GEOTECHNICAL REVIEWS
@
Iowa Geological and Water Survey

Paul VanDorpe and Soren Rundquist

What is the purpose of a geotechnical review?

A geotechnical review informs the department of existing hydrogeological conditions at a wastewater site, such as

- what geological materials are present at the site; how might they relate to lagoon construction; how might they affect groundwater movement; are there saturated materials at the site?
- what hydrological conditions exist at the site; what are the surface water conditions; where does groundwater flow; are there aquifers present / how will they be affected?

Why are we doing these geotechnical reviews?

So that wastewater sites do not become a source of contamination by releasing products into the environment which would endanger the safety and well being of Iowans, directly or indirectly.

First and foremost:

GEOTECHNICAL REVIEWS

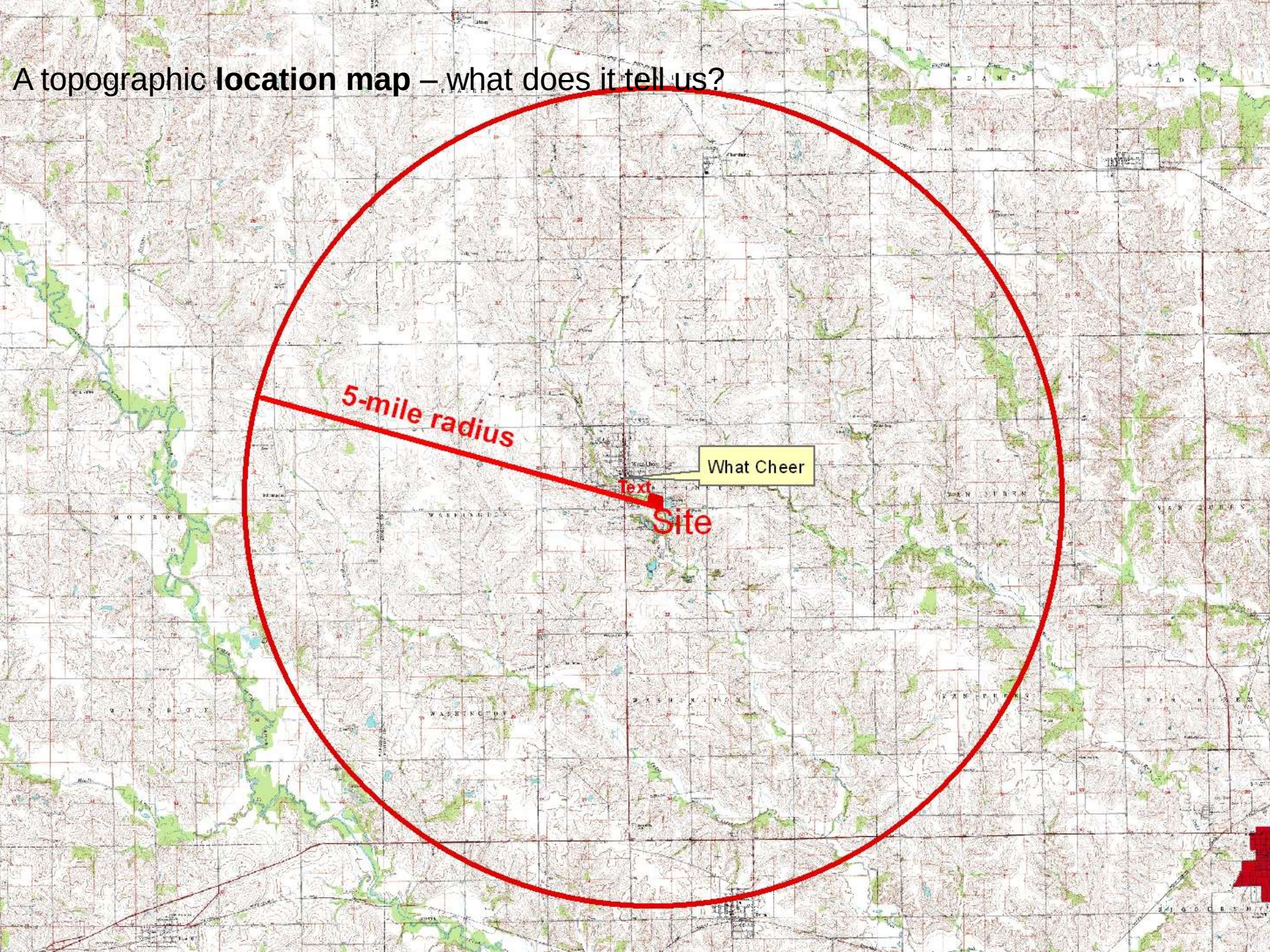
@

Iowa Geological and Water Survey

#1 Where in the world are we?

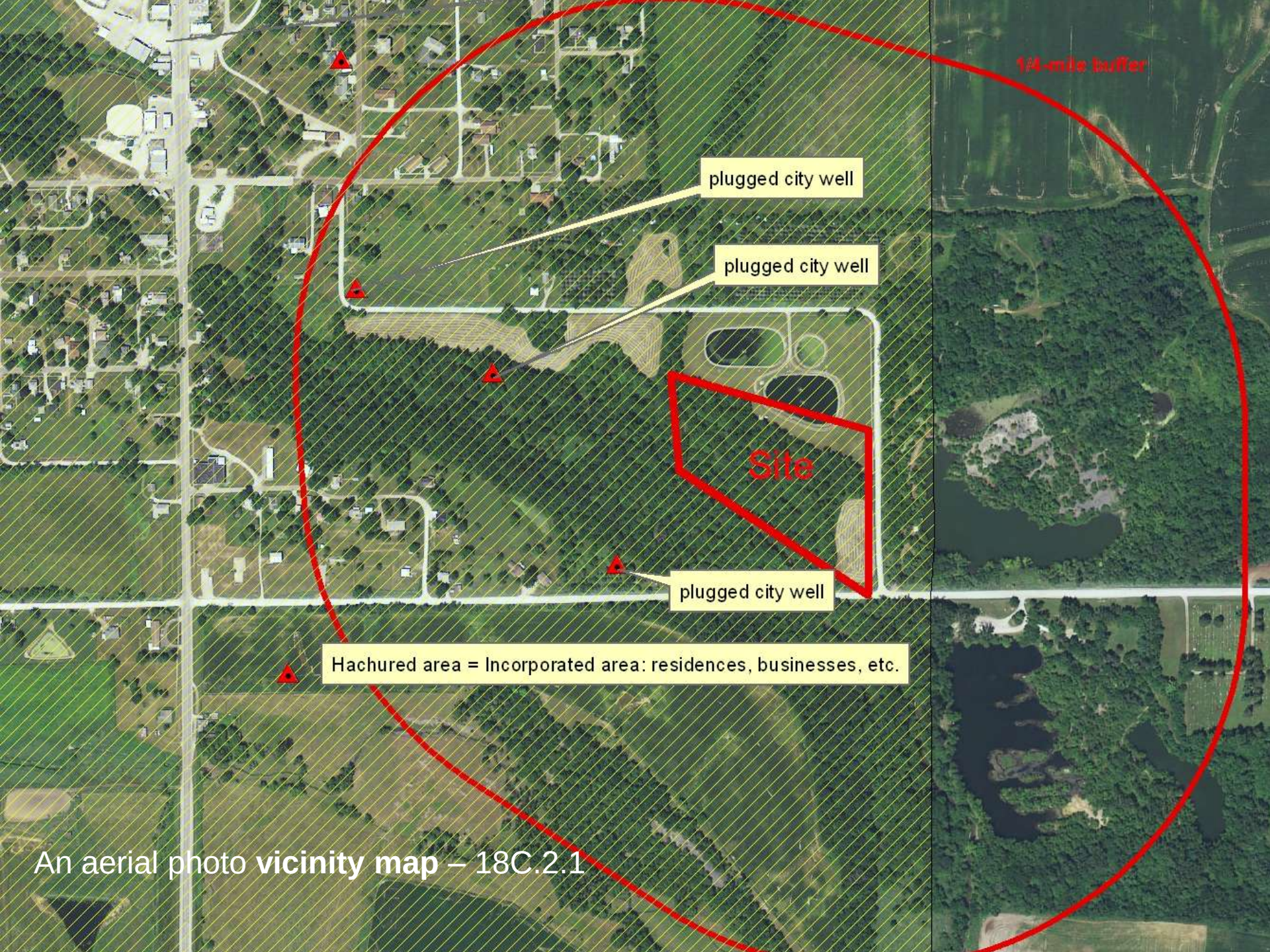
?

A topographic **location map** – what does it tell us?

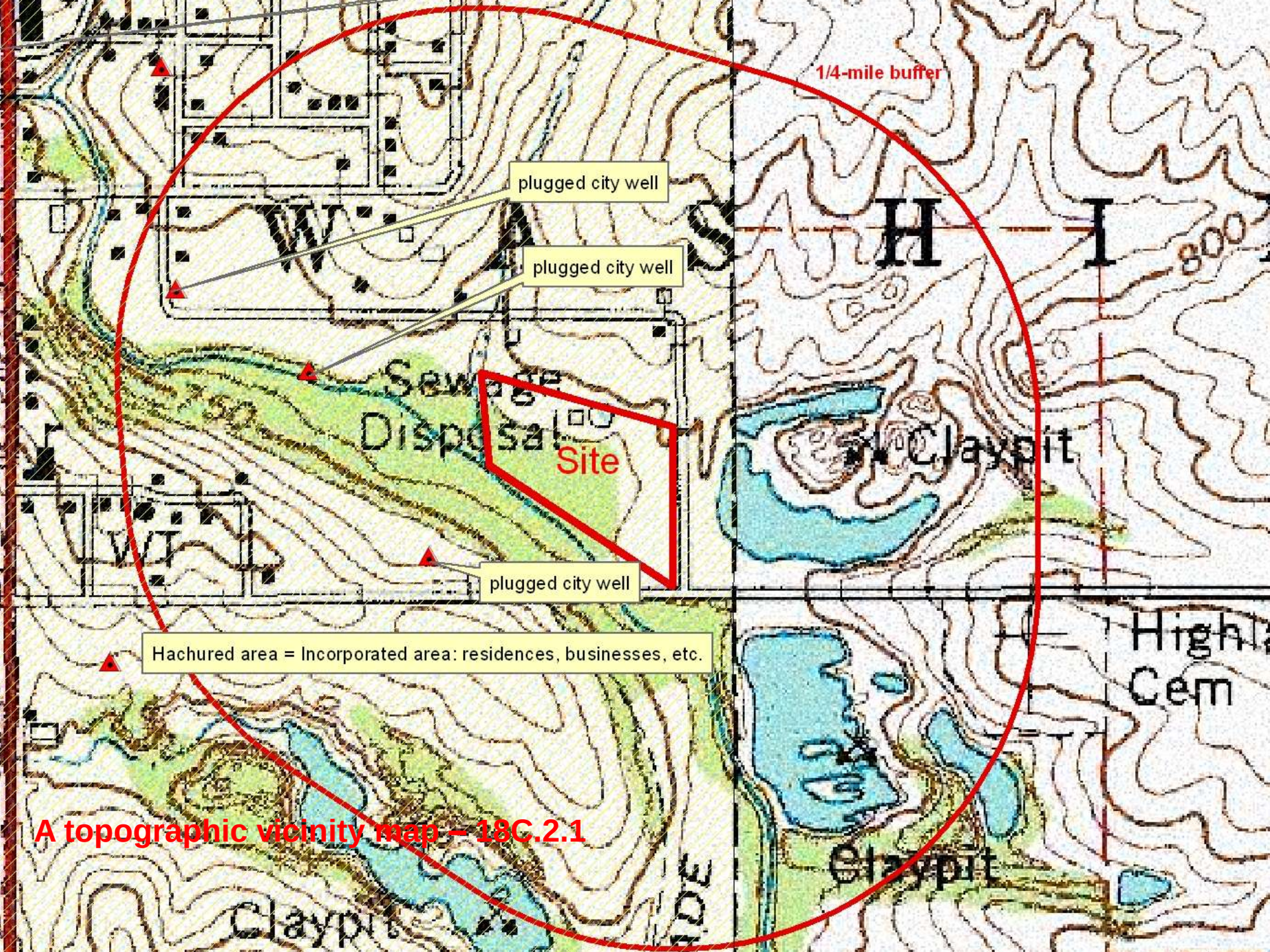


An aerial photo location map – what does it tell us?

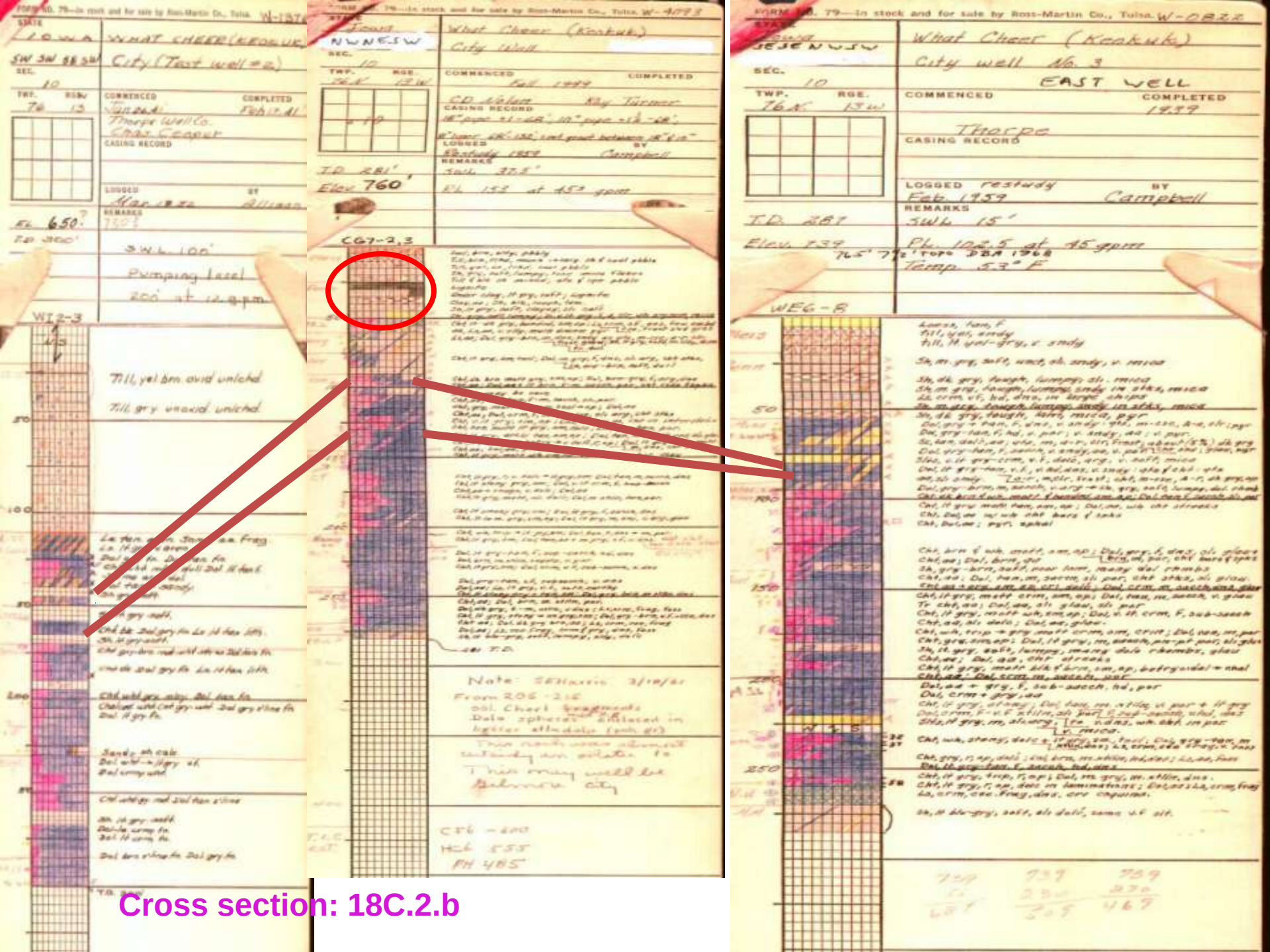
A closer aerial photo **location map** – what does it tell us?



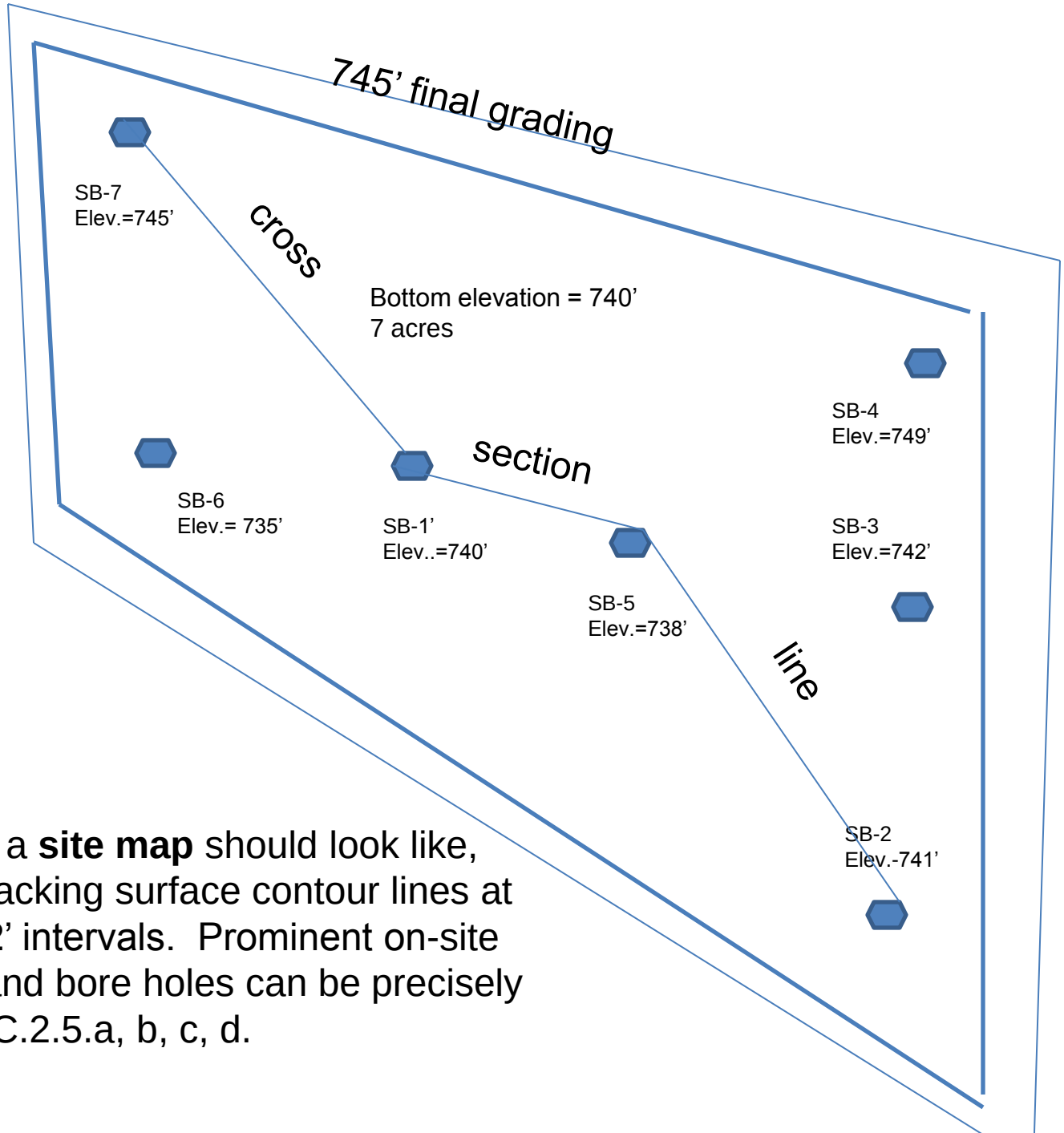
An aerial photo **vicinity map** – 18C.2.1



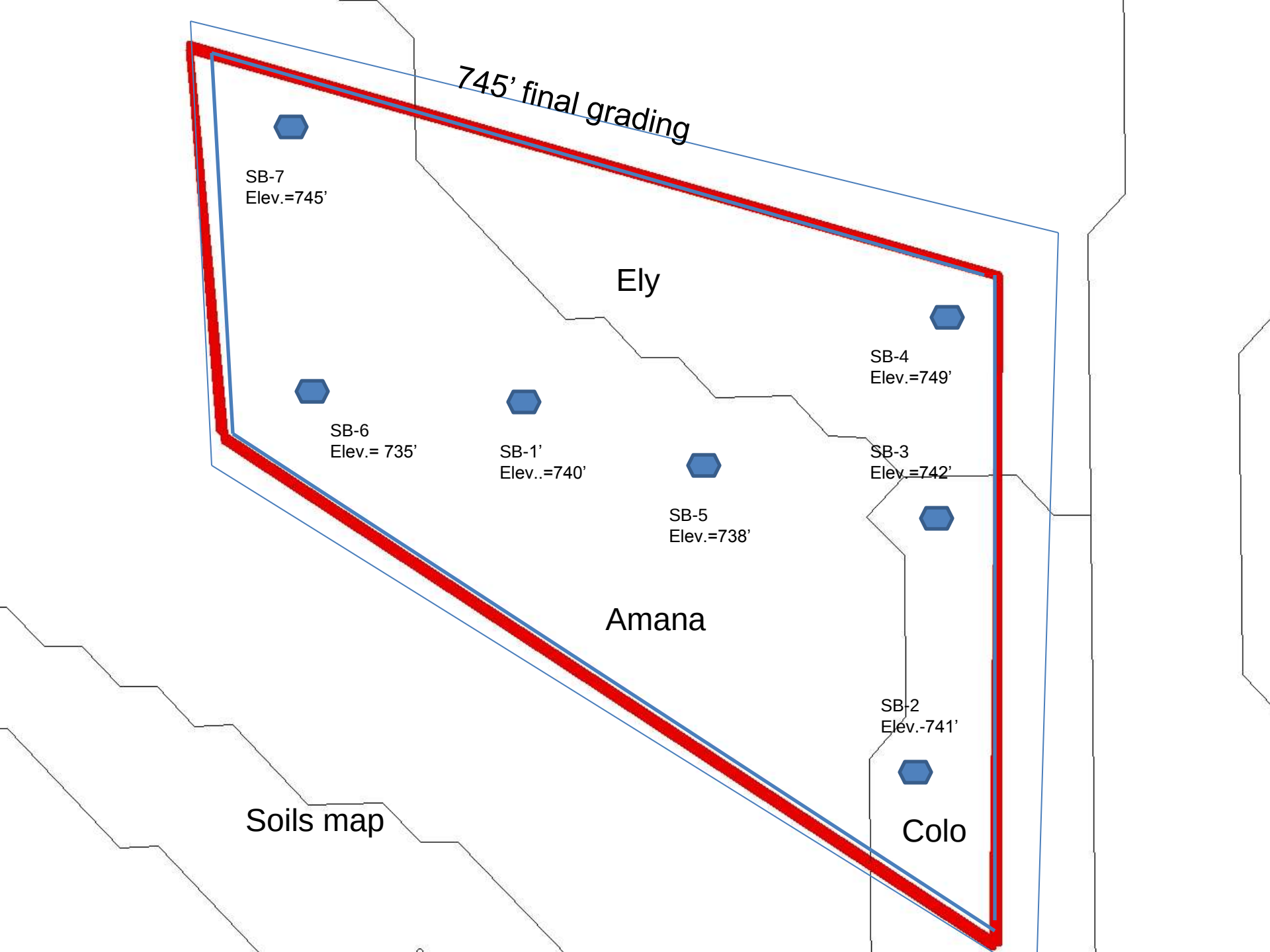
A topographic vicinity map – 18C.2.1

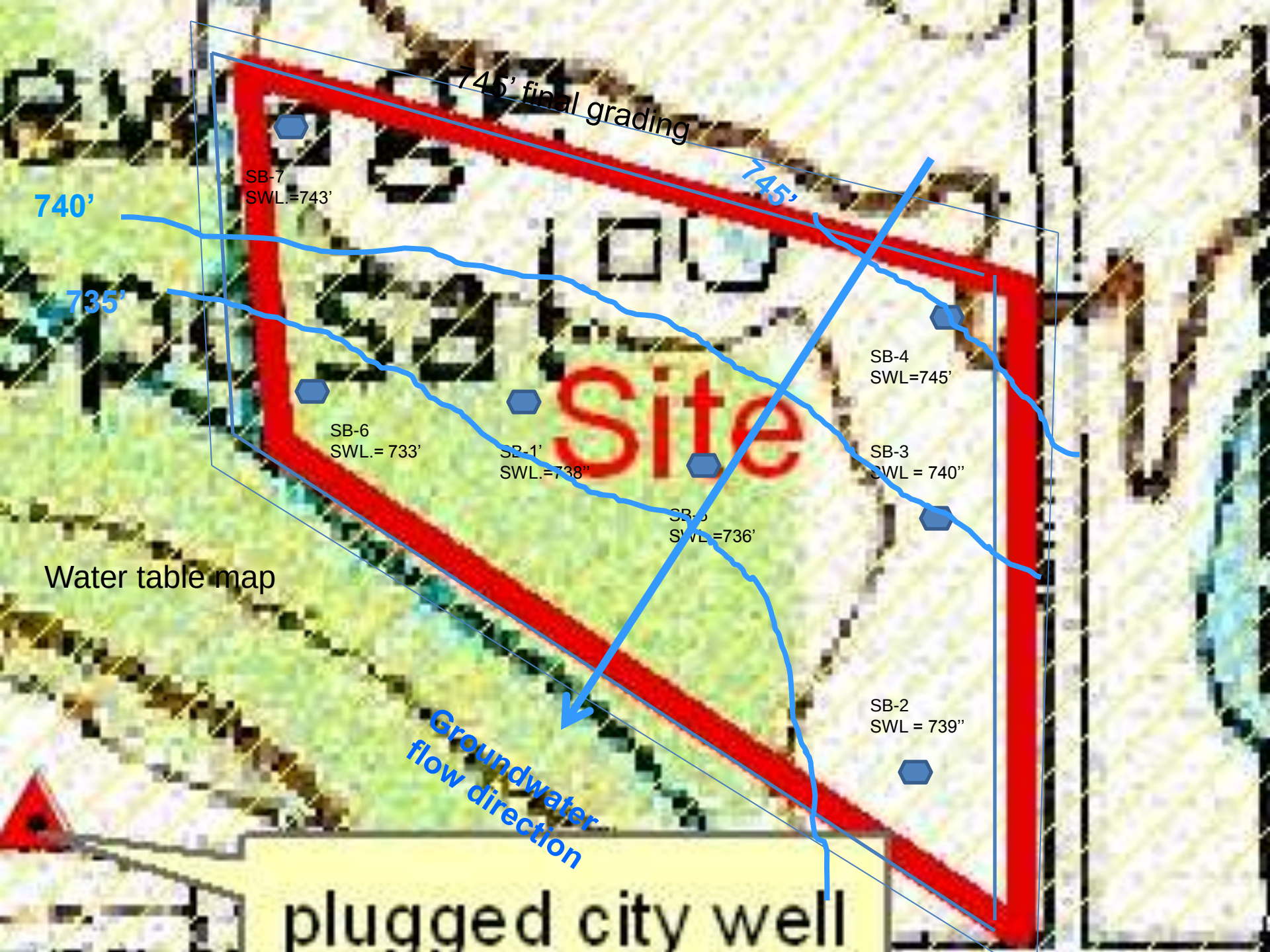


Cross section: 18C.2.b



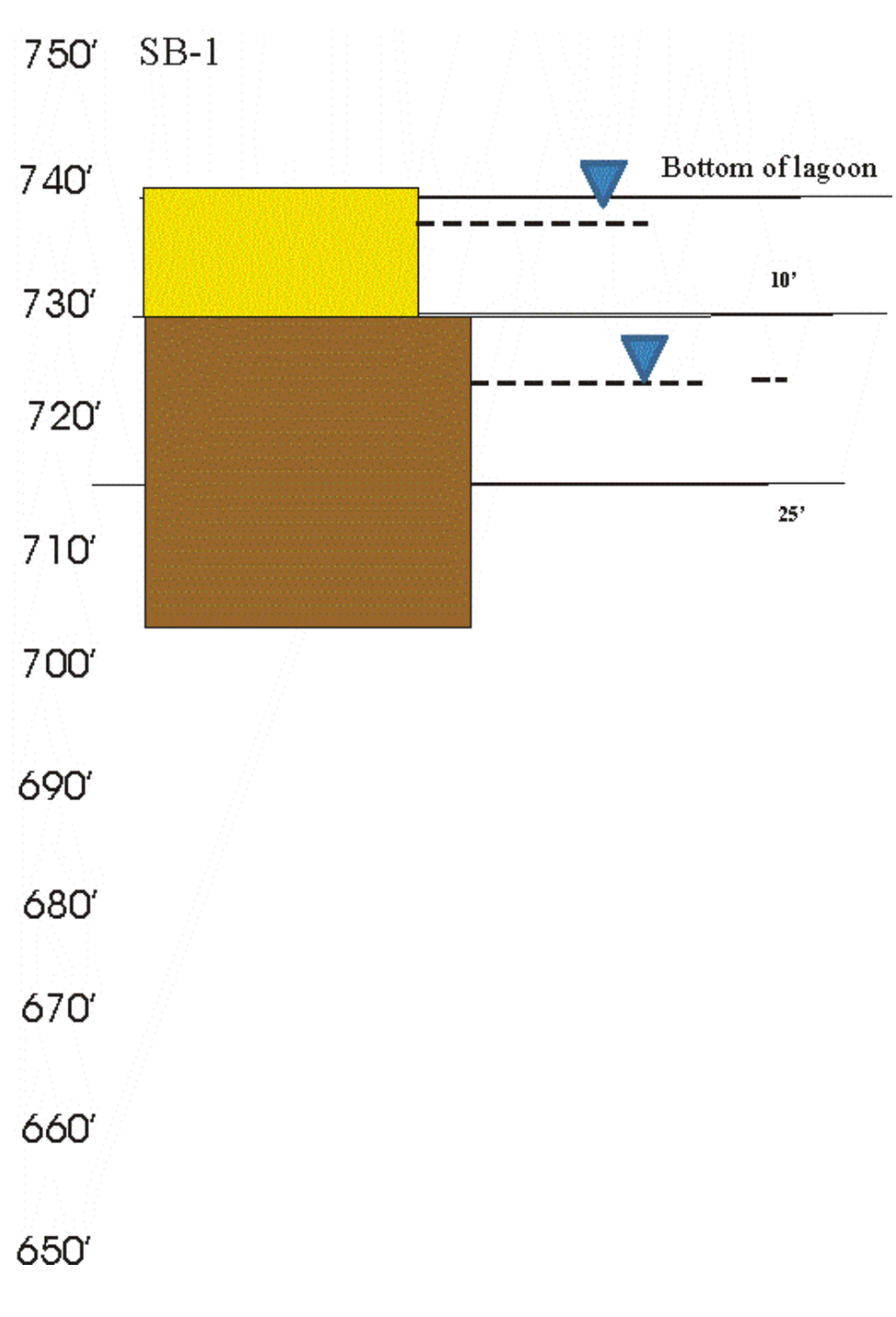
This is what a **site map** should look like, except it is lacking surface contour lines at either 1’ or 2’ intervals. Prominent on-site landmarks and bore holes can be precisely located. 18C.2.5.a, b, c, d.

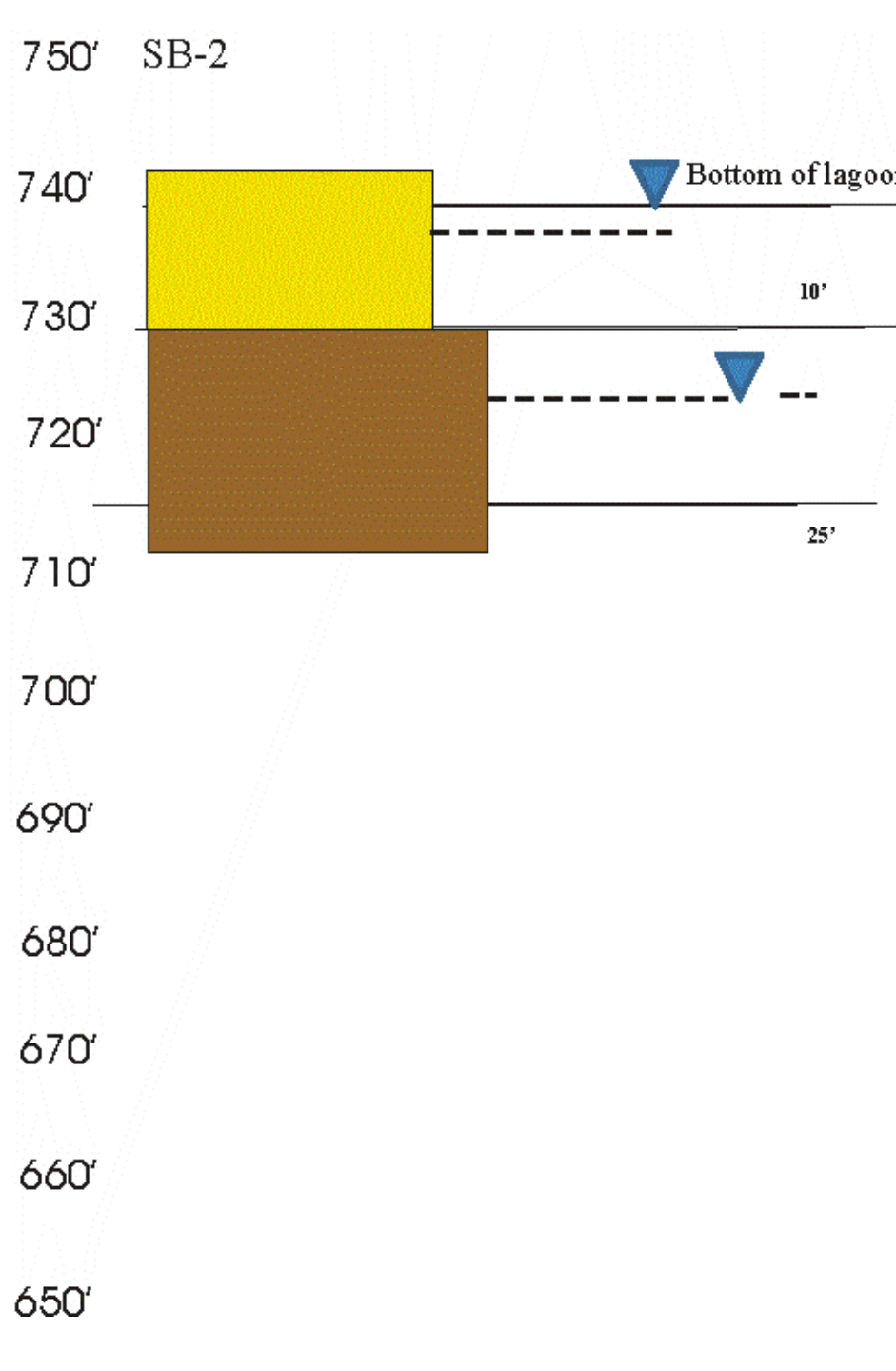

745’ final grading
SB-7
Elev.=745’
Ely
SB-4
Elev.=749’
SB-6
Elev.= 735’
SB-1’
Elev..=740’
SB-3
Elev.=742’
SB-5
Elev.=738’
Amana
SB-2
Elev.-741’
Colo
Soils map

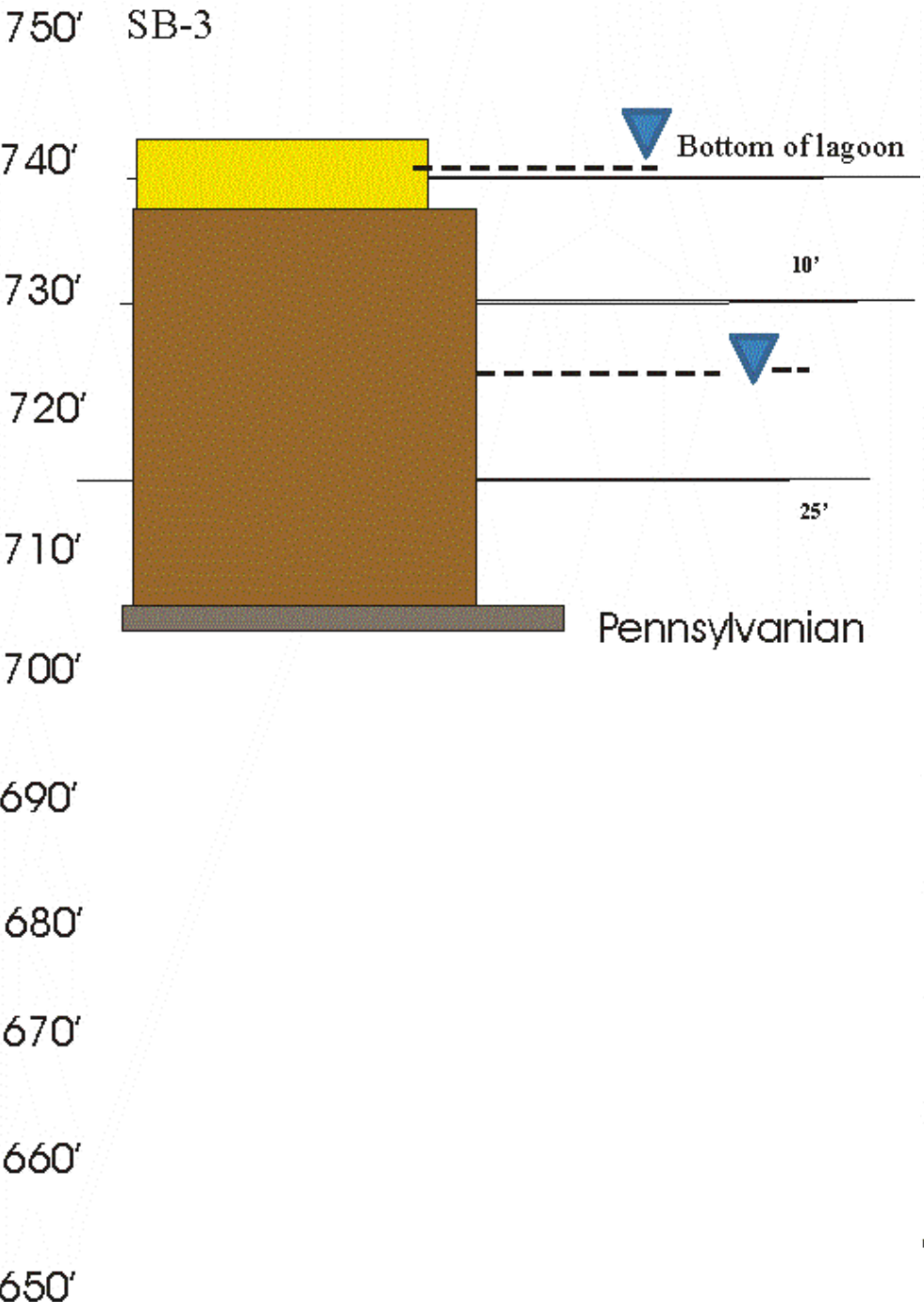

745’ final grading
745’
740’
735’
SB-7
SWL.=743’
SB-4
SWL=745’
Site
SB-6
SWL.= 733’
SB-1’
SWL.=738”
SB-3
SWL = 740”
SWL.=736’
Water table map
SB-2
SWL = 739”
Groundwater
flow direction
plugged city well

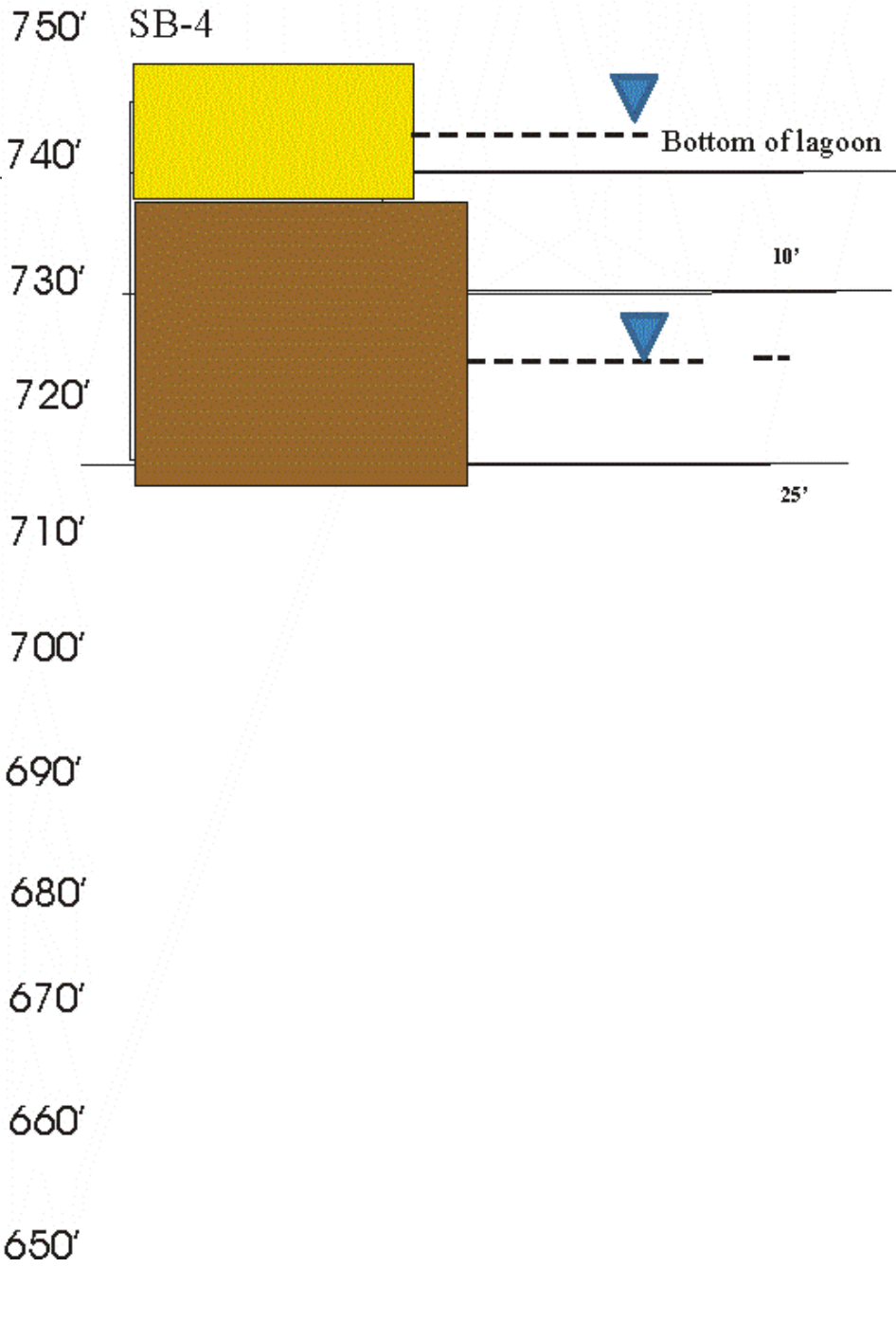
	surface elevation	bedrock elevation	depth to bedrock	10' below bottom	25' below bottom	Mississippian contact estimate	Soil	flood frequency	parent material	depth to water
SB-1	740	701	39	10	25	680	Amana	occasional	alluvium	1'-3'
SB-2	741	700	41	11	32	655	Colo	occasional	alluvium	1'-3'
SB-3	742	705	37	12	33	660	Colo	occasional	alluvium	1'-3'
SB-4	749	710	39	19	40	660	Ely	none	local alluvium	2'-5'
SB-5	738	702	36	8	29	670	Amana	occasional	alluvium	1'-3'
SB-6	735	700	35	5	26	680	Amana	occasional	alluvium	1'-3'
SB-7	745	720	25	15	36	685	Amana	occasional	alluvium	1'-3'

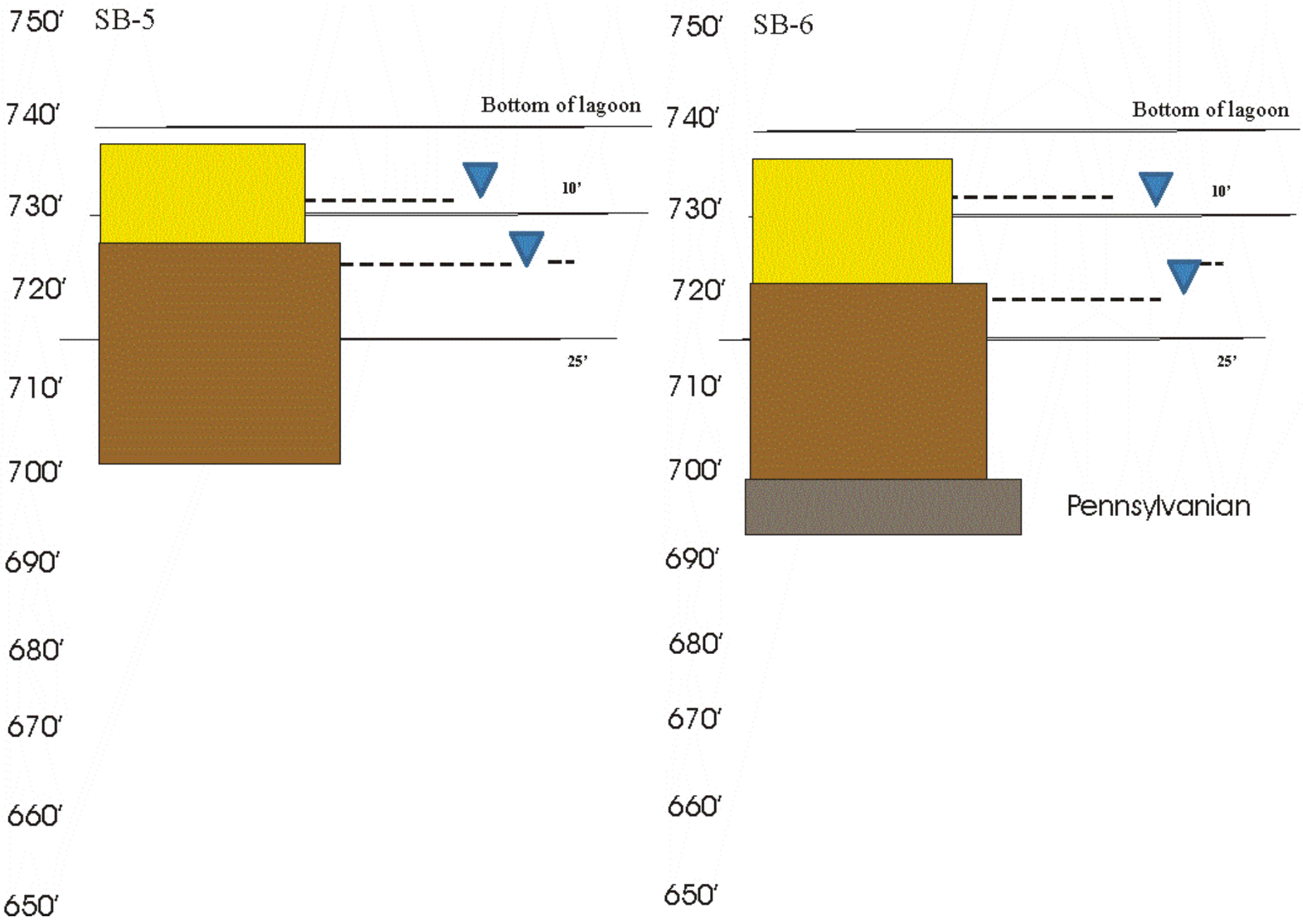
Most of this information should all be available before on-site drilling commences.

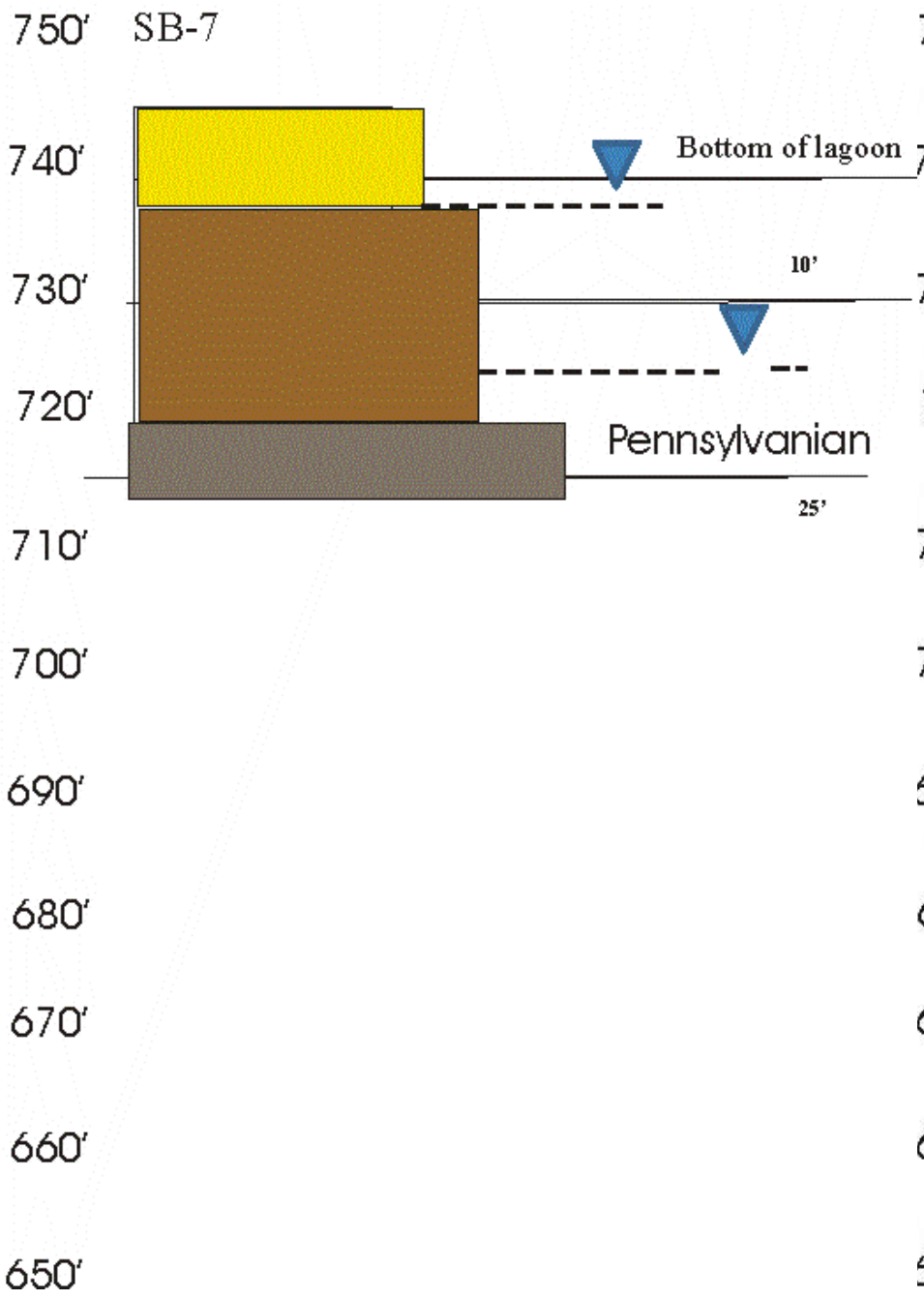

750'
SB-1
740'
Bottom of lagoon
730'
10'
720'
25'
710'
700'
690'
680'
670'
660'
650'

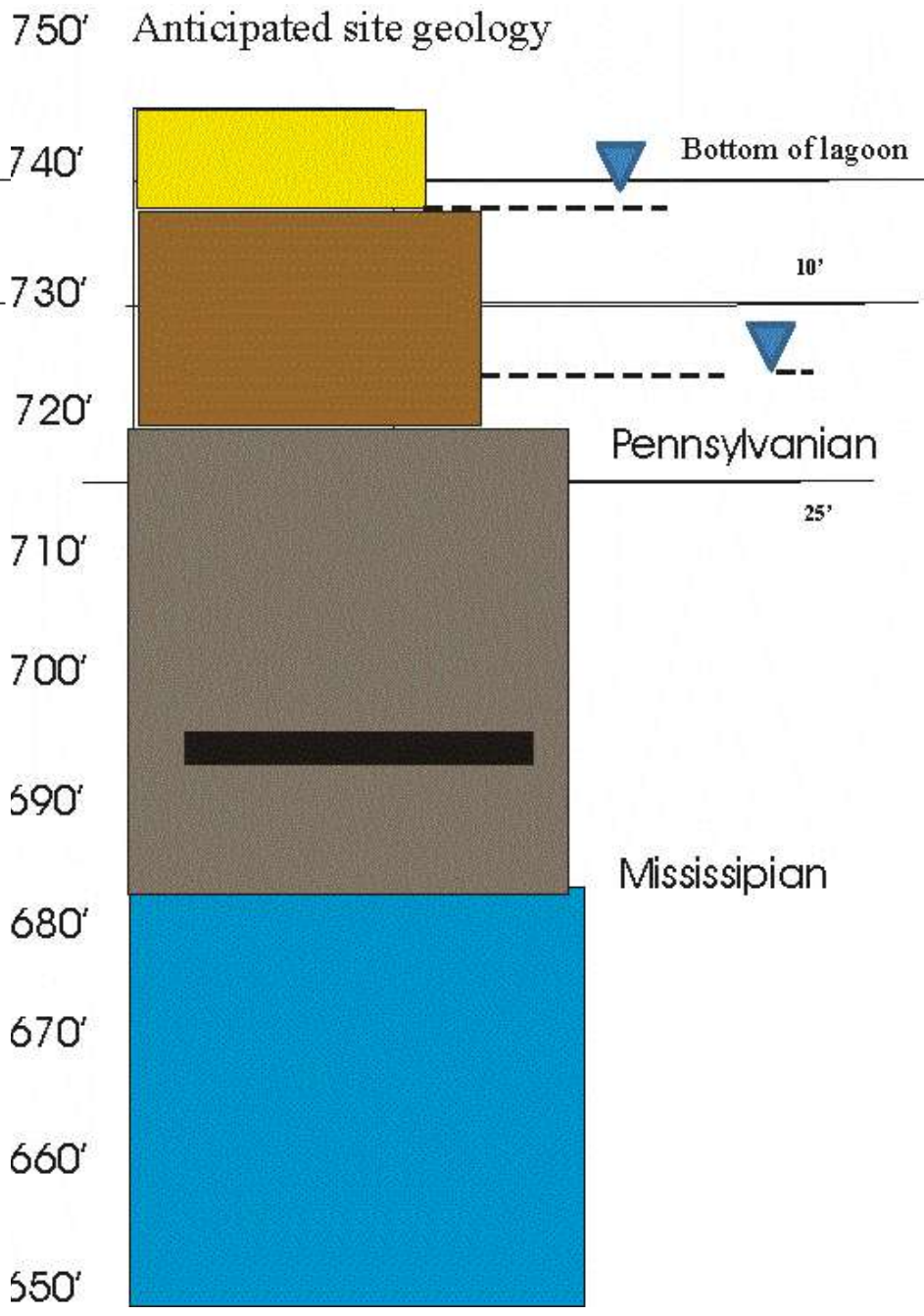

750'
SB-2
740'
Bottom of lagoo
730'
10'
720'
25'
710'
700'
690'
680'
670'
660'
650'

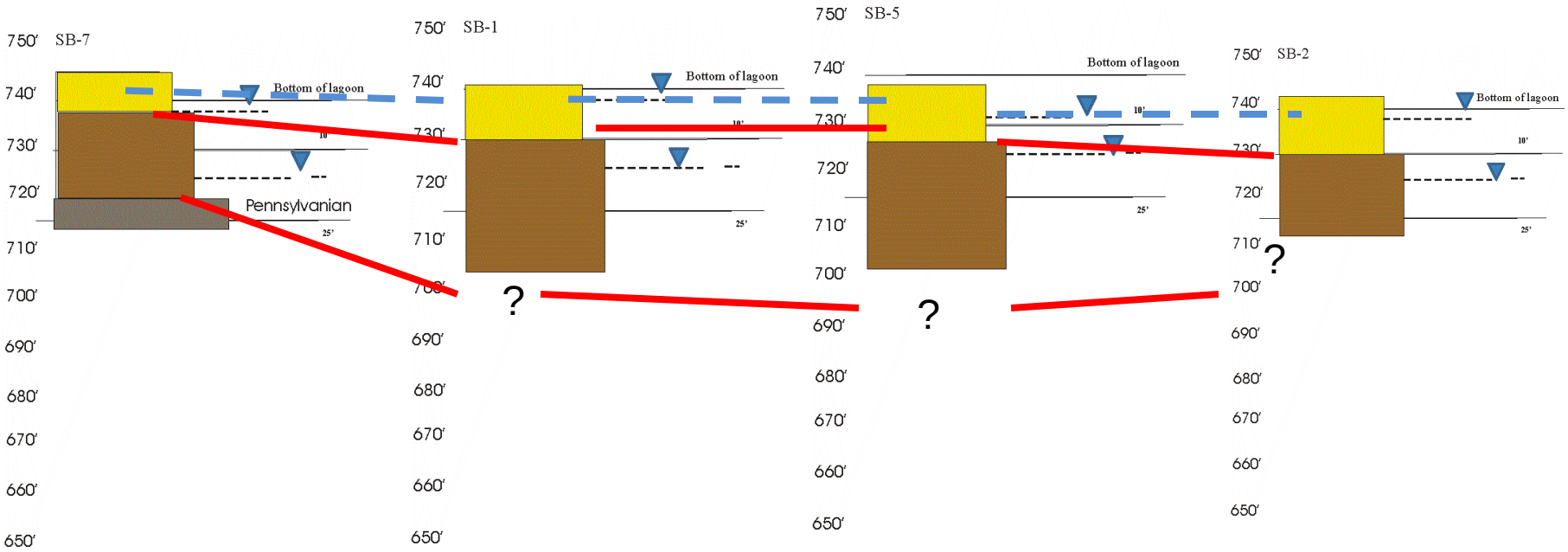

750'
SB-3
740'
Bottom of lagoon
730'
10'
720'
25'
710'
Pennsylvanian
700'
690'
680'
670'
660'
650'

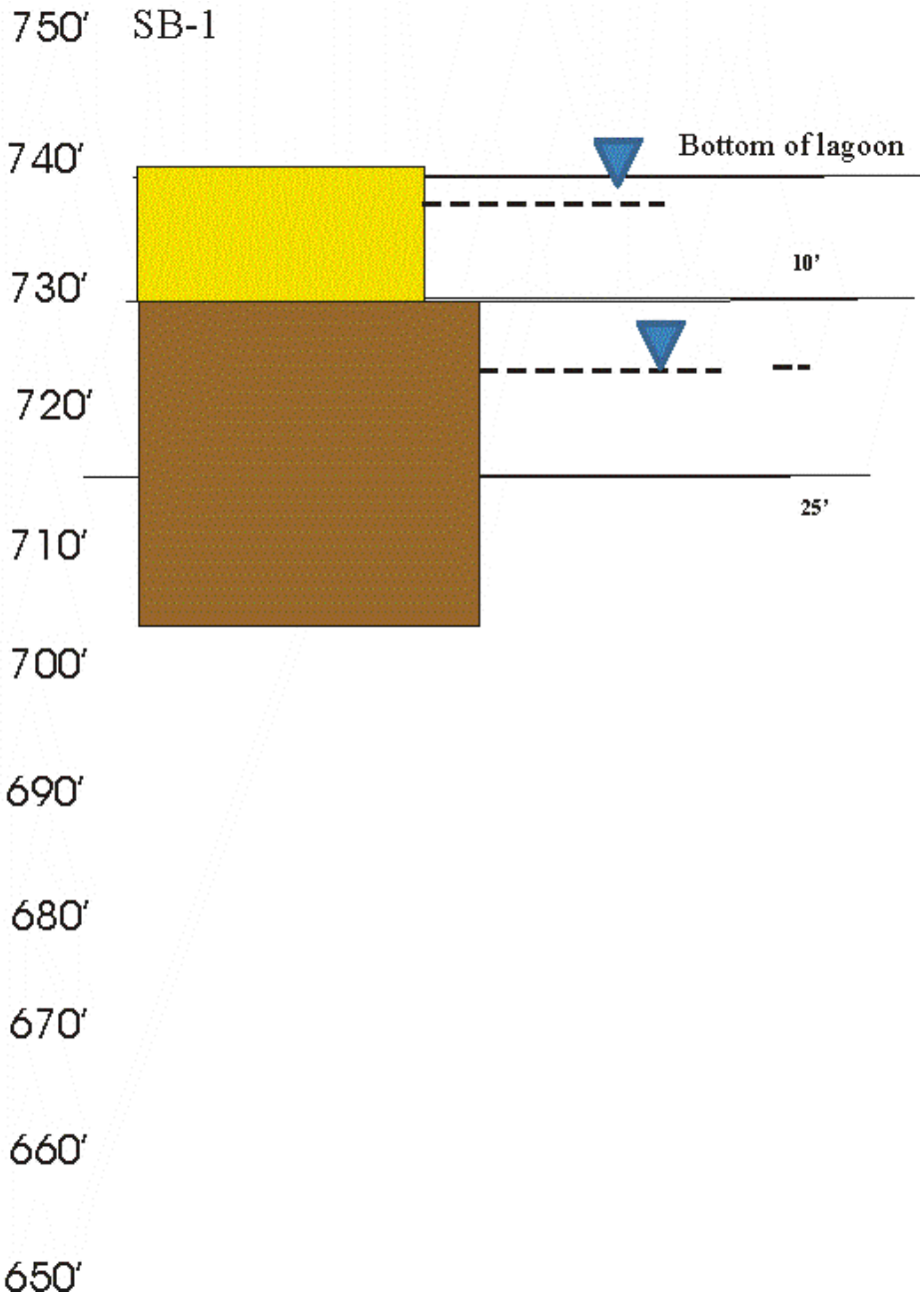

750'
SB-4
740'
Bottom of lagoon
730'
10'
720'
25'
710'
700'
690'
680'
670'
660'
650'


750'
SB-5
740'
Bottom of lagoon
730'
10'
720'
25'
710'
700'
690'
680'
670'
660'
650'
750'
SB-6
740'
Bottom of lagoon
730'
10'
720'
25'
710'
700'
Pennsylvanian
690'
680'
670'
660'
650'


750'
SB-7
740'
Bottom of lagoon
730'
10'
720'
Pennsylvanian
25'
710'
700'
690'
680'
670'
660'
650'


750'
Anticipated site geology
740'
Bottom of lagoon
730'
10'
720'
Pennsylvanian
25'
710'
700'
690'
Mississipian
680'
670'
660'
650'


SB-7
750′
740′
730′
720′
710′
700′
690′
680′
670′
660′
650′
Bottom of lagoon
10′
25′
Pennsylvanian
SB-1
750′
740′
730′
720′
710′
690′
680′
670′
660′
650′
Bottom of lagoon
10′
25′
?
SB-5
750′
740′
730′
720′
710′
700′
690′
680′
670′
660′
650′
Bottom of lagoon
10′
25′
?
SB-2
750′
740′
730′
720′
710′
700′
690′
680′
670′
660′
650′
Bottom of lagoon
10′
25′
?



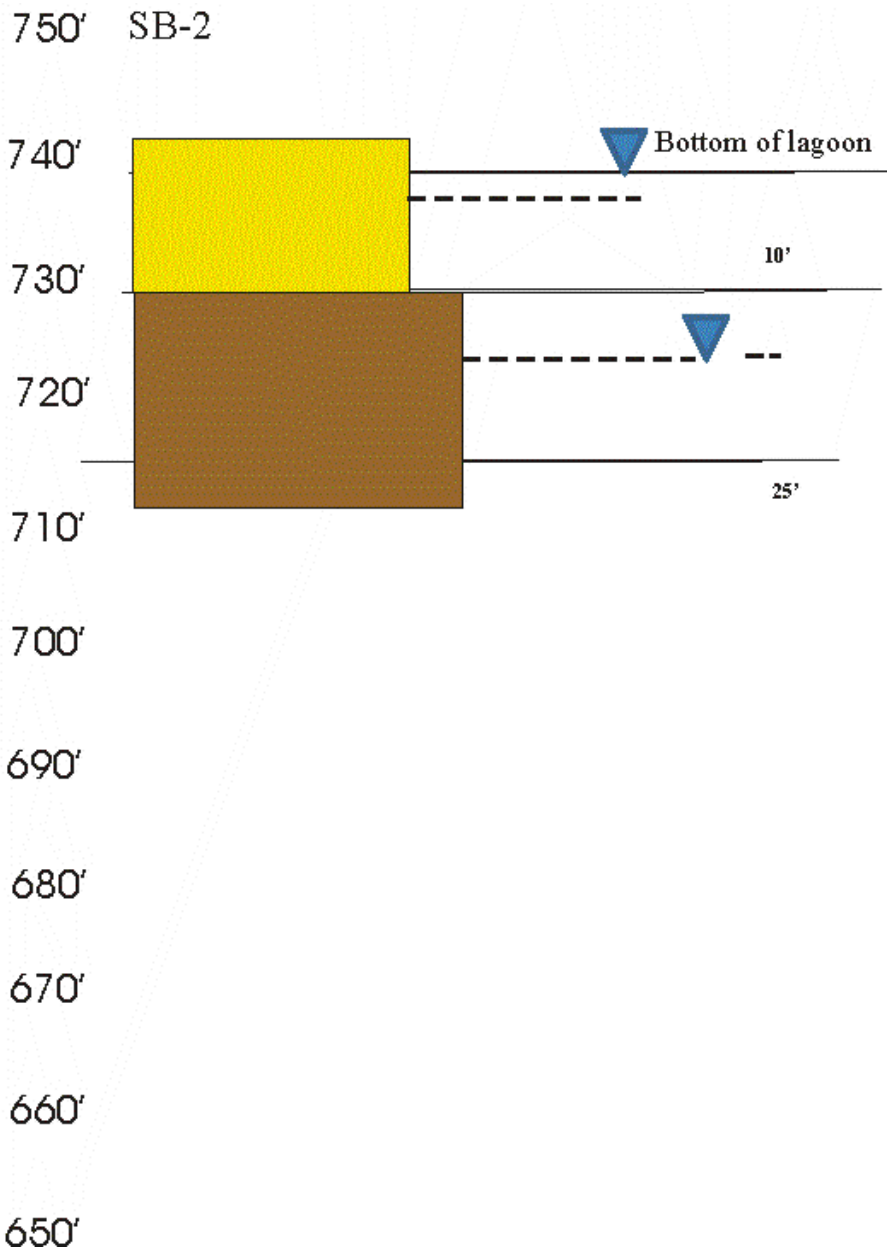
SB-1

No cut or fill.

Alluvial soils, high water table.

Alluvium above glacial till, bedrock is where?

This borehole is greater than 25 feet below the bottom of the lagoon.



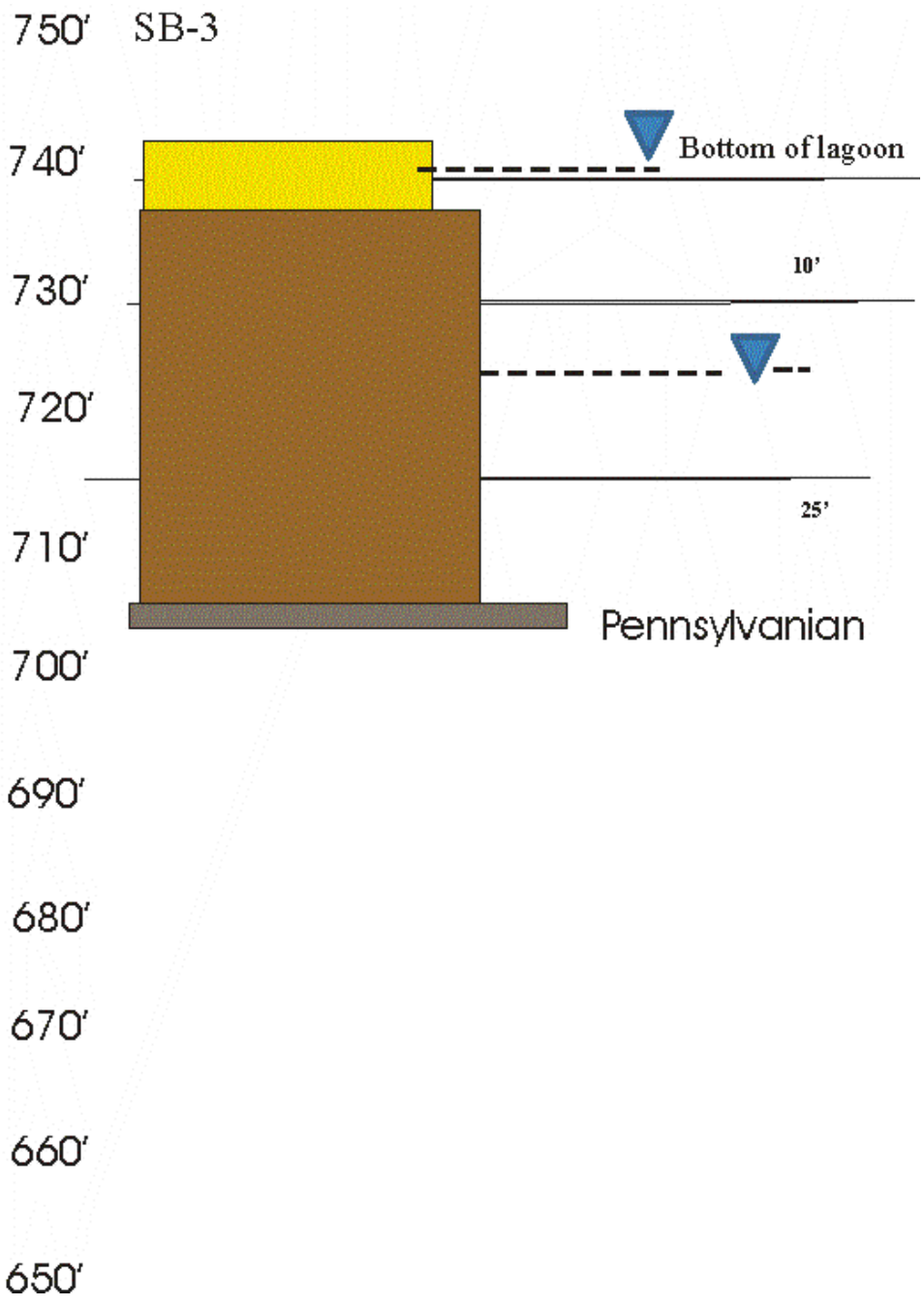
SB-2

1 foot cut.

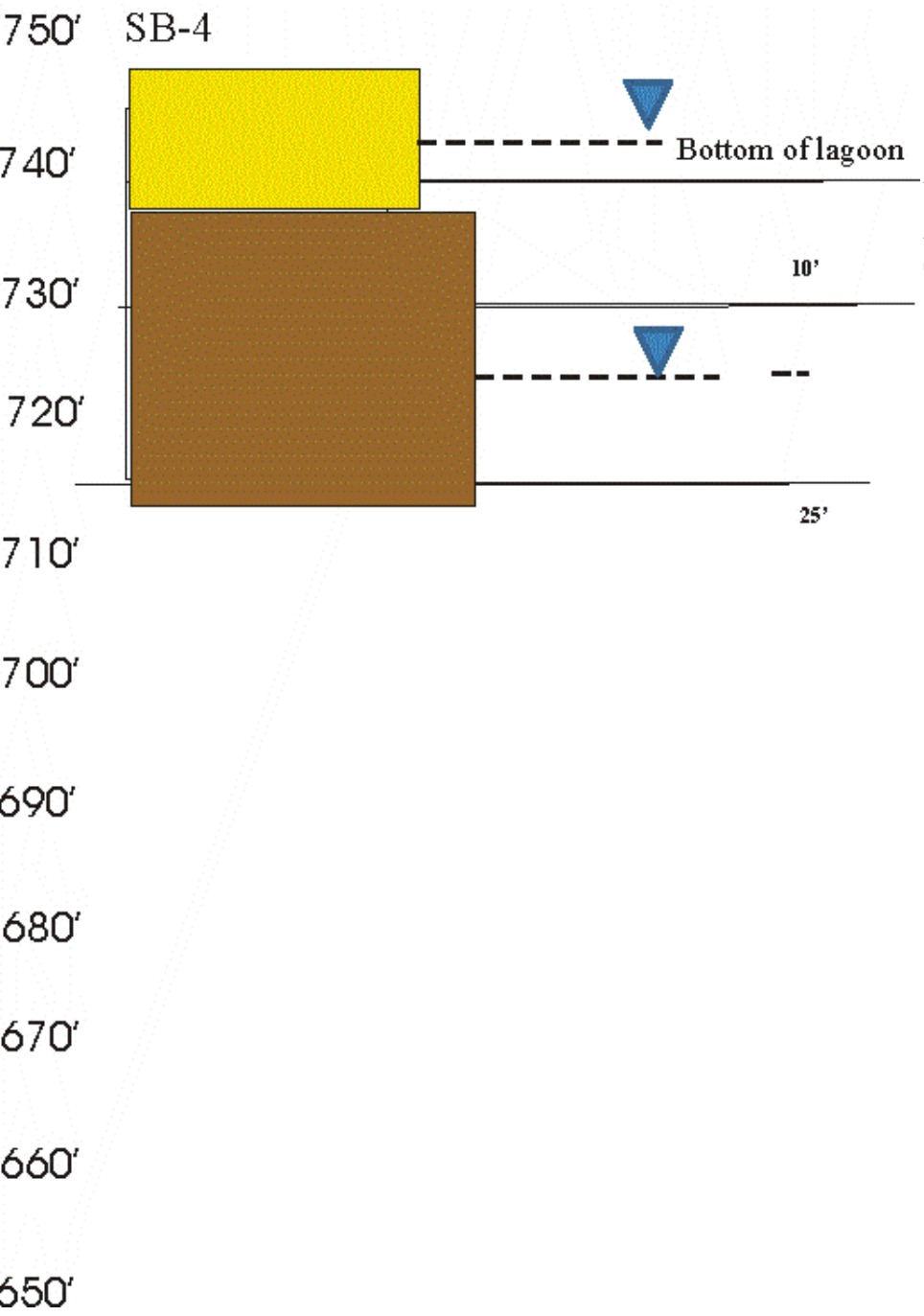
Alluvial soils, high water table.

Alluvium above glacial till, bedrock is where?

This borehole is slightly greater than 25 feet below the bottom of the lagoon.



SB-3
2 foot cut.
Alluvial soils, high water table.
Alluvium above glacial till.
Pennsylvanian bedrock, not a regional aquifer.
This borehole is greater than 25 feet below the bottom of the lagoon.



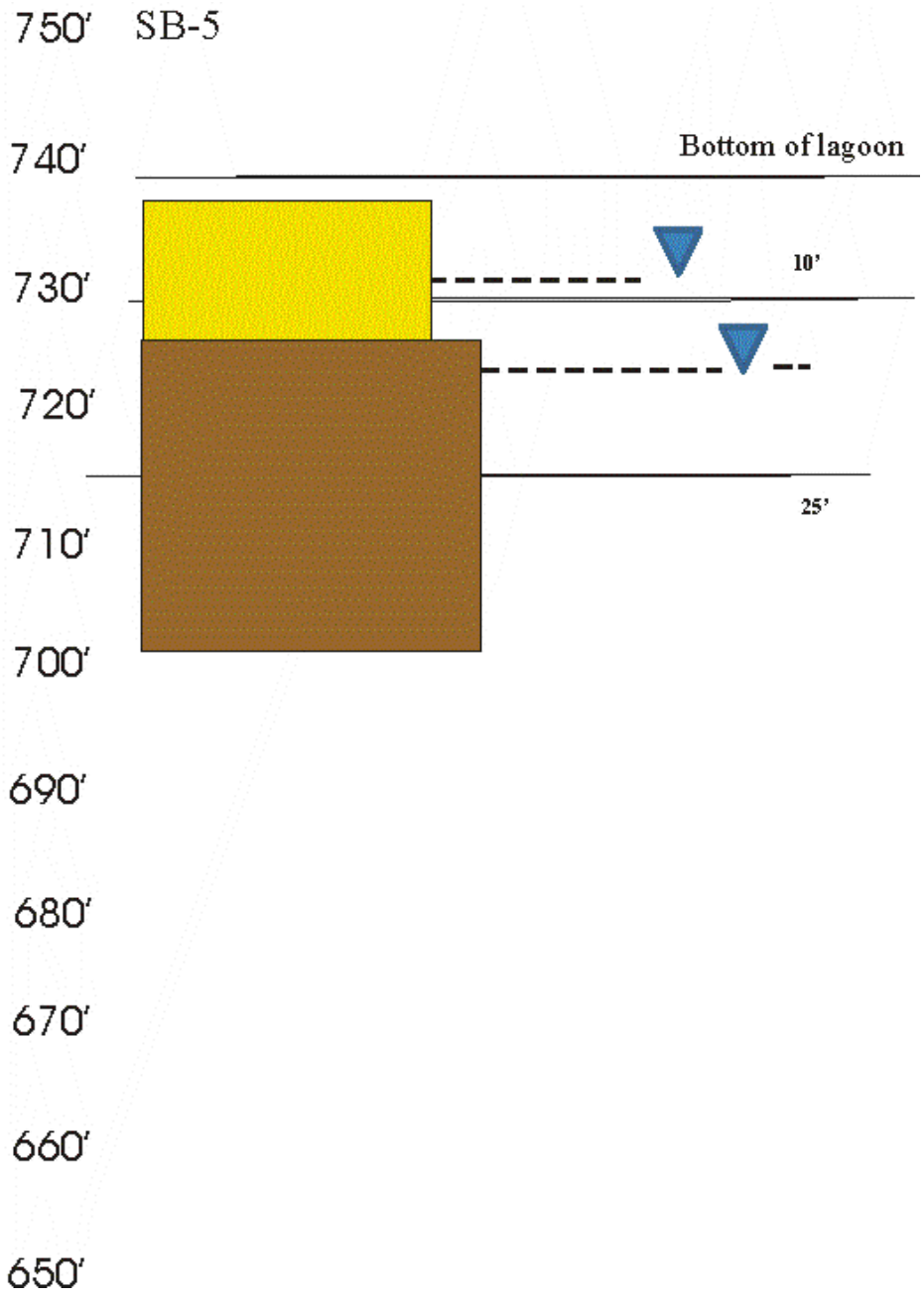
SB-4

7 foot cut; 6 feet below the water table.

Alluvial soils, high water table.

Alluvium above glacial till, bedrock is where?

This borehole is slightly greater than 25 feet below the bottom of the lagoon.



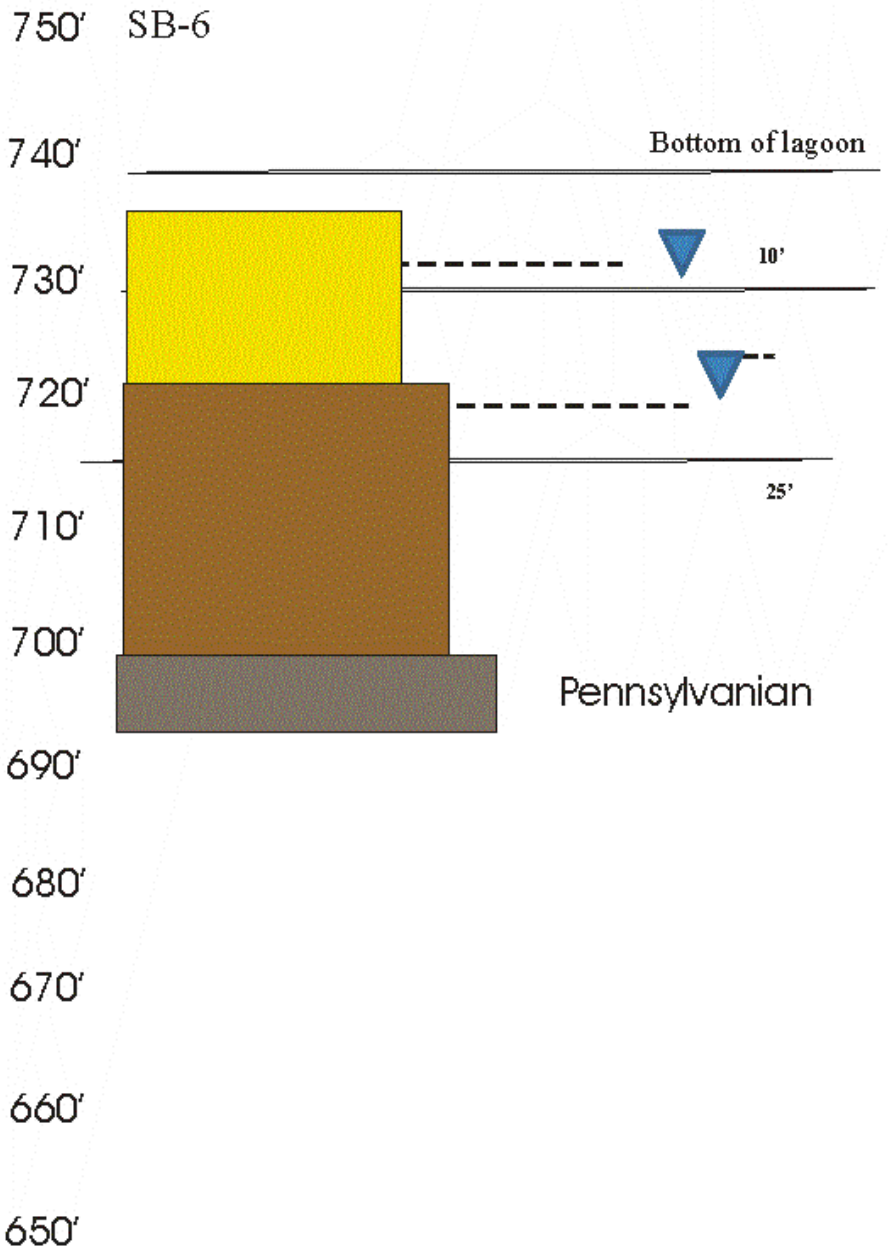
SB-5

2 foot fill; 8 feet above the water table.

Alluvial soils, high water table.

Alluvium above glacial till, bedrock is where?

This borehole is greater than 25 feet below the bottom of the lagoon.



SB-6

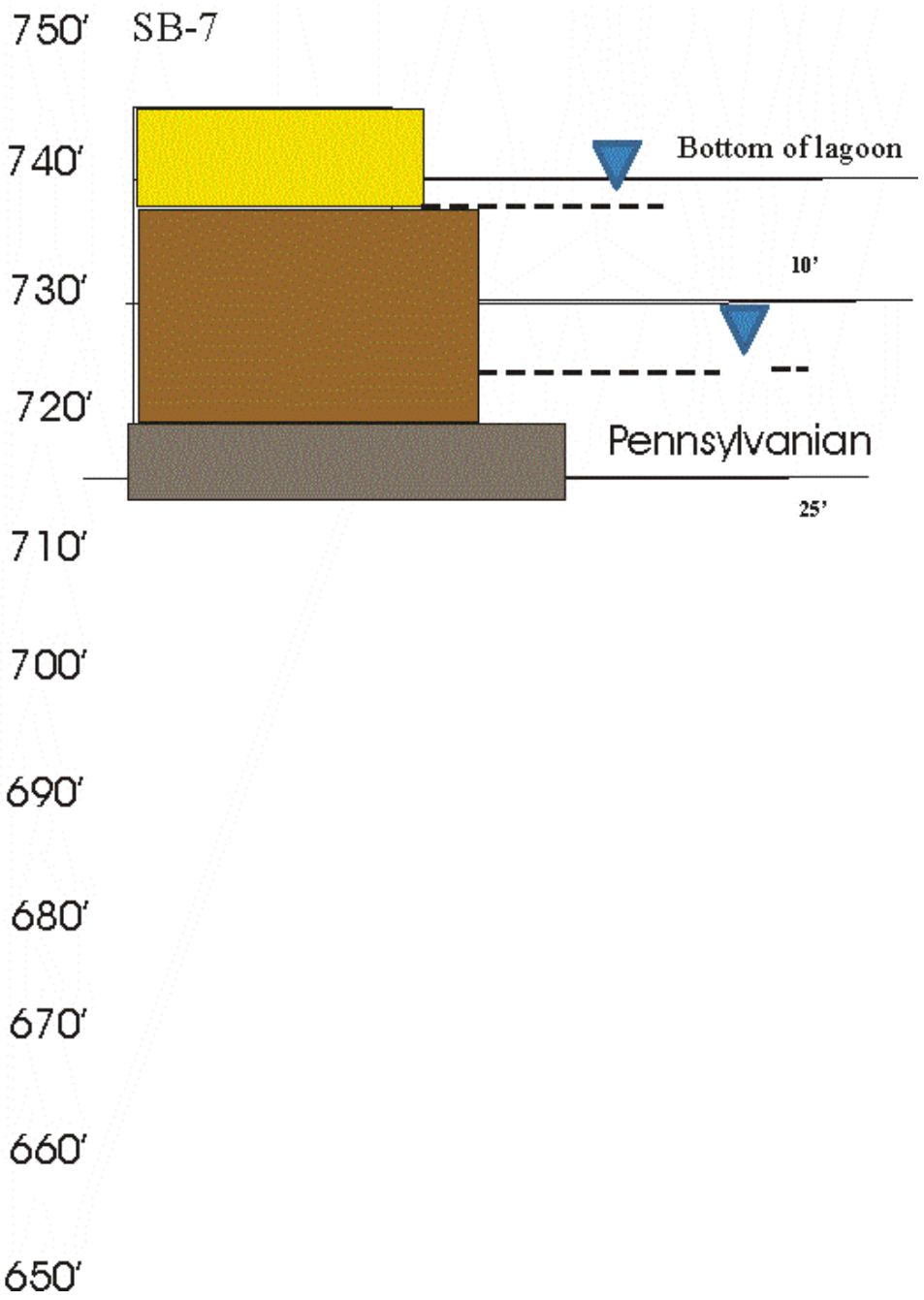
5 foot fill; 8 feet above the water table.

Alluvial soils, high water table.

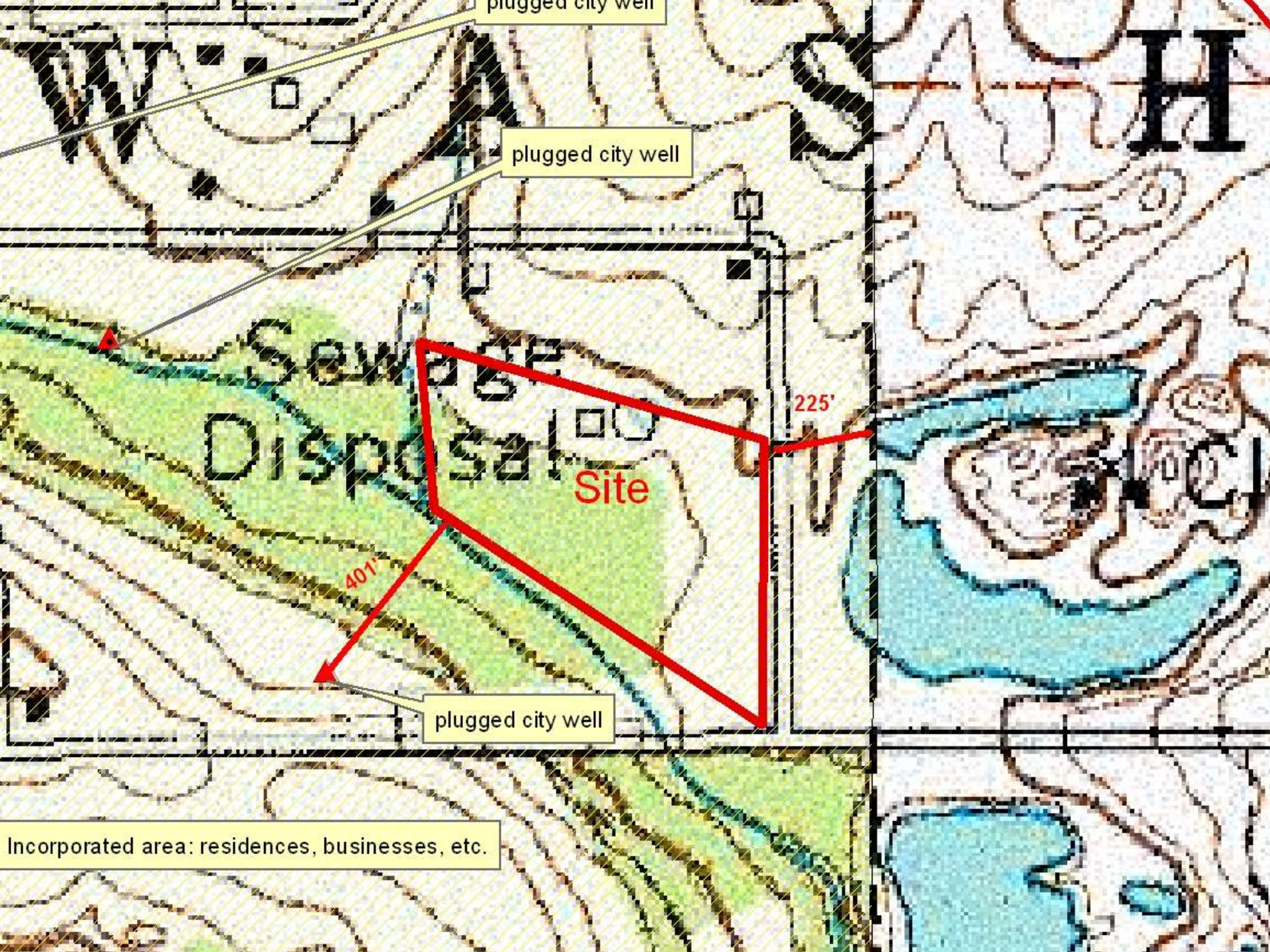
Alluvium above glacial till.

Pennsylvanian bedrock, not a regional Aquifer.

This borehole is greater than 25 feet below the bottom of the lagoon.



SB-7
5 foot cut.
Alluvial soils, high water table.
Alluvium above glacial till.
Pennsylvanian bedrock, not an aquifer.
This borehole is greater than 25 feet below the bottom of the lagoon.


plugged city well
plugged city well
Sewage
Disposal
Site
225'
401'
plugged city well
Incorporated area: residences, businesses, etc.

18C.3.5.1 Horizontal Separation

64.2(3) Site approval under 64.2(2) shall be based on the criteria contained in the Ten States Standards, design manuals published by the department, applicable federal guidelines and standards, standard textbooks, current technical literature and applicable safety standards. To the extent that separation distances of this subrule conflict with the separation distances of Iowa Code section 455B.134(3)*"f," the greater distance shall prevail. The following separation distances from a treatment* works shall apply unless a separation distance exception is provided in the "Iowa Wastewater Facilities Design Standards." The separation distance from lagoons shall be measured from the water surface.

a. 1000 feet from the nearest inhabitable residence, commercial building, or other inhabitable structure. If the inhabitable or commercial building is the property of the owner of the proposed treatment facility, or there is written agreement with the owner of the building, the separation criteria shall not apply. Any such written agreement shall be filed with the county recorder and recorded for abstract of title purposes, and a copy submitted to the department.

b. 1000 feet from public shallow wells.

c. 400 feet from public deep wells.

d. 400 feet from private wells.

e. 400 feet from lakes and public impoundments.

f. 25 feet from property lines and rights-of-way.

When the above separation distances cannot be maintained for the expansion, upgrading or replacement of existing facilities, the separation distances shall be maintained at no less than 90 percent of the existing separation distance on the site, providing no data is available indicating that a problem has existed or will be created

Therefore, if public well were still active, separation distances are met.

Are the ponds "lakes" or "public impoundments?"

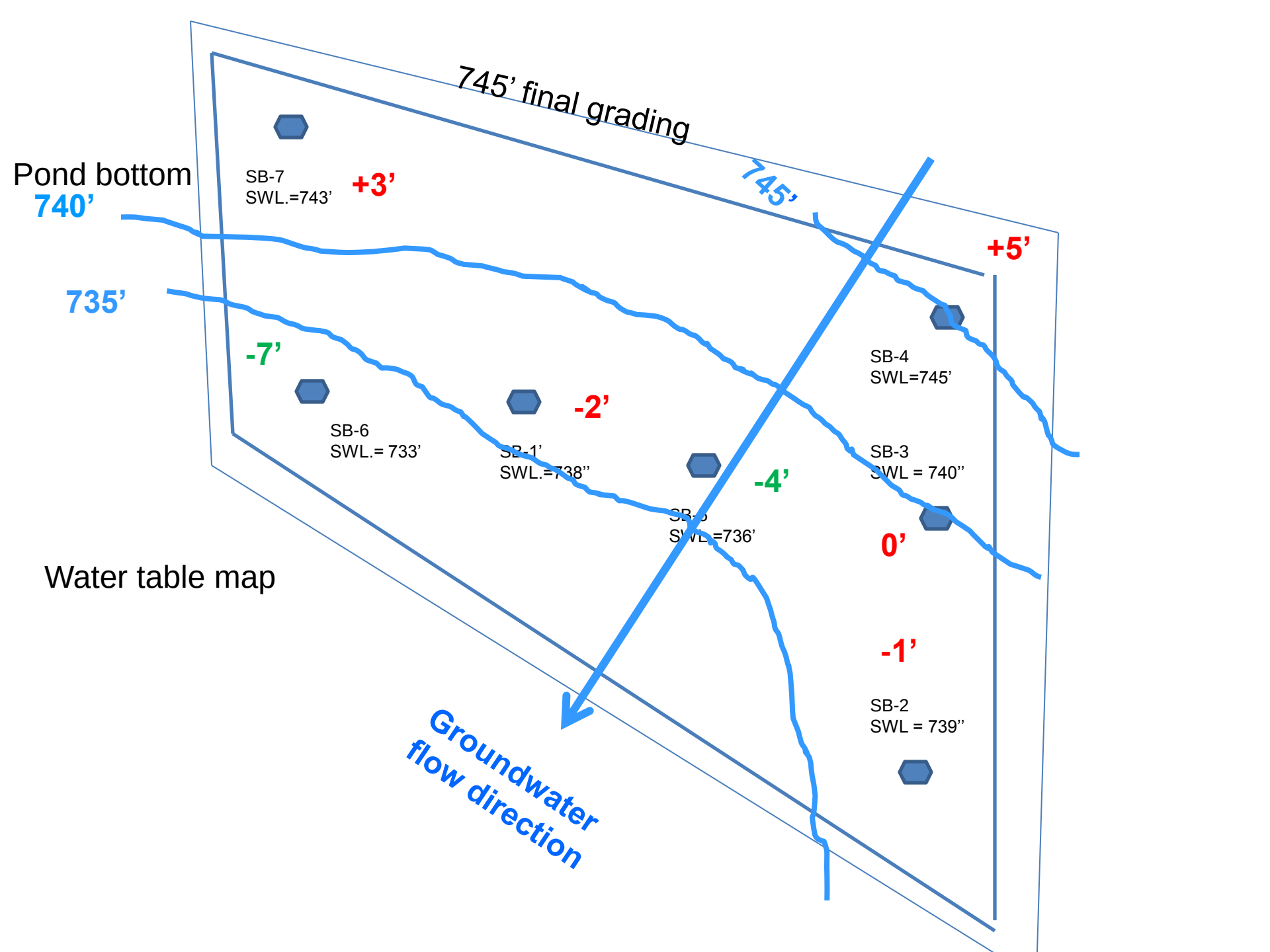
What about the stream and property lines?

18C.3.5.2 Vertical Separation

A minimum separation of four feet between the pond seal and the ***maximum groundwater table*** is recommended; however, ***in no case shall the top of the pond seal be below the maximum groundwater table.*** Where the groundwater table occurs as a result of a perched groundwater condition, see section 18C.3.5.3

.

If the maximum anticipated groundwater table is less than two feet below the bottom of the lagoon, the lagoon shall be provided with a synthetic liner.



Water table map

18C.3.5.3 Perched Groundwater

Provisions for the permanent artificial lowering of perched groundwater layers on a site may be considered. Perched groundwater layers shall be considered as those distinct layers of groundwater of limited area ca[u]sed by the blockage of normal seepage of rainwater / snowmelt / runoff by an impervious soil layer. Detailed Justification shall be provided to confirm that the groundwater layers are of limited area and to confirm the adequacy of the proposed drainage around the pond system.

Minimum requirements shall include the permanent lowering of the perched groundwater table to an elevation one foot below the top of the pond seal. If the perched groundwater table after permanent lowering is less than two feet below the bottom of the lagoon, the lagoon shall be provided with a synthetic liner.

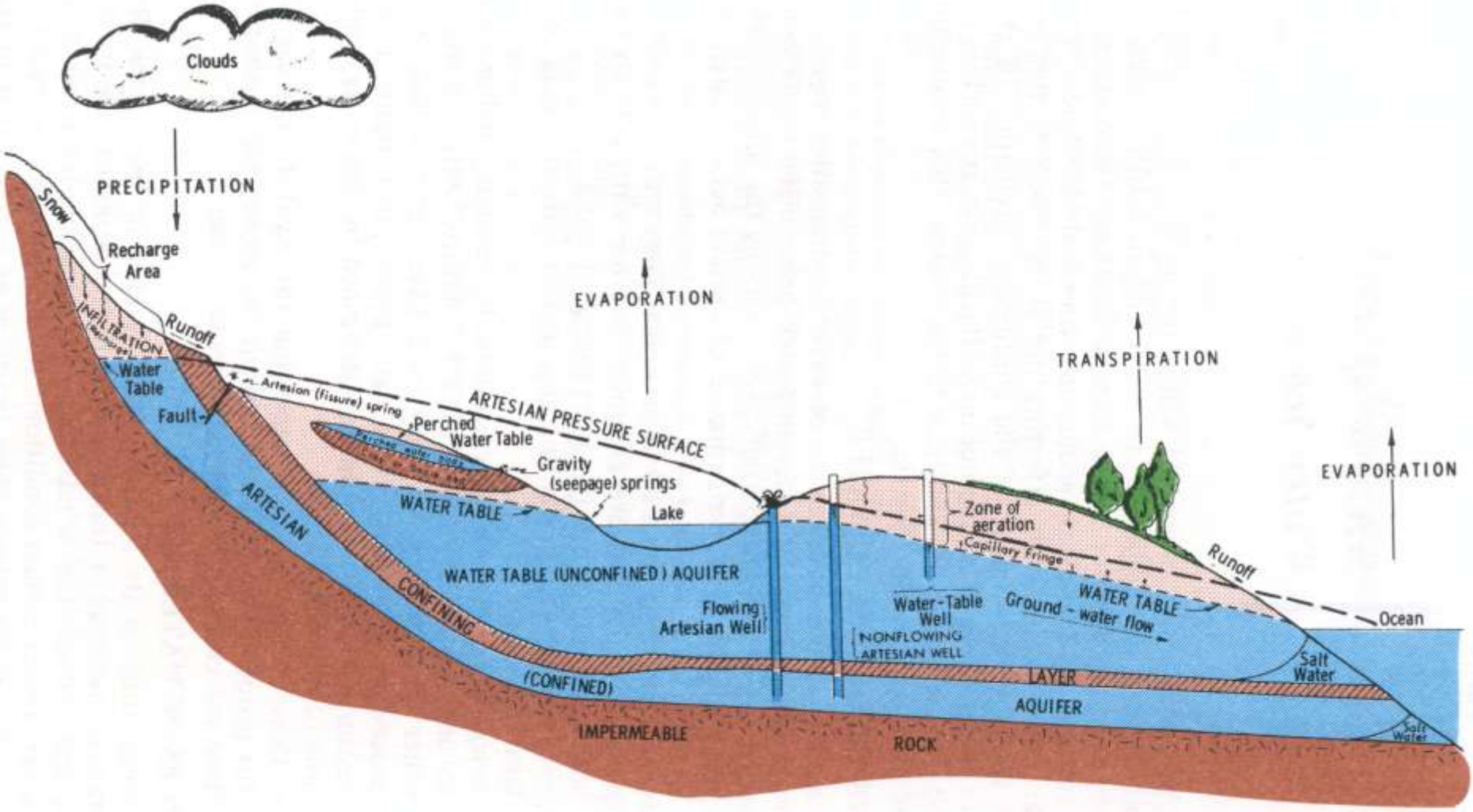
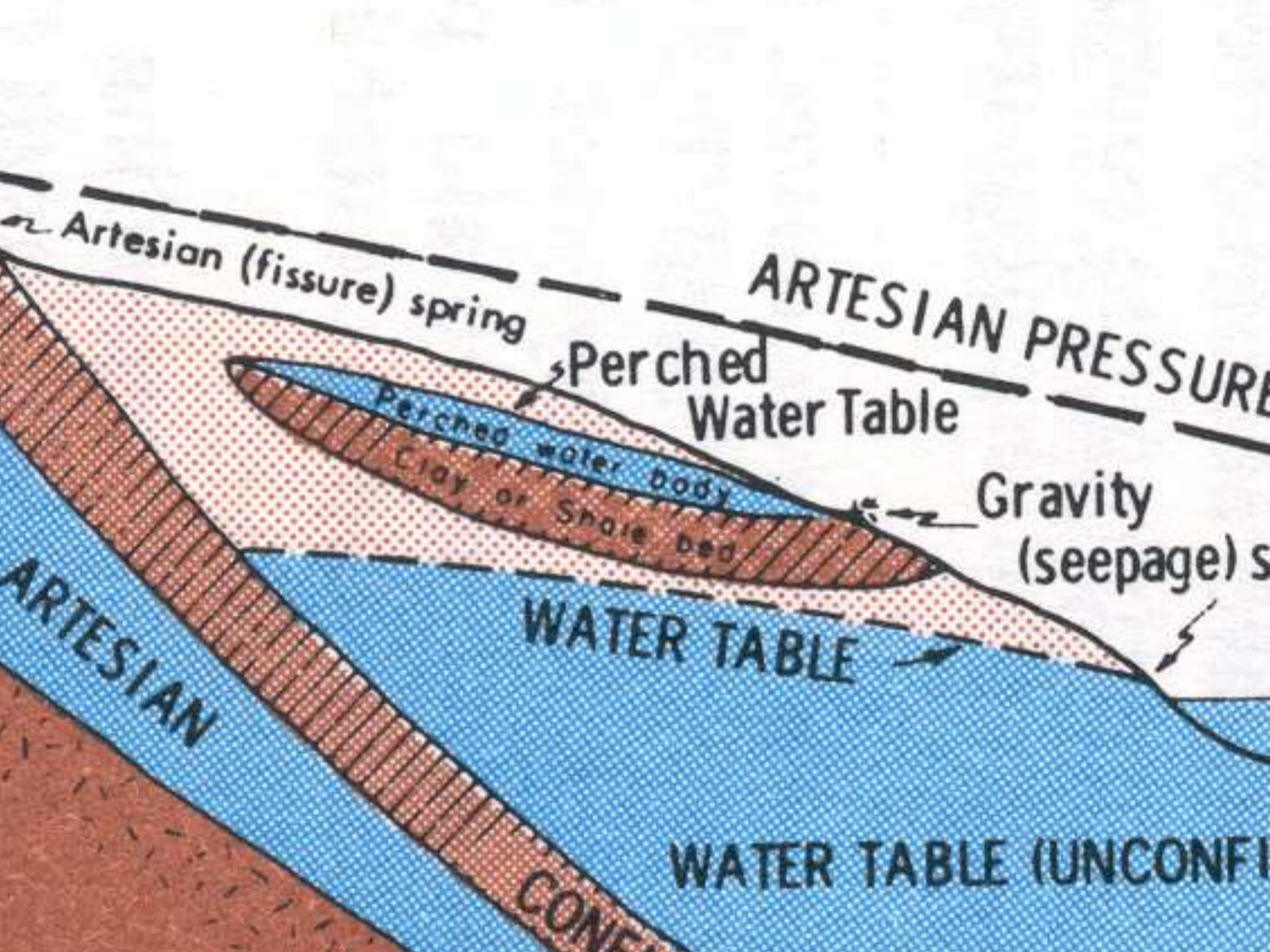


FIGURE 1. The hydrologic cycle.


Artesian (fissure) spring
ARTESIAN PRESSURE
Perched
Water Table
Perched water body
Clay or Shale bed
Gravity
(seepage) s
WATER TABLE
ARTESIAN
WATER TABLE (UNCONFI

Is there perched groundwater at the What Cheer site? Proof?

How far does the groundwater table have to be lowered to comply with the rules at this site?

How would you do it?

DOCUMENT IT!

18C.3.6.1 Karst Features

The pond shall not be located on sites that exibit Karst features: i.e., sink holes or solution channeling generally ovcurring in areas underlain by limestone or dolomite.

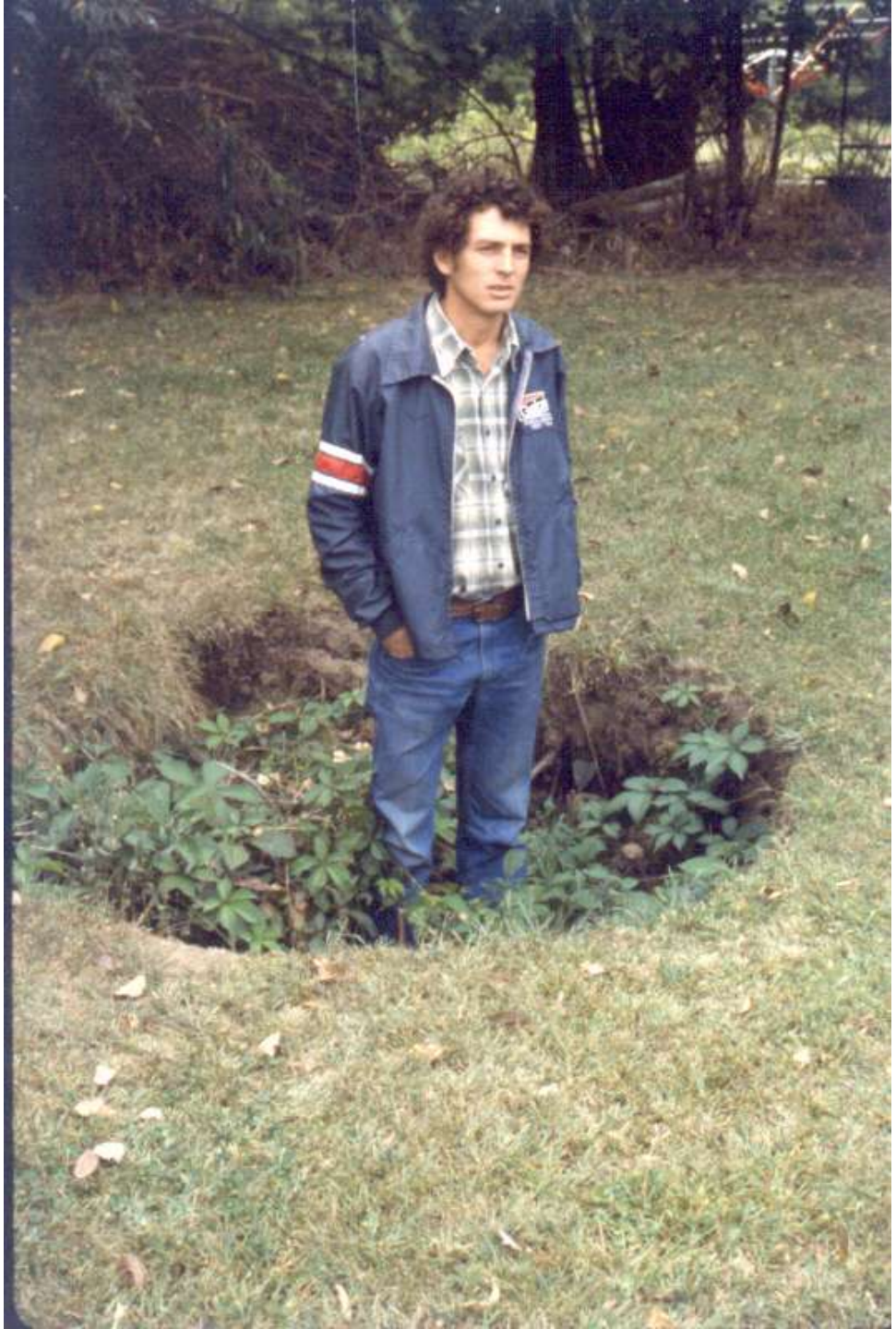
All proposed lagoon facilities in Karst areas will require special review early in the siting procedure. Proposed locations shall be submitted for review and if it is determined that a potential for sinkhole development exits, a lagoon system will not be opermitted.

If the facility is located in an area of know or suspected fractured limestone (Karst topography), all cells must be lined with a synsthetic liner.

18C.3.6.2 Bedrock Separation

A separation of ten feet between the pond bottom and any bedrock formations is recommended with a minimum separation of four feet required. A synthetic liner shall be required if the lagoon bottom is to be located less than ten feet above a carbonate or sandstone formation.


JOHN DEERE



MEMO FROM: Iowa Geological and Water Survey

DATE: 7/1/2011

Criteria required for Iowa Geological and Water Survey (IGWS) geotechnical review of proposed wastewater lagoons according to *Iowa Wastewater Facilities Design Standards Chapter 18C Waste Treatment Ponds (Lagoons*) [specifically Chapter 18C2 and 18C3].

One application - the application submitted to IGWS must be for a single site; multiple ponds or cells are acceptable, so long as the map products clearly show the appropriate layout of the site.
Location map - this is the map which shows the relationship of the proposed wastewater facility with various landmarks (towns, roads, landscape, boundaries, etc.). This map should show the surrounding area for a few miles. Topographic maps are ideal for presenting this type of information. Other map bases will be accepted so long as the site can be easily located.
Site map – this is the map or set of maps which show the site plus at least ¼-mile radius in order to identify any wells, tile lines, restricted facilities, and the geotechnical borings for the site. The maps can be on a topographic or aerial photo base, HOWEVER, the boring logs must be on a topographic base which is the same as the U.S. Geological Survey (USGS) quadrangles.
At a minimum, the application must contain the following information

- Proposed pond acreage.
- Proposed pond bottom elevation.
- Boring logs:
  - with surface elevation to match UGSG topography.
  - Split spoon samples – blows/foot.
  - Water levels measured upon completion of drilling and one week later, at a minimum.
  - Detailed materials descriptions.
  - Number of borings and depths according to rule 18C.2.5.
- Discussion of general geology of site.
- Discussion of local groundwater flow conditions.

If any of the above items is missing, IGWS will return the application to the Wastewater Engineering Section.

Deborah Quade
Section Supervisor
Geology and Groundwater Section

The Good

EXAMPLES

The Bad

The Ugly

NOTE: VICINITY MAP SUPERIMPOSED ON A GOOGLE MAPS IMAGE. DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES.

Project No.	08115086-01
Scale:	NOT TO SCALE
Drawn By:	AJW
Date:	September 27, 2011

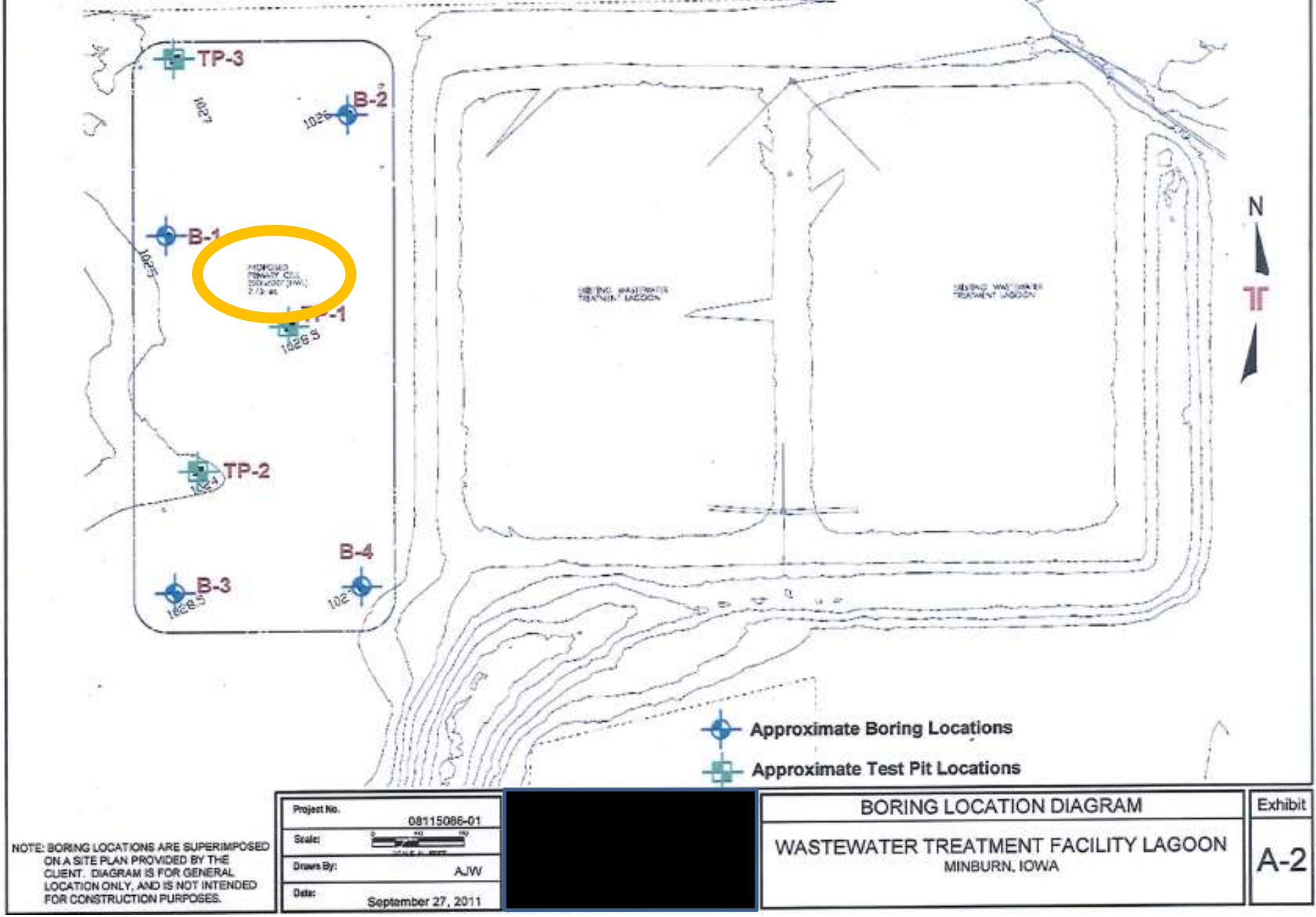
[redacted]

VICINITY MAP

WASTEWATER TREATMENT FACILITY LAGOON
MINBURN, IOWA

Exhibit A-1

The Good: name of community (albeit hard to read) and site location on an aerial photo base.



NOTE: BORING LOCATIONS ARE SUPERIMPOSED ON A SITE PLAN PROVIDED BY THE CLIENT. DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES.

Project No.	08115086-01
Scale:	
Drawn By:	AJW
Date:	September 27, 2011

[redacted]

BORING LOCATION DIAGRAM

WASTEWATER TREATMENT FACILITY LAGOON
MINBURN, IOWA

Exhibit A-2

The Bad: contours not labeled; acres hard to read; no pond bottom elevation

The Ugly: no contours, no labeling, what and where is this; where is the lagoon?

LOG OF BORING NO. 1

CLIENT: KIRKHAM MICHAEL ASSOCIATES

SITE: WEST OF EXISTING LAGOON CELLS, MINBURN, IOWA

PROJECT: WASTEWATER TREATMENT FACILITY LAGOON

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 1027 ft									
	0.3 Root Zone at Surface 1026.5				PA					
	1 SILTY FINE SAND, Dark Brown 1026									
	SILTY FINE TO COARSE SAND, Brown, Loose		SM	1	SS	6	6			
	6.5 1020.5	5			PA					
	SANDY LEAN CLAY, Trace Gravel, Brown Gray, Medium Stiff to Stiff, Occasional Sand Seams		CL	2	SS	1	7	1		3000*
		10			PA					
	Becoming Very Stiff and Gray Brown Below About 14 Feet 15.5 1011.5		CL	3	SS	1	13	1		5000*
	FAT CLAY, With Sand, Gray, Stiff to Very Stiff	15			PA					
			CH	4	SS	1	13	2		6500*
	22 1005	20			PA					
	FAT CLAY, Trace Sand, Gray and Brown Gray, Very Stiff		CH	5	SS	1	18	1		8000*
		25			PA					
			CH	6	SS	18	18	2		6000*
	32.5 994.5	30			PA					
	SANDY LEAN CLAY, Trace Gravel, Brown, Very Stiff to Hard, Occasional Sand Seams and Cobbles 35.5 991.5		CL	7	SS	18	18	14		9000*
	BOTTOM OF BORING	35								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Hand Penetrometer
**140 Lbs Automatic SPT Hammer

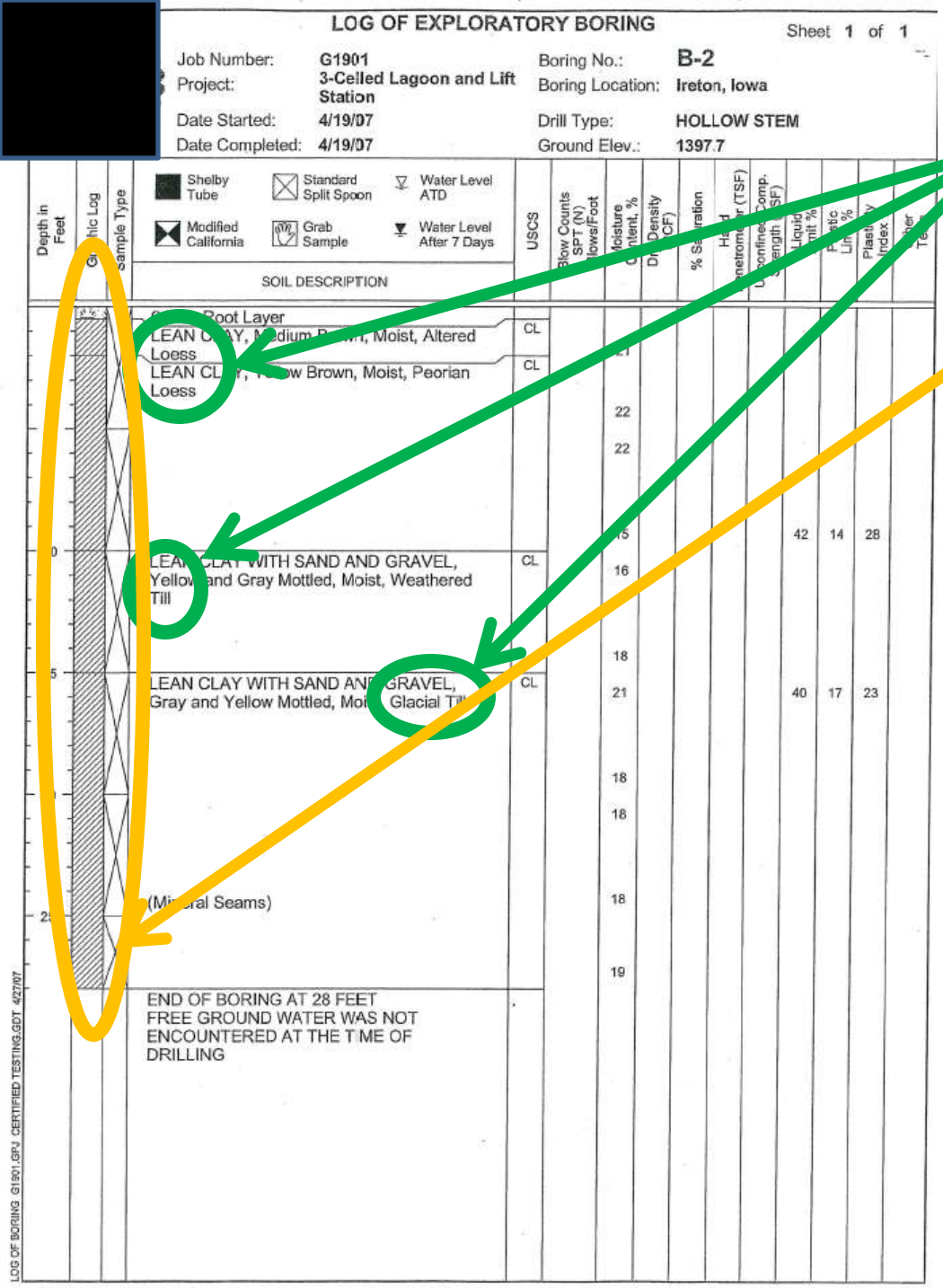
WATER LEVEL OBSERVATIONS, ft

WL	▽ N/E	WD	▽ 13.5 on 10/4/201
WL	▽		▽
WL	WCI @ 20.5' on 10/4/2011		

[redacted]

BORING STARTED			9-21-11
BORING COMPLETED			9-21-11
RIG	772	FOREMAN	PF
APPROVED	AJW	JOB #	08115086

The Good: split spoon blows / foot changes; change coincides with lithologic change: significance?



LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: G1901
Project: 3-Celled Lagoon and Lift Station
Boring No.: B-2
Boring Location: Ireton, Iowa
Date Started: 4/19/07
Date Completed: 4/19/07
Drill Type: HOLLOW STEM
Ground Elev.: 1397.7

Shelby Tube | Standard Split Spoon | Water Level ATD
Modified California | Grab Sample | Water Level After 7 Days

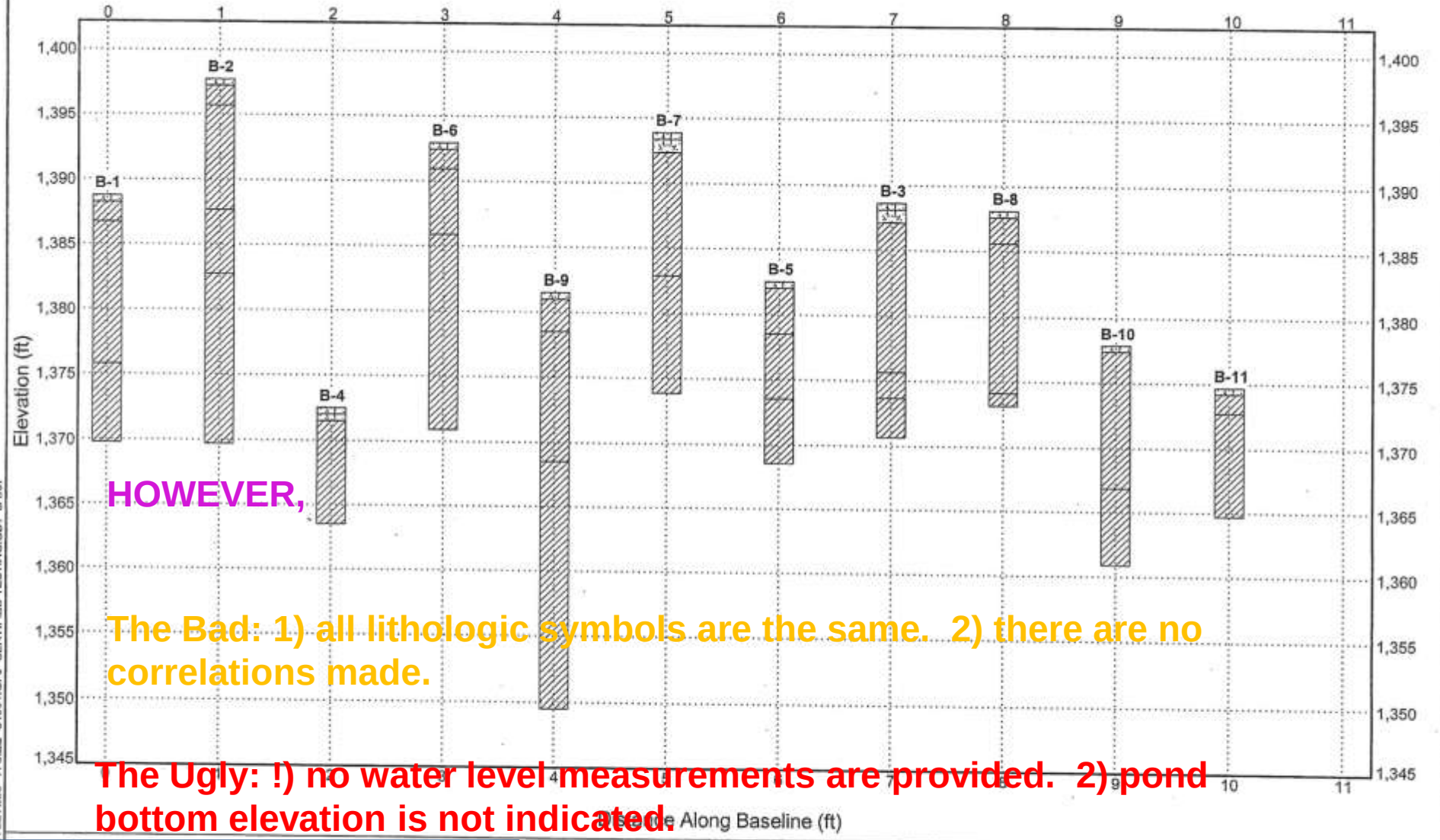
Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	USCS	Blow Counts SPT (N) Blows/Foot	Moisture Content, %	Dry Density (PCF)	% Saturation	Hand Penetrometer (TSF)	Unconfined Comp. Strength (PSF)	Liquid Limit %	Plastic Limit %	Plasticity Index	Other Tests
			Root Layer											
			LEAN CLAY, Medium Brown, Moist, Altered Loess	CL		21								
			LEAN CLAY, Yellow Brown, Moist, Peorian Loess	CL		22								
						22								
0			LEAN CLAY WITH SAND AND GRAVEL, Yellow and Gray Mottled, Moist, Weathered Till	CL		15					42	14	28	
						16								
						18								
5			LEAN CLAY WITH SAND AND GRAVEL, Gray and Yellow Mottled, Moist, Glacial Till	CL		21					40	17	23	
						18								
						18								
			(Mineral Seams)			18								
						19								
			END OF BORING AT 28 FEET FREE GROUND WATER WAS NOT ENCOUNTERED AT THE TIME OF DRILLING											

LOG OF BORING G1901.GPJ CERTIFIED TESTING.GDT 4/27/07

The Good: actually identifies rock types.

The Bad: no change in symbols.

The Good: all wells can be compared.



HOWEVER,

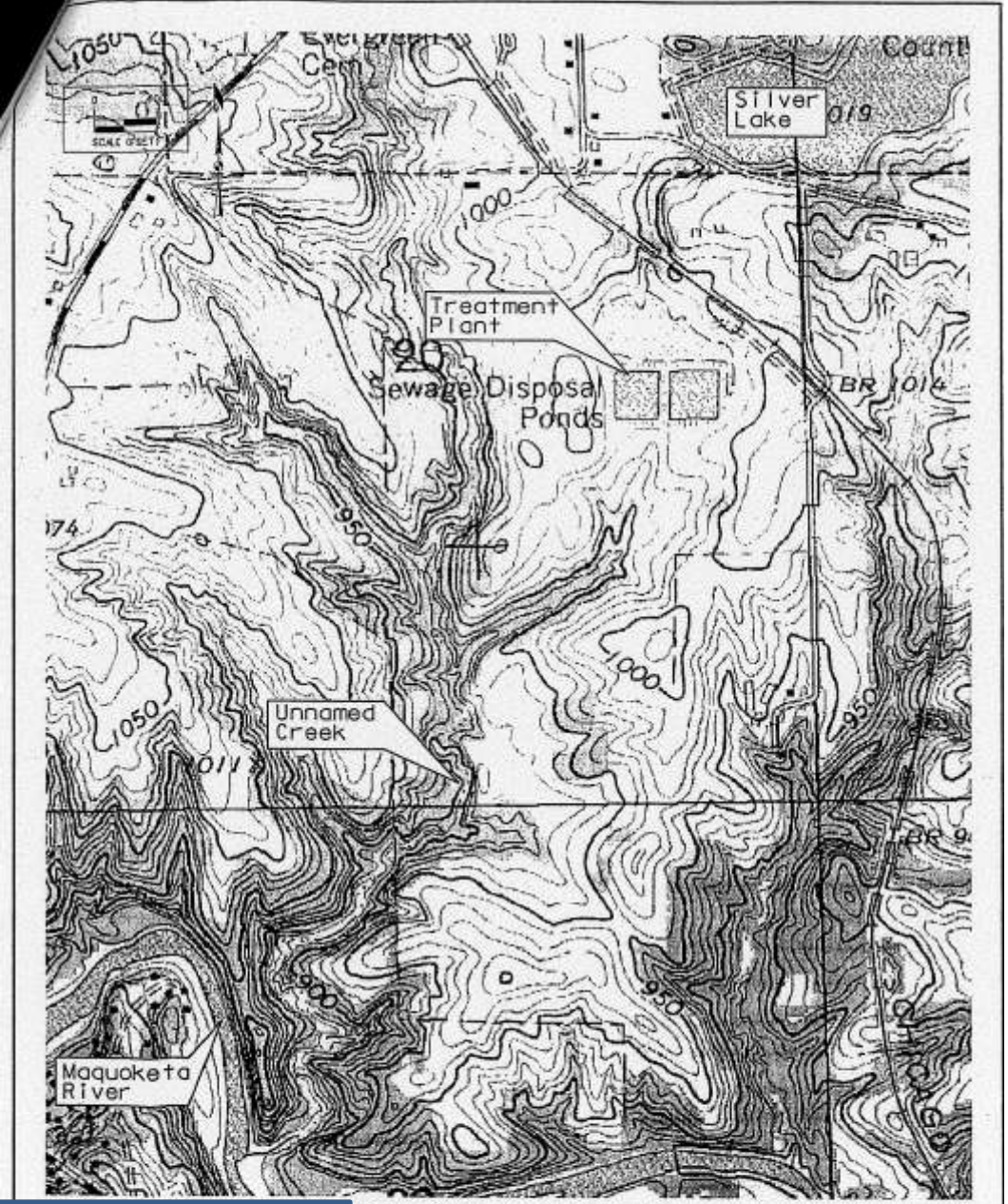
The Bad: 1) all lithologic symbols are the same. 2) there are no correlations made.

The Ugly: !) no water level measurements are provided. 2) pond bottom elevation is not indicated.

[redacted]

3-Celled Lagoon and Lift Station
Ireton, Iowa

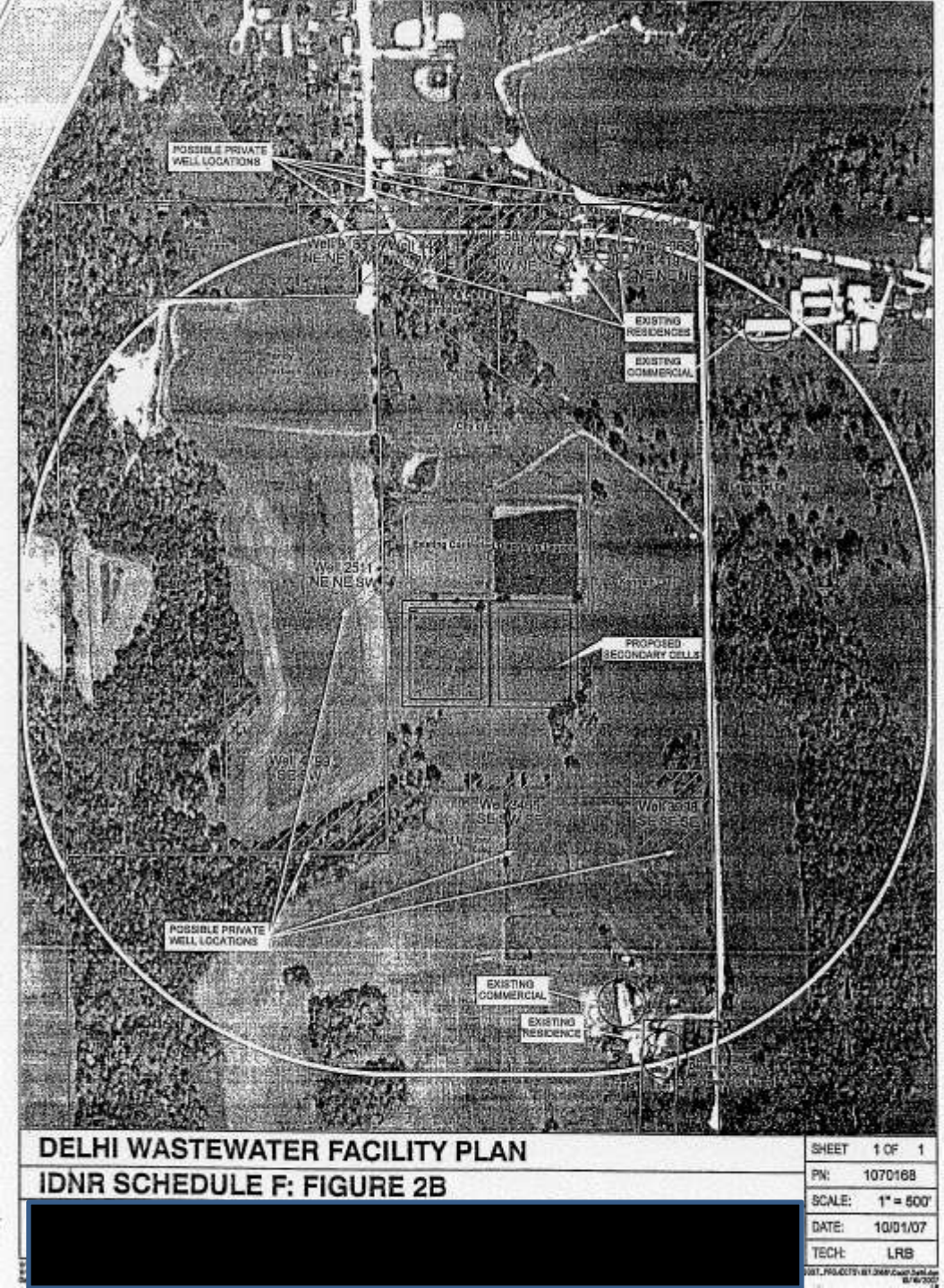
Project Number: G1901



DELHI LAGOON TOPOGRAPHY

FIGURE 3.2

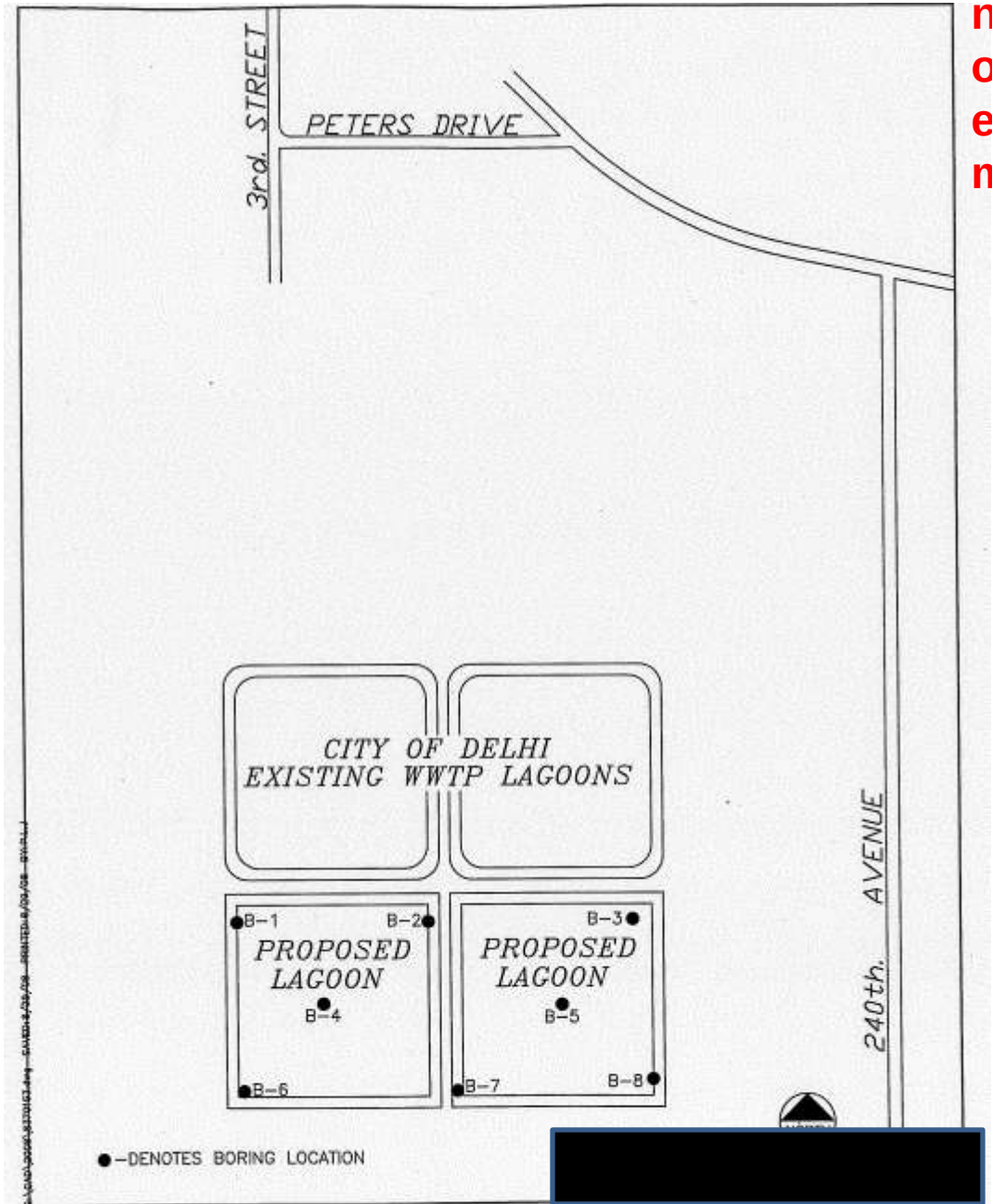
The Good: location map on a topographic base.

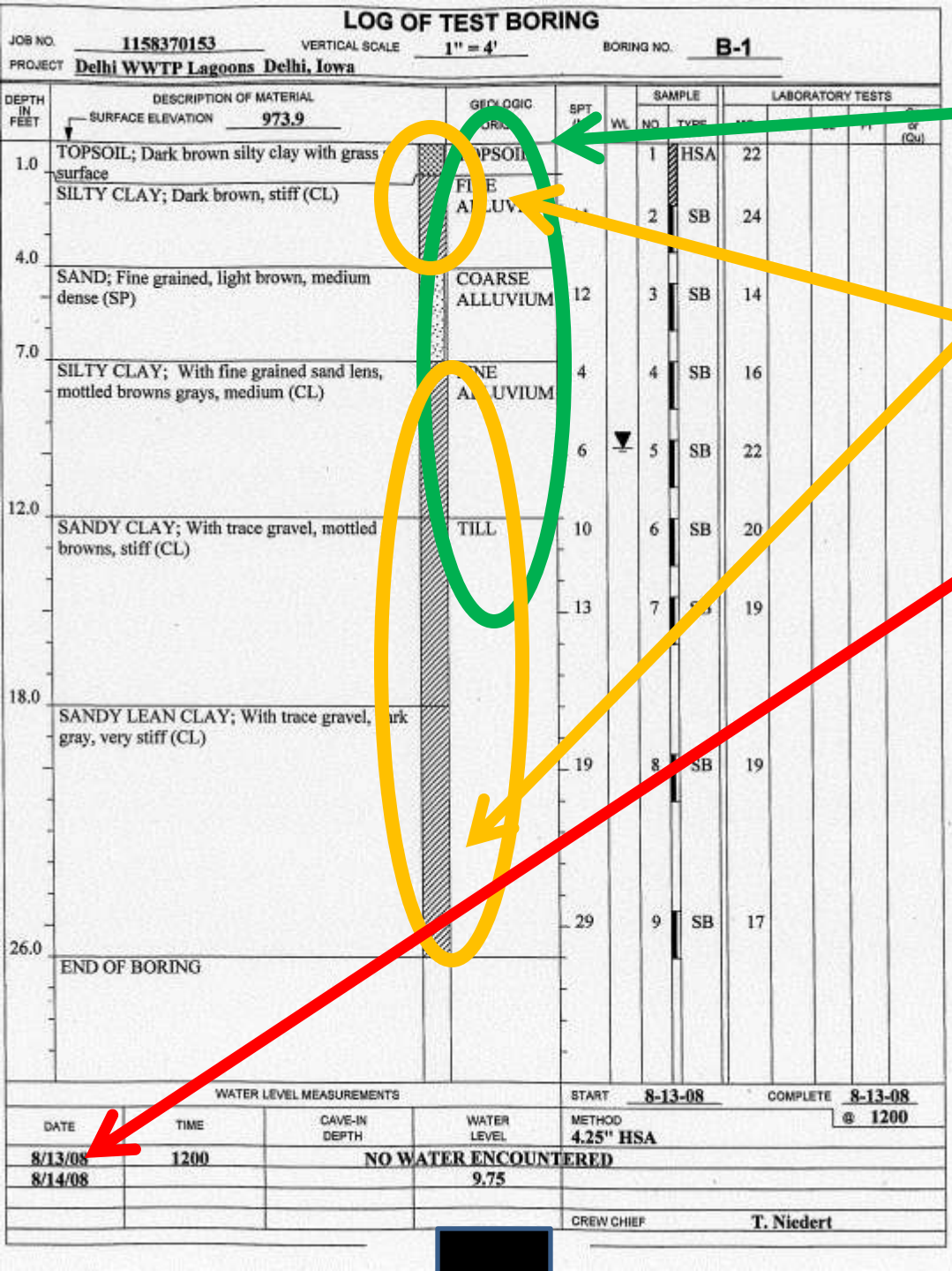


The Good: vicinity map; aerial photo base is acceptable. Identifies lagoon site, possible private wells, commercial entities, municipal limits.

The Bad: difficult to read.

The Ugly: 1) no topographic base for the site map. 2) site map does not match lagoons as displayed on the vicinity map. 3) boring log elevations are not on this site map.





LOG OF TEST BORING

JOB NO. 1158370153 VERTICAL SCALE 1" = 4' BORING NO. B-1

PROJECT Delhi WWTP Lagoons Delhi, Iowa

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 973.9)	GEOLOGIC ORIGIN	SPT	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS
1.0	TOPSOIL; Dark brown silty clay with grass surface	TOPSOIL			1	HSA	22
	SILTY CLAY; Dark brown, stiff (CL)	FINE ALLUVIUM			2	SB	24
4.0	SAND; Fine grained, light brown, medium dense (SP)	COARSE ALLUVIUM	12		3	SB	14
7.0	SILTY CLAY; With fine grained sand lens, mottled browns grays, medium (CL)	FINE ALLUVIUM	4		4	SB	16
			6	▼	5	SB	22
12.0	SANDY CLAY; With trace gravel, mottled browns, stiff (CL)	TILL	10		6	SB	20
			13		7	SB	19
18.0	SANDY LEAN CLAY; With trace gravel, dark gray, very stiff (CL)		19		8	SB	19
			29		9	SB	17
26.0	END OF BORING						

WATER LEVEL MEASUREMENTS

START 8-13-08 COMPLETE 8-13-08 @ 1200

METHOD 4.25" HSA

DATE	TIME	CAVE-IN DEPTH	WATER LEVEL
8/13/08	1200	NO WATER ENCOUNTERED	
8/14/08			9.75

CREW CHIEF T. Niedert

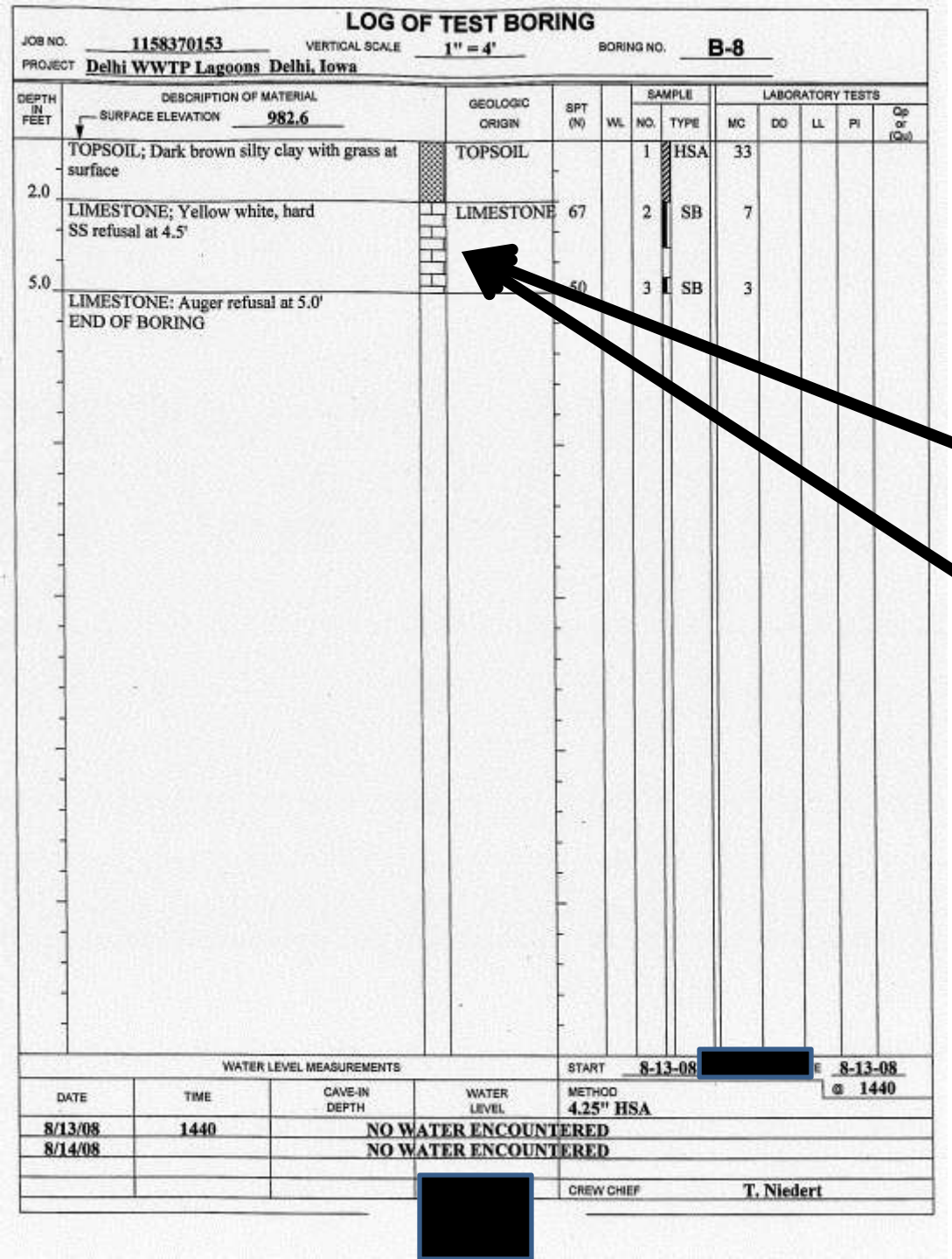
[redacted]

The Good: actually identifies rock types.

The Bad: no change in symbols.

The Ugly: Water levels were taken the day after drilling instead of one week (or longer) later.

Proposed rule change: groundwater table is the seasonal high water table determined by temporary monitoring wells not earlier than 7 days following installation; other pertinent information may be utilized to determine the seasonal high groundwater table.



LOG OF TEST BORING

JOB NO. 1158370153 VERTICAL SCALE 1" = 4' BORING NO. B-8

PROJECT Delhi WWTP Lagoons Delhi, Iowa

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 982.6)	GEOLOGIC ORIGIN	SPT (N)	WL	SAMPLE NO.	SAMPLE TYPE	LAB TESTS MC	DD	LL	PI	Qp or (Qu)
	TOPSOIL; Dark brown silty clay with grass at surface	TOPSOIL			1	HSA	33				
2.0	LIMESTONE; Yellow white, hard SS refusal at 4.5'	LIMESTONE	67		2	SB	7				
5.0	LIMESTONE: Auger refusal at 5.0' END OF BORING		50		3	SB	3				

WATER LEVEL MEASUREMENTS

DATE	TIME	CAVE-IN DEPTH	WATER LEVEL
8/13/08	1440	NO WATER ENCOUNTERED	
8/14/08		NO WATER ENCOUNTERED	

START 8-13-08 [redacted] E 8-13-08 @ 1440

METHOD 4.25" HSA

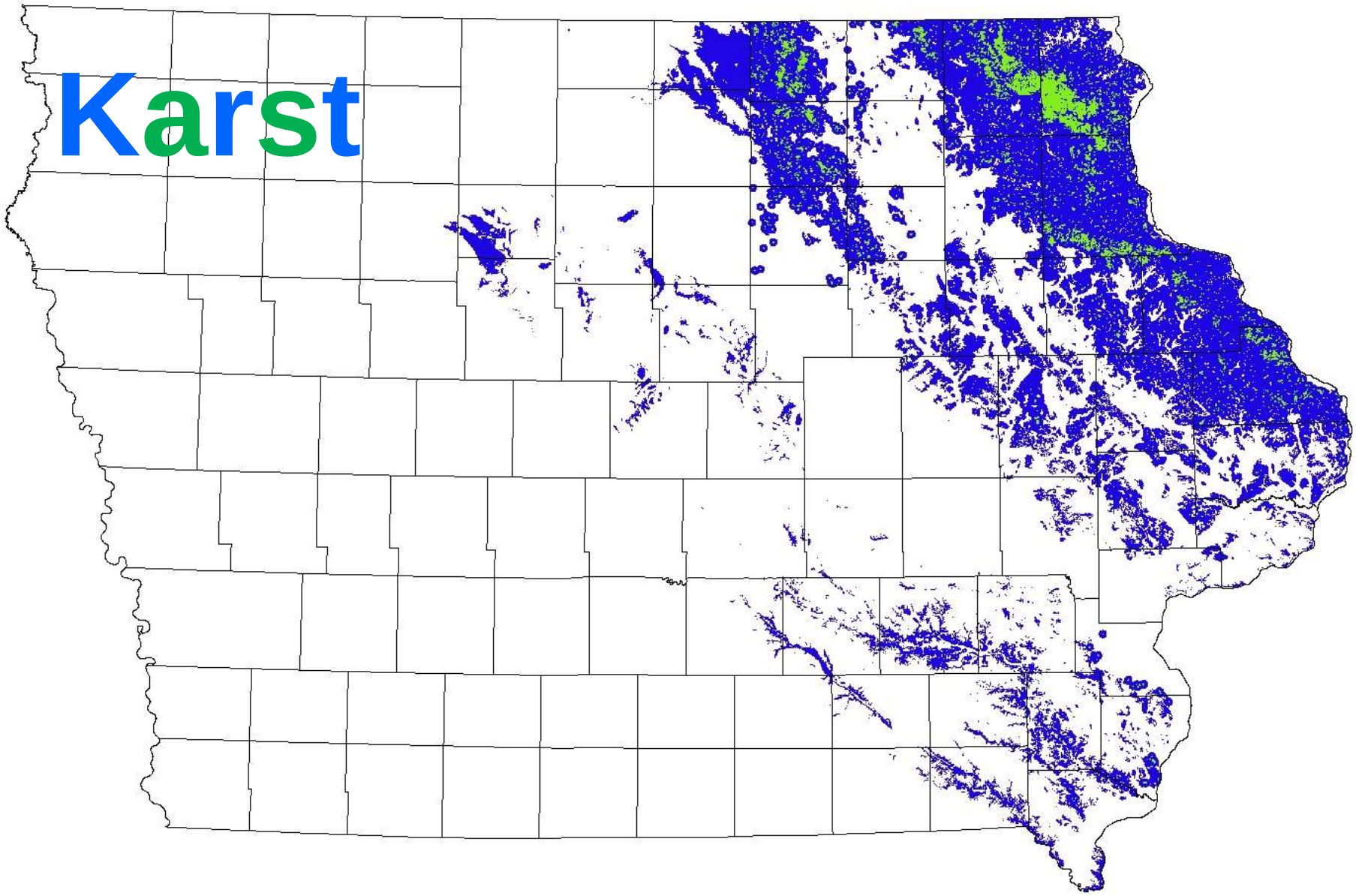
CREW CHIEF T. Niedert

[redacted]

18C.3.6.2 Bedrock Separation: A separation of 10 feet is recommended; a minimum of 4 feet is required.
If less than 10 feet above a carbonate or sandstone formation, a synthetic liner is required.

18C.3.6.1 Karst Festures: The pond shall not be located on sites that exhibit Karst features: i.e., sink holes or solution channeling generally occurring in areas underlain by limestone or dolomite.

Karst



This map contains a GRID representing areas within 1000 feet of known sinkholes and other areas that have carbonate bedrock within 50 feet of the ground surface.

Sources of data and other information:

Topography **http://ortho.gis.iastate.edu/**

Soils **http://soils.usda.gov/technical/classification/osd/index.html**

Information for Karst areas and potential Karst areas can be found from the following links

(1)
http://programs.iowadnr.gov/ims/website/livestock_burial_zones/viewer.htm

Tip: Looking for Karst region by turning off the burial function and turning on Karst function of the interactive mapping. Redraw map.

(2) **ftp://ftp.igsb.uiowa.edu/igspubs/pdf/ofm-2010-07.pdf**

Tip: Be patient

Iowa DNR Interactive Map

programs.iowadnr.gov/ims/website/livestock_burial_zones/viewer.htm

Iowa DNR Interactive Mapping

for website help, click here

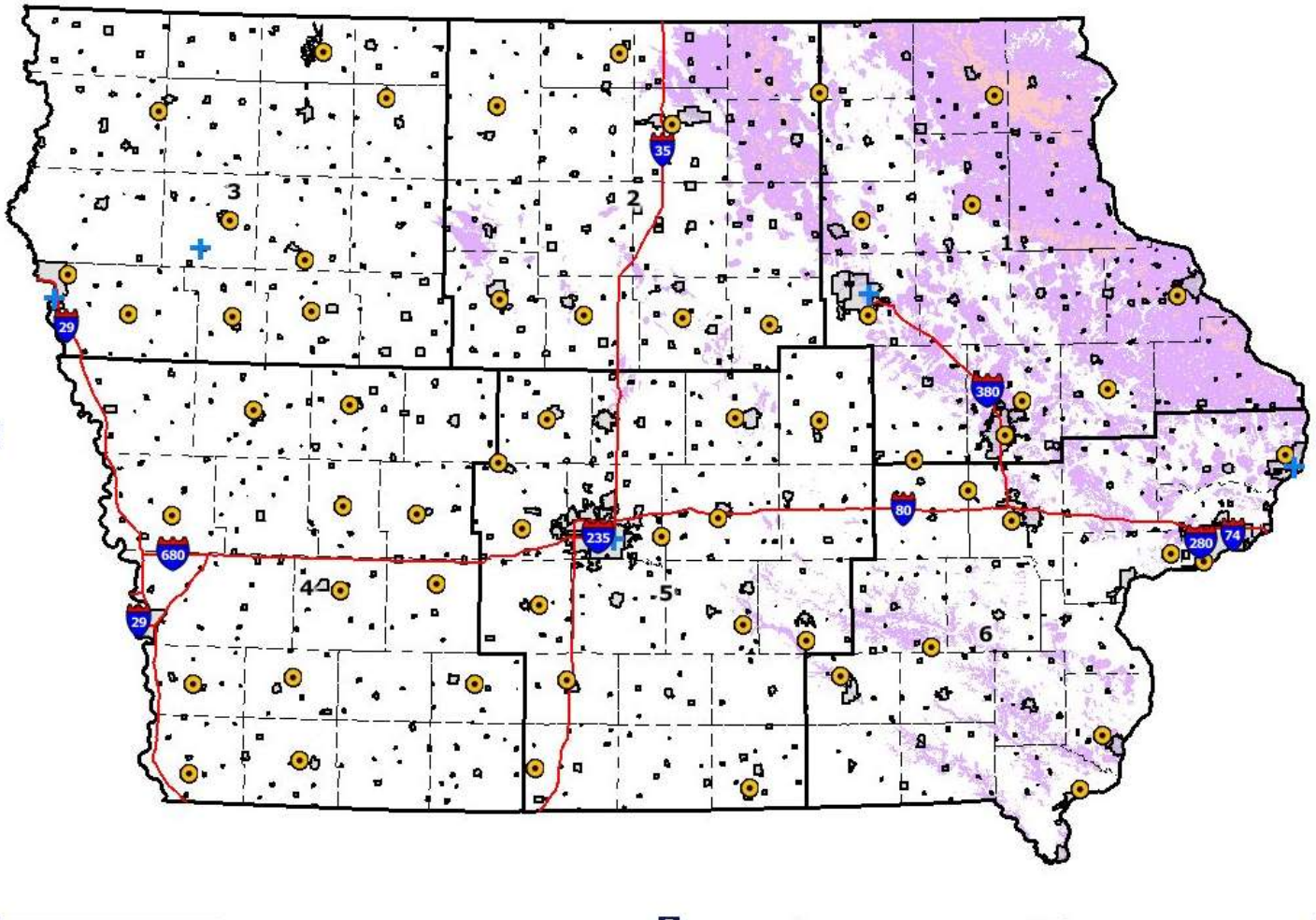
print map | print legend | zoom full | zoom last | zoom in | zoom out | pan map | add bkmrk | go to bkmrk | go to legal | query data | id map | set units | meas d&a | clear select | buffer select | select box | pick map scale: 3,500

Some of this material was made possible, in part, by a Grant from the United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). It may not necessarily express APHIS' views.
If you're a **first-time user** of this site, then click here.

Click on this symbol in the Toolbar to zoom to a **legal description**. For more updates click here.

- Source Water Protection Area Surface Runoff Area Capture Zones
- Source Water Protection Area 1 Mile Capture Zones
- Source Water Protection Area 2,500 ft Capture Zones
- Burial Zones (Transparent)
- Burial Zones (Full Color)
  - No Restrictions
  - High Water Table (less than) 6 Ft Down
  - Bedrock (less than) 25 Ft Down
  - 9% - 14% Slopes
  - Public Lands
  - Upland Drainages
  - Wetland Reserves
  - Restricted
- Alluvial
  - Potential Alluvial Soils
  - Not Alluvial Soils
- Karst
  - Karst (within 1,000 Ft of sinkhole)
  - Potential Karst
  - Not Karst
- Percent Slope
  - 0 - 5
  - 5 - 9
  - > 9
  - No Data
- DOT Road Map
- 1:24K Topographic Maps

Redraw Map



programs.iowadnr.gov/ims/website/livestock_burial_zones/dnr_refresh.htm

NE Iowa Watershed and Karst Map

Iowa Geological and Water Survey
Open File Map OFM-10-7
November 2010

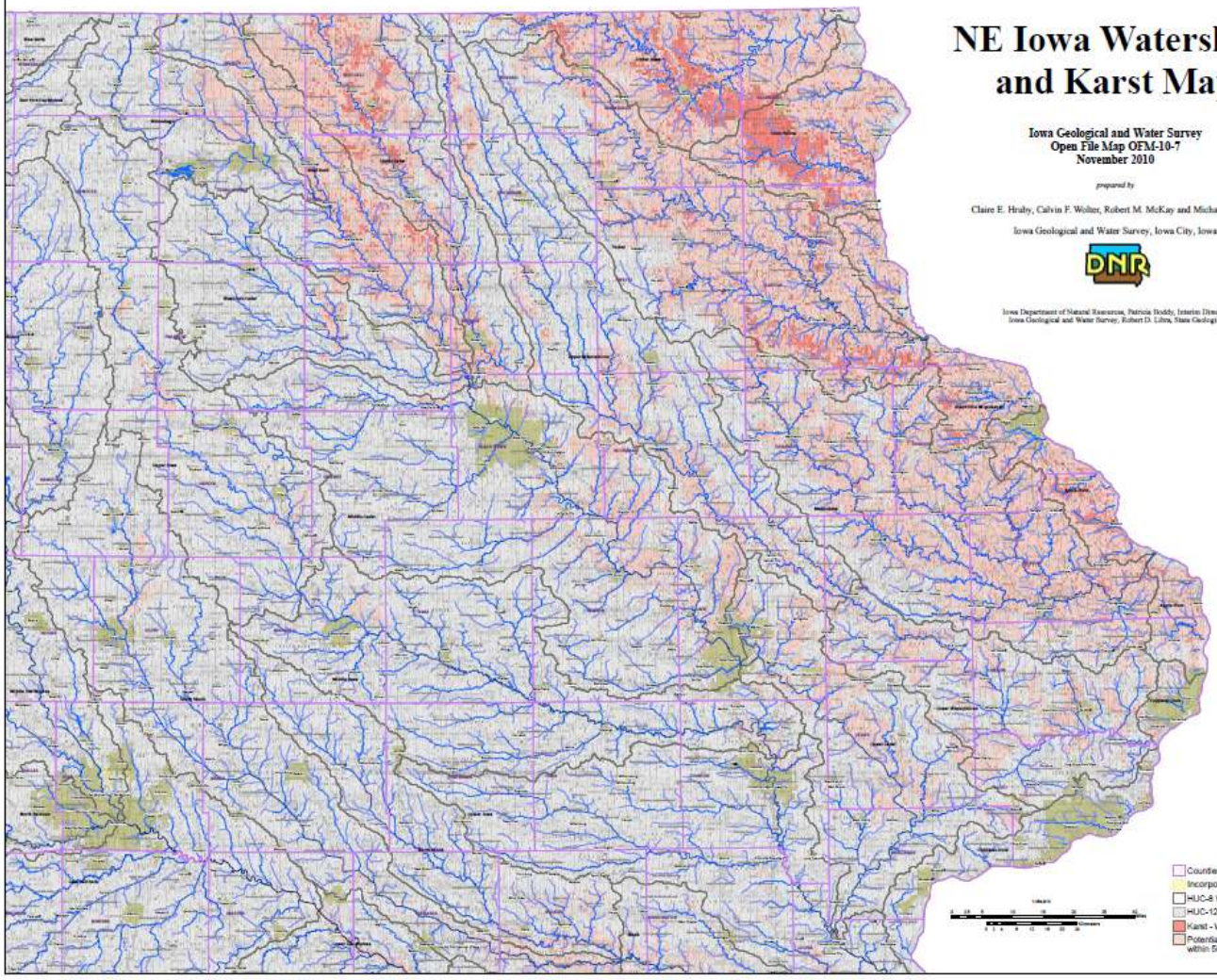
prepared by

Claire E. Hruby, Calvin F. Wolter, Robert M. McKay and Michael J. Bounk

Iowa Geological and Water Survey, Iowa City, Iowa

DNR

Iowa Department of Natural Resources, Patricia Boddy, Interim Director
Iowa Geological and Water Survey, Robert D. Libra, State Geologist



The types of information supplied with the application that would be most informative to the Department:

1) A location map (or aerial photo – 5 miles is OK).
2) A vicinity map (or aerial photo – 1500' is OK); showing water bodies.
3) A site map or maps on a USGS topographic base showing the following:
   a) current land topography at 1' or 2' intervals across the site.
   b) modification of site topography.
   c) bottom elevation of lagoon or pond.
   d) acreage of pond or lagoon.
   e) soils map with soils on site identified.
   f) boreholes accurately located with elevations that match borehole descriptions.
   g) a water table map on current land topography base; indicate flow direction (18C.2.5 "…groundwater characteristics (including elevation and flow)…"
   h) if site excavation will seriously modify any of the above, provide additional maps showing the anticipated changes.
4) Borehole logs should contain the following:
   a) name, location, elevation, drilling date;
   b) lithologic description and stratigraphic determination, depths, blows/foot (if appropriate);
   c) symbol column depicting lithology and/or stratigraphy
   d) water levels/conditions (i.e., moist, dry) – during drilling, after drilling, 7 or more days after drilling. Were measurements made in an open hole or with a well (screen, slotted PVC, etc.). Provide well construction details.

CONTINUED: The types of information supplied with the application that would be most informative to the Department:

and diagrams on boring logs.

e) other observations: 10’ below pond bottom; 25’ below pond bottom A cross section wherever possible; at the very least, a project area driller’s logs compilation is better than nothing.

5) A narrative, reasonably brief, discussing regional setting (location (section, township and range preferred), landform, topography, etc.). geology, hydrogeology, groundwater flow direction and other pertinent groundwater characteristics, and environmental concerns.

If anyone wants to have a hydrogeological site evaluation at any time, just call,

BECAUSE:

We're from the government.

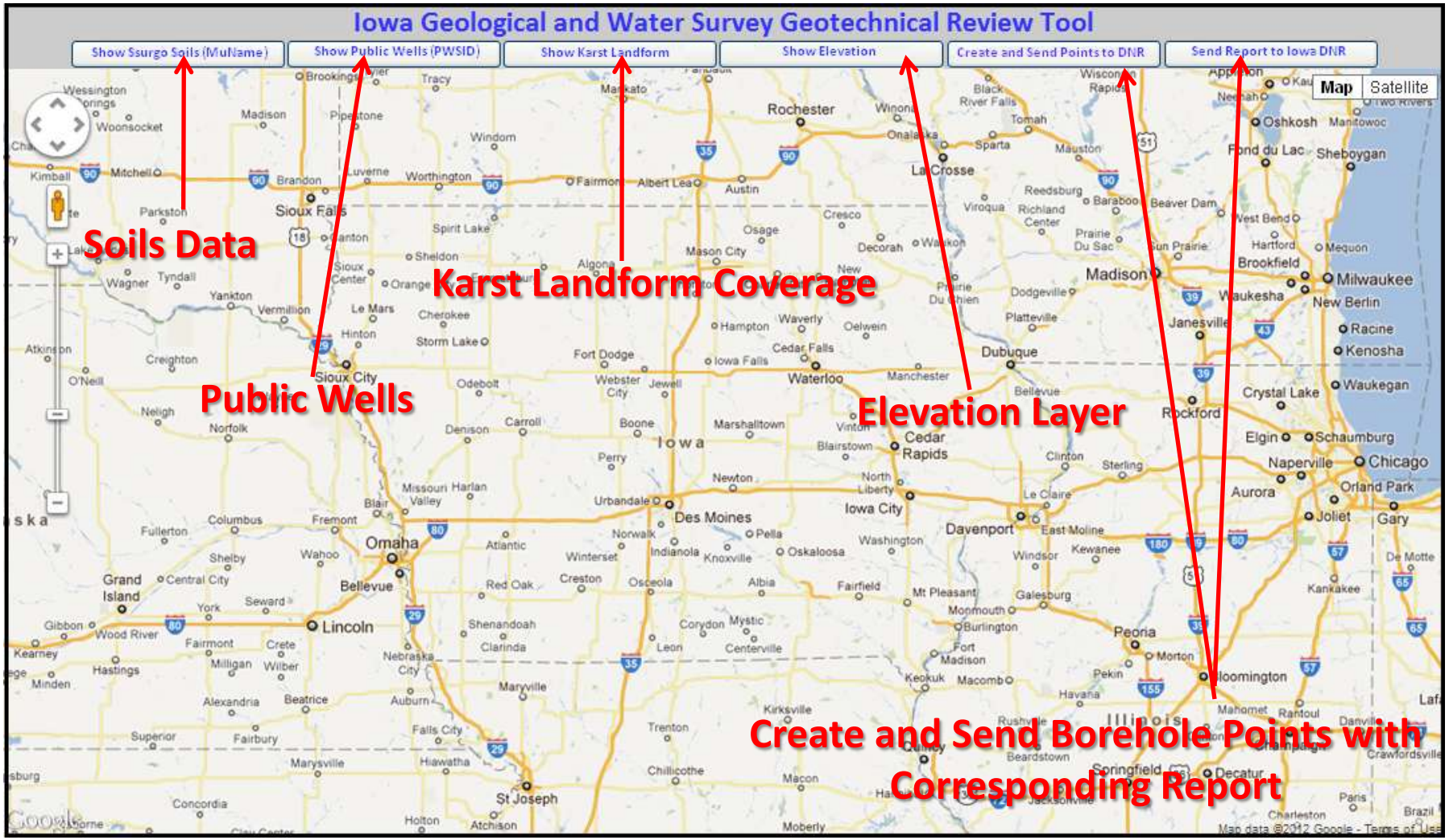
We're here to help

YOU!

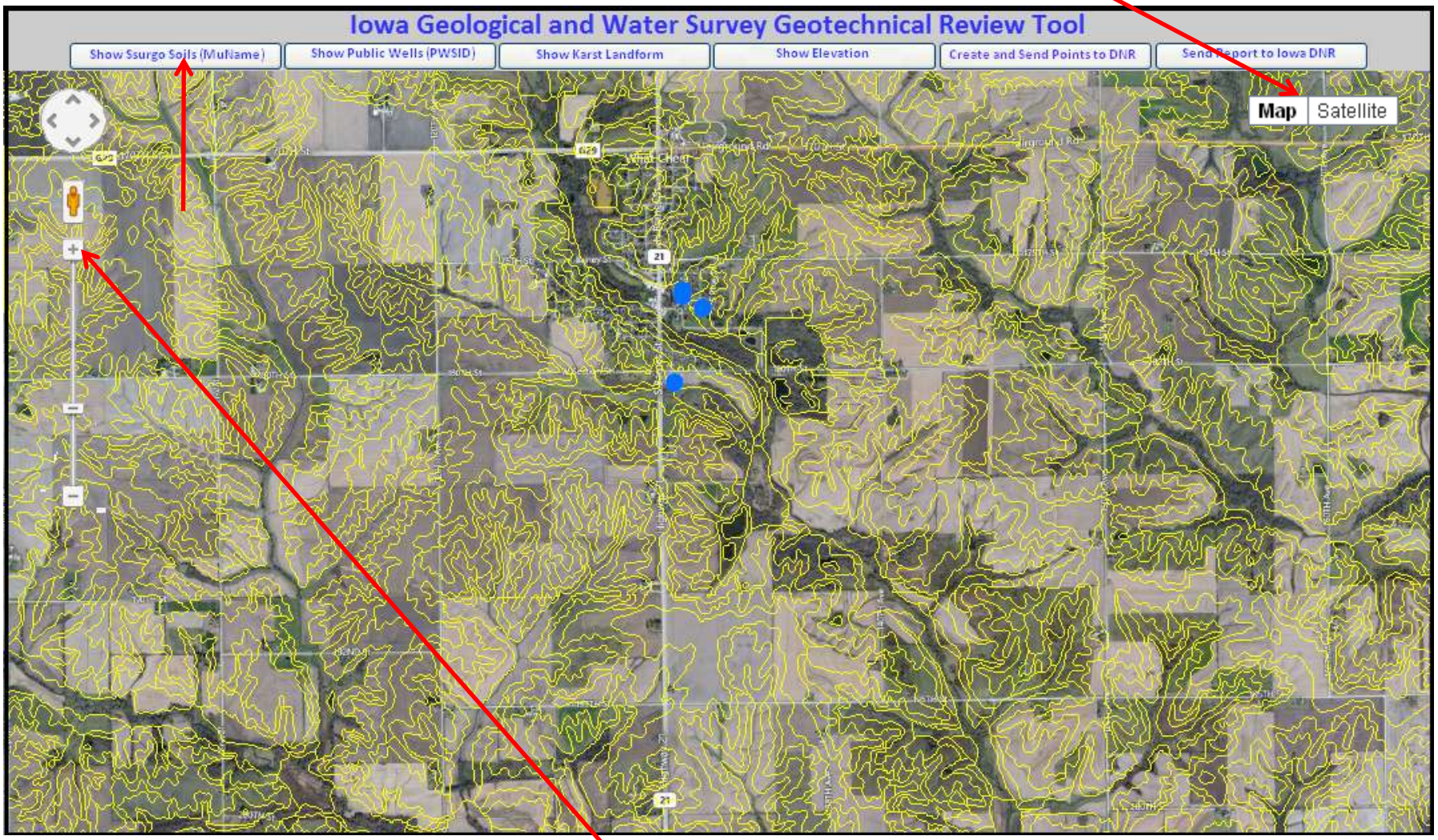
In fact, we want you to provide the department with the best hydrogeological information available . To that extent, we are offering you the opportunity to have IGWS build you a custom web application.

It would look something like this:

Potential Web App for Streamline Data Transfer with the Iowa DNR

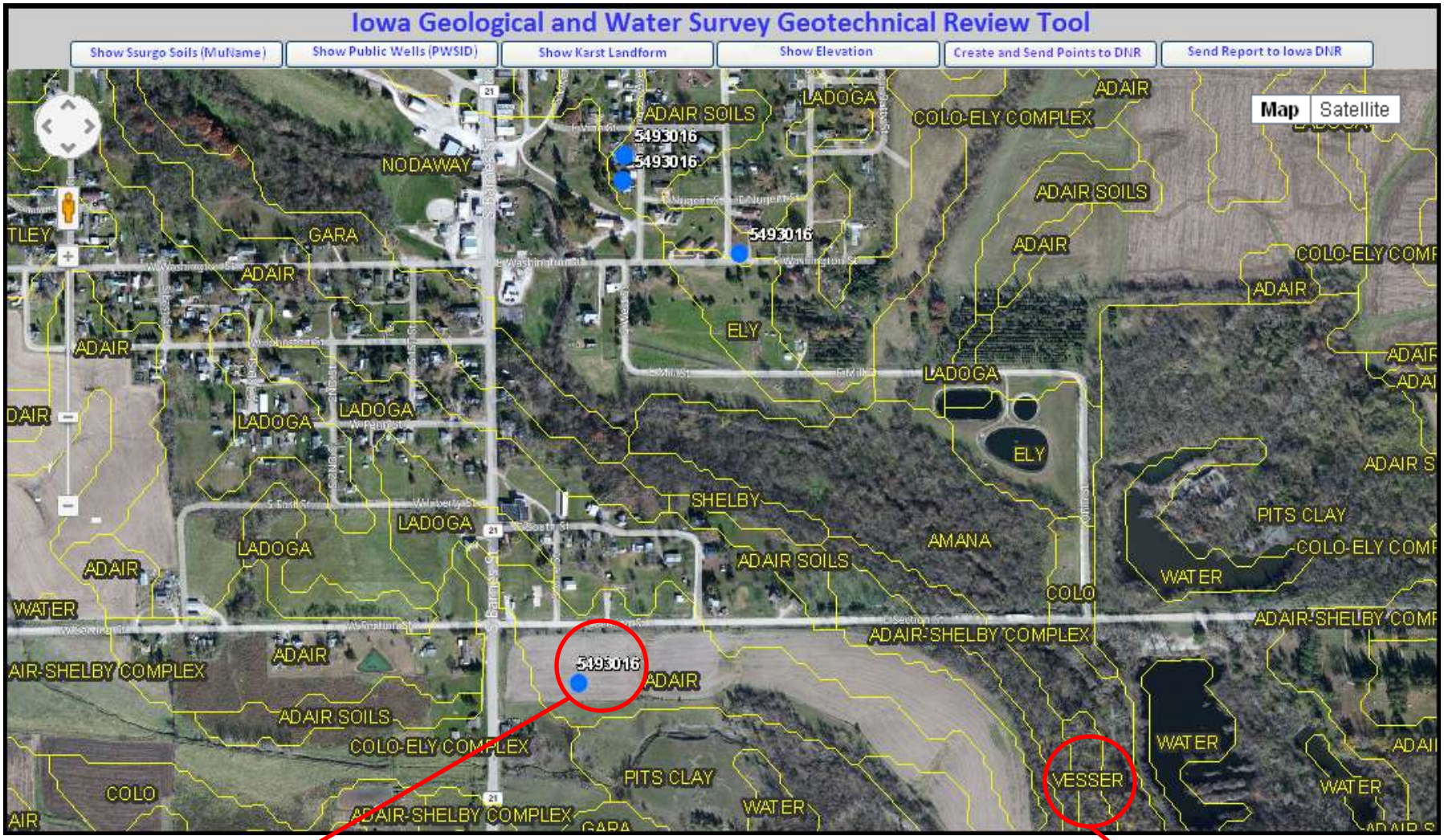


The Ability to Zoom in with Aerial Coverage



Labels Appear after zoomed in past 1:10,000

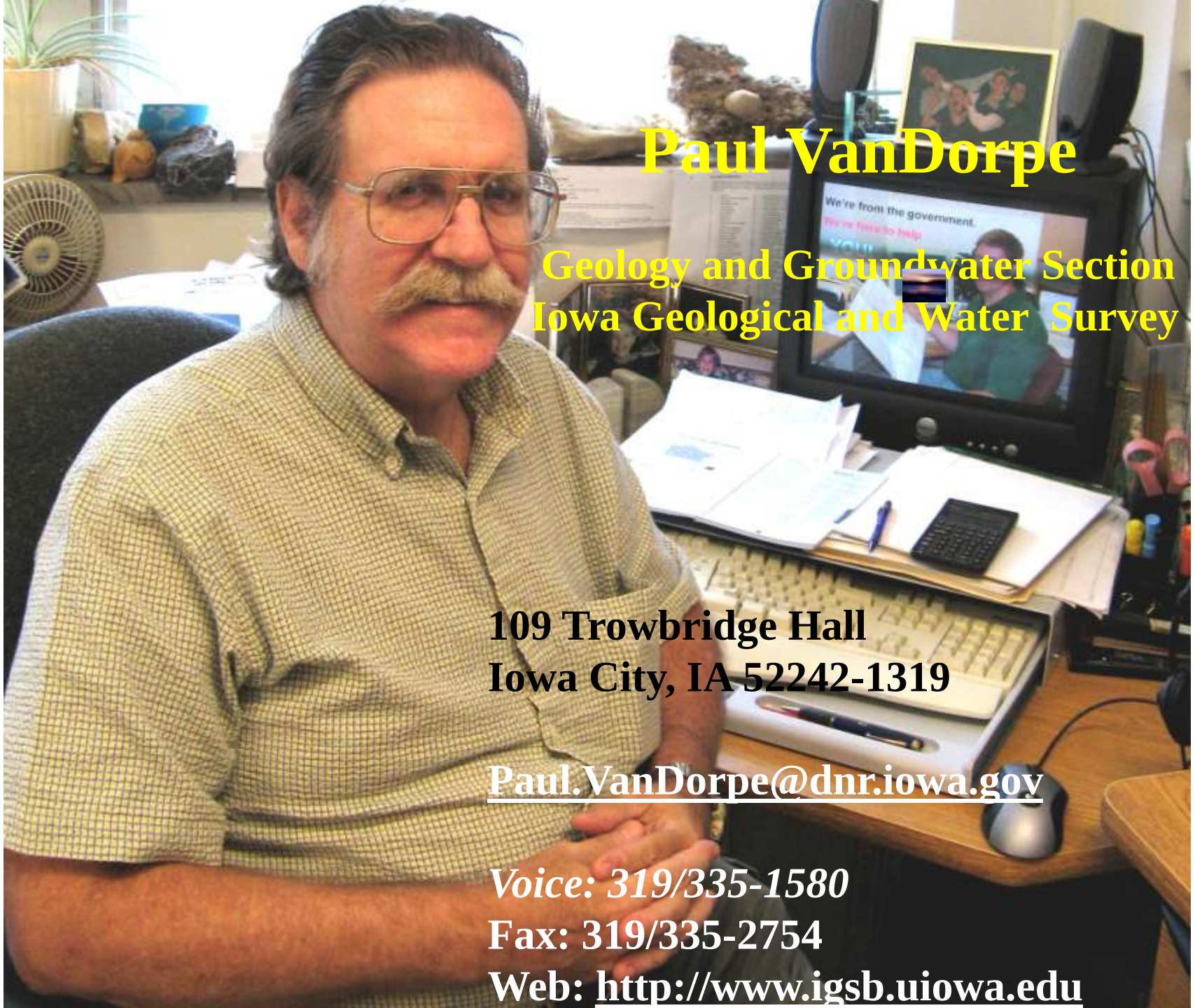
Zoom Into Detailed Environment of What Cheer Iowa for Better Reference



Create Data and send to the DNR with a few clicks of the Mouse

This is your chance:

COMMENTS?



Paul VanDorpe

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