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# *Flooding As An Unplanned Remedial Option?*

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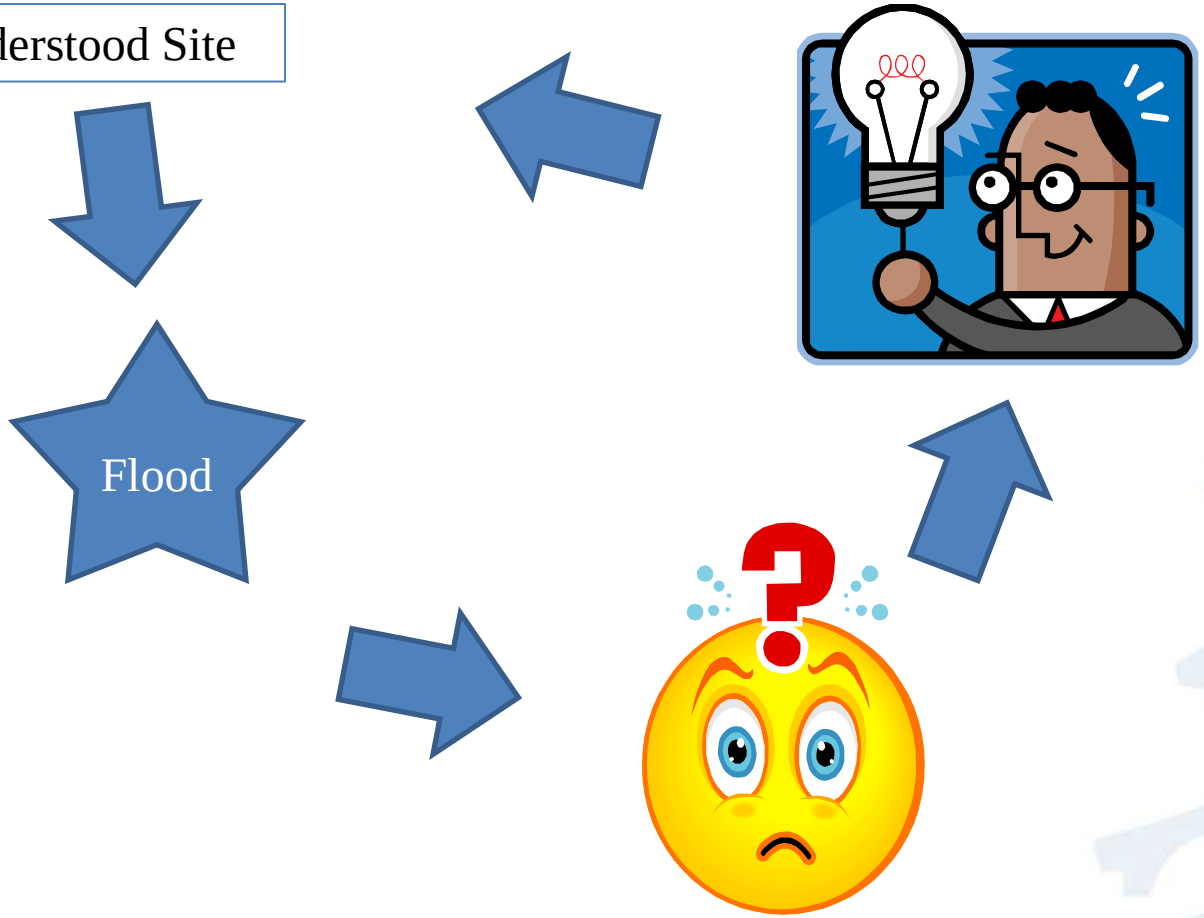
# Disclaimer

No two Sites are alike and the results from one case study by not be similar to the results for you project.

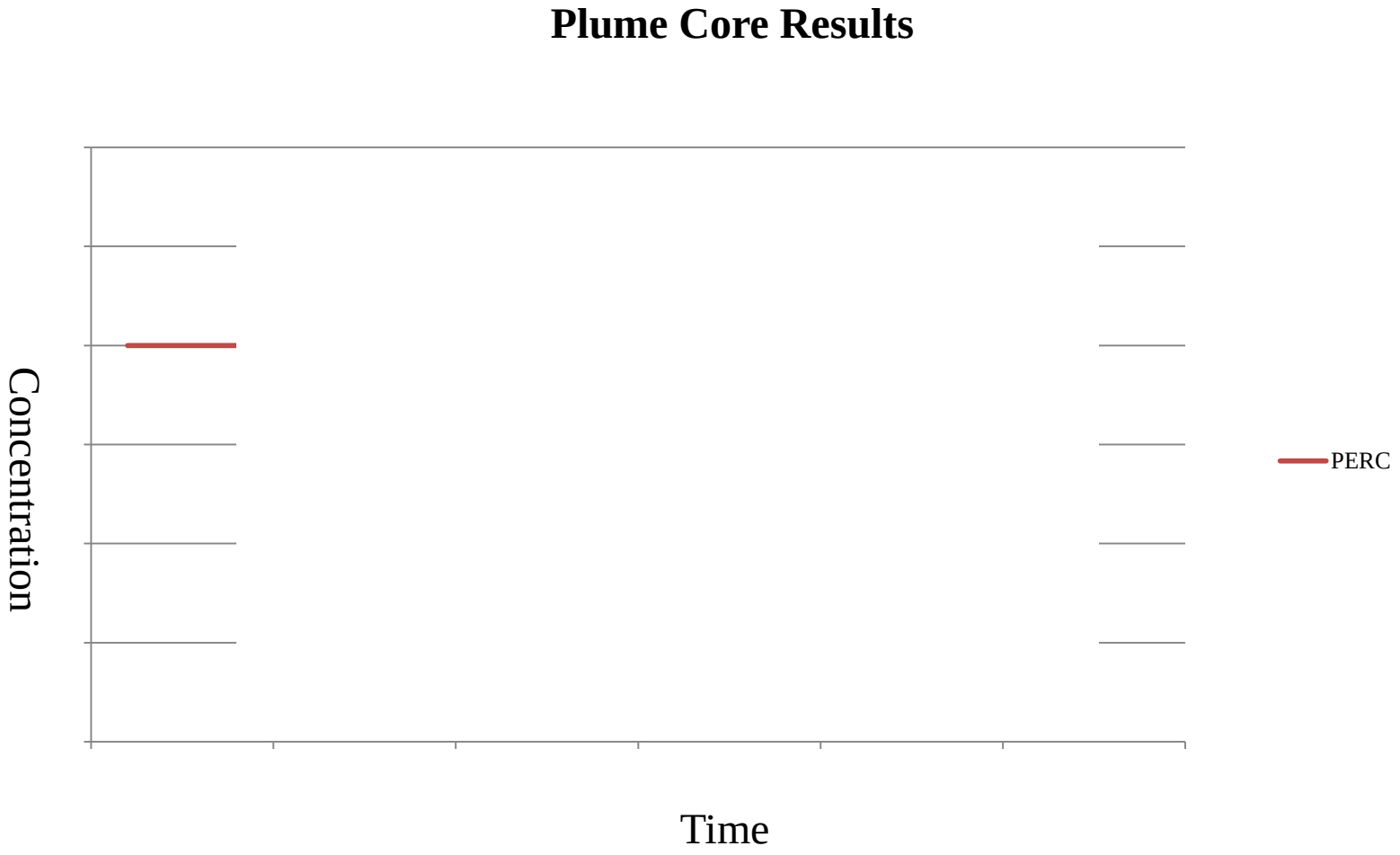
Nothing in this presentation should be construed as a recommendation to purposely flood your property.  If you plan to flood a property it should be done with great care and at your own risk.

# Goal

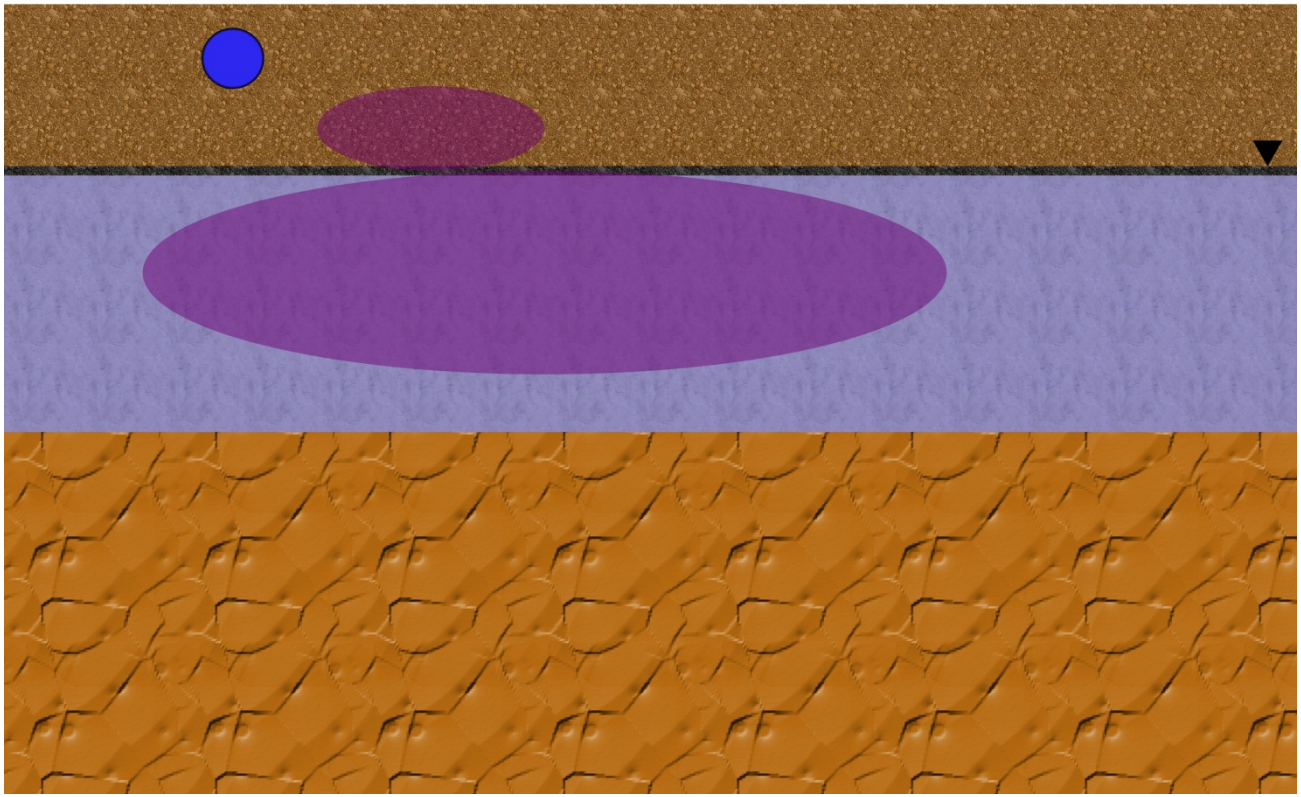
Well Understood Site



# Case Study 1



# Case Study 1 - Why



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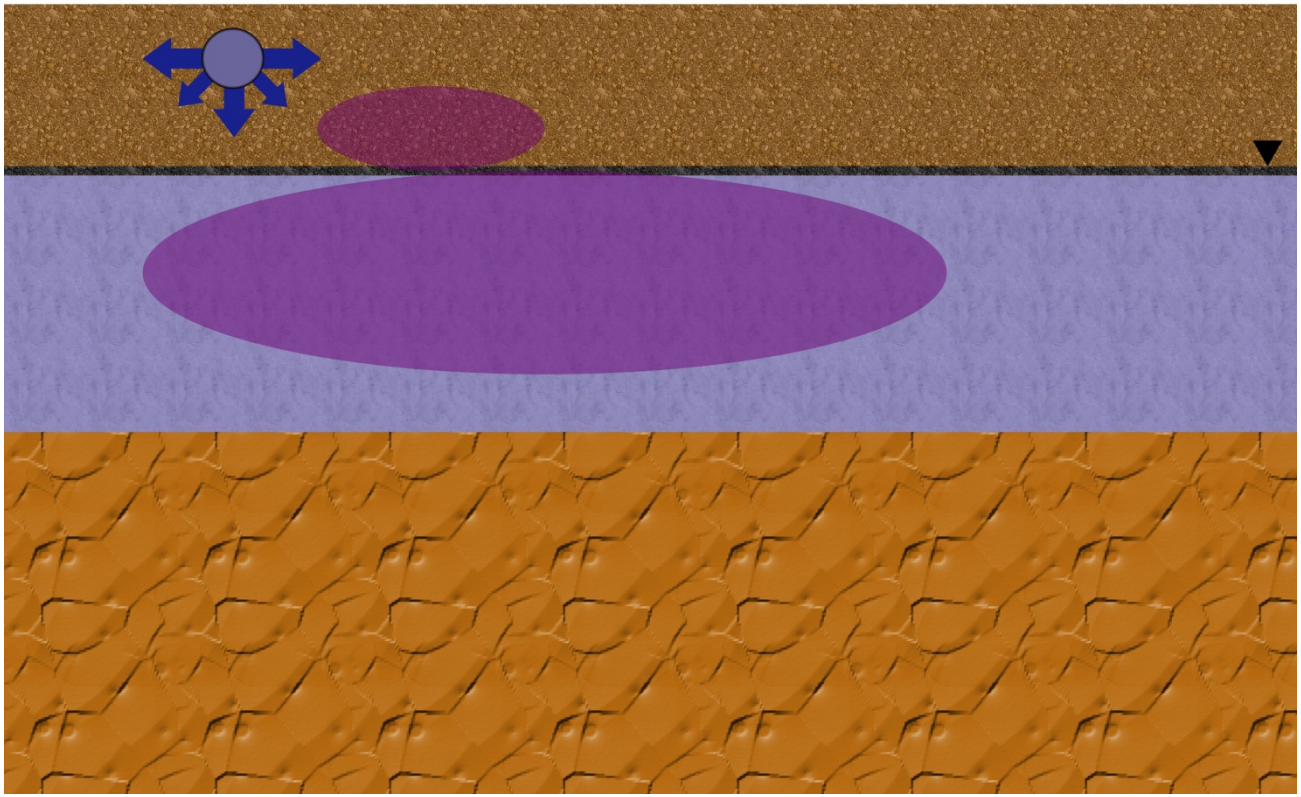

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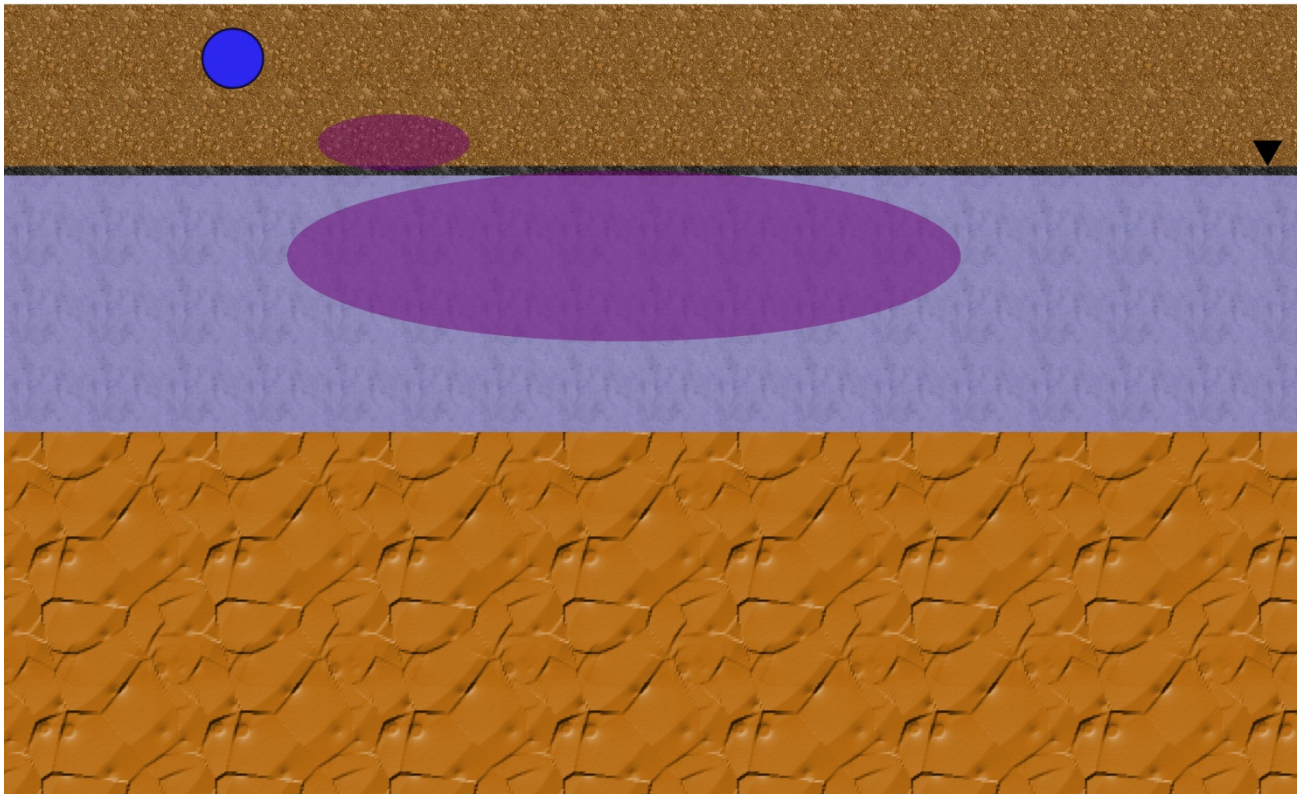
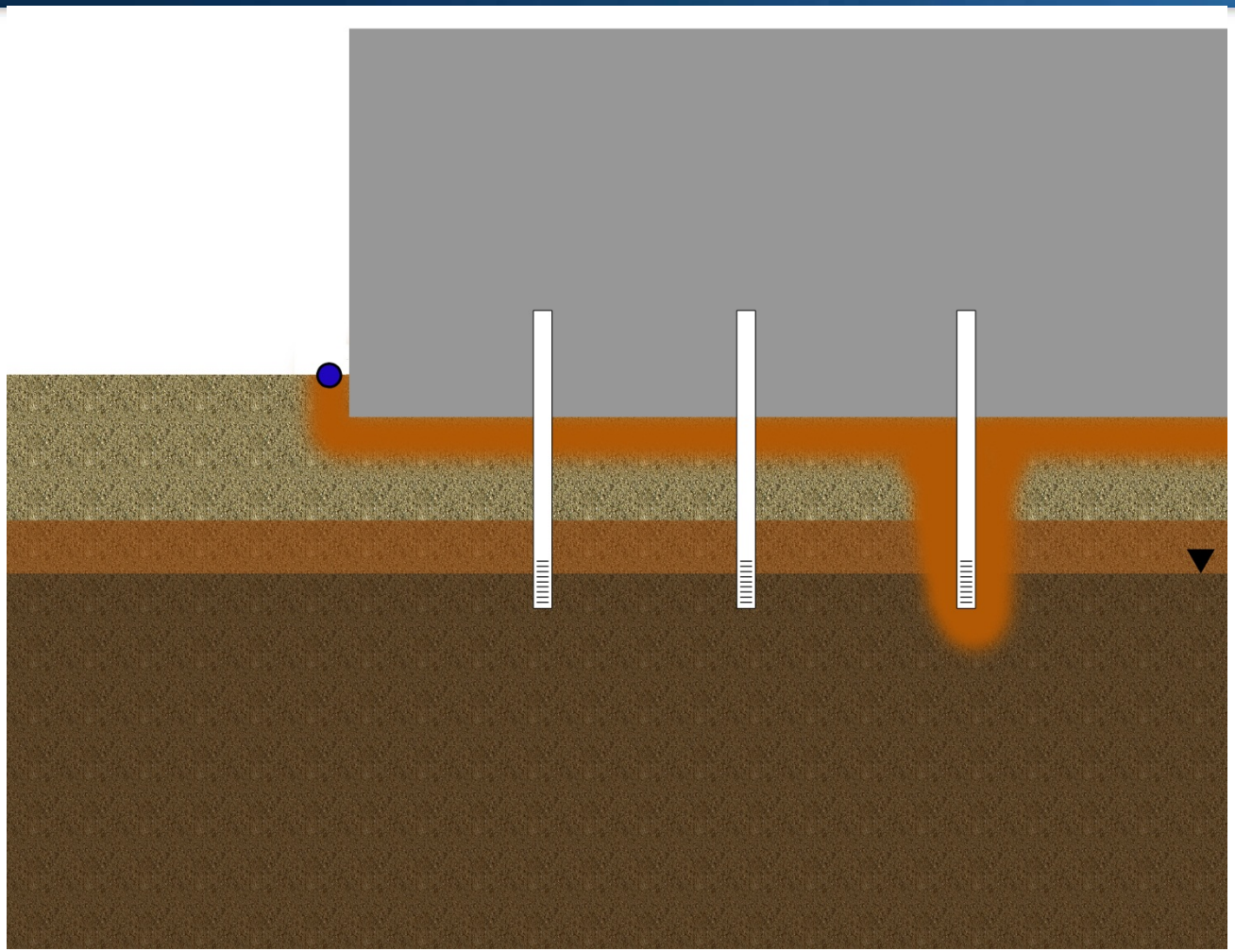


# Case Study 2

- Vacant building, slightly below grade.
- Historically used as a chrome plating facility. $Cr^{6+}$ concrete floor surface is leachable.
- Flooded from a garden hose left on for several days
- Water enters building through holes in slab.
- Water exits building through holes in slab (after running down trenches).
- Several groundwater wells monitored after flood. Most had very little water. One had lots of water and high $Cr^{6+}$ concentrations. Then clean a week later.

# Case Study 2 - Why



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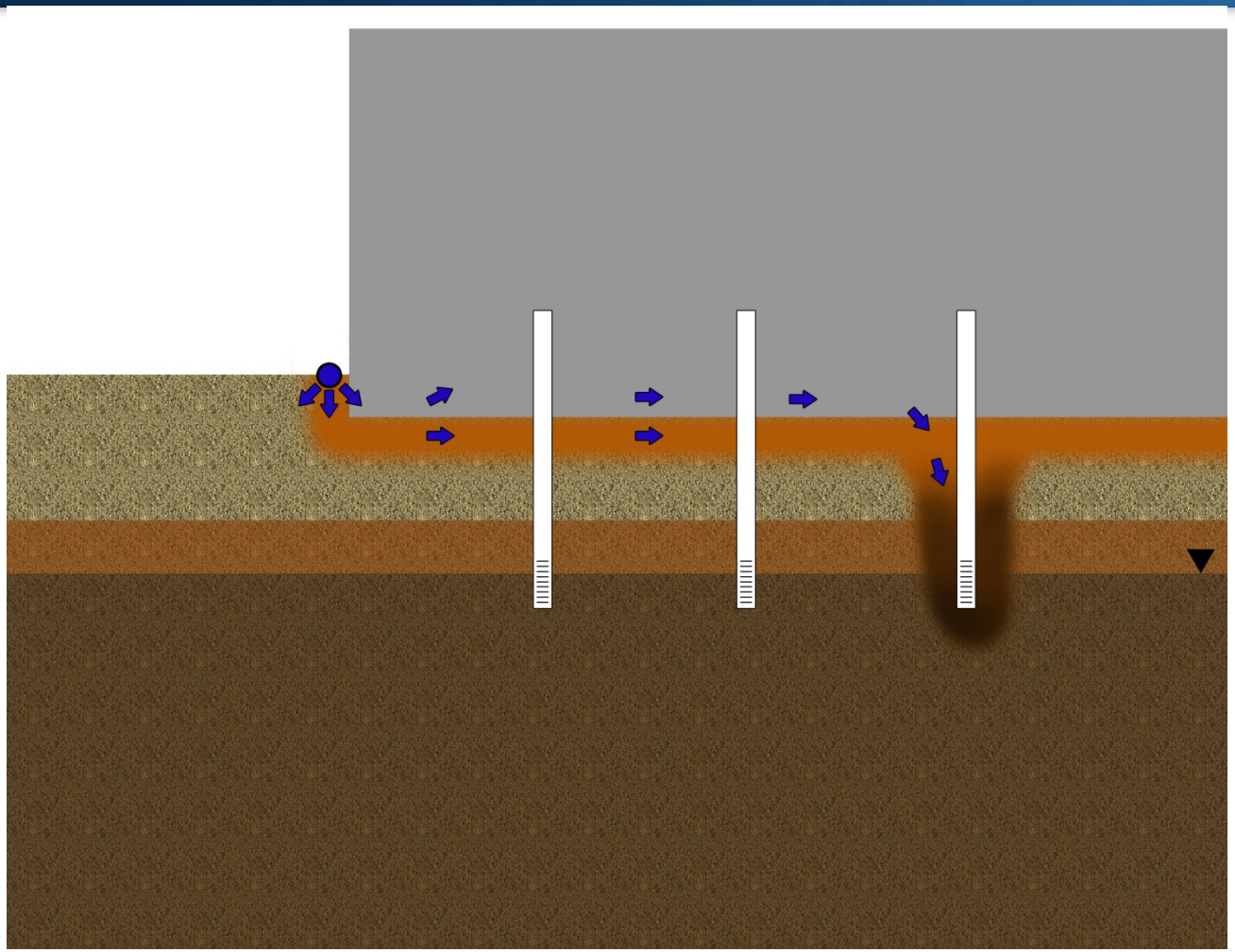


# Building a Post Flood CSM

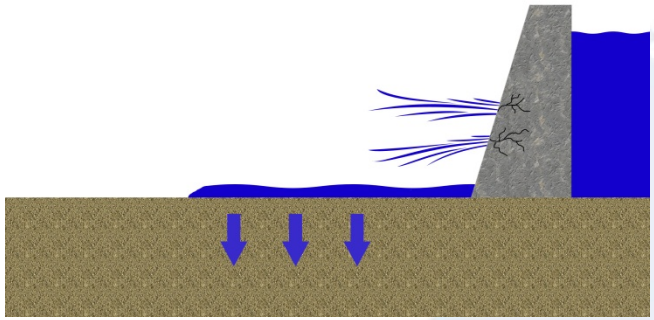
What factors to consider

- Safety First
- Mechanisms of flooding
- Water source and type
- Direction of water flow
- Duration of flooding
- Surface cover
- Subsurface hydraulic conductivity
- Potential changes to subsurface that would affect hydraulics or chemical reactions, that indirectly affect the contaminants.

# Building a Post Flood CSM

Mechanism of Flooding

- Where is the water coming from?
- Where is the water going?



- How much water is flowing through the Site, and specifically the areas of contamination?
- How much pressure was involved?

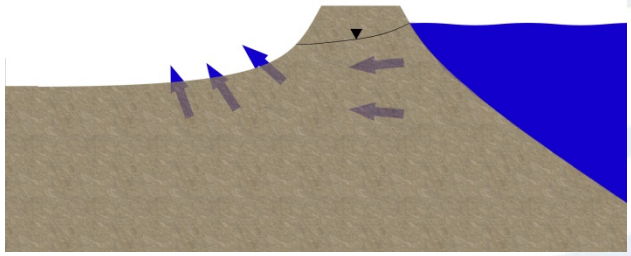
# Building a Post Flood CSM

Water Source and Type

- Is the water clean or bringing in new contamination?
- Is the water supplying electron donors or receptors that might promote increase biological activity?

Direction of Water Flow

- North, east, west, south?
- Up or down?



# Building a Post Flood CSM

Duration of Flooding

- Minutes, hours, days, etc.
- Timing of sampling after the flood

Surface Cover

- Bare ground
- Vegetated
- Asphalt
- Concrete

# Building a Post Flood CSM

Subsurface hydraulic conductivity

- Consider from a layer by layer approach, not holistically
- What layers should be affected by the flood and what layers should be shielded from the floods effect?
- Can an off-Site flood affect a deeper aquifer?

# Building a Post Flood CSM

Subsurface hydraulic conductivity

- Was there sufficient pressure to cause fracing, or create/change preferential flow pathways?
- Have natural biological degradation parameters been affected?
- Have other changes occurred to chemical of physical nature of subsurface that would affect groundwater or chemical flow rates?

# Take Home

After a flood, the primary goal of the investigator should be to re-assess the current CSM and evaluate if the CSM needs to be updated.

- Begin by asking the key questions about the flood and how it could affect the subsurface.
- Develop your new theories.
- Test the theories.
- Develop a new CSM.

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