



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

MIRBCA Technical Guidance

APPENDIX B

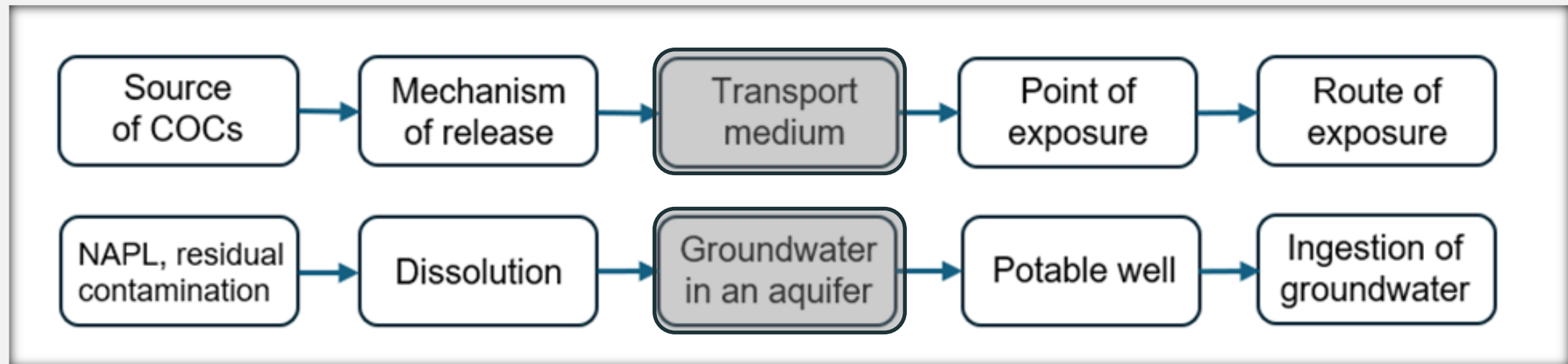
DETERMINING IF THE GROUNDWATER PROTECTION
EXPOSURE PATHWAY IS **INCOMPLETE**

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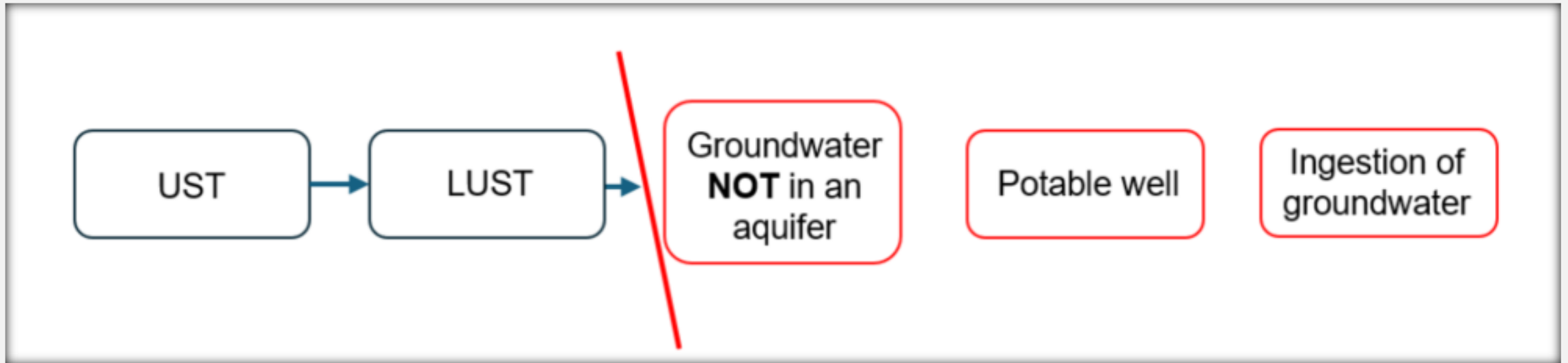
For the groundwater protection pathway to be complete...

- **All the following must be present:**
 1. **Source** of chemicals of concern (NAPL, residual chemicals)
 2. **Release** of chemicals of concern (dissolution)
 3. **Medium** that chemicals of concern will travel from release to receptor (groundwater)
 4. **Point of exposure** (potable well)
 5. **Route of exposure** (ingestion of groundwater)

Elements of a **complete** groundwater protection exposure pathway



Groundwater **not** in an aquifer



- No transport medium
- Groundwater protection pathway **incomplete** (Section B.2)

Is Appendix B for current or future use?

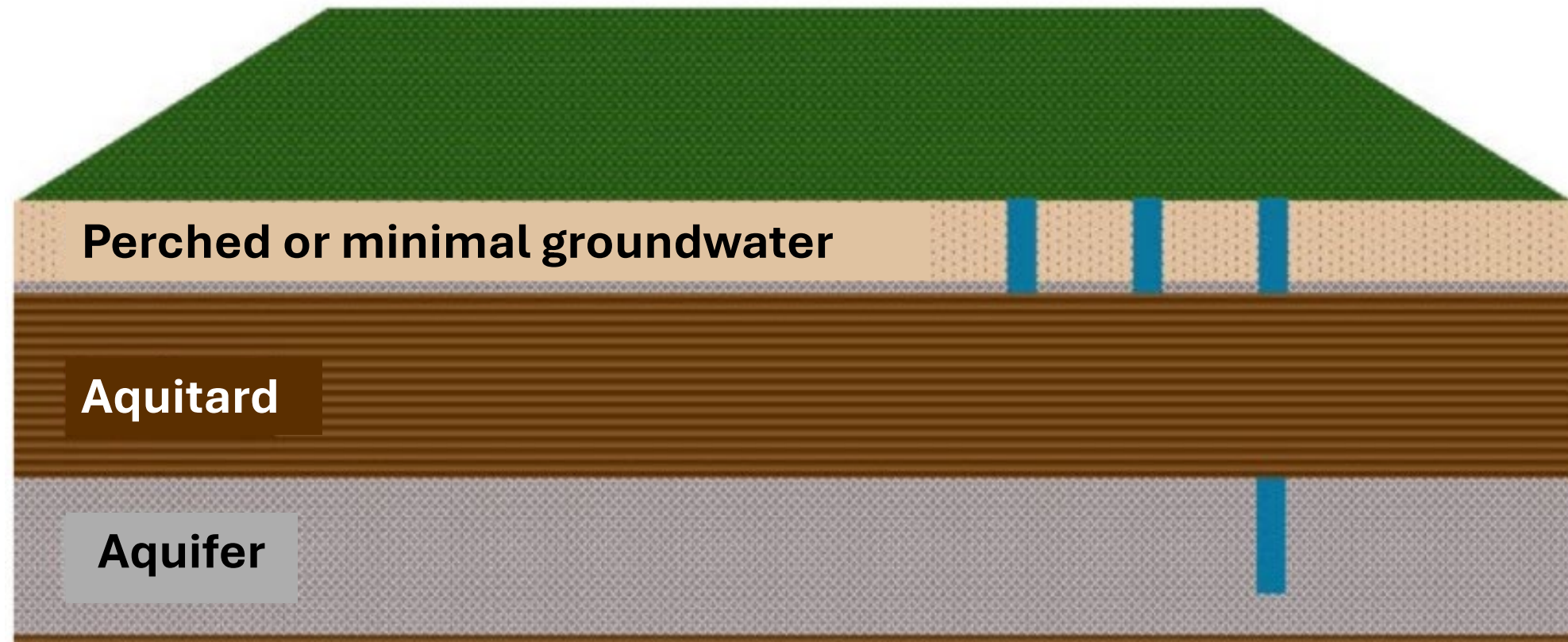
CURRENT USE

Groundwater protection pathway is complete if there is water supply well that is potentially impacted by release

FUTURE USE

See Appendix B!

What is Groundwater not in an Aquifer (GWNIAA)?



Two Conditions to Demonstrate GWNIAA

1

Groundwater Quantity

Insufficient permeability to support wells

2

Hydraulic Communication

Not able to reasonably transport sufficient mass of contaminant to aquifer that would exceed generic Drinking Water criteria

Understanding basic conditions required allows for site specific evaluations!

More flexibility and professional judgement in making GWNIAA determinations by lessening data needs.

Condition 1: Groundwater Quantity

Only 1 of the following:



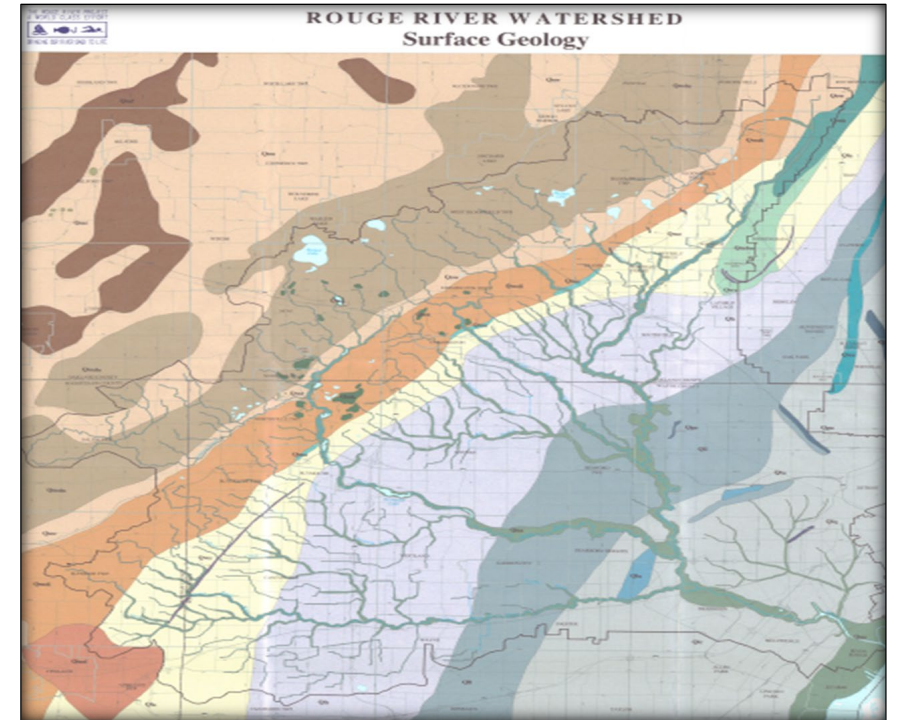
a) All monitoring wells bail or pump dry at 0.1 gpm (e.g. low-flow sampling)

b) Slug Testing showing hydraulic conductivity (K) is less than 1×10^{-5} cm/sec at 3 locations per $\frac{1}{4}$ acre (assumed to be the size of typical Gas Station)

c) Other testing such as pump or well yield tests

Condition 1: Groundwater Quantity Cont.

- In areas of State mapped with known **low permeability soils** – clay, diamicton, or other low permeability lithology
- One monitoring well pumping dry at 0.1 gpm
- K less than 1×10^{-5} cm/sec at one location for 213 sites



Condition 2: Hydraulic Communication

- 1) Documentation of regional geology with supplemented site-specific that support the saturated zone is not in communication with any aquifers:
 - i. Through pumping tests
 - ii. Boring or well logs, geophysical information, cross sections, field notes showing sufficient thickness of an aquitard

- 2) All formation groundwater is discharging to surface water

- 3) Fate transport modeling with supporting site data formation won't reach aquifer above RBSL

Only one of options above must be met for Condition 2

Considerations for GWNIAA for documentation

- **This evaluation is for future use only!**
- **Wellhead protection areas** may require some additional considerations
- **Crock wells** and other wells may still be in use – ensure that receptor survey is conducted for current use
- If GWNIAA is being done where **no municipal water** is available, party should **notify the local or county health department.**

Appendix B Note Box

A GWNIAA determination can also be made by demonstrating that groundwater at the site consists of water that is trapped or isolated in fill material in an underground storage tank or equivalent basin in lieu of demonstrating the two conditions below.

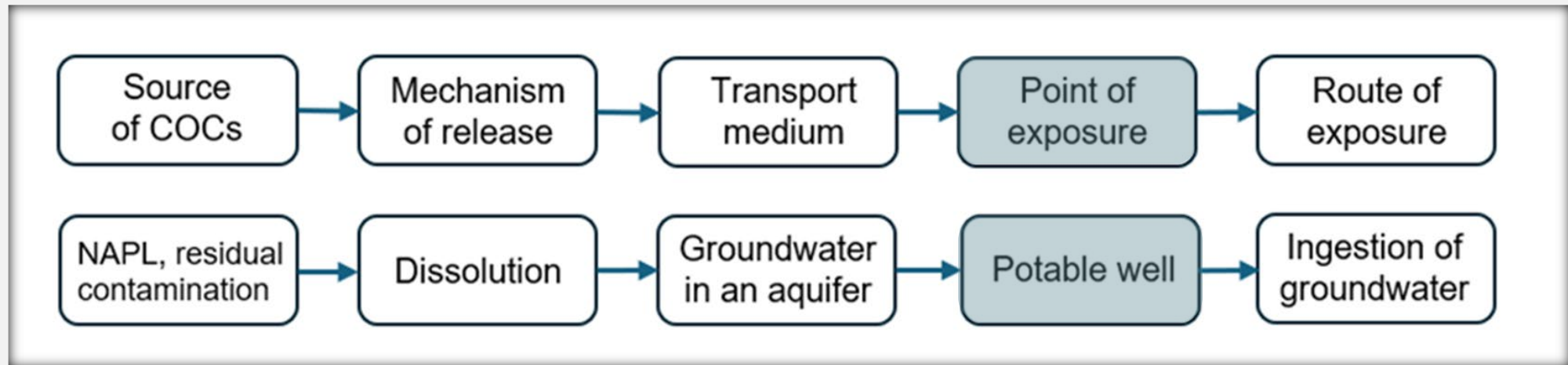
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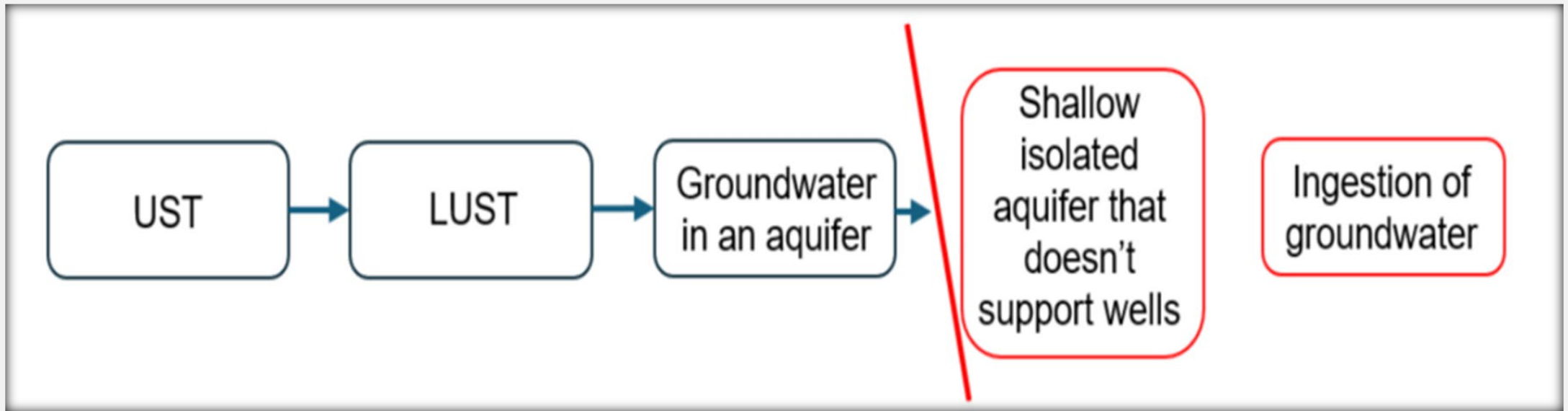
Documentation in MIRBCA - Form 13 (2) & (3)

MIRBCA REPORT		FORM NO. 13(2)
Facility ID number:	Date(s) confirmed release(s) discovered:	
Date form completed:	Form completed by:	
GROUNDWATER PROTECTION - FUTURE USE (ONSITE)		
ONSITE: Determine if the pathway is complete for future use onsite	Yes	No
1. Is there a land use or groundwater resource use restriction onsite?	☐	☐
2a. Groundwater quantity. Does the formation yield sufficient water? (Refer to Appendix B.2 and justify below, if the answer is "No")	☐	☐
2b. Hydraulic communication. Is the impacted formation likely to transport COCs to an aquifer? (Refer to Appendix B.2 and justify below, if the answer is "No")	☐	☐
3a. Is the depth to the bottom of the aquifer > 15 feet? (Refer to Appendix B.3 and justify below, if the answer is "No")	☐	☐
3b. Is the impacted formation likely to transport COCs to a useable aquifer? (Refer to Appendix B.3 and justify below, if the answer is "No")	☐	☐
3c. Are there any water supply wells within 300 feet of the site property? (Refer to Appendix B.3 and provide justification below)	☐	☐
If either: (i) 2a and 2b are checked "No", or (ii) 3a, 3b, and 3c are checked "No", the pathway is not complete for future use. If the pathway is complete for future use, the POE is any point in the affected aquifer and is evaluated in Tier 1 by the recent maximum concentration of each COC on each impacted property. Based on the above considerations, is the GW protection pathway complete for: Onsite residential future use ☐ Yes ☐ No Onsite nonresidential future use ☐ Yes ☐ No		
ADDITIONAL NOTES		
Data and Justification will be placed here and can include additional supporting documentation. This will be done for onsite and offsite in forms		
Attachments: (1) Figure 19: Water well survey map showing location of wells; (2) Attachment 16: Documentation of water supply well survey; (3) Attachment 17: Water supply well construction logs;		

What if groundwater is in an aquifer after the evaluation but there is no point of exposure?

- Must have ALL elements for there to be complete pathway for future use
- Conduct point of exposure evaluation (Section B.3)





If aquifer evaluation suggests **there is an aquifer**, but **aquifer doesn't support legal well** to be installed in future, **pathway is incomplete**

Point of Exposure Evaluation

Current Use

- Does a water supply well exist?
- Are current water supply wells potentially impacted?

Future Use

- Is there reasonable potential for a well in the impacted aquifer?
- Is the contaminated aquifer of sufficient depth for a legal well to be installed?

Point of Exposure Evaluation

- Presence of municipal water **does not** make groundwater protection exposure pathway **incomplete** for future use!
 - Future point of exposure could be somewhere in aquifer
 - MIRBCA will limit distance to 500'/300' from source



Shallow isolated aquifer that doesn't support wells

All of the following must be met:

1 Bottom of Aquifer Depth of 15 feet or less

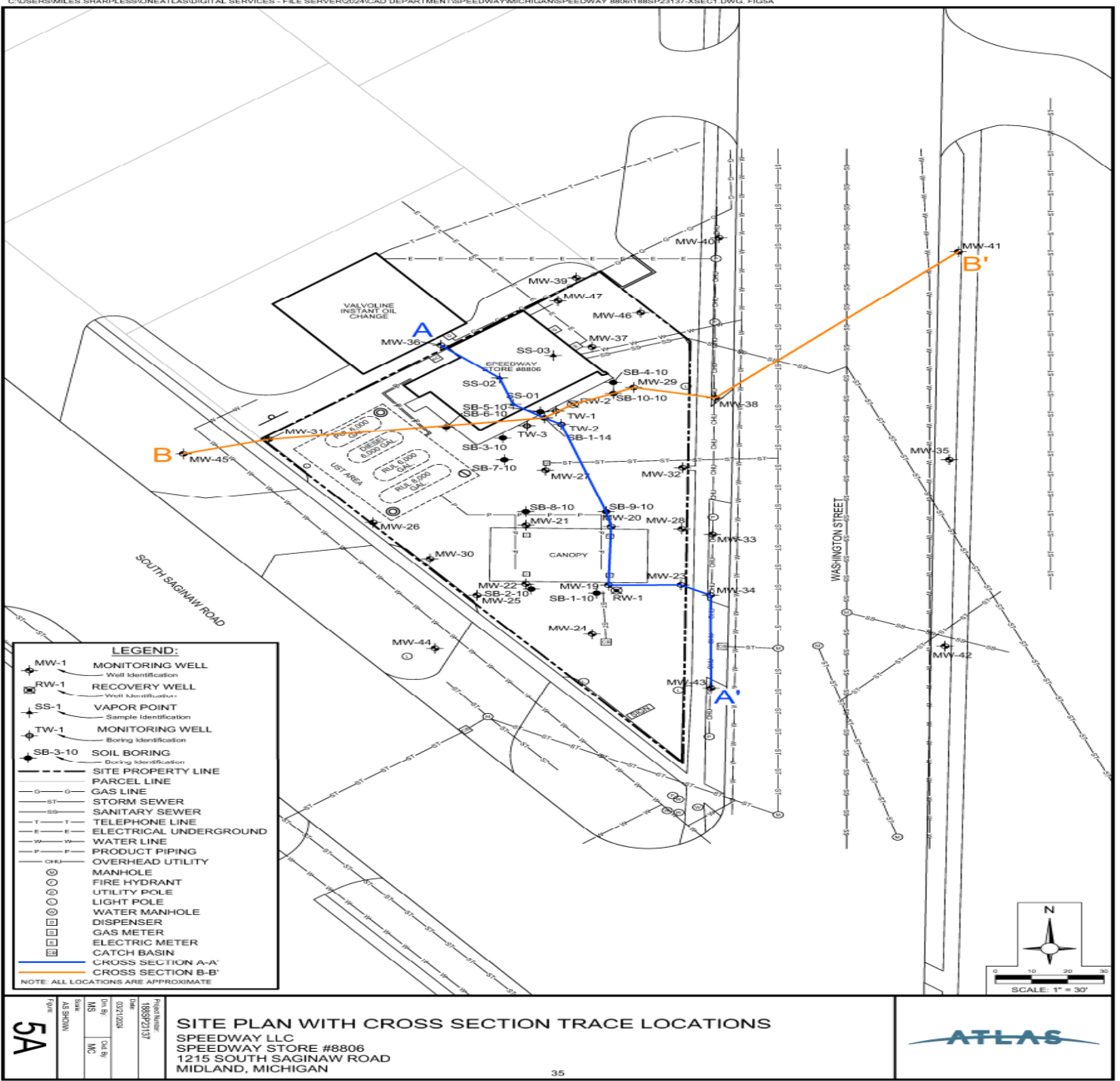
2 Not in Hydraulic Communication with Usable Aquifer

3 No wells within 300 feet of Site Property Boundary

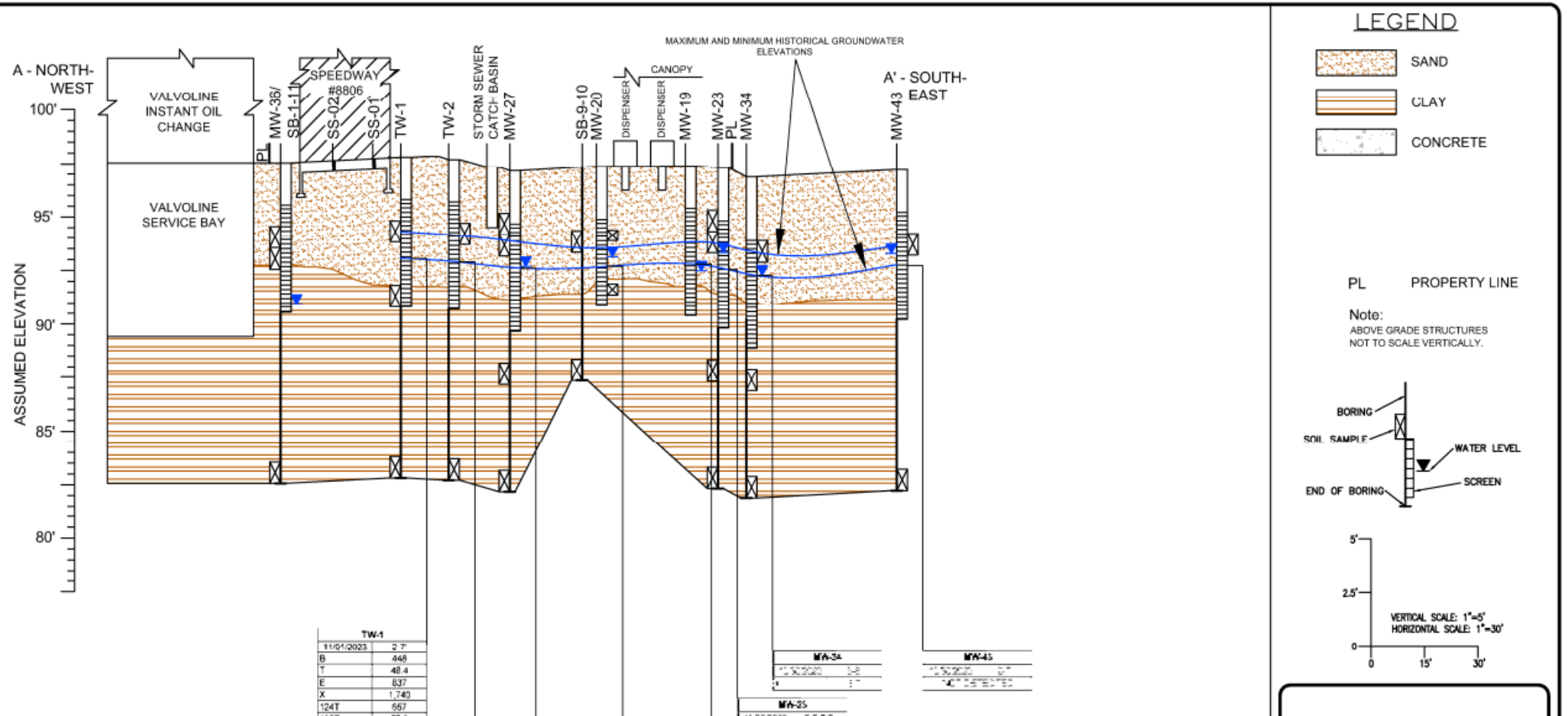
Documented
by boring logs
and cross-
sections

Documented
by well survey

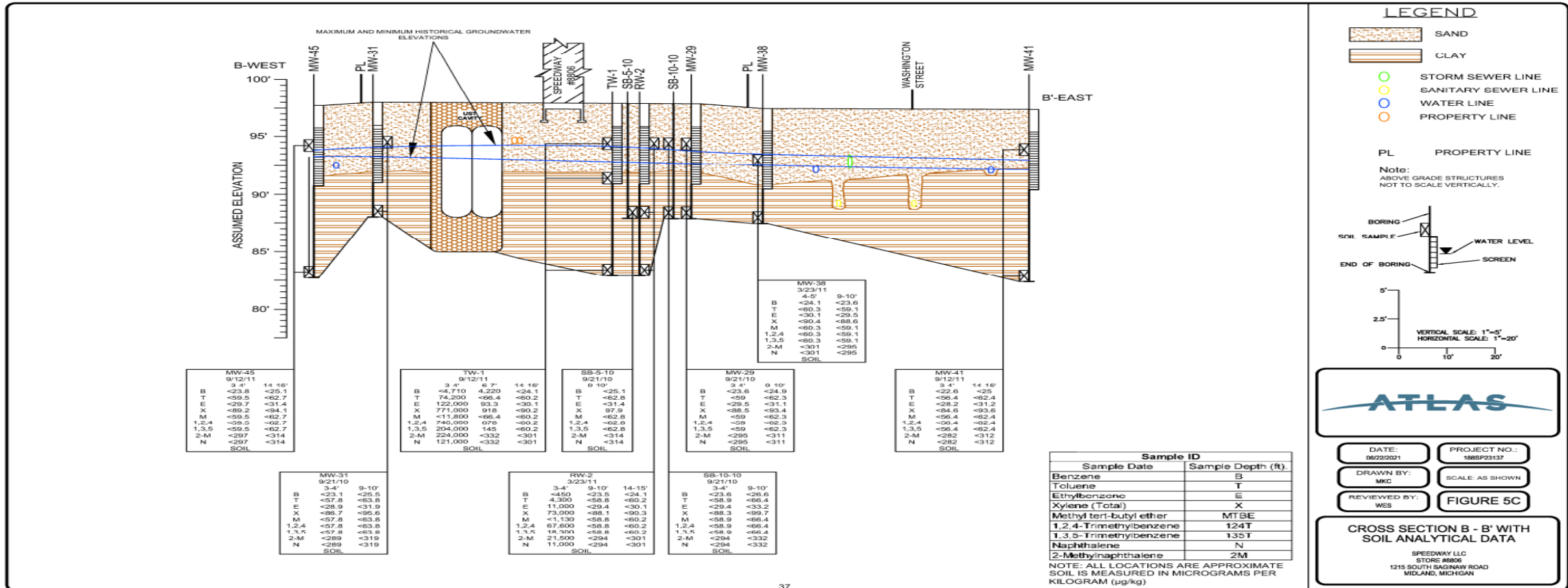
Appendix B
Case Study



Case Study Shallow GW Analytical



Case Study Soil Analytical



Case Study

- 1) Well survey – no existing wells in any aquifer within 300' of site
- 2) Cross sections/boring logs show a shallow aquifer that extends to ~10' in depth
- 3) Clay layer at ~10' in depth
- 4) A legal well must be a minimum of 25' deep

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Onsite nonresidential future use	☐ Yes	☐ No
ADDITIONAL NOTES		
Data and justification will be placed here Onsite and offsite forms will be completed.		
Attachments: (1) Figure 19: Water well survey map showing location of wells; (2) Attachment 16: Documentation of water supply well survey; (3) Attachment 17: Water supply well construction logs;		

Key Takeaways from Appendix B

- 1 Only for groundwater protection pathway for future use
- 2 If groundwater protection pathway is incomplete for both current and future use, no further evaluation needed
- 3 Two elements of exposure pathway that can be eliminated making pathway incomplete
- 4 1) Transport medium – groundwater is not in an aquifer
- 5 2) Point of exposure – shallow isolated aquifer that doesn't support wells
- 6 Other pathways with groundwater may still be complete that will require evaluation



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MIRBCA Technical Guidance Appendix B

Questions?