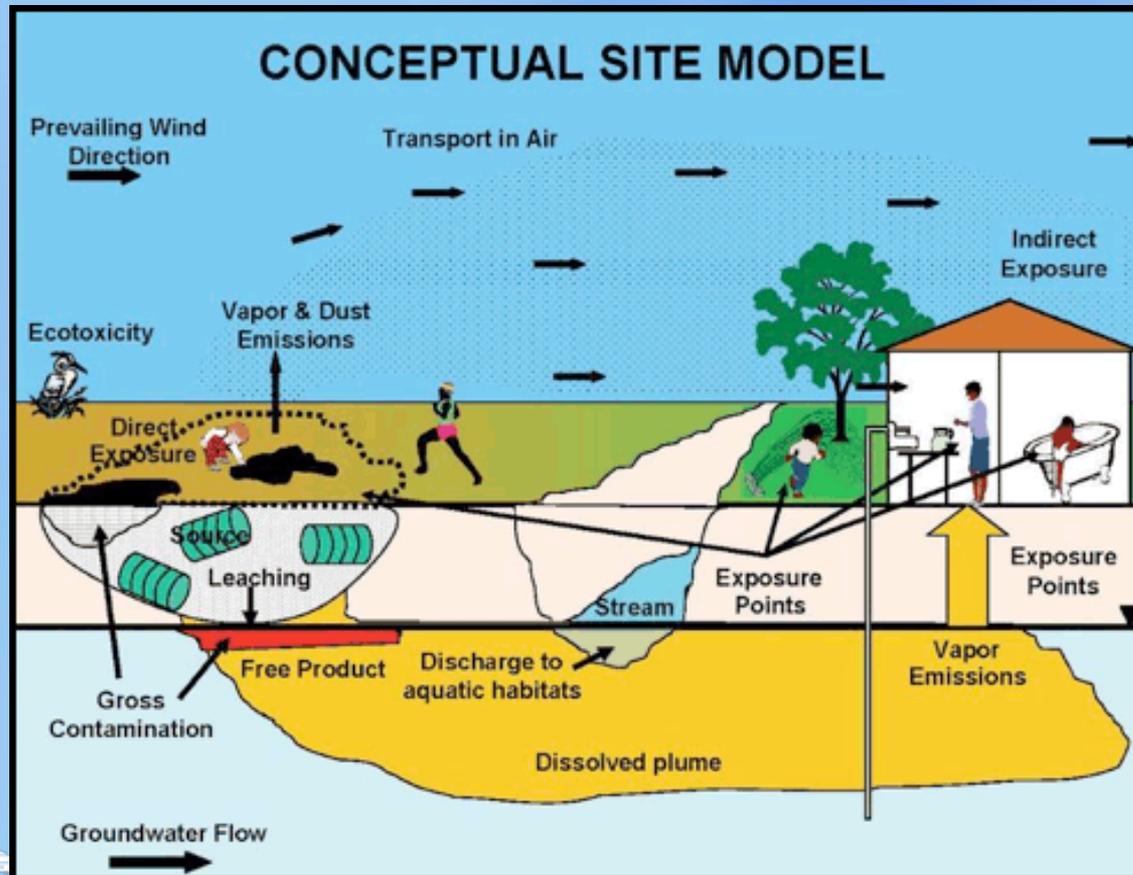
BASICS OF A CSM

Provides a written and/or pictorial representation of:

- site features
- surface and subsurface conditions
- contaminant and concentrations of concern
- potential pathway exposures

The CSM Develops Over Time

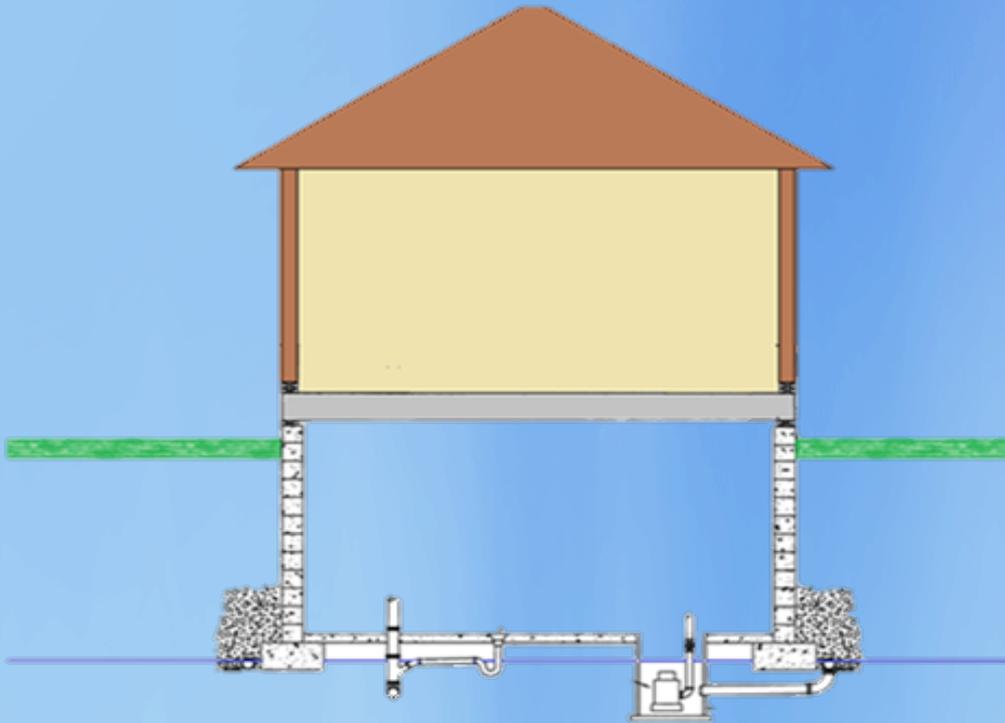
- A Conceptual Site Model (CSM) describes site features and surface/subsurface conditions to understand contaminants and the risk(s) they pose



Conceptual Site Models: DIY



PREPARE A CSM FOR YOUR HOME/PROPERTY



Utilities?

Sump?

Depth to GW?

HVAC System?

Elevator?

Crawl Space?

Field Stone Walls?

Dirt Floor?

Tanks?

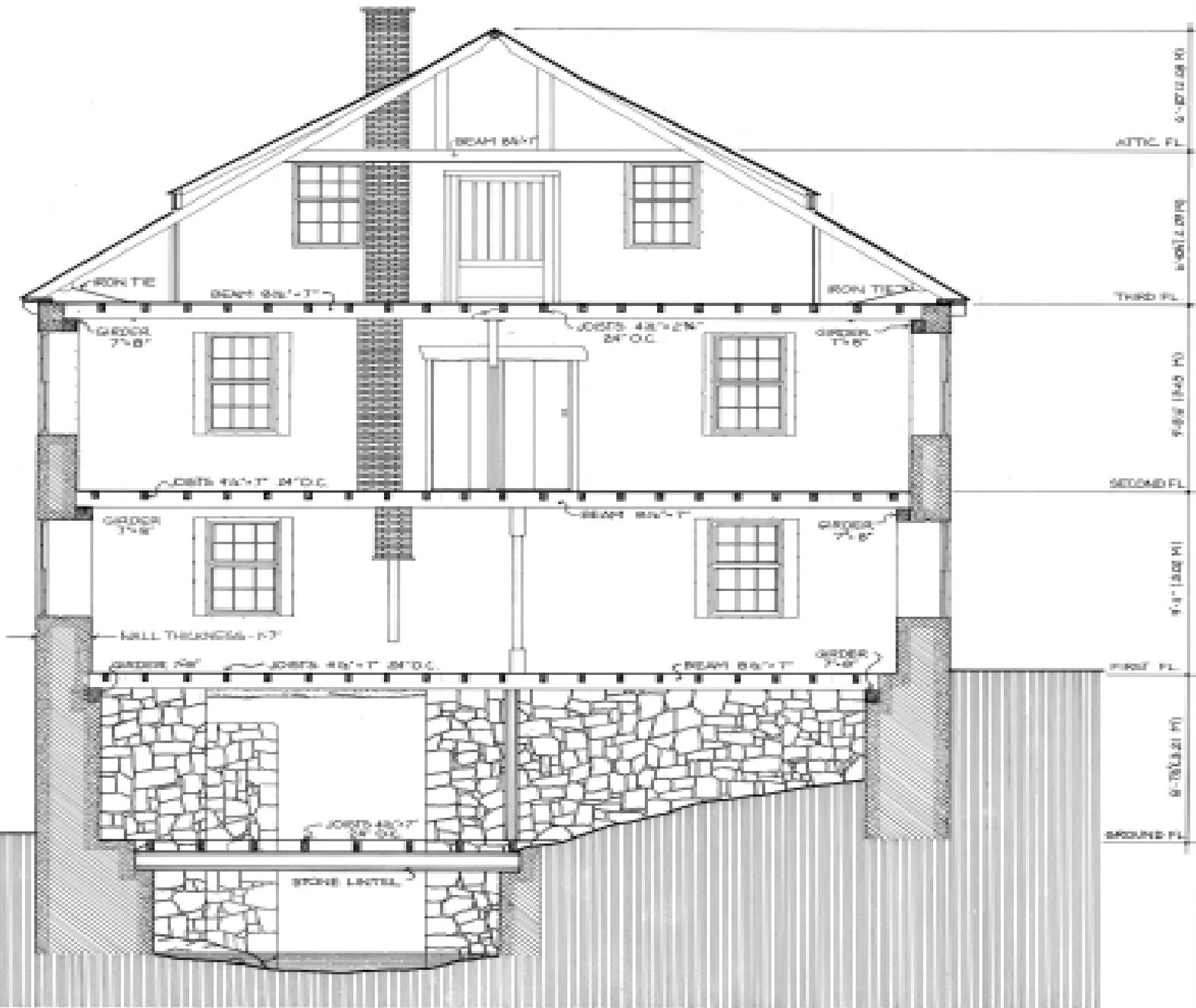
CONCEPTUAL SITE MODEL CHECKLIST

1.0 UTILITIES AND PROCESS PIPING

_____ Maps, figures, and cross-sections of the building provide the location and depths of all underground utilities and/or process piping near the soil or groundwater impacts.

2.0 BUILDINGS (RECEPTORS)

- _____ Maps identify:
Existing or proposed buildings, Vacant parcels, Property boundaries
- _____ Description of the occupancy and use of all properties/buildings
- _____ Construction of each structure includes (if applicable):
General construction style (e.g., basement, crawlspace, slab on grade)
Floor construction (e.g., concrete, dirt)
Depth below grade of lowest floor
Building layout (e.g., large and open, small rooms)
Height (and number of floors)
Sumps or foundation drains
Alternate ventilation system
Elevator(s)
- _____ Heating, ventilation or air conditioning system in each structure is described
- _____ Installed sub-slab ventilation systems or moisture barriers present are described and identified on all building figures



CROSS SECTION LOOKING WEST

CONCEPTUAL SITE MODEL

3.0 SOURCE AREA(S)

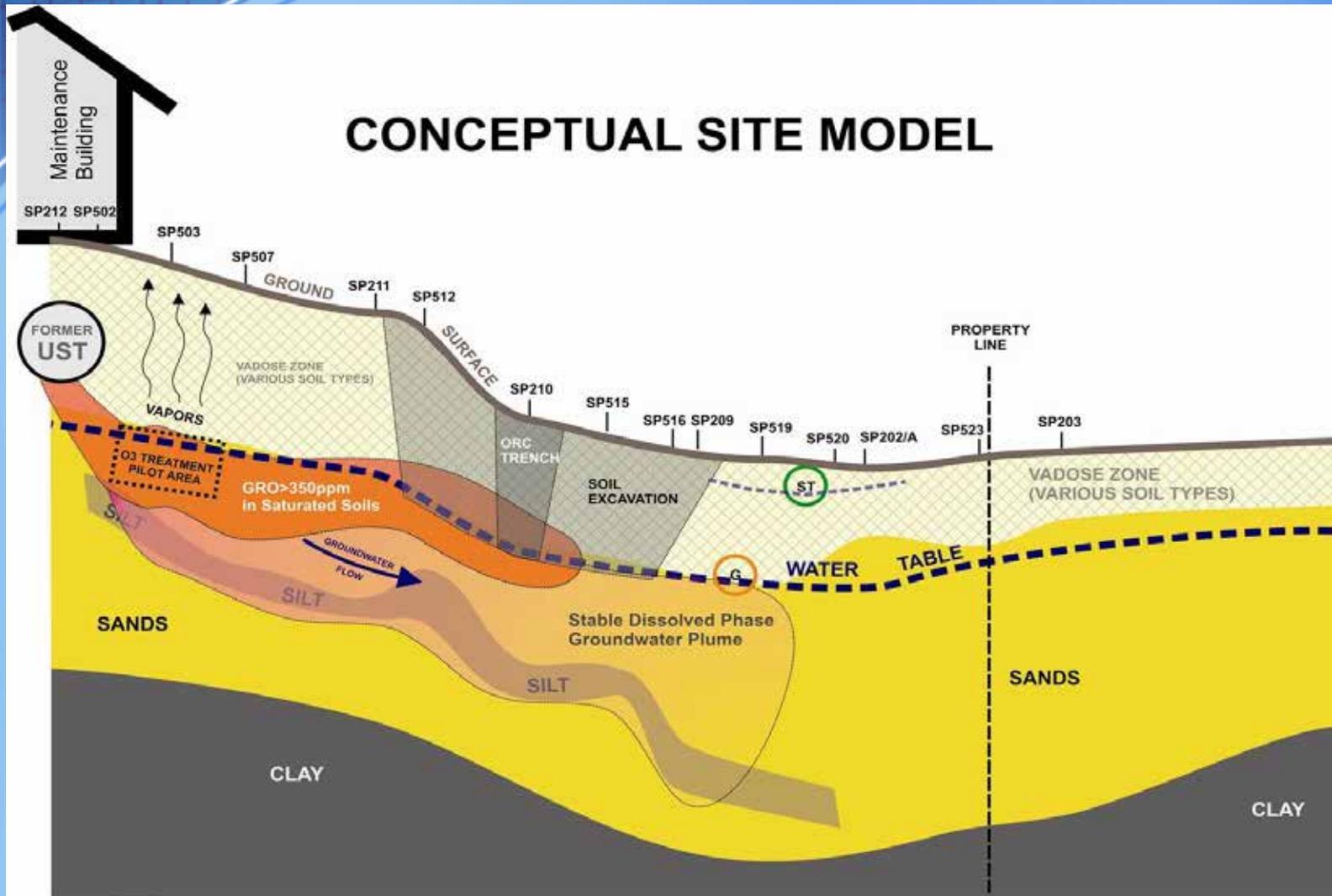
_____ Description and known history of the release.

_____ Maps and figures identify and show the location of all vapor source(s) in relation to each structure (including the presence, distribution, and composition of any non-aqueous phase liquid at the site).

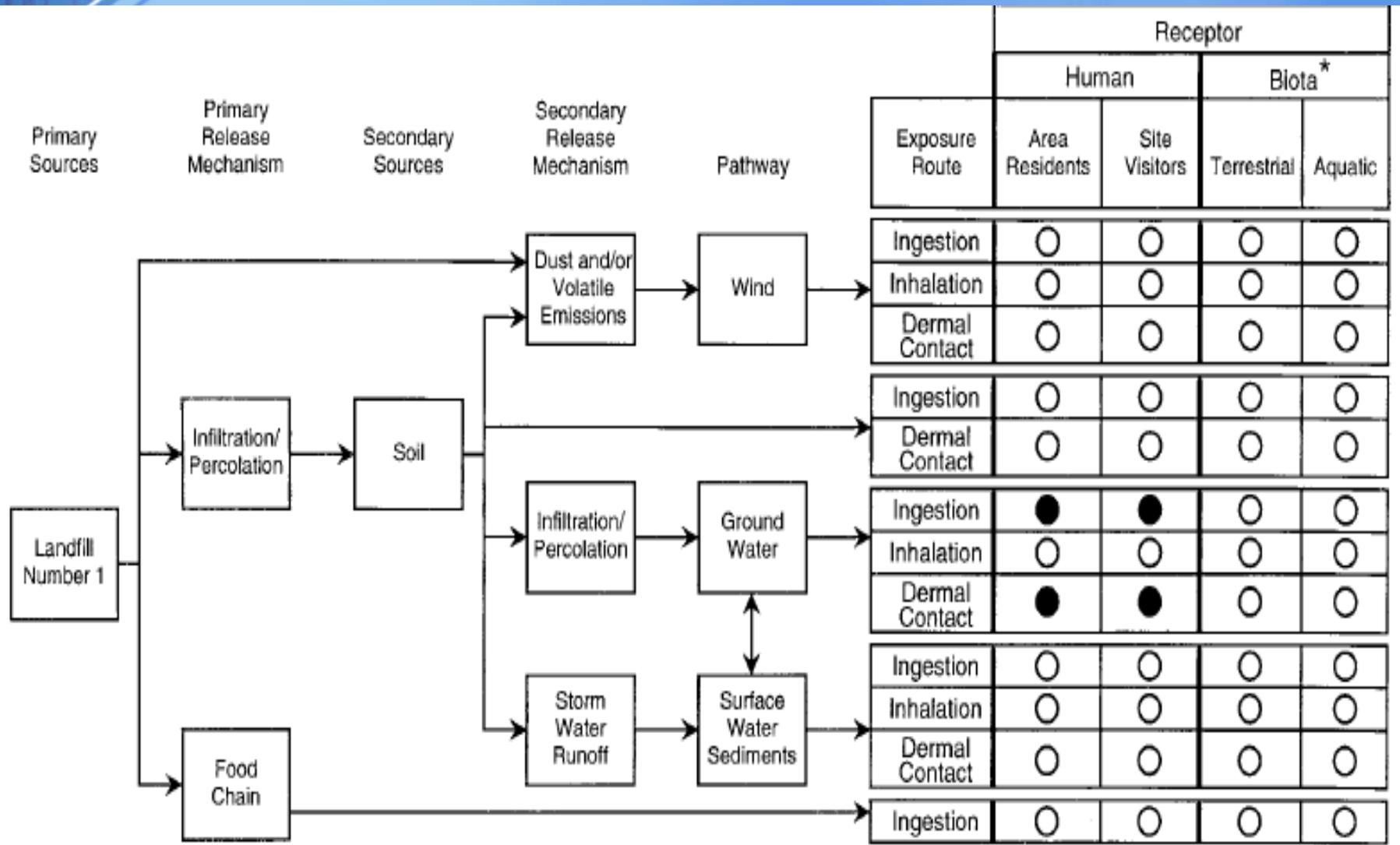
_____ Cross-sections showing example building, construction styles, and relationship to source of vapors (actual number will vary as appropriate).

_____ Description of the potential migration characteristics (e.g., stable, increasing, decreasing).

CONCEPTUAL SITE MODEL



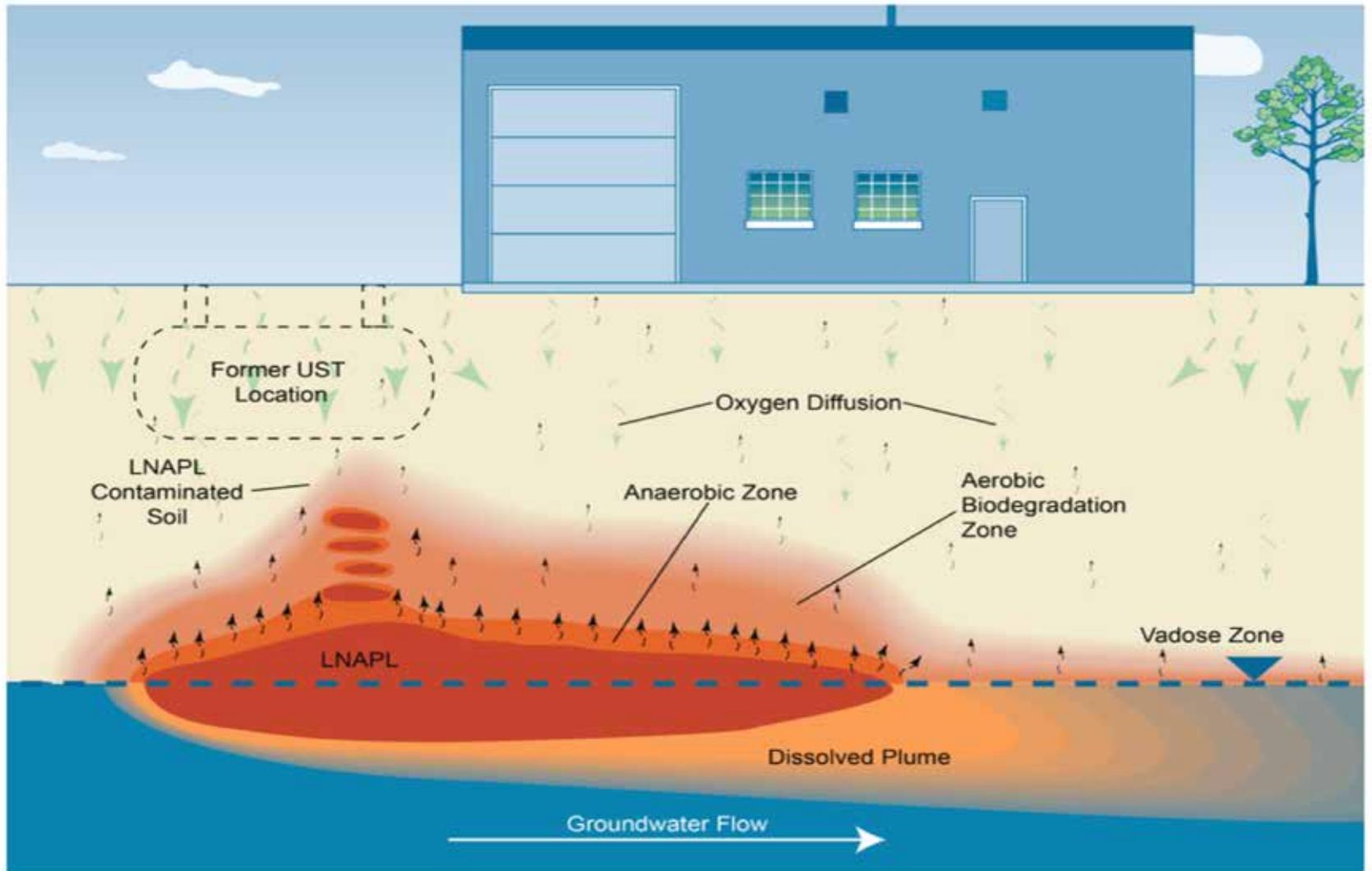
CONCEPTUAL SITE MODEL: ASTM GUIDANCE (E1689 – 95)



● = Pathway complete, further evaluation recommended
 ○ = Pathway evaluated and found incomplete, no further evaluation recommended

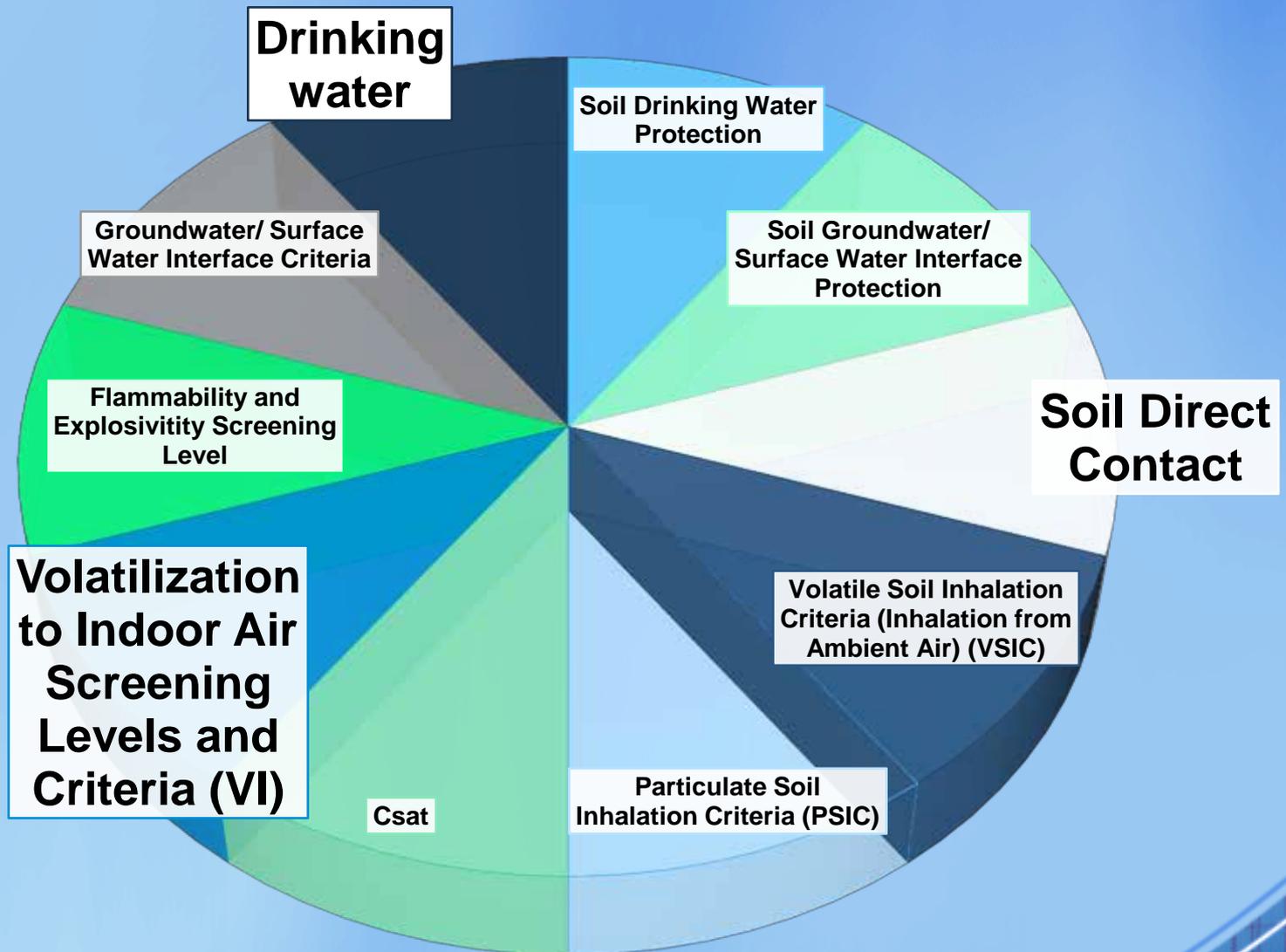


CONCEPTUAL SITE MODEL

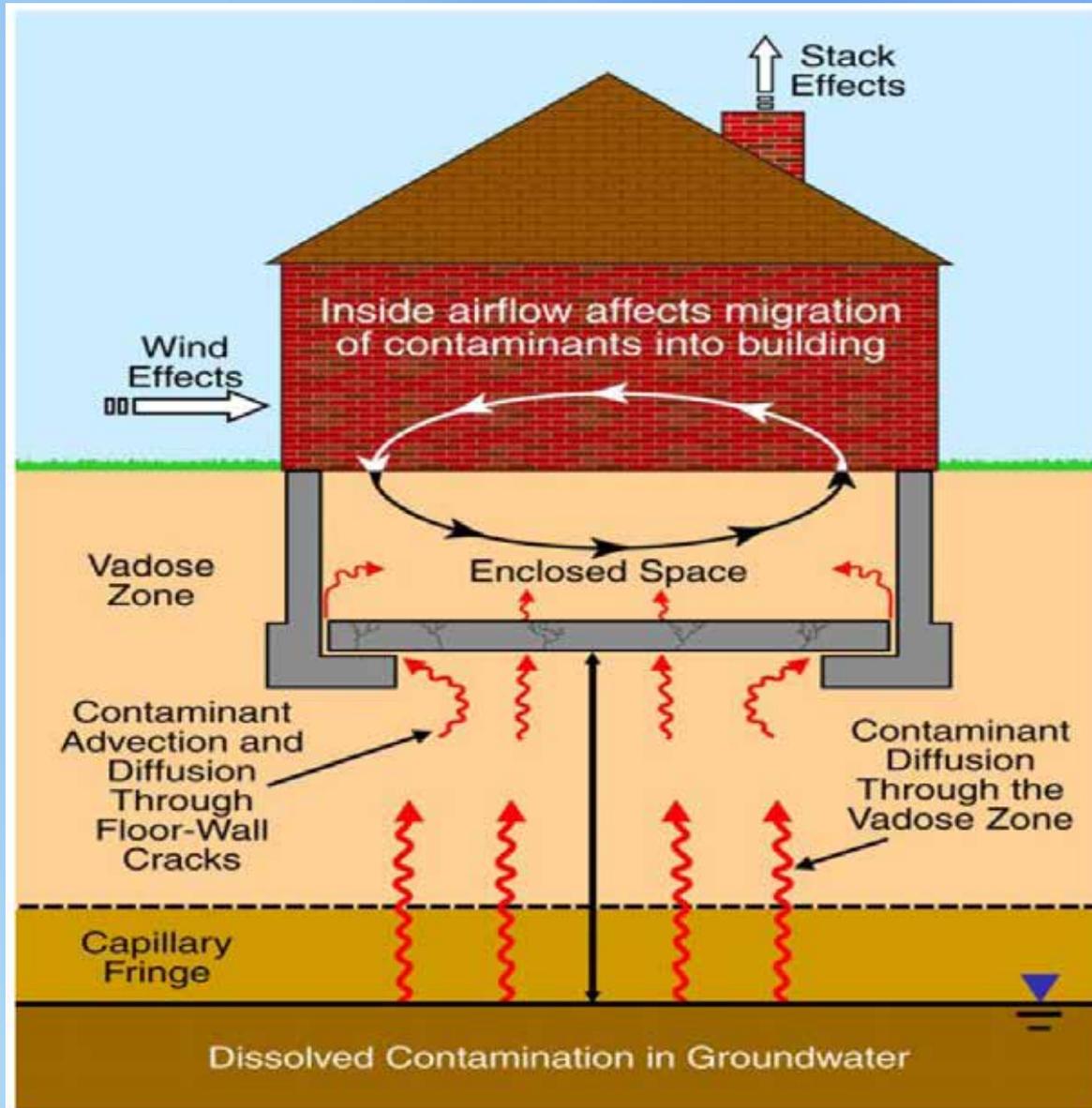


Conceptual Site Models & Pathway Evaluations

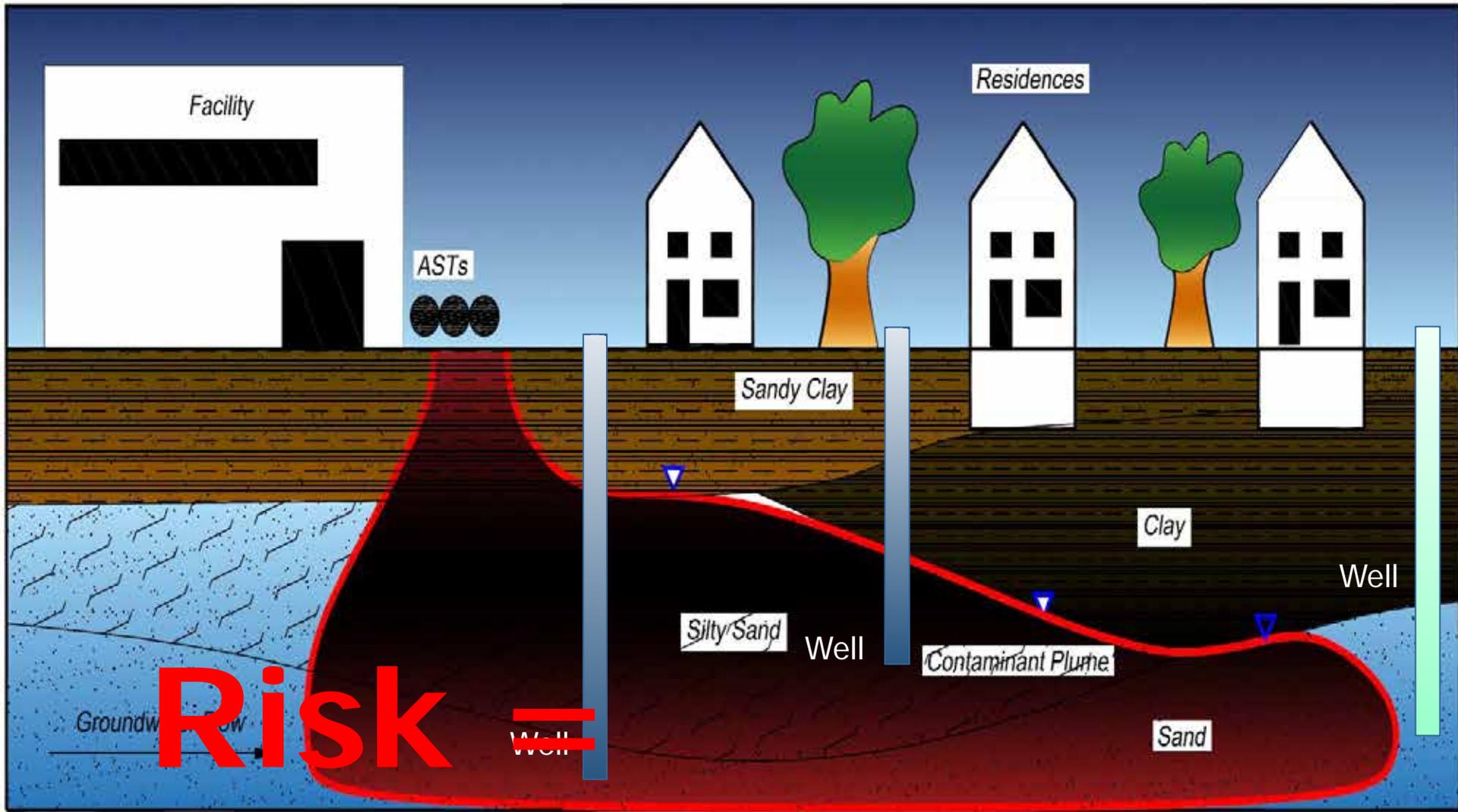
Pathways to Consider:



Vapor Intrusion



Residential Drinking Water Relevant Pathway

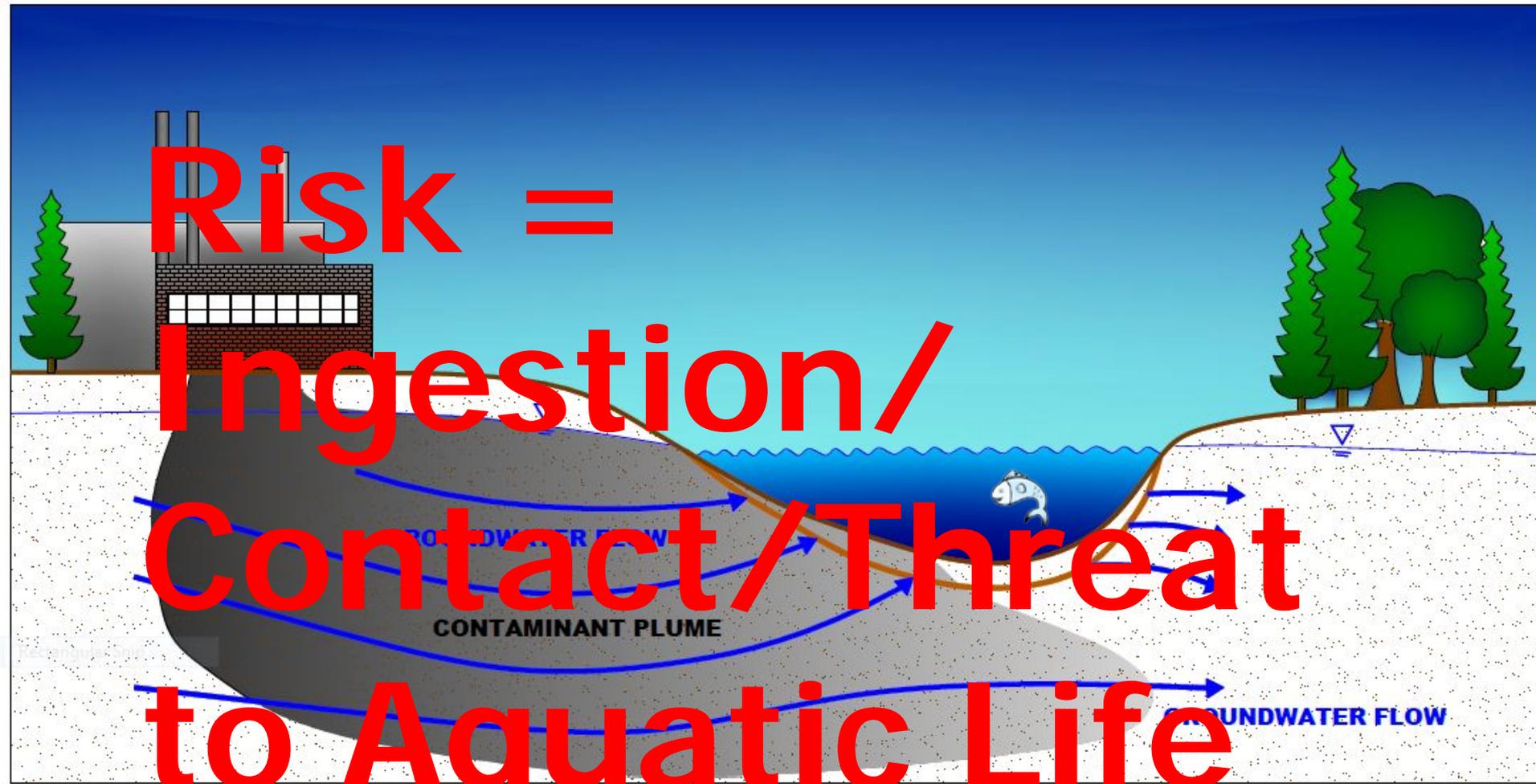


Risk =

Ingestion

Contaminated Groundwater is in an aquifer
Contaminated Groundwater is not in an aquifer, but
may be transported to an aquifer

**Risk =
Ingestion/
Contact/Threat
to Aquatic Life**

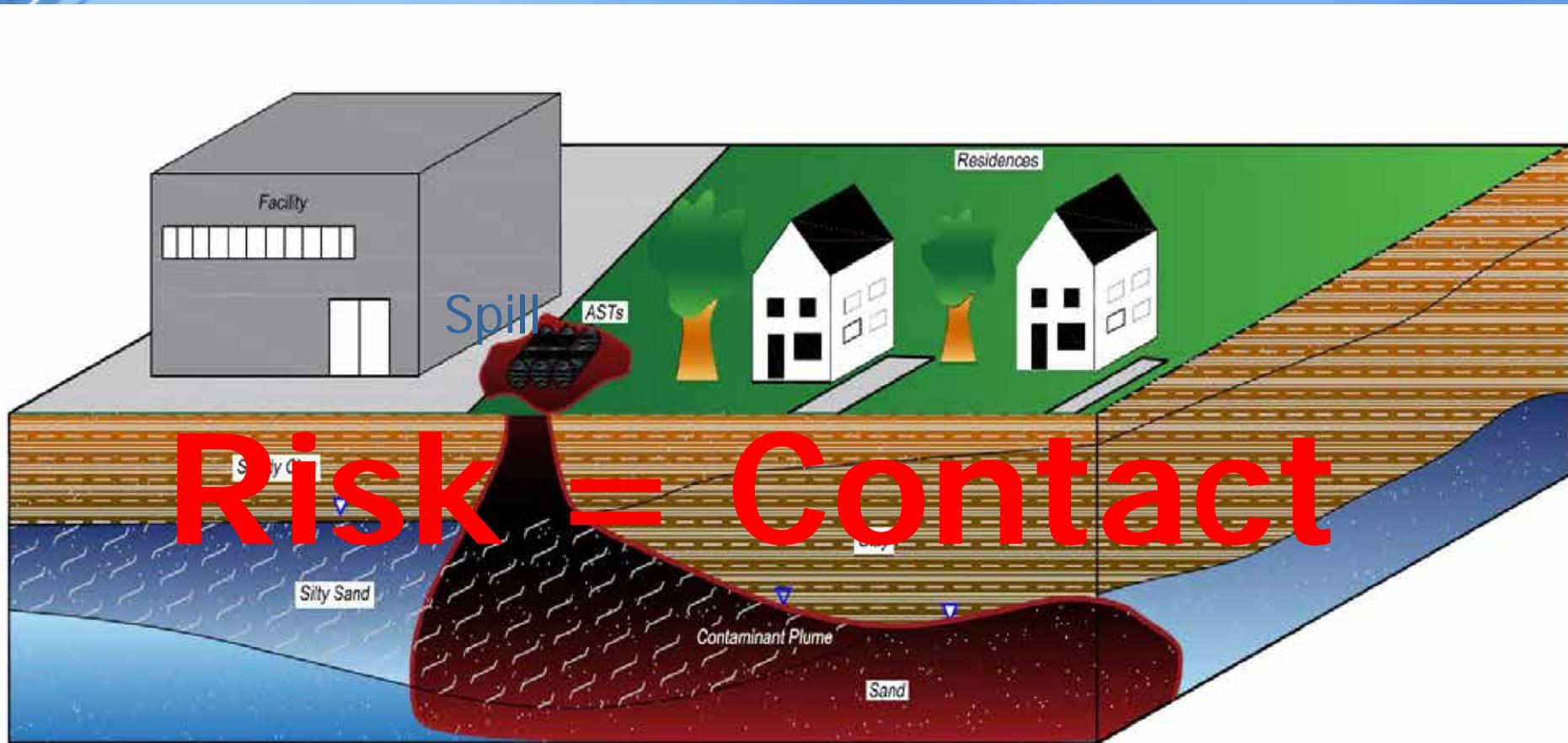


Generic Cleanup Criteria Only Apply if Pathway is Relevant

Generic Cleanup Criteria are the Water Quality

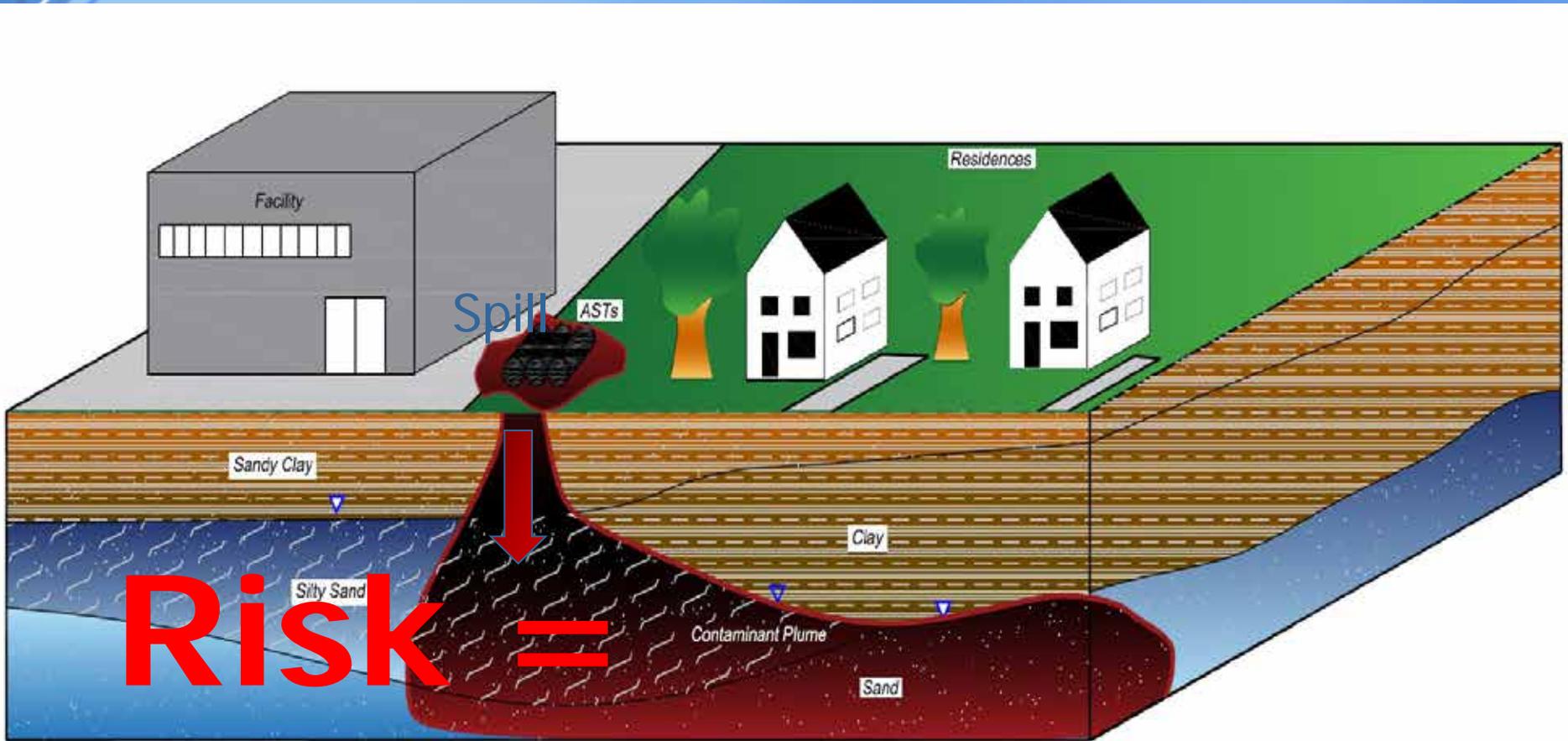
Standards per Part 31 and are updated periodically

Soil Direct Contact Relevant Pathway



Soil Direct Contact is a pathway that is considered relevant.
Generic soil criteria are applicable at all depths.

Soil Leaching to Groundwater Relevant Pathway



Risk =

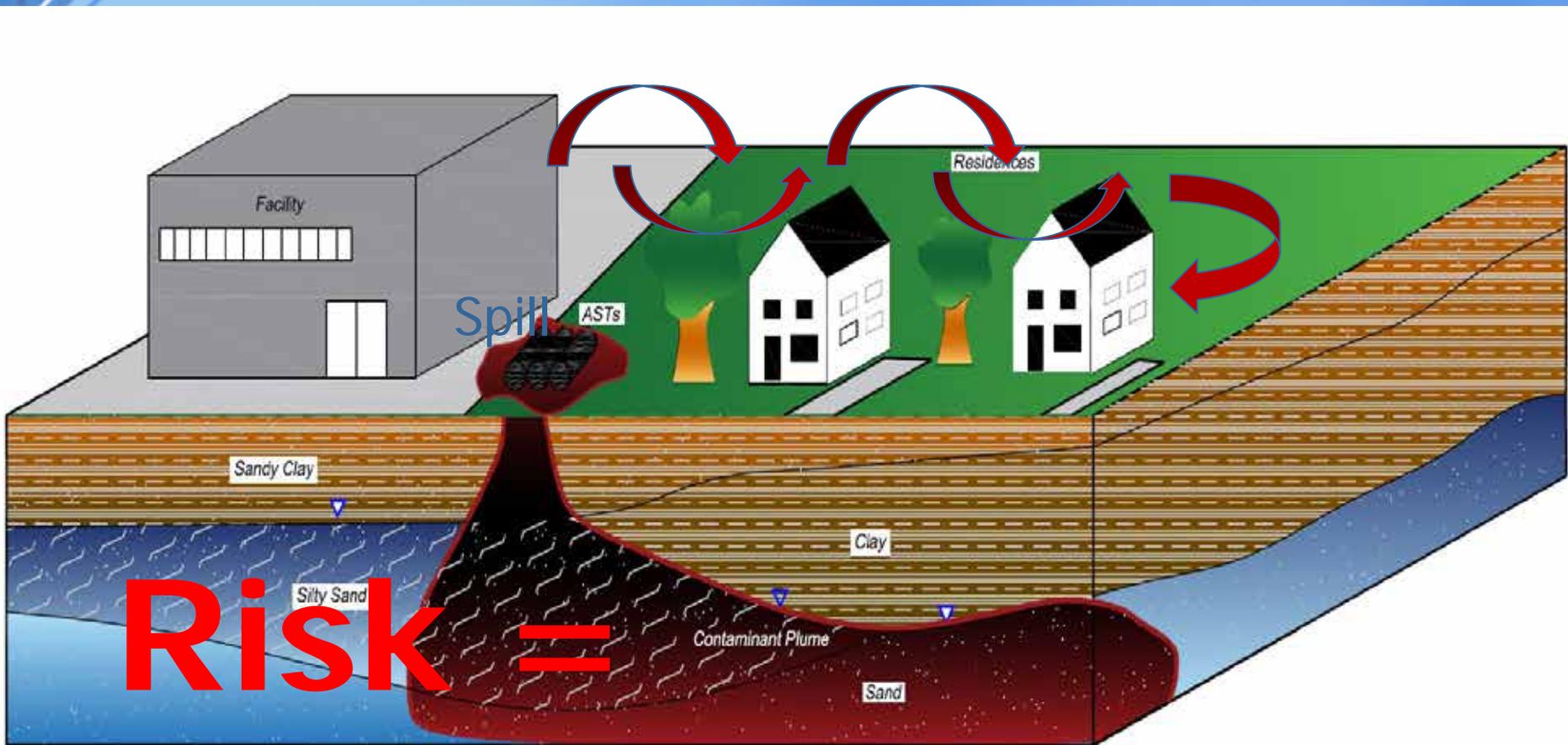
Ingestion

For soil concentrations protective of groundwater – include and groundwater/surface water interface.

Generic criteria are the higher of the values derived from

Partition Coefficient of the groundwater concentration $\times 2$

Soil Volatilizing to Ambient Air Relevant Pathway



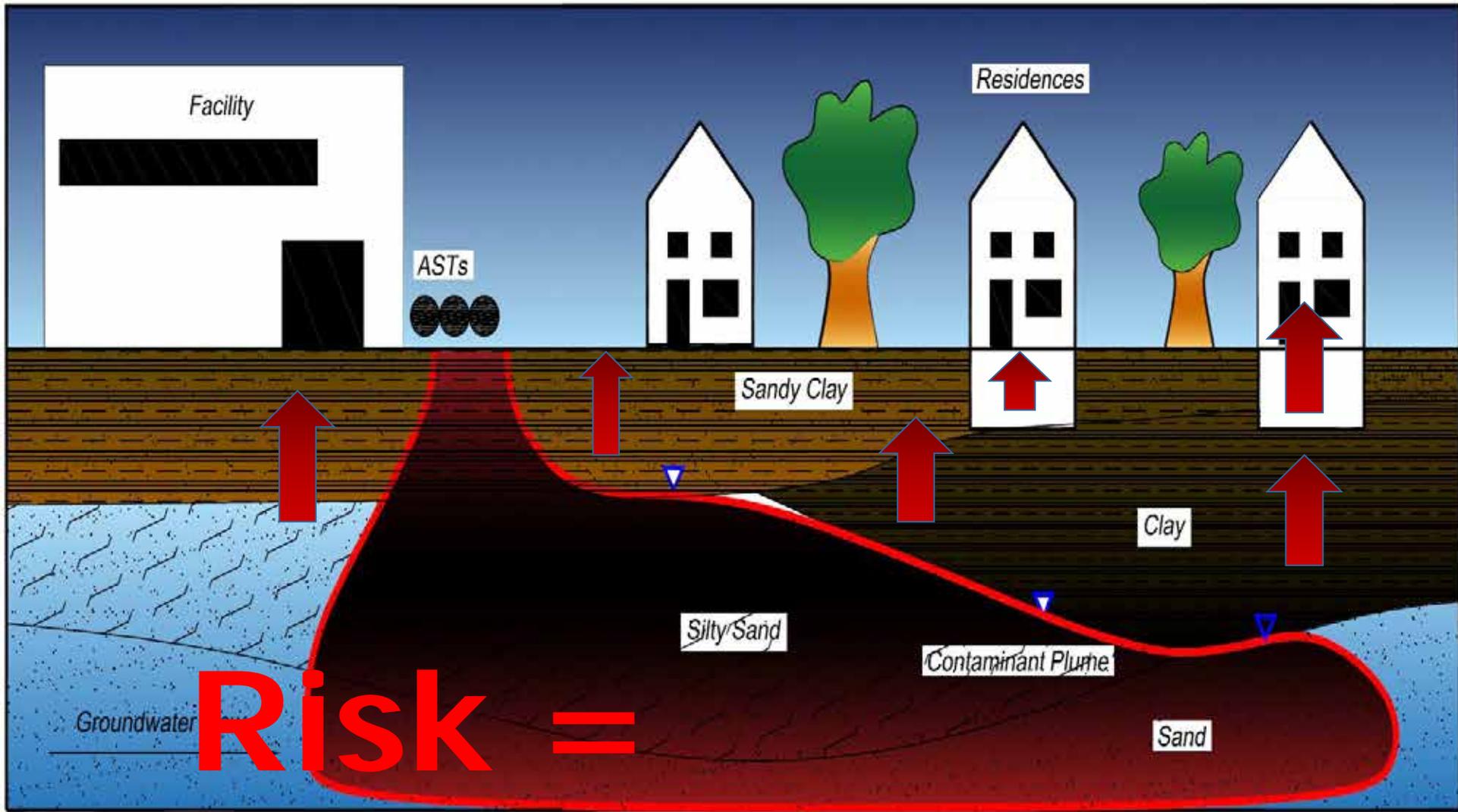
Inhalation

Soil Volatilizing to Ambient Air is considered a relevant pathway for facilities.

Volatile Soil Inhalation Criteria (VSIC) and Particulate Soil Inhalation Criteria (PSIC)

MECC 2016

Volatilization to Indoor Air Relevant Pathway



Screening Levels are Published
Inhalation

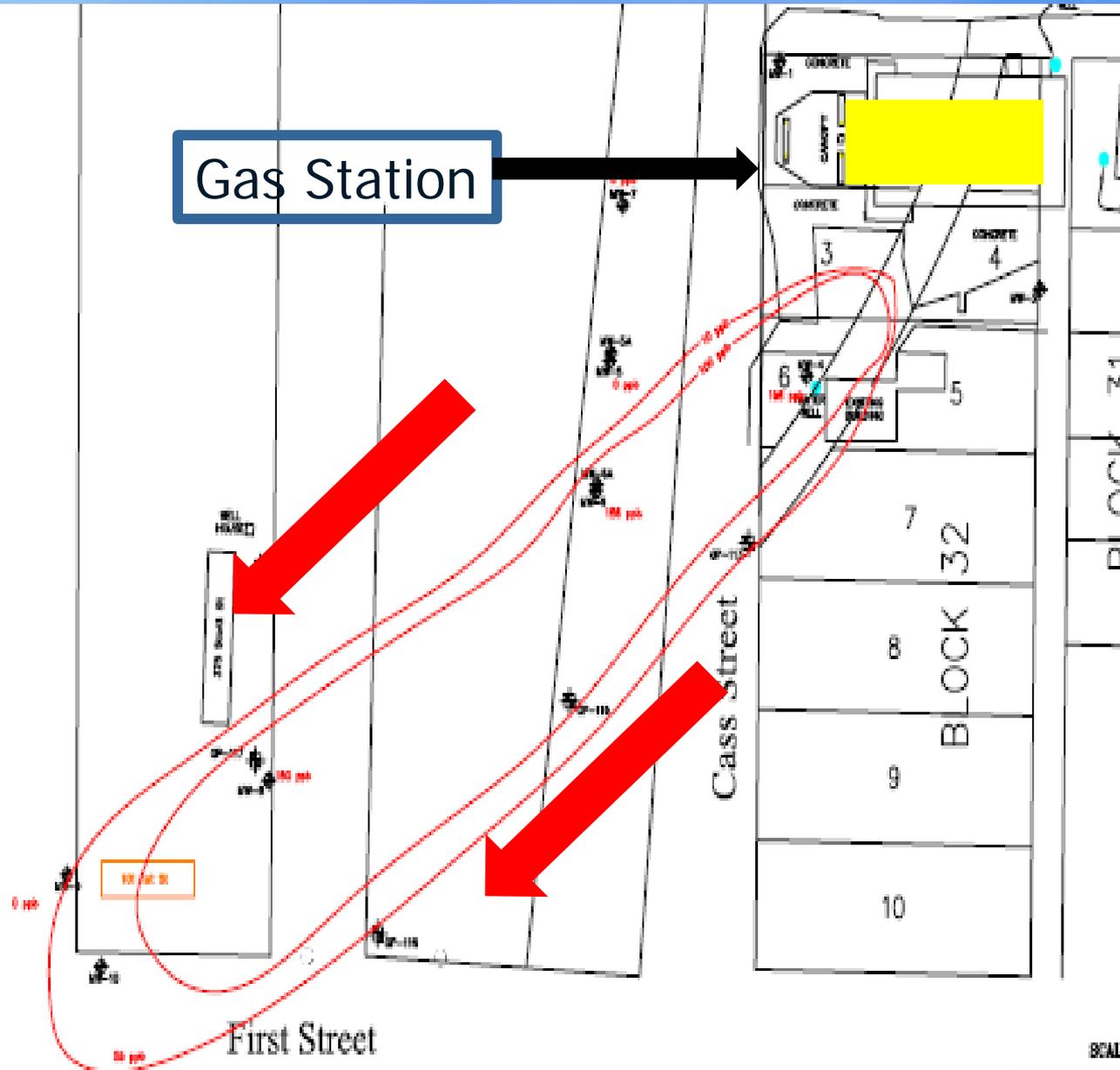
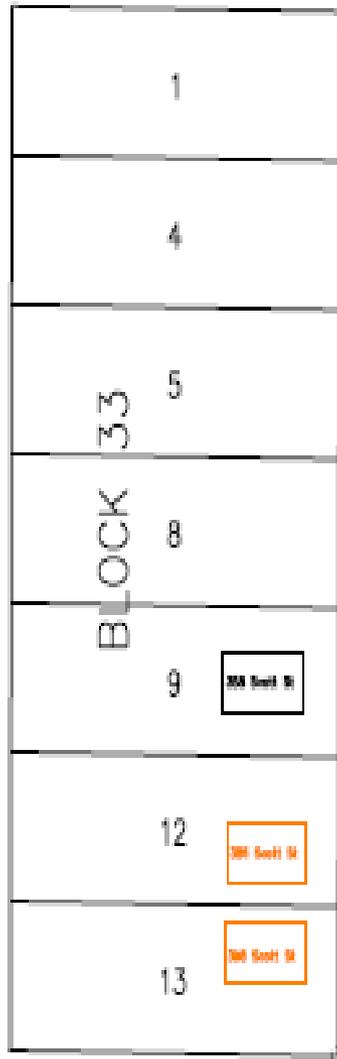
Generic criteria are calculated with some facility-specific values
MECC 2016

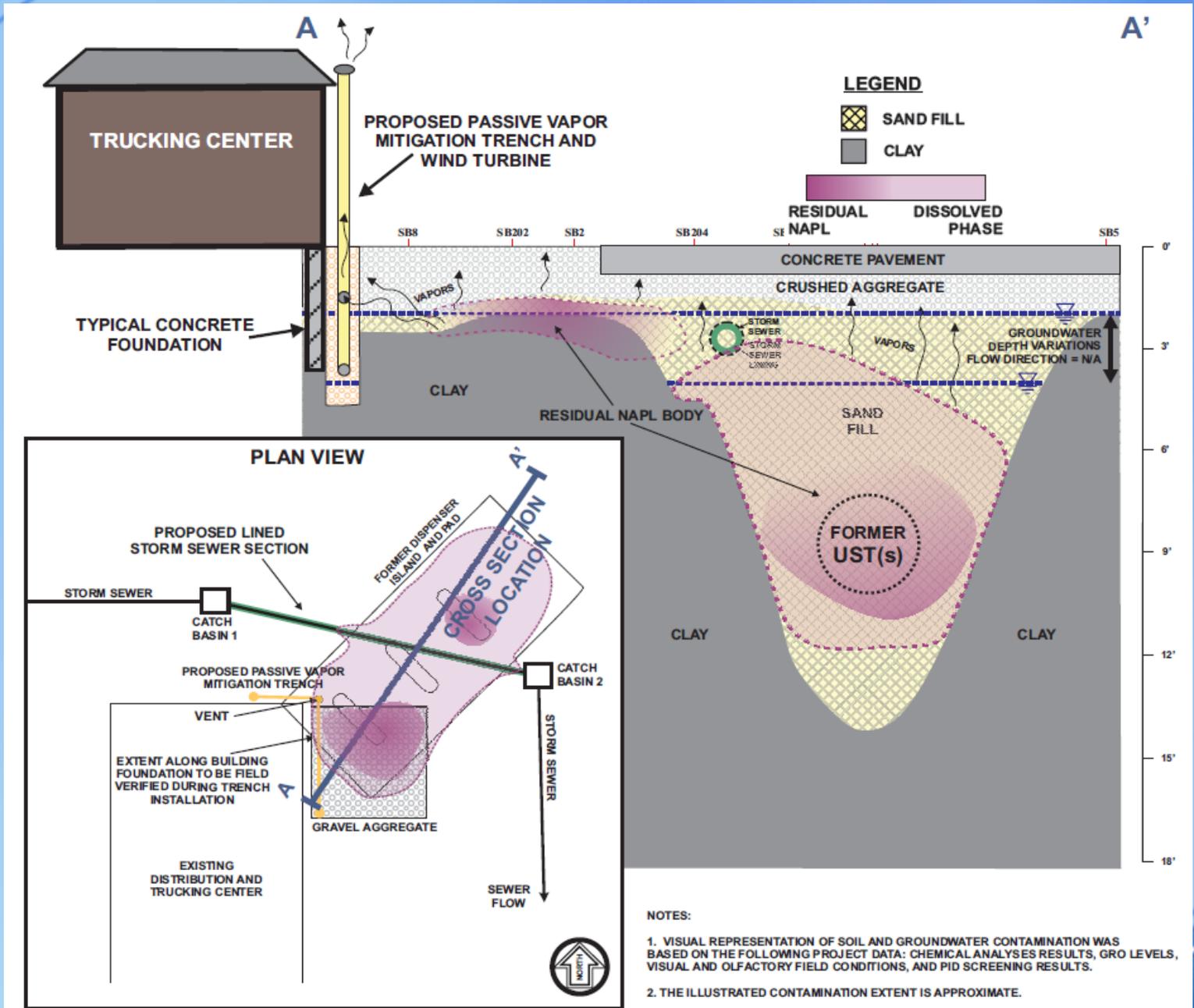


WHAT'S IN YOUR NEIGHBORHOOD?



Google

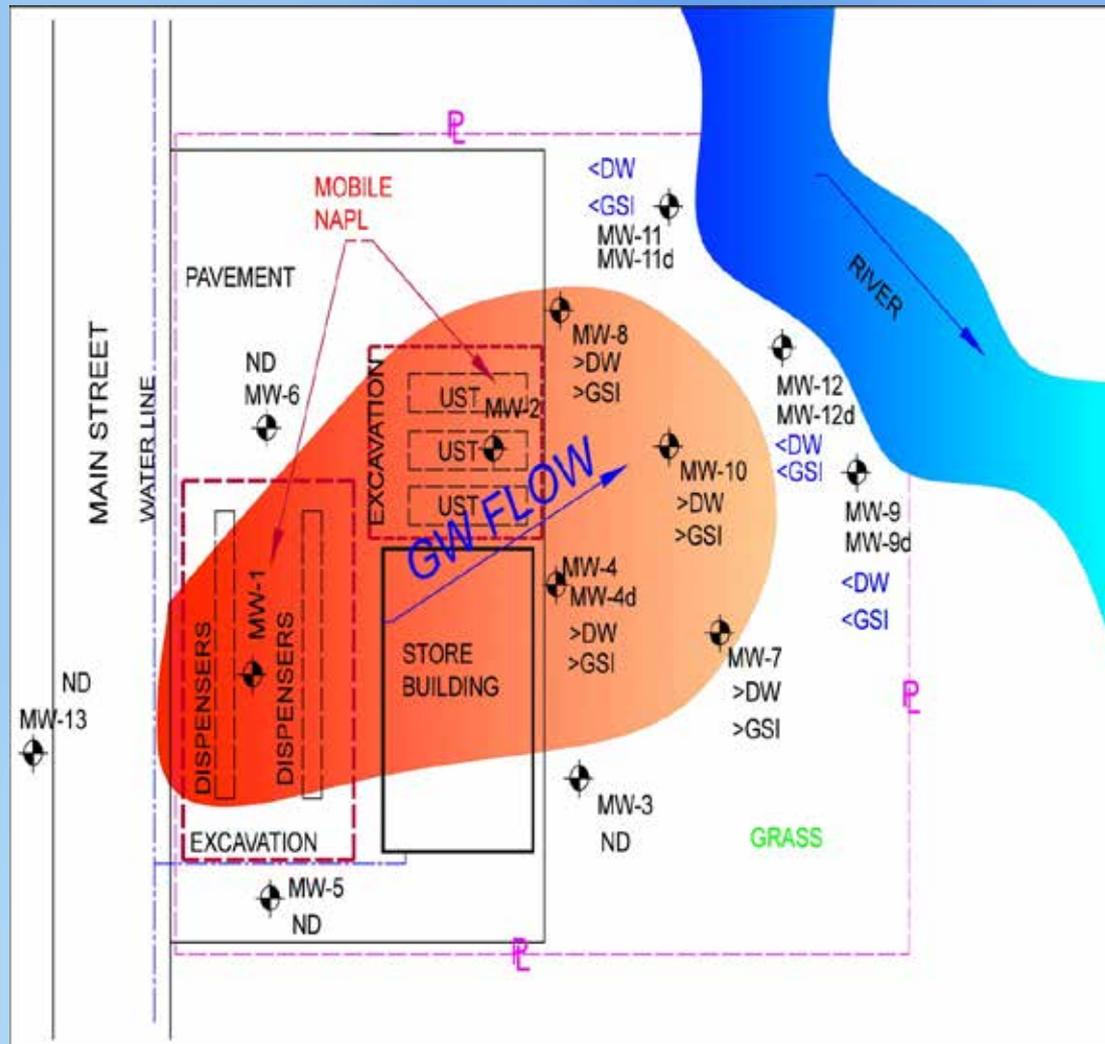




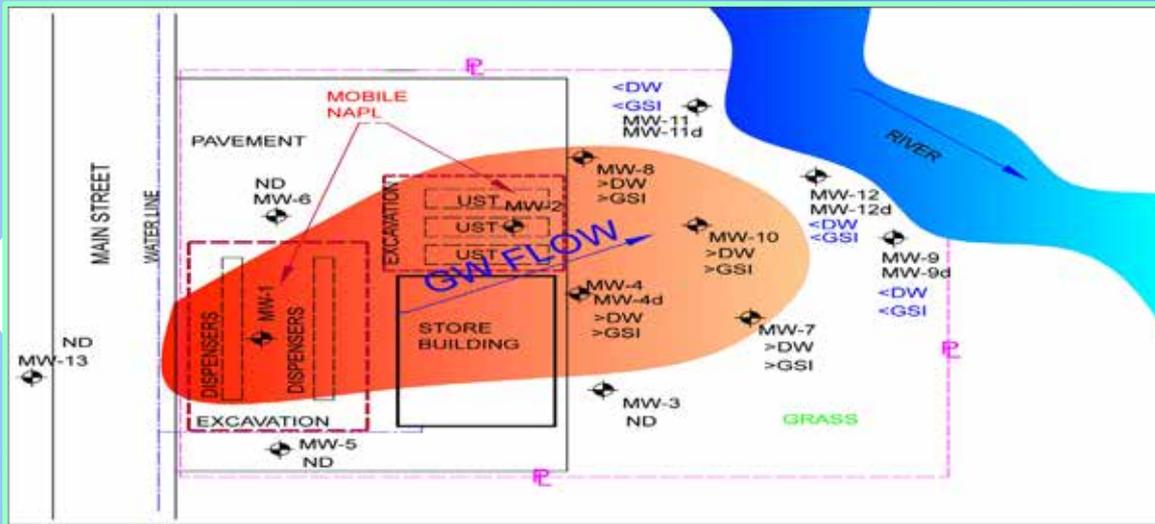
NOTES:

1. VISUAL REPRESENTATION OF SOIL AND GROUNDWATER CONTAMINATION WAS BASED ON THE FOLLOWING PROJECT DATA: CHEMICAL ANALYSES RESULTS, GRO LEVELS, VISUAL AND OLFACTORY FIELD CONDITIONS, AND PID SCREENING RESULTS.
2. THE ILLUSTRATED CONTAMINATION EXTENT IS APPROXIMATE.

Ready for Risk Evaluation and Remedial Decisions



Benefits of the Tool



All parties involved see the same picture.



Communication improves



Helps develop
partnership
to solve
complex
problems

The Results

**Good Site Characterization
+ Good CSM (Communication Tool)**

**= Applying Resources
to Manage True Risks with
Mutually Agreeable Protective
Solutions**

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