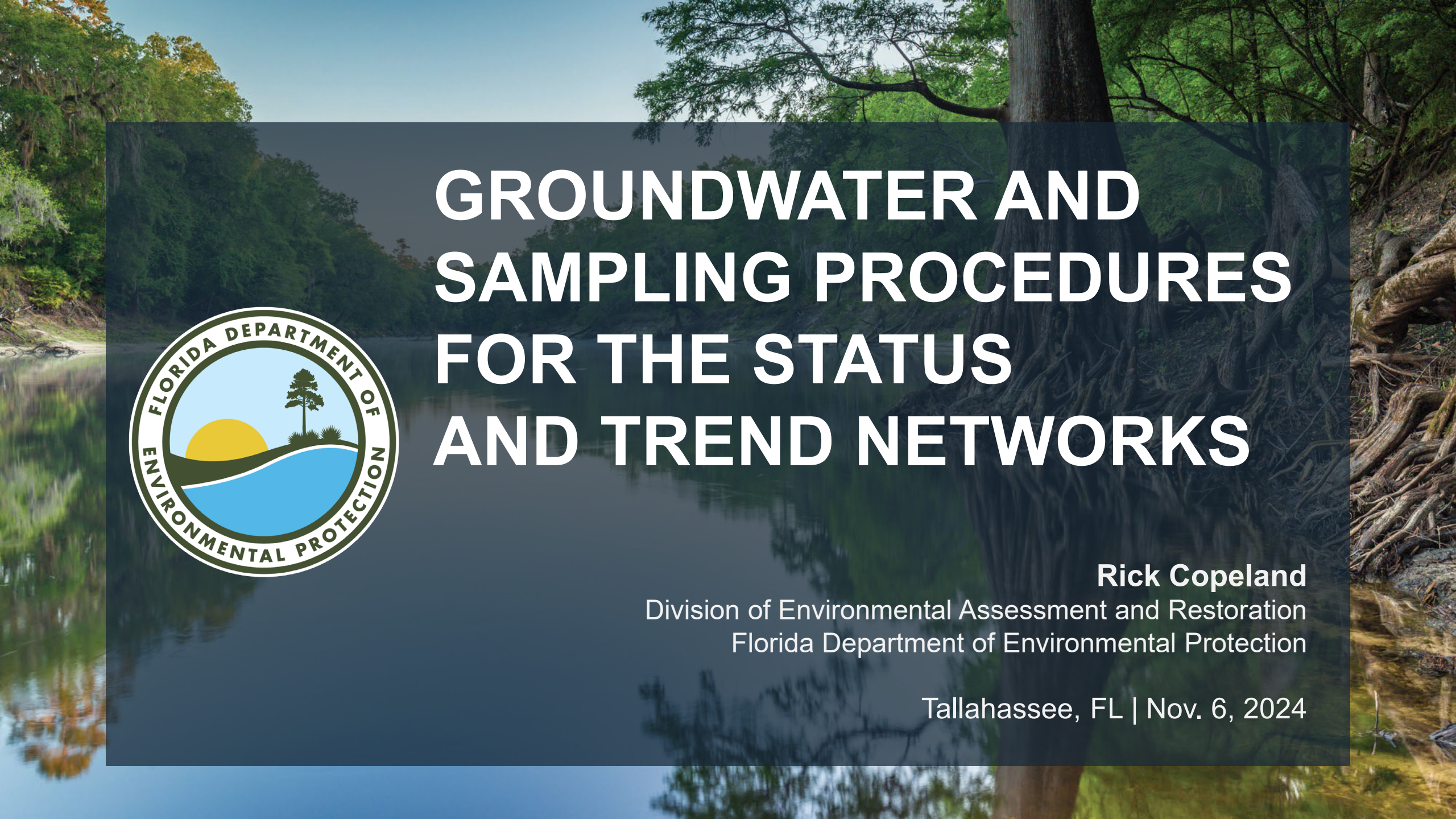


GROUNDWATER AND SAMPLING PROCEDURES FOR THE STATUS AND TREND NETWORKS

Rick Copeland
Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection

Tallahassee, FL | Nov. 6, 2024

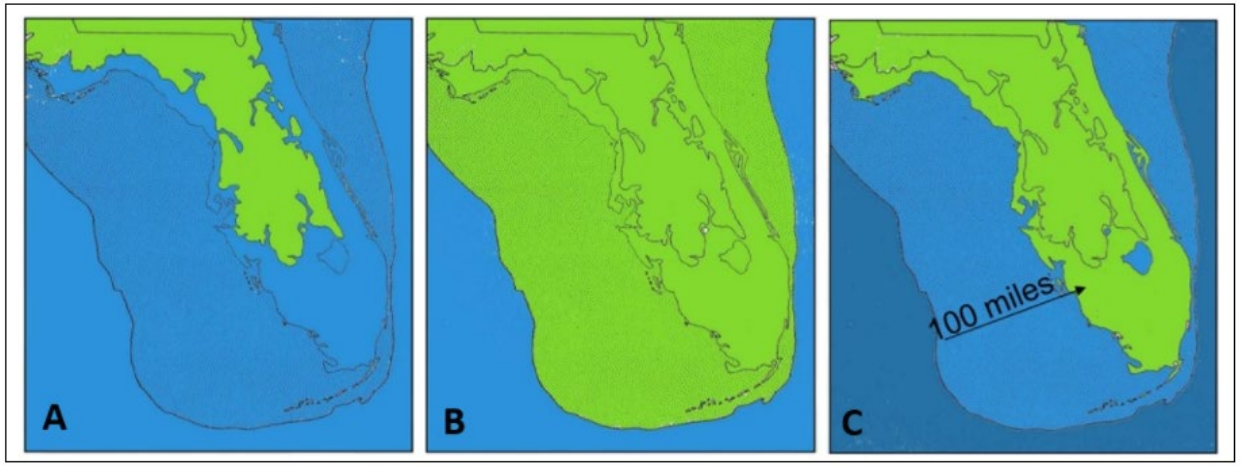
GROUNDWATER TRIVIA

- Quantity of groundwater (GW) in U.S. is greater than 20 to 30 times that of lakes, streams and rivers combined.

- About 25% of all rainfall ultimately becomes GW.

Source: Johnson Well Screen Inc., 1998.

EFFECT OF SEA LEVEL CHANGES AND FLORIDA'S GROUNDWATER



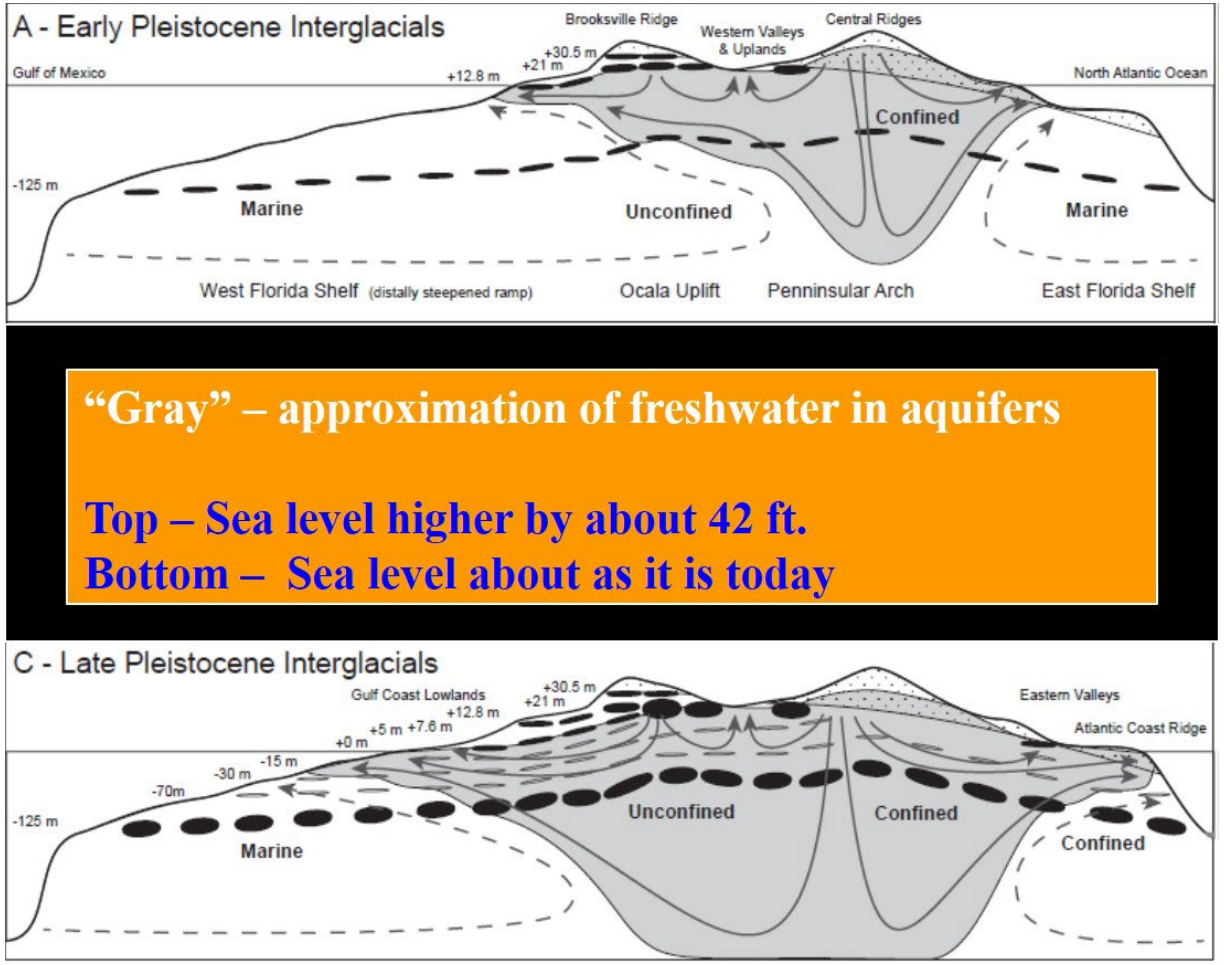
Florida During the Past Interglacial, Glacial, and Present. *Image Source: Wanless*

(A) Pleistocene minimum interglacial.

(B) Pleistocene maximum glacial.

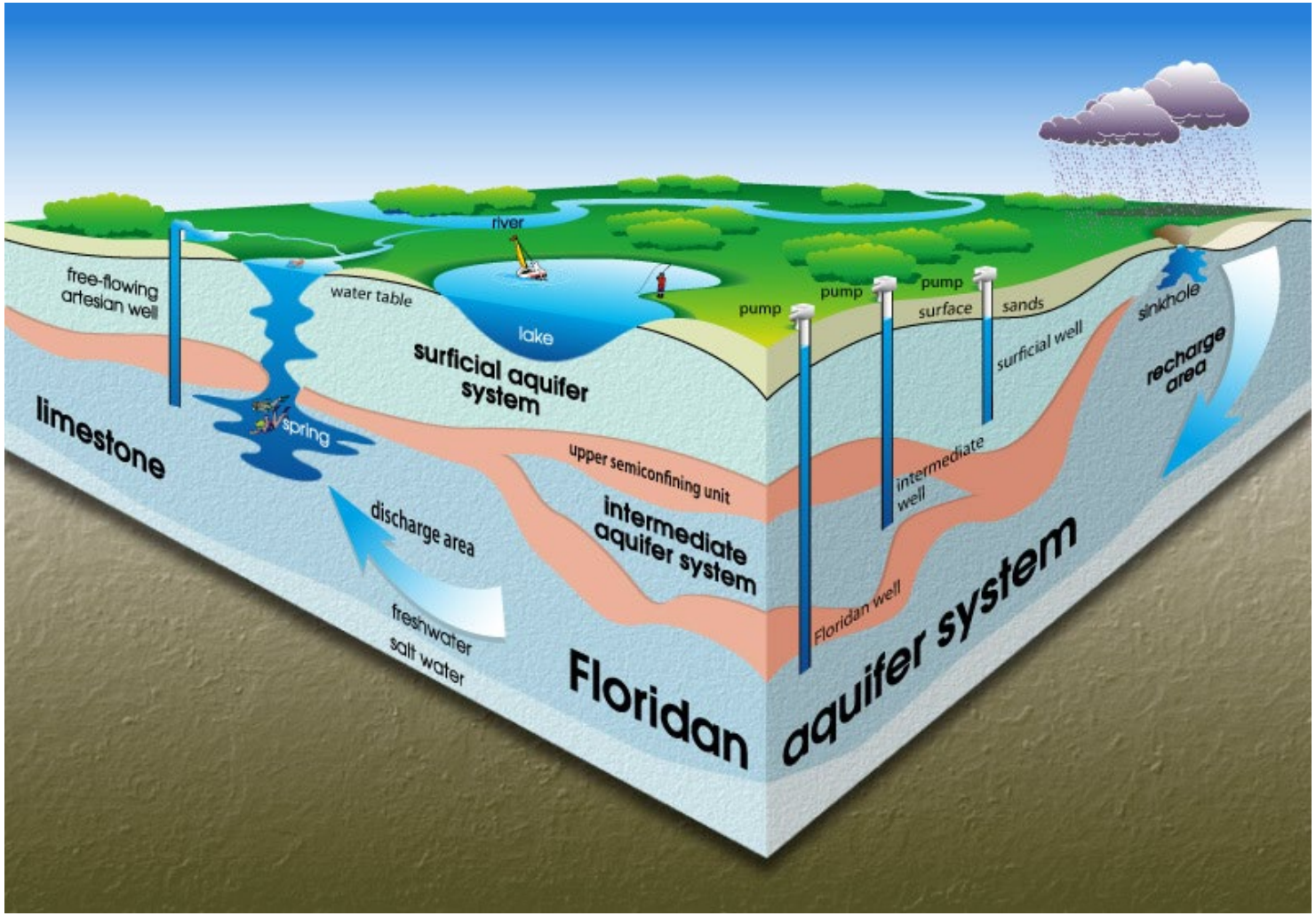
(C) Present.
(http://www.ces.fau.edu/nasa/impacts/i4-sea-change/explanation3a.php)

CROSS SECTION OF FRESH GW IN PAST GEOLOTIC TIMES



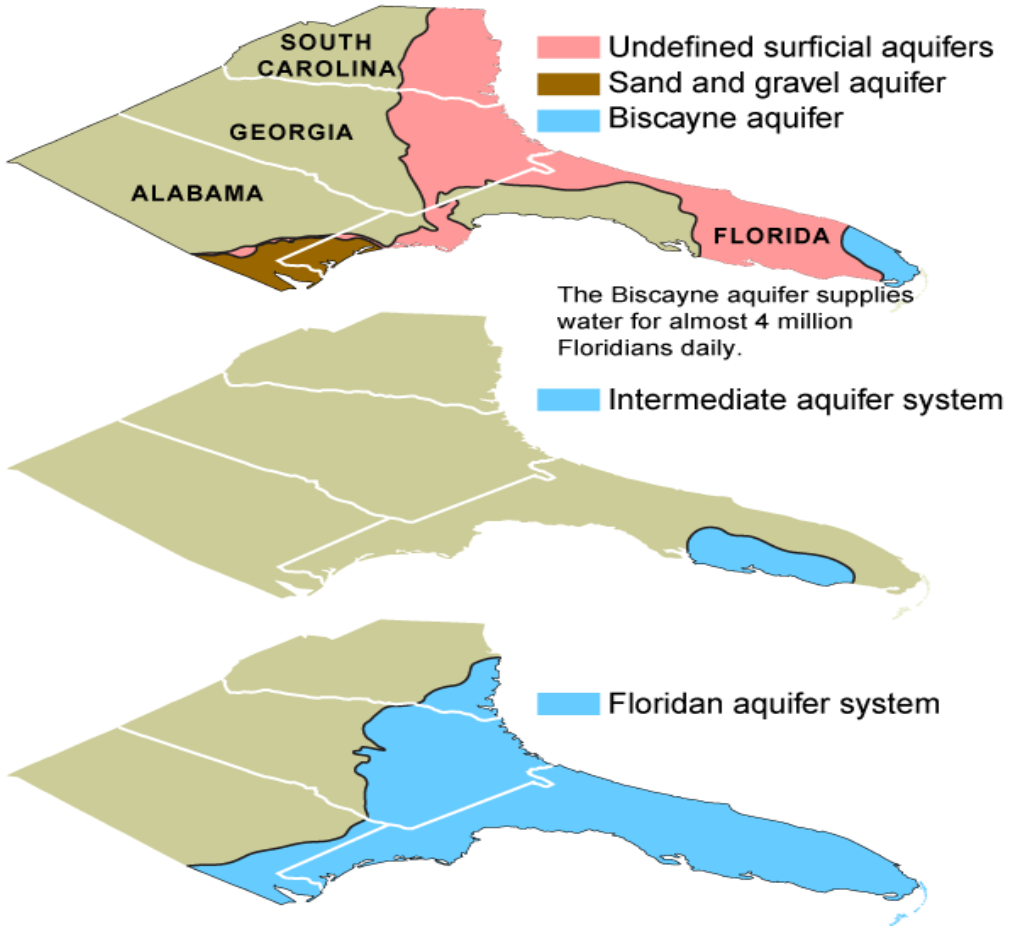
Source: Gulley and Florea, 2016

BLOCK DIAGRAM OF FLORIDA'S AQUIFER SYSTEMS



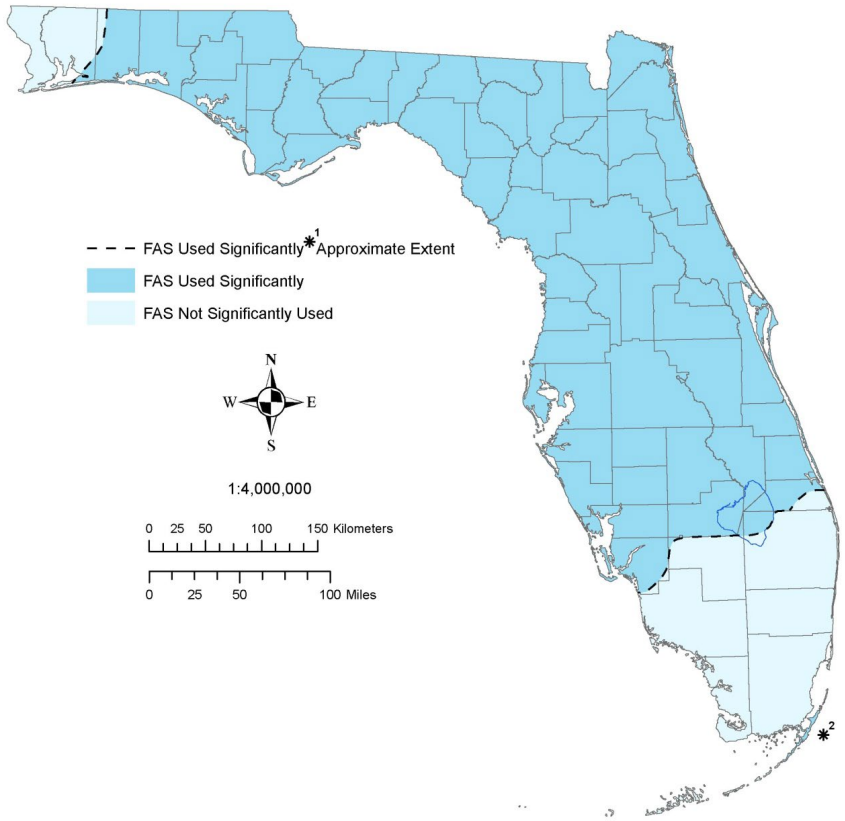
Source: St. Johns River Water Management District, 2024

MAJOR AQUIFER SYSTEMS IN FLORIDA



Source: United States Geological Survey (USGS), 2024

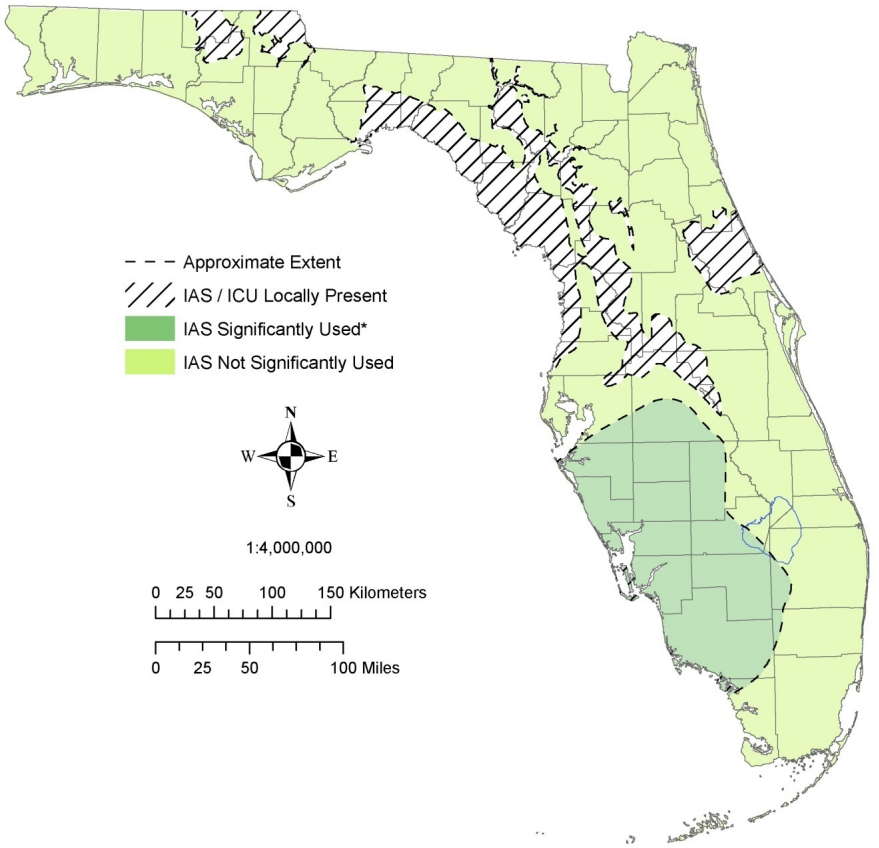
WHERE THE FLORIDAN AQUIFER SYSTEM (FAS) IS USED SIGNIFICANTLY



*1 Significant is greater than 5% of county groundwater use based on 2000 data from Marella and Bendt (2005).
*2 FAS significantly used in a portion of Key Largo in Monroe County

Source: Florida Geological Survey, 2009

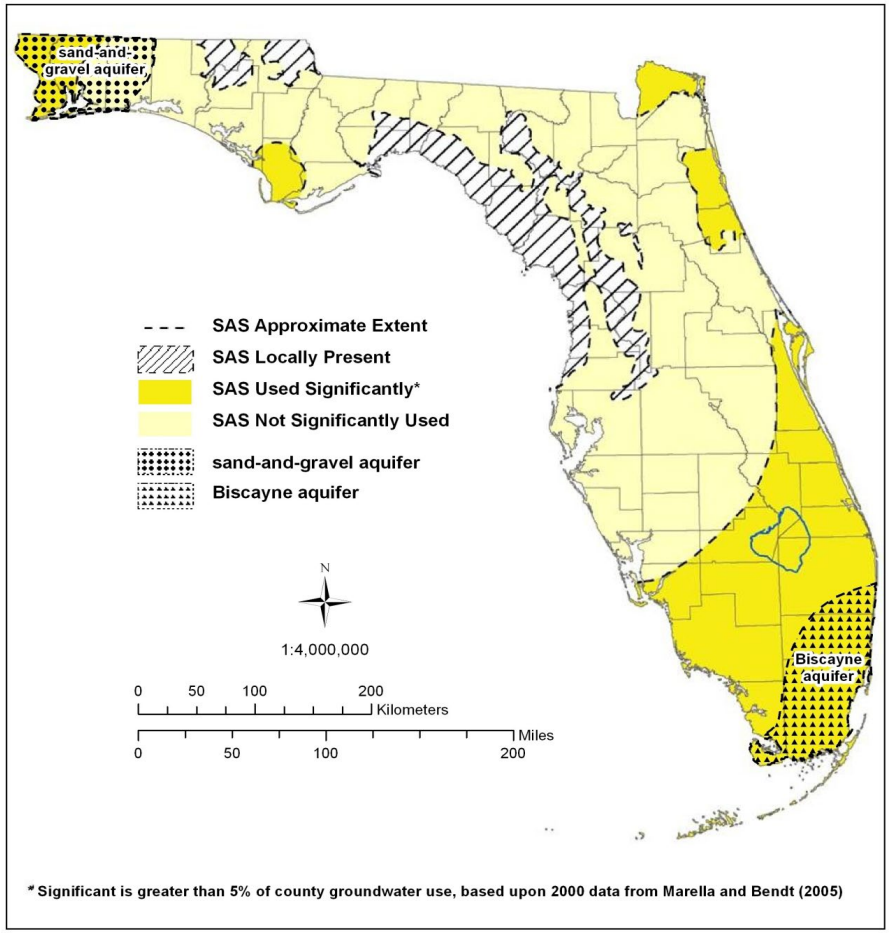
WHERE THE INTERMEDIATE AQUIFER SYSTEM (IAS) IS USED SIGNIFICANTLY



* Significant is greater than 5% groundwater use, based on 2000 data from Marella and Bendt (2005).

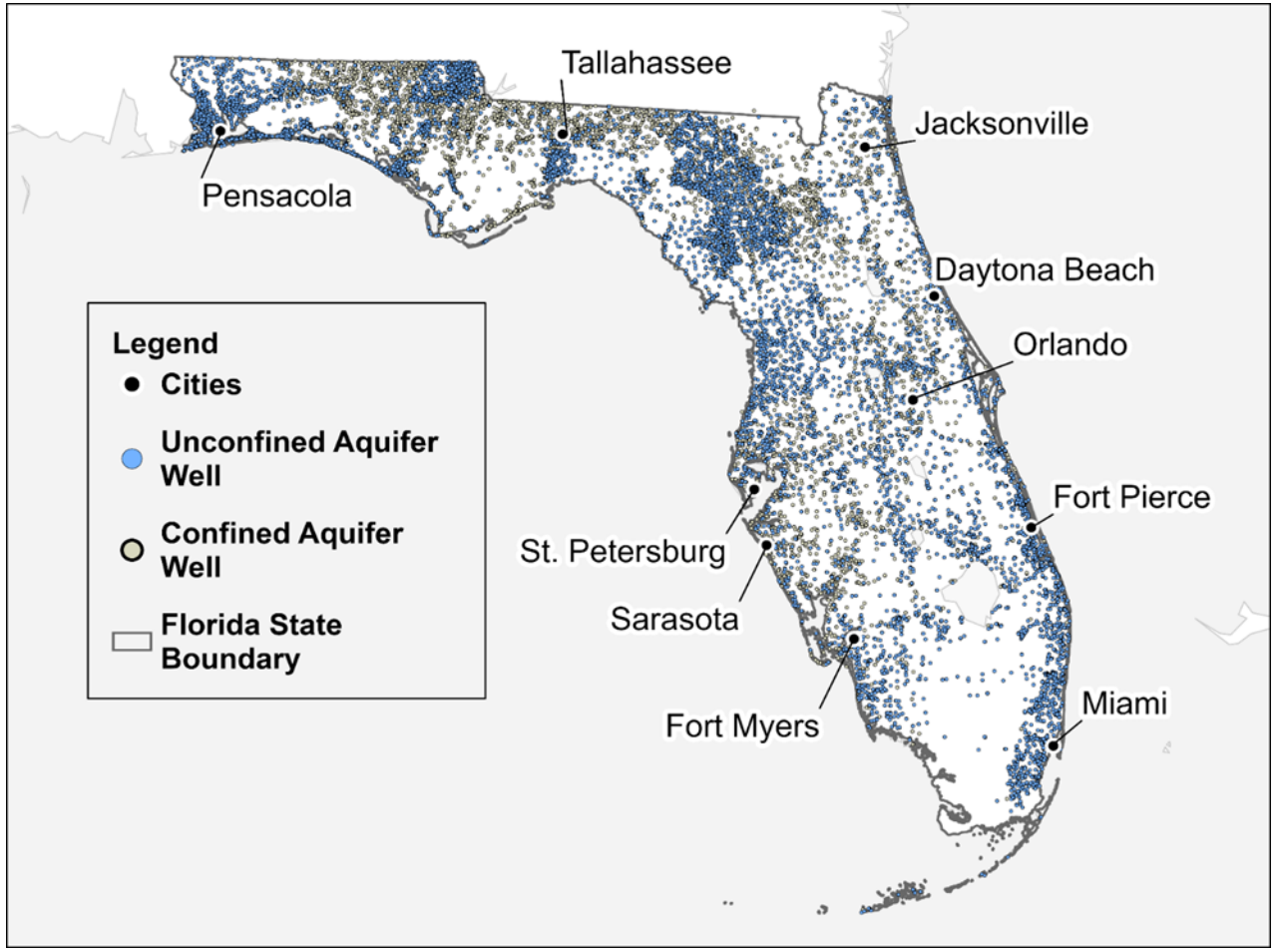
Source: Florida Geological Survey, 2009

WHERE THE SURFICIAL AQUIFER SYSTEM (SAS) IS USED SIGNIFICANTLY

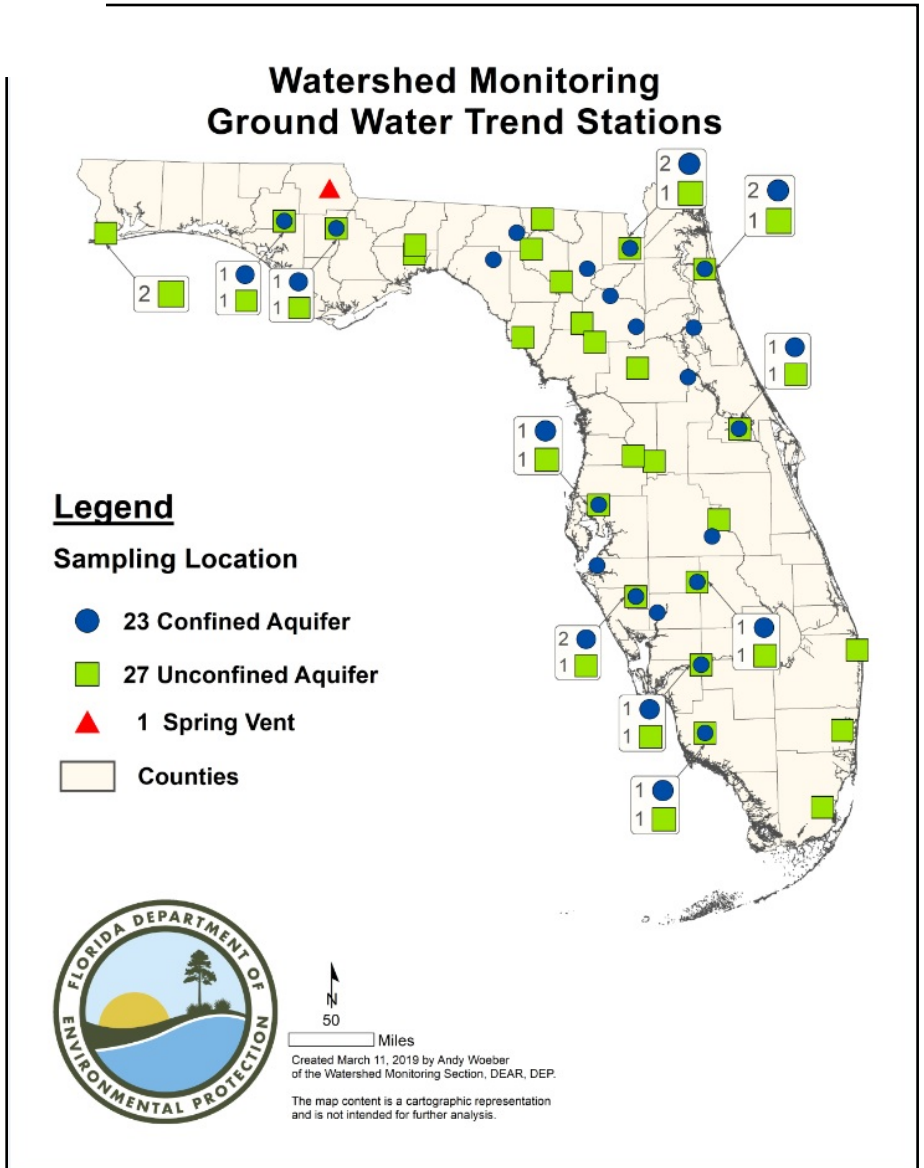


Source: Florida Geological Survey, 2009

STATUS NETWORK SAMPLED WELLS
(2000-21)



TREND NETWORK



TYPES OF WELLS

Confined and Unconfined Wells can be:

- Monitoring.
- Private (Residential, Domestic).
- Public Water Supply (PWS).
- Industrial.
- Agricultural.

Note that the last four categories often have in-place plumbing.

MONITORING WELLS

Below grade: Stickup is negative.

MONITORING WELLS

- There may, or may not, be in place plumbing for this type of well but check and be prepared to use you own pump.
- Well information should be readily available from station comments and reconnaissance.

MONITORING WELLS WITH RECORDERS

Contact agency that installed the recorder to let them know you want to sample the well.

Wells can have a water level recorder installed. Communicate with owners of the recording equipment so their data is not corrupted.

PUBLIC SUPPLY WELLS

- Large pumps and longer screened interval.
- Pumped for longer periods of time with large water volumes (250 to 5,000 gallons per minute [GPM] flow rate).
- GW withdrawals remove large amounts of water from the aquifer.
- The withdrawals can potentially change the groundwater flow direction and velocity.
- Required by law to have a spigot.

PUBLIC SUPPLY WELLS

Typical Public Supply Well Turbine Pumps

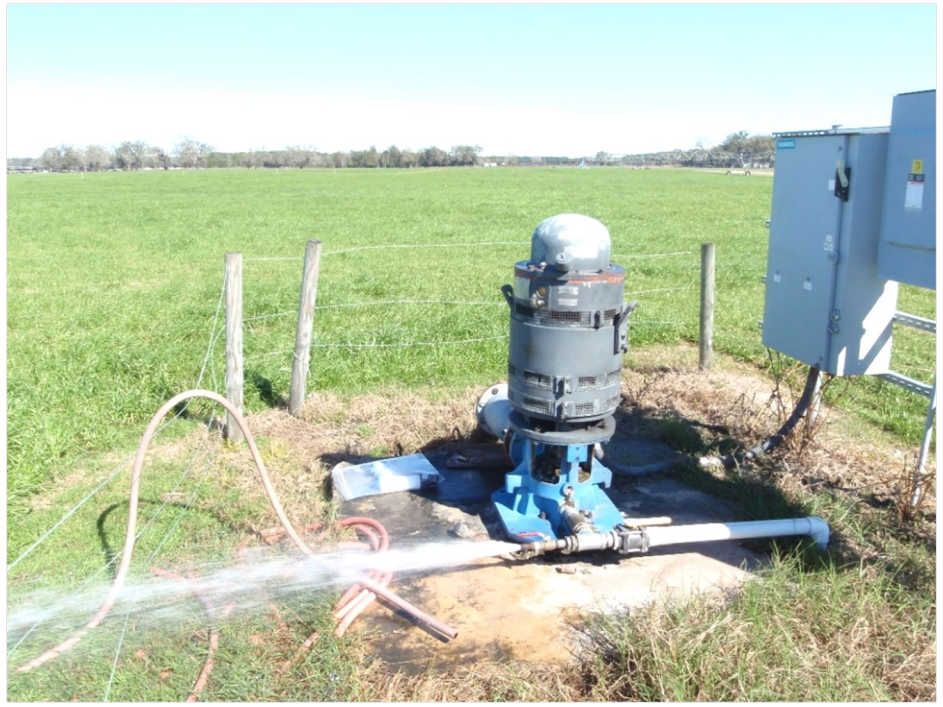
Raw Water Sampling Point.

Required by Rule for all PWS Wells.

AGRICULTURE SUPPLY WELLS

Submersible Pump

Turbine Pump



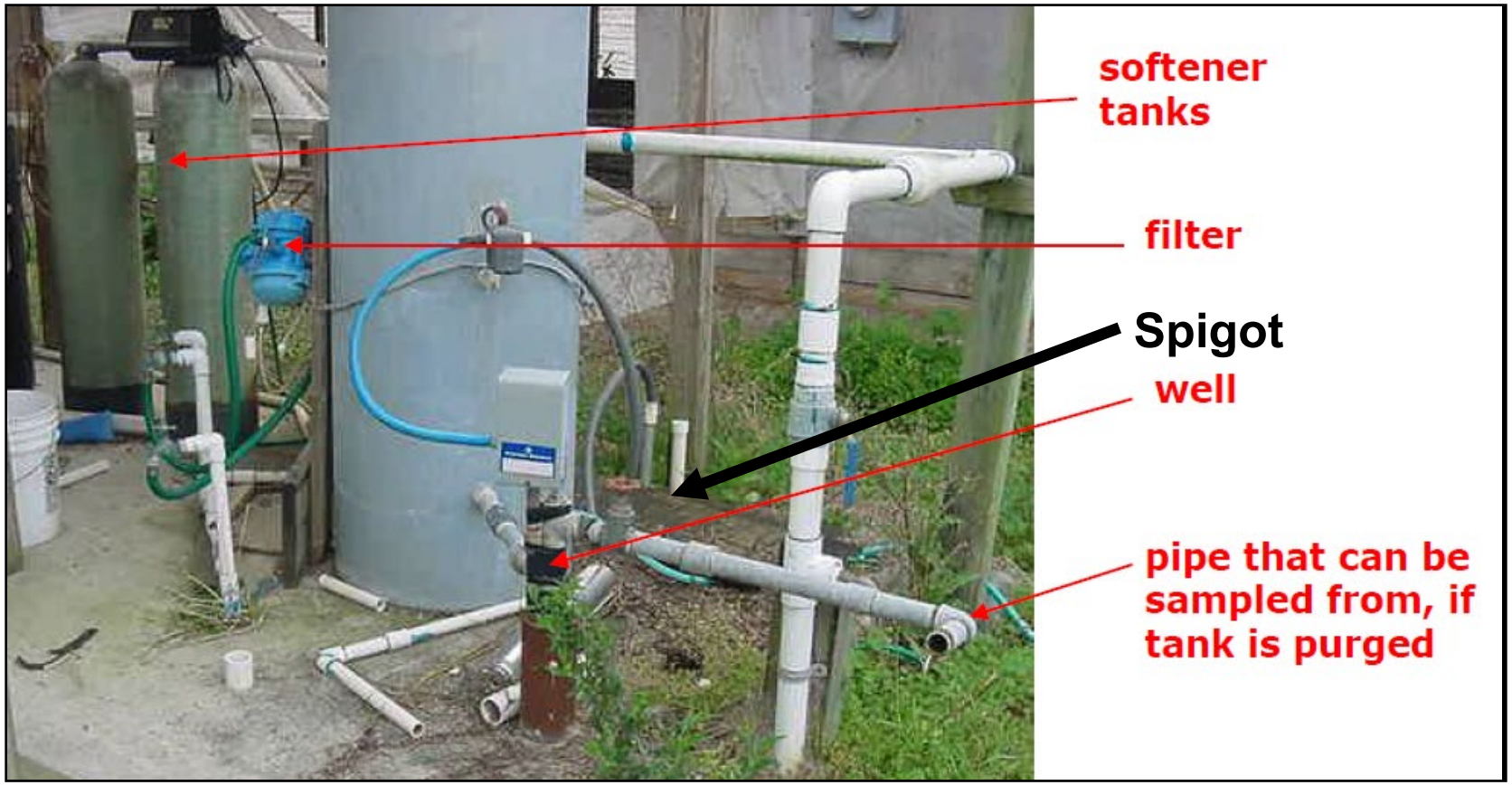
Get reconnaissance info and contact well owner or manager.

INDUSTRIAL WELLS

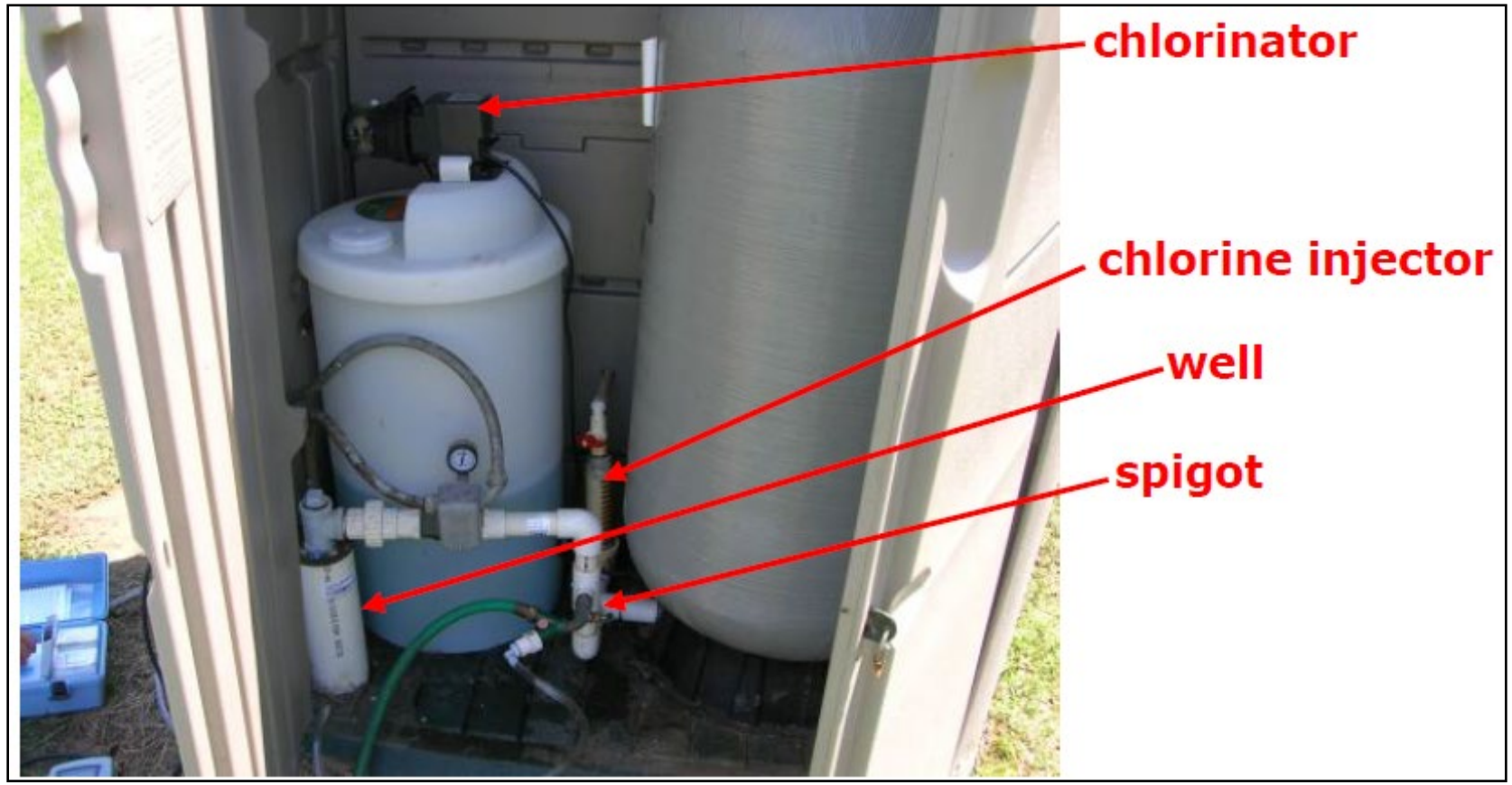
Both are Turbine Pumps (often run continuously).

- Sampling Point: Check for compatibility.
- This one requires a reducing adapter made of PVC.

PRIVATE WELLS CAN HAVE COMPLEXITIES



PRIVATE WELL ADD-ONS AND CHLORINATORS



FLORIDA UNIQUE WELL ID (FLUWID)

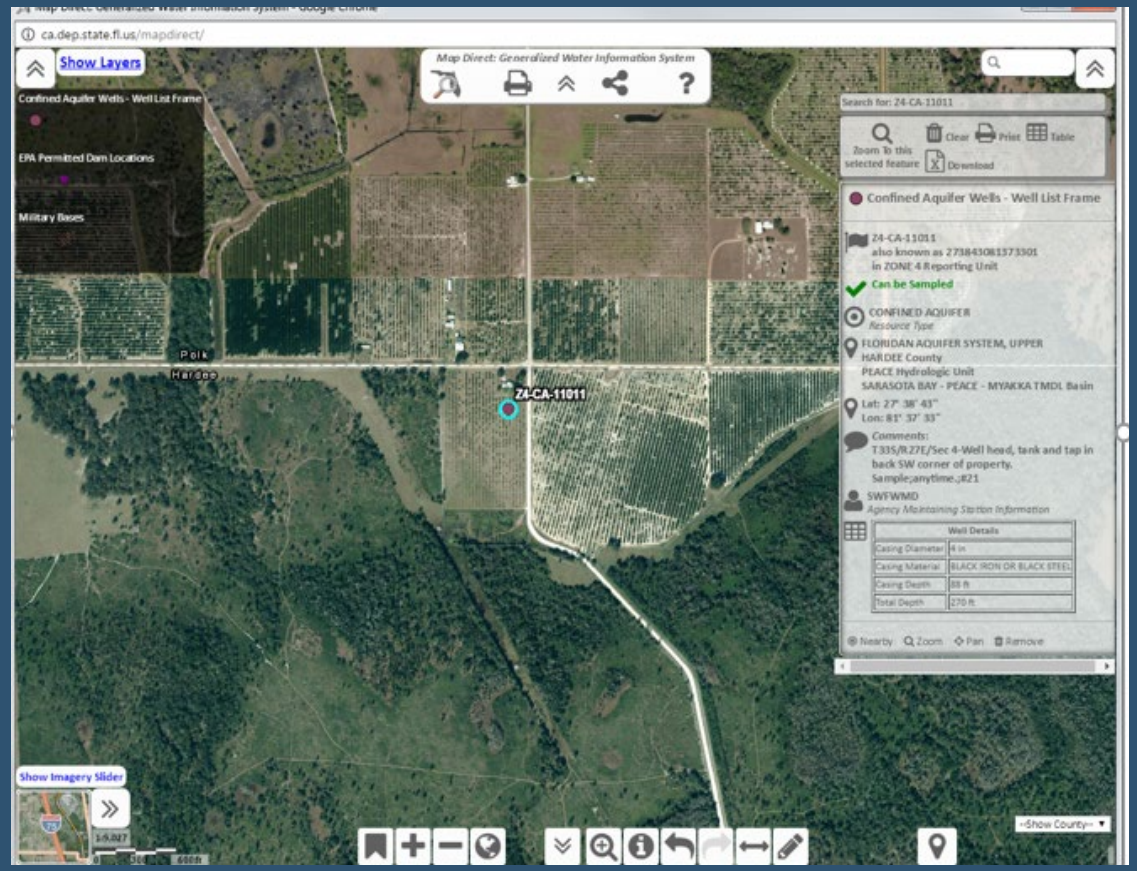
PART 2: SAMPLING

Source: Pexels

- **Pre-Sampling.**
  - Inventory equipment/supplies.
  - For Status Network Wells: Recon and obtain permission to sample.
  - For Trend Wells: Need to include in-line filter (ortho-phosphate) and account for three weeks.
- **Well Sampling Procedures.**
- **Clean equipment between each site.**

WELL RECONNAISSANCE

- Use General Water Information System (GWIS) utility app.
- Use maps.
- Use recon information.
- Check well tags.
- Check historical data.



Screenshot from Map Direct

IMPORTANT “WHAT IF”

Arrive at site, find out designated well has been destroyed, but owner has another well that can be used.

1. Exclude old well (unsampleable).
2. Well addition form (for new well).
3. New well will be considered for addition to List Frame.
4. Do **not** sample new well.

WELL ADDITION FORM

WELL ADDITION FORM

The following information is required for a well to be listed as a candidate to be randomly sampled for Florida's Ground Water Quality Status Monitoring Network.

Please enter as much of the following information as possible to have your well considered for sampling. Completion of this form does not guarantee your well will be added to the database or sampled.

Owner Information

Owner's Name: _____

Owner's Address: _____

City: _____ State: _____ Zip Code: _____

Owner's Phone Number: (_____) _____

Contact Person Information (if other than Owner)

Contact's Name: _____

Contact's Address: _____

City: _____ State: _____ Zip Code: _____

Contact's Phone Number: (_____) _____

Well Information

County: _____ Construction Date: _____

Well Driller's Information:

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone Number: (_____) _____

Well Information (Continued)

Water Management District Permit Number: _____

*Location: Latitude _____ Longitude _____ Datum/Source _____

Section-Township-Range: _____

Physical Address: _____

Aquifer: (Circle one) Confined Floridan Intermediate Biscayne Sand & Gravel Unconfined Floridan Surficial Unknown

Total Well Depth (feet): _____ Total Casing Depth (feet): _____

Casing Diameter (inches): _____

Casing Material: (Circle one) Steel PVC Plastic Iron Rock Concrete None Tile Brick Stainless Steel Galvanized Metal Unknown

Is the Well Screened? (Circle one) Yes No Don't Know

Screen Length (feet): _____

Well Use: (Circle one) Private Drinking Water Irrigation Agricultural Supply Monitoring Public Drinking Water Industrial Supply Other

* Please draw a sketch map of the location of the well, roads, and other items such as gates. Also include any other comments.

Please return this form to:
Florida Department of Environmental Protection
Watershed Monitoring Section
2600 Blair Stone Road, MS 3525
Tallahassee, Florida 32399-2400
Phone (850) 245-8533; Fax (850) 245-7601

SAMPLING PROCEDURES OUTLINE

1. Measure Depth to Water (DTW) in the well.
2. **Purge** well (remove stagnant GW).
3. If no FLUWID on well, check GWIS, order reprint or apply new tag if necessary.
4. Take field measurements of well water.
5. Collect GW samples.
6. Take photographs of well, including FLUWID.
7. Note land uses adjacent to well.

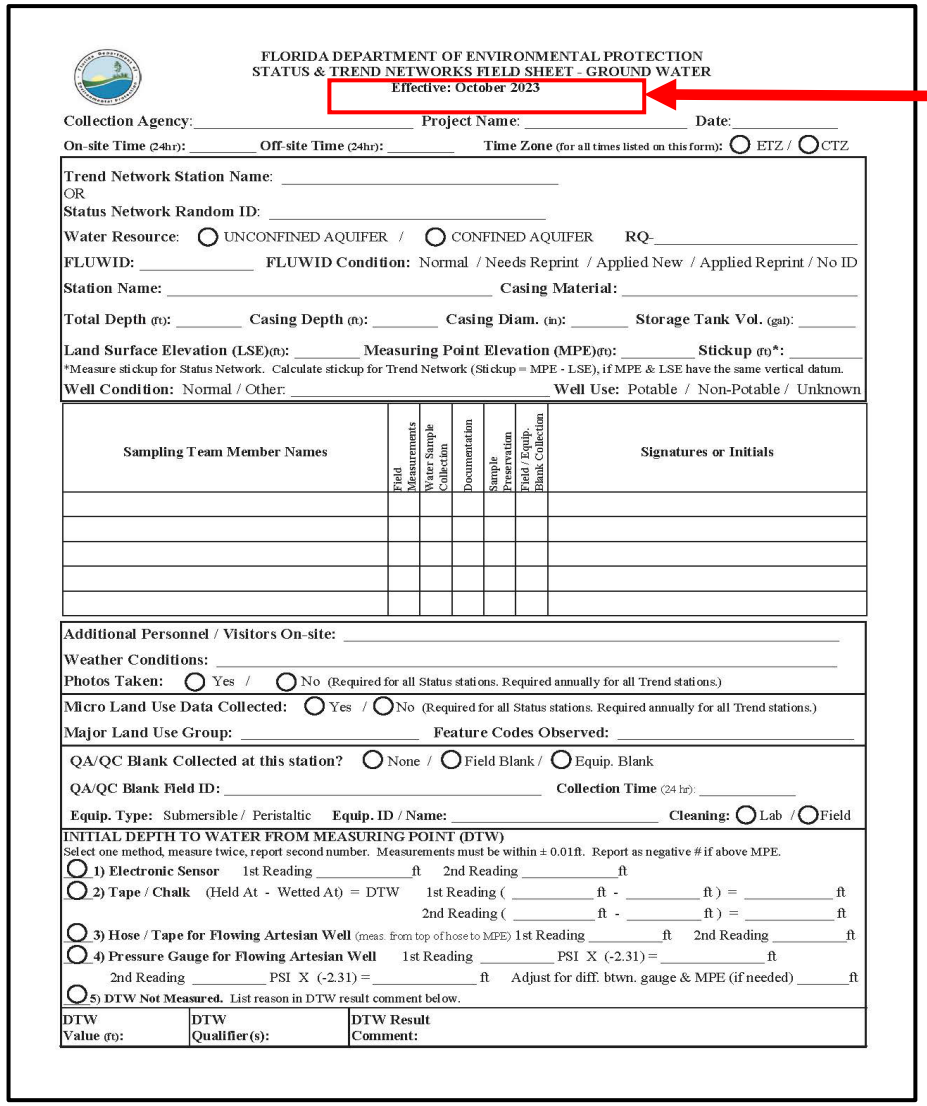
Document information re: Sampling event.

ALWAYS REMEMBER...

- We are in the documentation business.
- We are not in the assumption business.

Source: Pexels

FIELD SHEET



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATUS & TREND NETWORKS FIELD SHEET - GROUND WATER
Effective: October 2023

Collection Agency:_____ Project Name: _____ Date:_____

On-site Time (24hr): _____ Off-site Time (24hr): _____ Time Zone (for all times listed on this form): ◯ EDT / ◯ CDT

Trend Network Station Name: _____
OR
Status Network Random ID: _____

Water Resource: ◯ UNCONFINED AQUIFER / ◯ CONFINED AQUIFER RQ-_____

FLUWID: _____ FLUWID Condition: Normal / Needs Reprint / Applied New / Applied Reprint / No ID

Station Name: _____ Casing Material: _____

Total Depth (ft): _____ Casing Depth (ft): _____ Casing Diam. (in): _____ Storage Tank Vol. (gal): _____

Land Surface Elevation (LSE)(ft): _____ Measuring Point Elevation (MPE)(ft): _____ Stickup (ft)*: _____

*Measure stickup for Status Network. Calculate stickup for Trend Network (Stickup = MPE - LSE), if MPE & LSE have the same vertical datum.

Well Condition: Normal / Other: _____ Well Use: Potable / Non-Potable / Unknown

Sampling Team Member Names	Field Measurements	Water Sample Collection	Documentation	Sample Preservation	Field / Equip. Blank Collection	Signatures or Initials

Additional Personnel / Visitors On-site: _____

Weather Conditions: _____

Photos Taken: ◯ Yes / ◯ No (Required for all Status stations. Required annually for all Trend stations.)

Micro Land Use Data Collected: ◯ Yes / ◯ No (Required for all Status stations. Required annually for all Trend stations.)

Major Land Use Group: _____ Feature Codes Observed: _____

QA/QC Blank Collected at this station? ◯ None / ◯ Field Blank / ◯ Equip. Blank

QA/QC Blank Field ID: _____ Collection Time (24 hr): _____

Equip. Type: Submersible / Peristaltic Equip. ID / Name: _____ Cleaning: ◯ Lab / ◯ Field

INITIAL DEPTH TO WATER FROM MEASURING POINT (DTW)

Select one method, measure twice, report second number. Measurements must be within ± 0.01ft. Report as negative # if above MPE.

◯ 1) Electronic Sensor 1st Reading _____ft 2nd Reading _____ft

◯ 2) Tape / Chalk (Held At - Wetted At) = DTW 1st Reading (_____ ft - _____ ft) = _____ ft

2nd Reading (_____ ft - _____ ft) = _____ ft

◯ 3) Hose / Tape for Flowing Artesian Well (meas. from top of hose to MPE) 1st Reading _____ft 2nd Reading _____ft

◯ 4) Pressure Gauge for Flowing Artesian Well 1st Reading _____ PSI X (-2.31) = _____ft

2nd Reading _____ PSI X (-2.31) = _____ ft Adjust for diff. btwn. gauge & MPE (if needed) _____ft

◯ 5) DTW Not Measured. List reason in DTW result comment below.

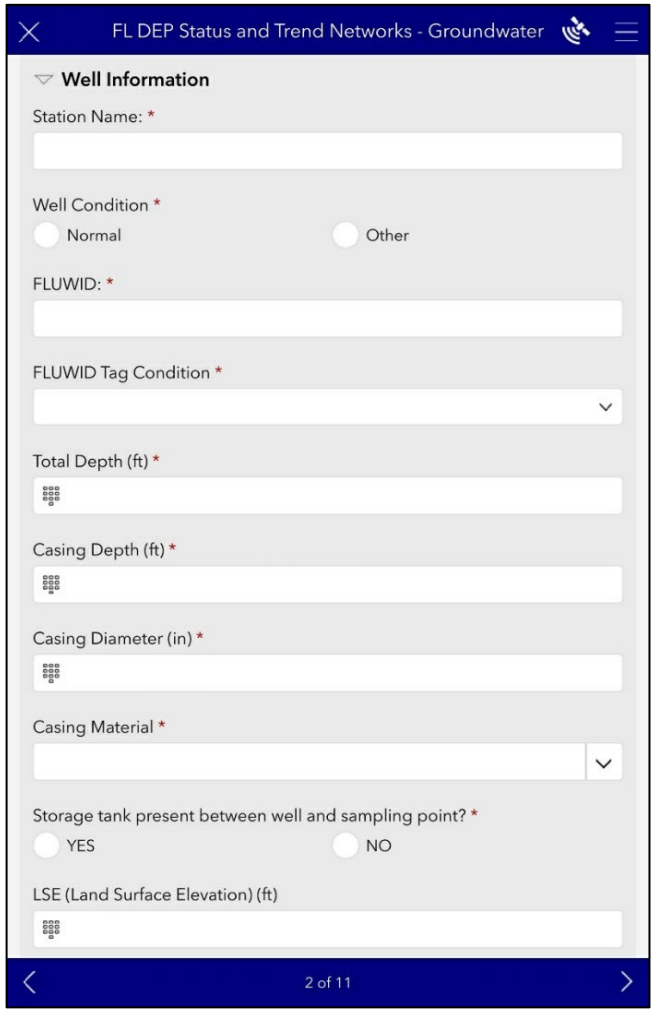
DTW Value (ft):	DTW Qualifier(s):	DTW Result Comment:

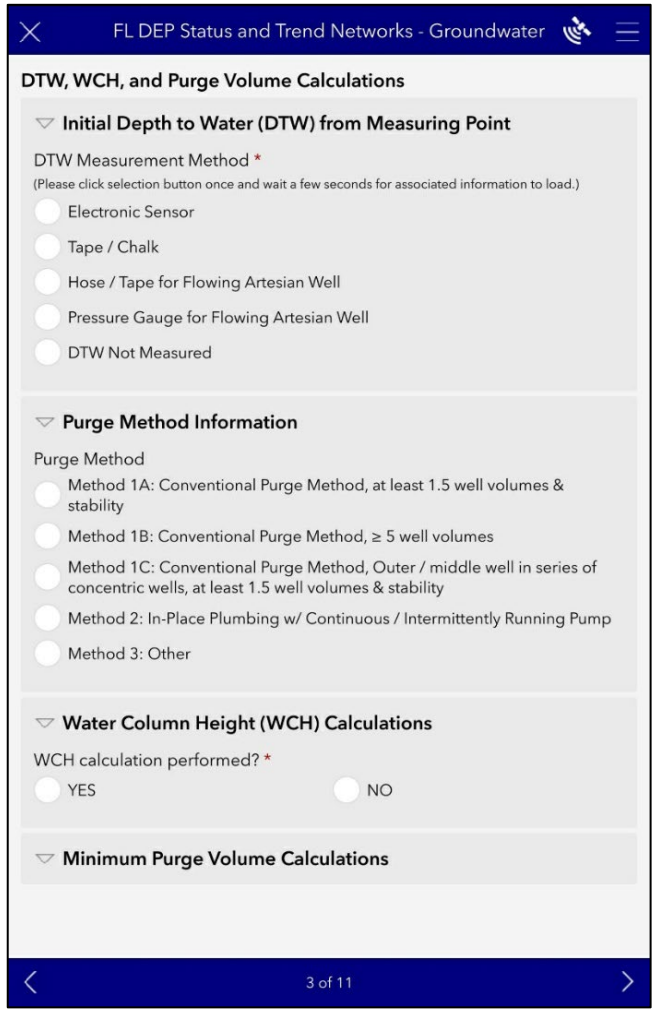
“Effective: October 2023”

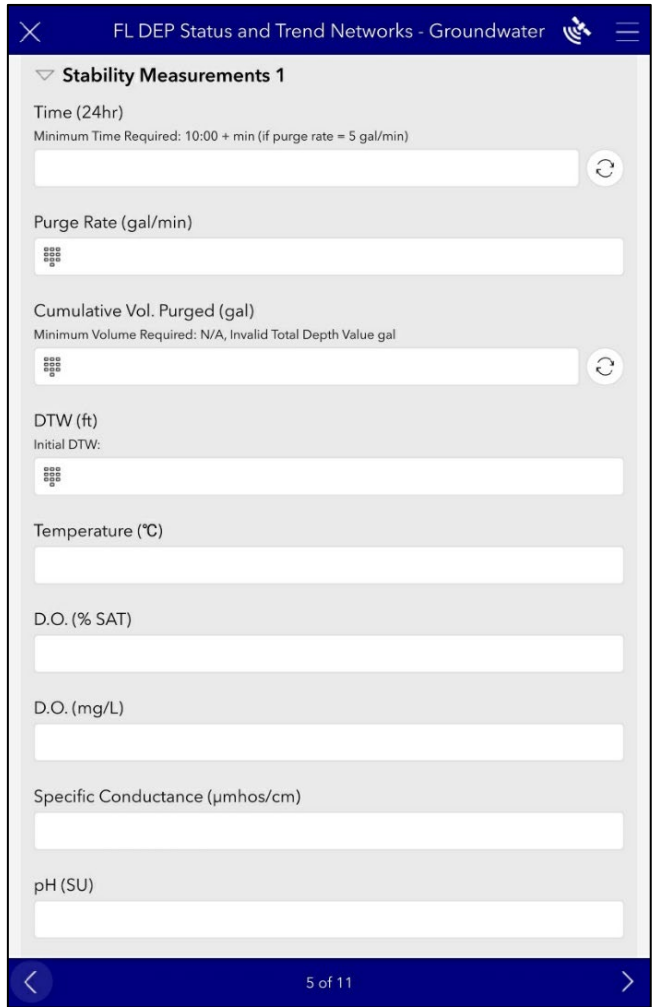
- Complete the GW field sheet (front and back) and GW sample details page.
- Use most recent version (“October 2023”).
- Preferred- Use Survey 123 Status and Trend GW form To complete field sheets.

FIELD SHEET

Preferred – Use Survey 123 Status and Trend GW form.
To complete both Field and Custody sheets.



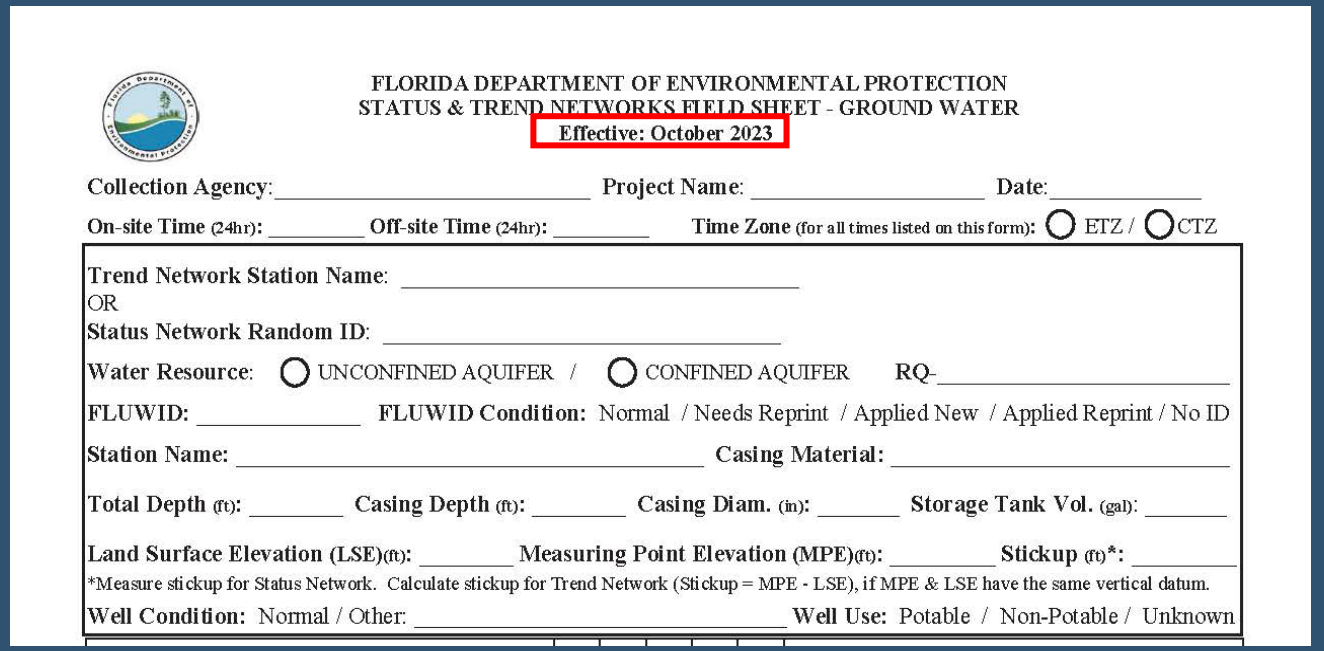




FIELD SHEET

Top section of field sheet contains general information about well and sampling event:

- Collection Agency.
- Project Name.
- Water Resource.
- Time zone indicator.
- Date and time on-/off-site.



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATUS & TREND NETWORKS FIELD SHEET - GROUND WATER
Effective: October 2023

Collection Agency:_____ **Project Name**: _____ **Date**:_____

On-site Time (24hr): _____ **Off-site Time** (24hr): _____ **Time Zone** (for all times listed on this form): ◯ ETZ / ◯ CTZ

Trend Network Station Name: _____
OR
Status Network Random ID: _____

Water Resource: ◯ UNCONFINED AQUIFER / ◯ CONFINED AQUIFER **RQ**-_____

FLUWID: _____ **FLUWID Condition:** Normal / Needs Reprint / Applied New / Applied Reprint / No ID

Station Name: _____ **Casing Material**: _____

Total Depth (ft): _____ **Casing Depth** (ft): _____ **Casing Diam.** (in): _____ **Storage Tank Vol.** (gal): _____

Land Surface Elevation (LSE)(ft): _____ **Measuring Point Elevation (MPE)**(ft): _____ **Stickup** (ft)*: _____

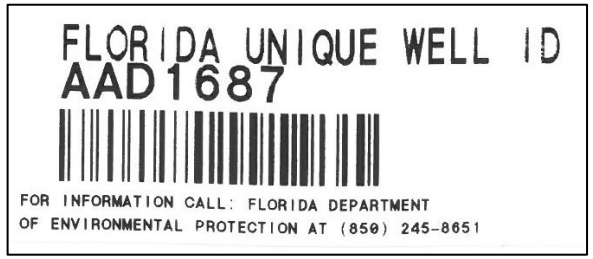
*Measure stickup for Status Network. Calculate stickup for Trend Network (Stickup = MPE - LSE), if MPE & LSE have the same vertical datum.

Well Condition: Normal / Other: _____ **Well Use:** Potable / Non-Potable / Unknown

FLUWID

- Research well before visiting. Has a FLUWID tag been previously attached?
- Never tag a well that already has a tag.
- Order reprint if old tag is missing or damaged.
- Place labels on permanent well components.

- ONE label on well.



(If new tag, use program FLUWID. If old FLUWID tag is faded, replace.)

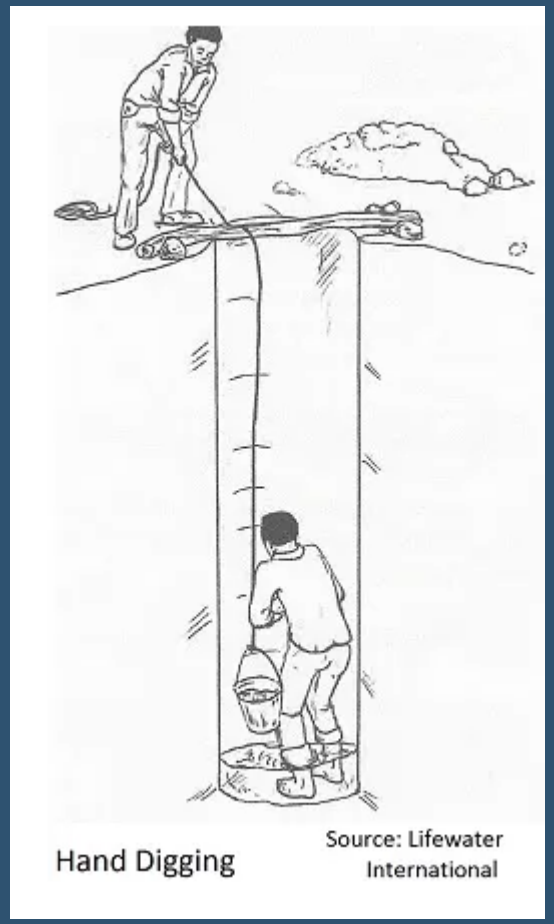
FLUWID

FLUWID condition:

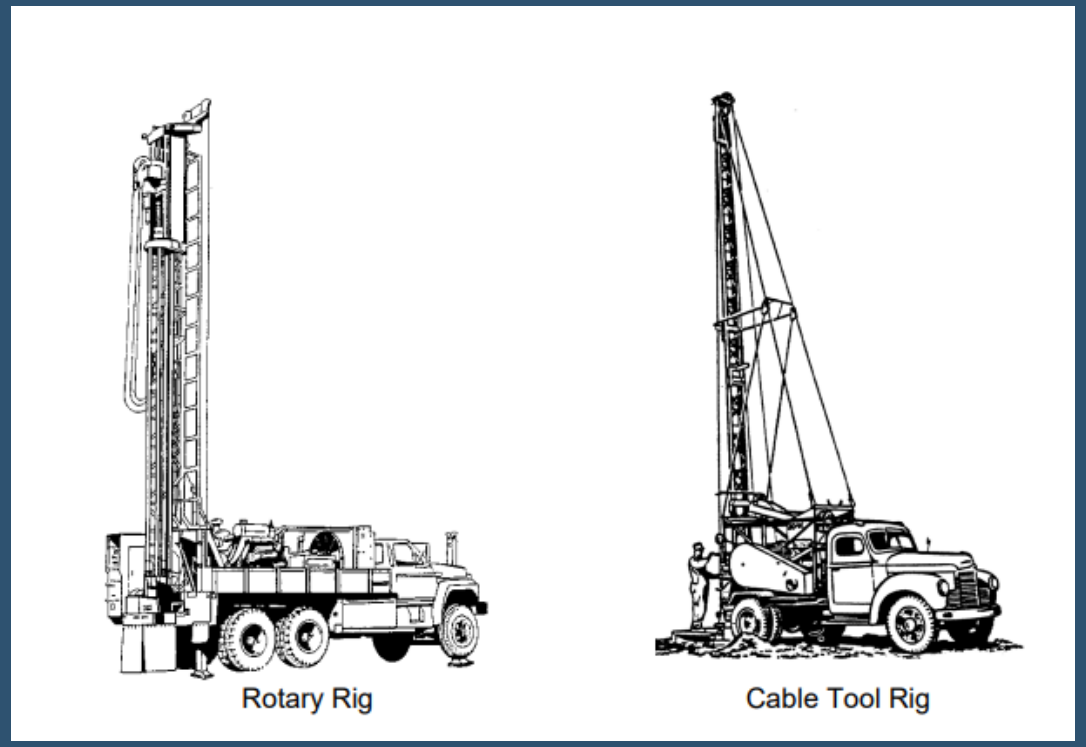
- Normal (good condition).
- Needs (FLUWID) Reprint.
- New Applied (to well).
- Reprint Applied (to well).

All must have FLUWID tag action.

THREE WELL INSTALLATION METHODS

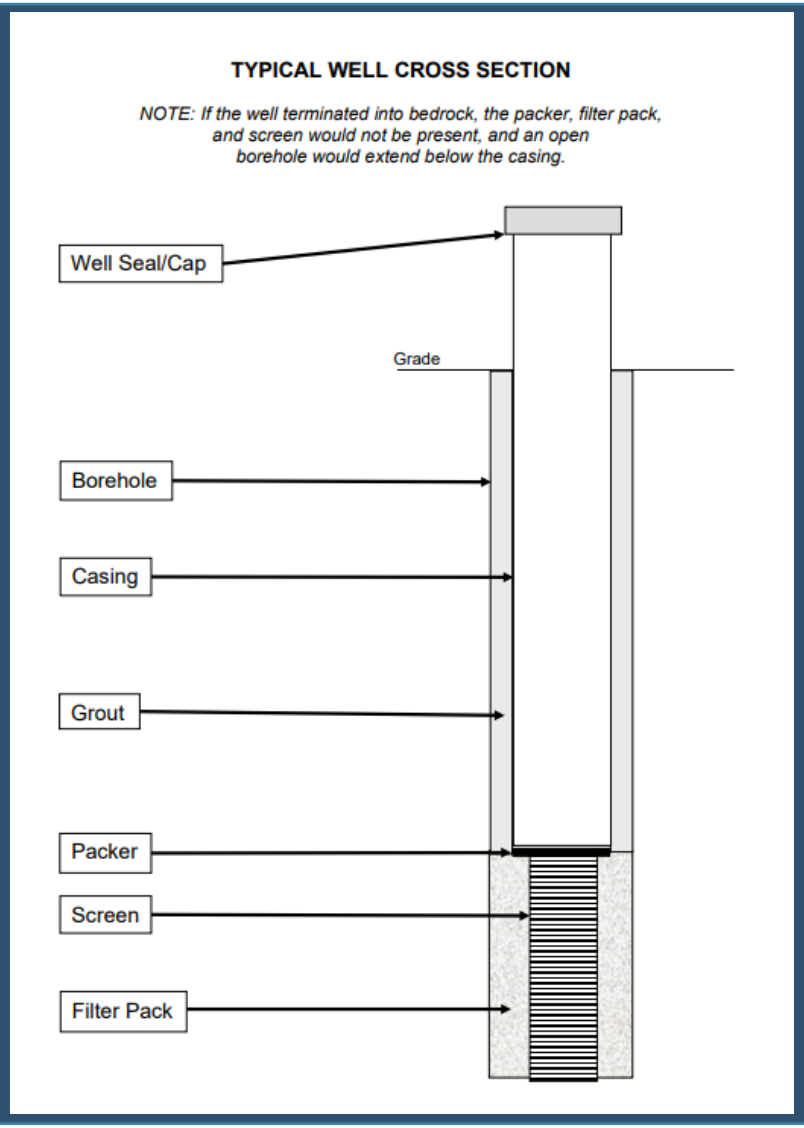


Hand dug well.
(Lifewater International : http://www.clean-water-for-laymen.com/hand-dug-wells.html



A Rotary and a Cable Tool Rig
(Michigan Department of Environment, 2023).

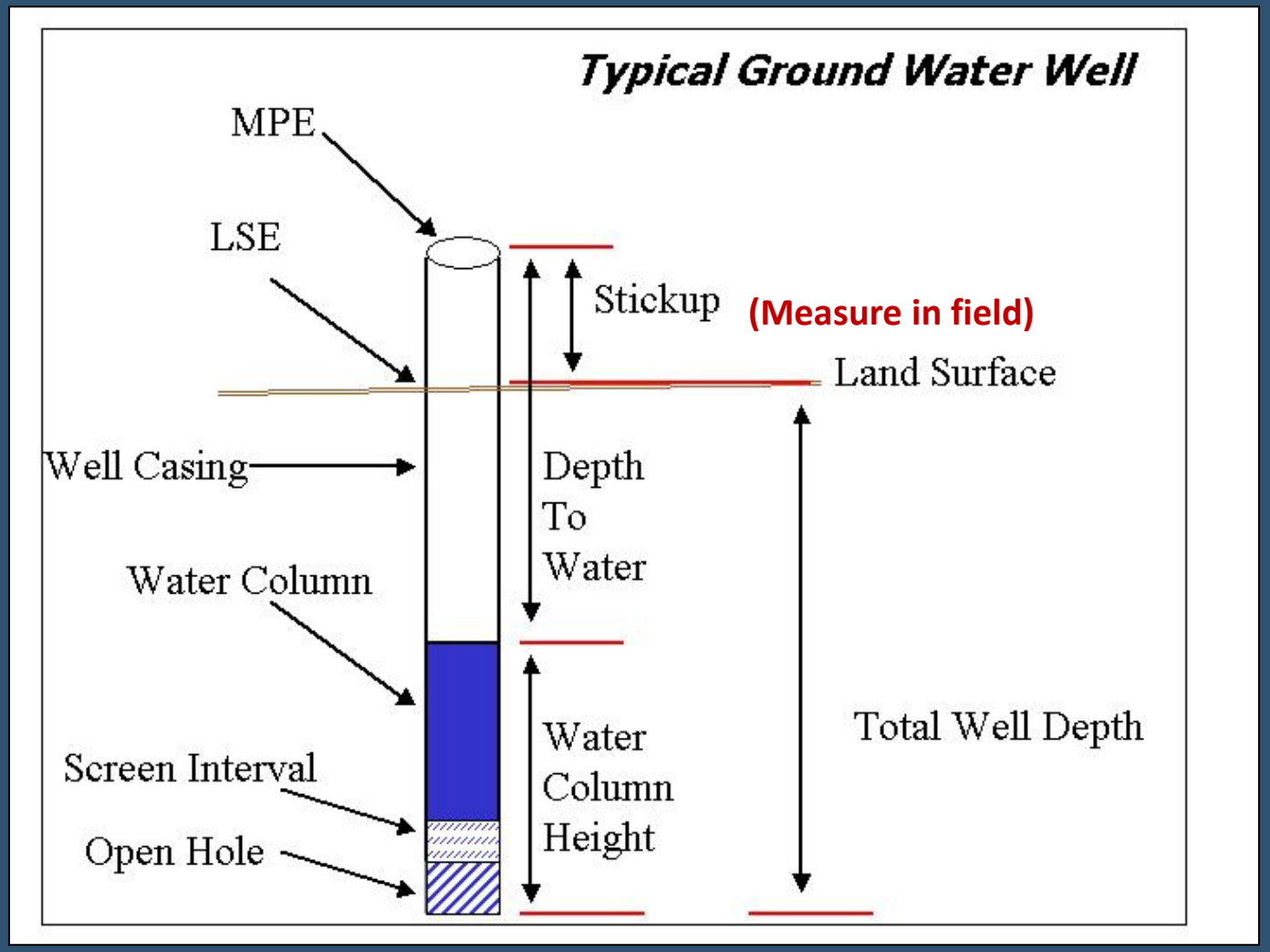
TYPICAL WELL CROSS SECTION



Michigan Department of Environment, 2023D

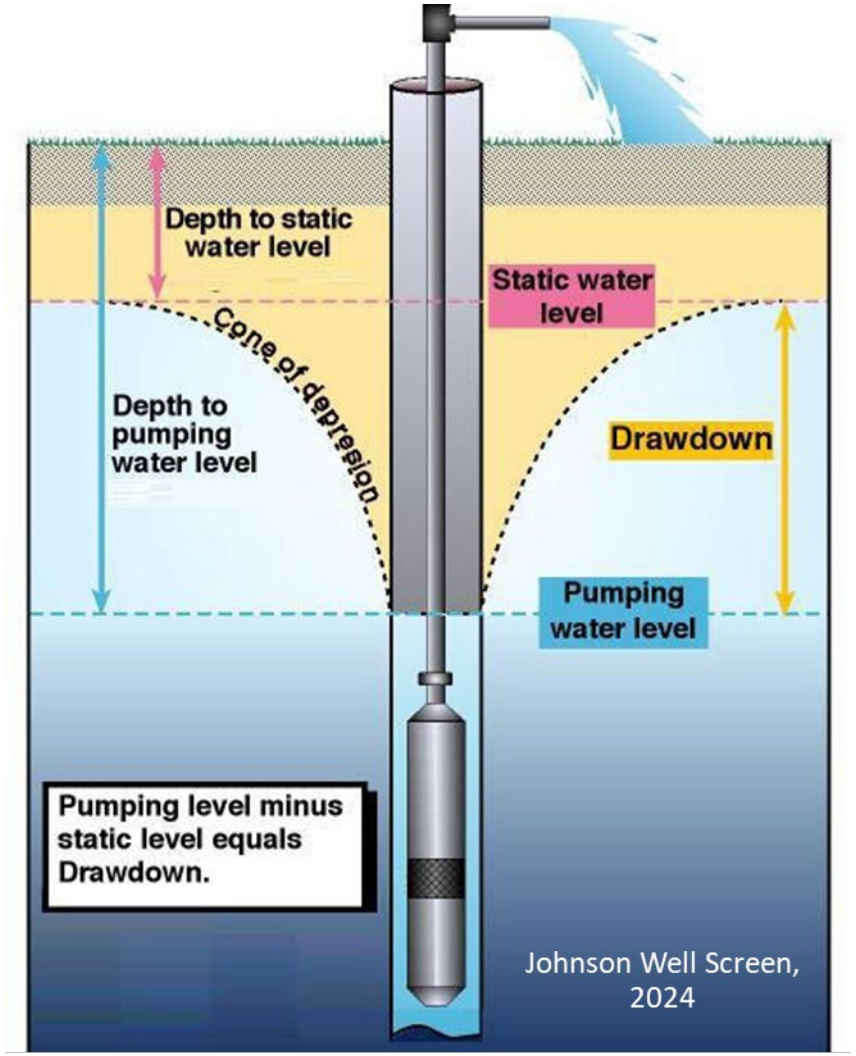
MONITORING WELL WITH SLOTTED INTERVALS

WELL GUIDE



pg. 165 sampling manual

DETERMINING DEPTH TO WATER (DTW)

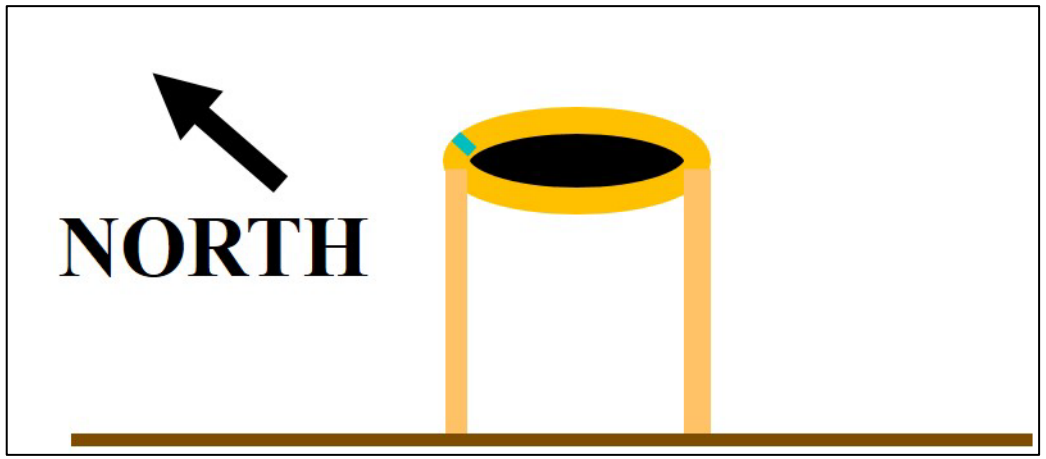


- Measure the Static Water Level.
- Before you purge.
- To remove stagnant water from well.

DETERMINING DTW

- Always measure DTW from the same measuring point elevation (MPE) reference point of survey mark on top of the well casing.

- If there is no reference mark, measure from the north side of the casing.



DETERMINING DTW

- Measure to nearest 0.01 ft.
- Measure twice.
- Two consecutive measurements within ± 0.01 ft.
- Report second measurement. as initial (undisturbed) DTW.
- Use second measurement in water column height (WCH) calculation.

INITIAL DEPTH TO WATER FROM MEASURING POINT (DTW)

Select one method, measure twice, report second number. Measurements must be within ± 0.01ft. Report as negative # if above MPE.

◯ **1) Electronic Sensor** 1st Reading _____ft 2nd Reading _____ft

◯ **2) Tape / Chalk** (Held At - Wetted At) = DTW 1st Reading (_____ ft - _____ ft) = _____ ft

2nd Reading (_____ ft - _____ ft) = _____ ft

◯ **3) Hose / Tape for Flowing Artesian Well** (meas. from top of hose to MPE) 1st Reading _____ft 2nd Reading _____ft

◯ **4) Pressure Gauge for Flowing Artesian Well** 1st Reading _____ PSI X (-2.31) = _____ ft

2nd Reading _____ PSI X (-2.31) = _____ ft Adjust for diff. btwn. gauge & MPE (if needed) _____ft

◯ **5) DTW Not Measured.** List reason in DTW result comment below.

DTW Value (ft):	**DTW Qualifier(s):**	**DTW Result Comment:**

DETERMINING DTW

INITIAL DEPTH TO WATER FROM MEASURING POINT (DTW)

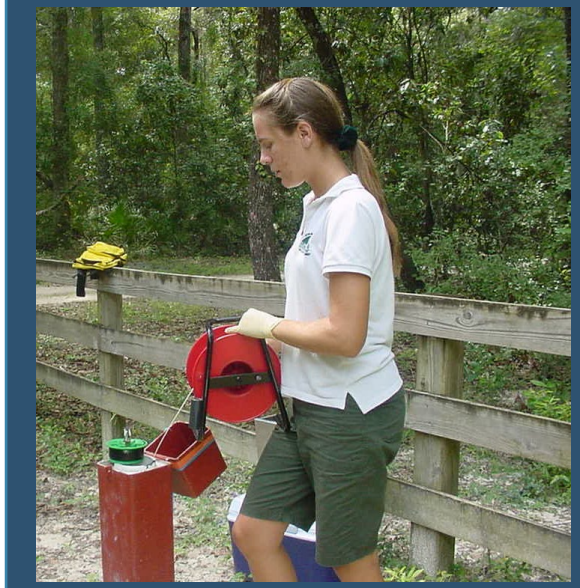
Select one method, measure twice, report second number. Measurements must be within ± 0.01ft. Report as negative # if above MPE.

○ **1) Electronic Sensor** 1st Reading _____ ft 2nd Reading _____ ft

○ **2) Tape / Chalk** (Held At - Wetted At) = DTW 1st Reading (_____ ft - _____ ft) = _____ ft

2nd Reading (_____ ft - _____ ft) = _____ ft

- Non-flowing wells.
- Use **Electronic sensor** or **tape and chalk.**



DETERMINING DTW
TAPE AND CHALK

As an example, a sampler placed chalk all along the bottom 10 ft. of the tape. She held the tape at the 20-foot mark and the top of the water mark was at 5.20 ft.

Held at = **20.00** feet (ft.)
Chalk from 0.00 to 10.00 ft.
Wet at = **5.20** ft.

Held at - Wetted at = DTW
20.00 - 5.20 = **14.80** ft.

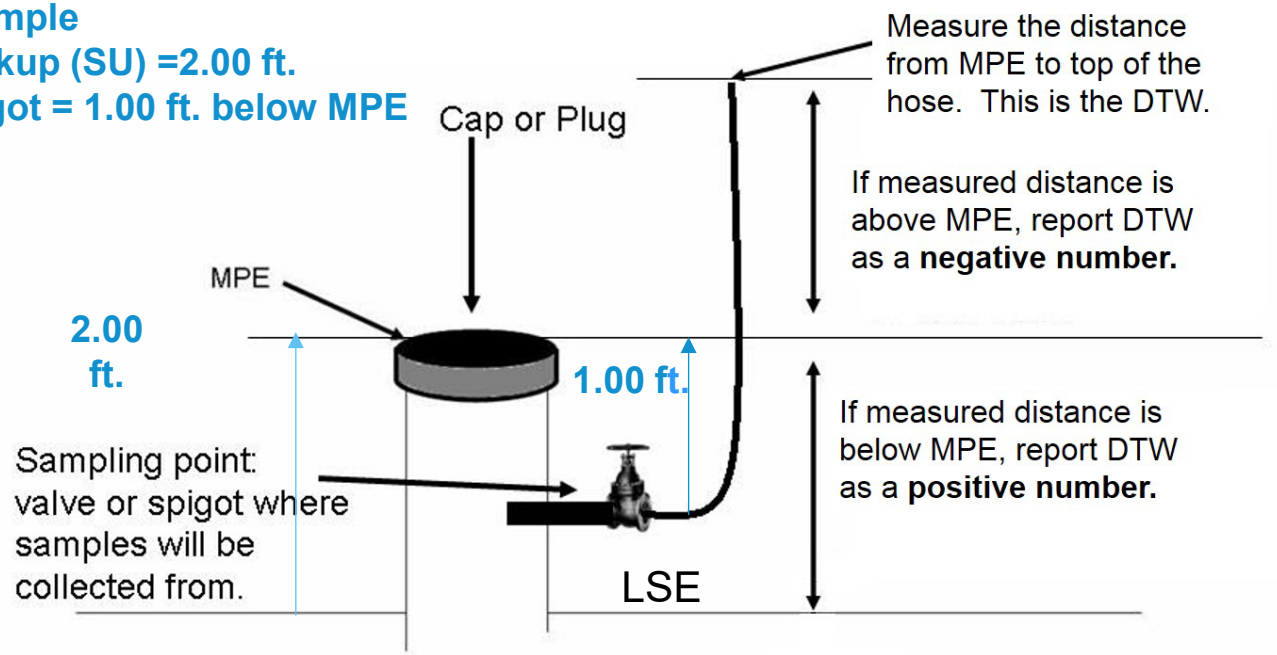
DETERMINING DTW
ARTESIAN WELLS

Flowing wells:

- Use hose/tape or pressure gauge.
- Record as negative if DTW is above the MPE.

DTW
HOSE/TAPE

Example
Stickup (SU) =2.00 ft.
Spigot = 1.00 ft. below MPE



E.G. DTW = - 2.01 ft. from MPE (- 3.01 ft. from spigot)

For a correct measurement, the water meniscus should be bulging slightly above the end of the hose. Incorrect measurements are made when the water level is below the end of the hose or when water is allowed to flow out of the hose.

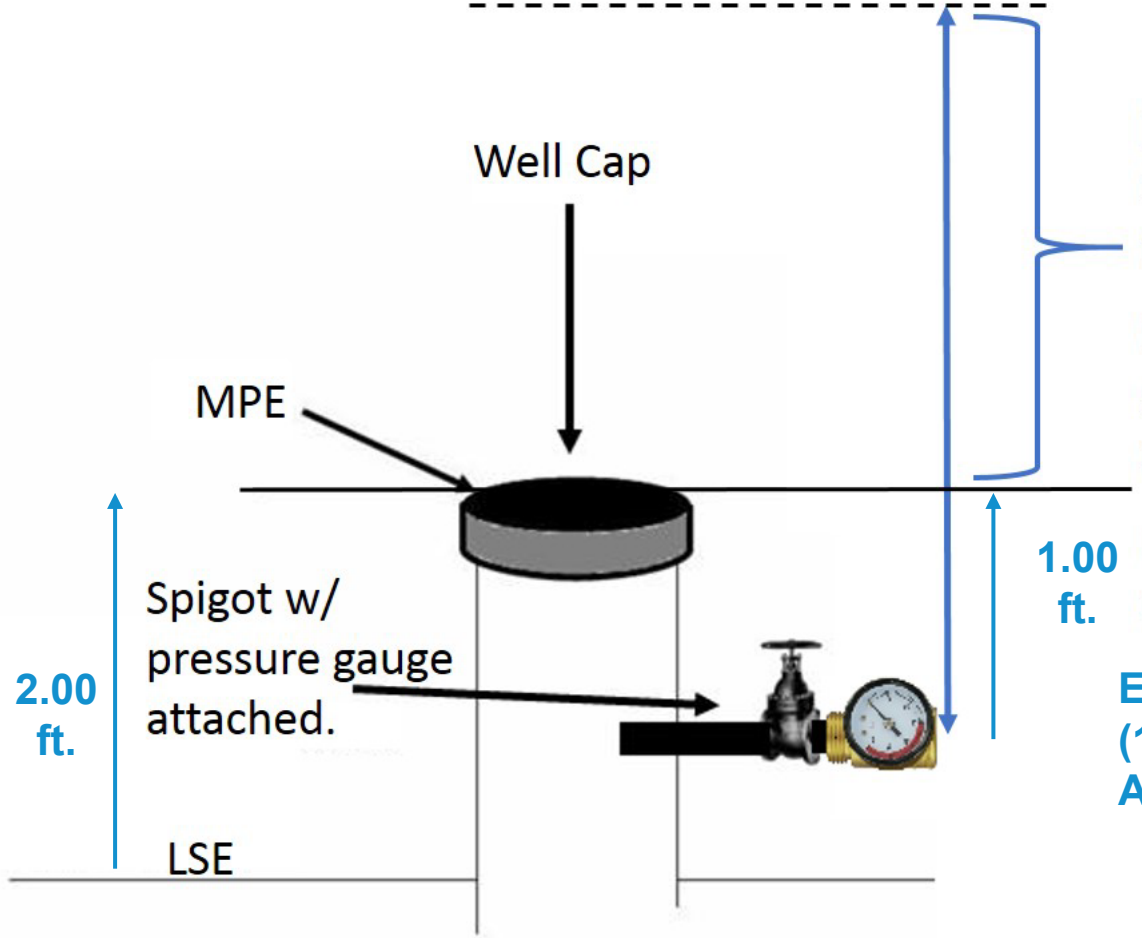
"Water seeks its own level". Therefore the length of hose does not matter.

See Sampling Manual page 166 for more information.

DTW
PRESSURE GUAGE

Use conversion factor to calculate Depth to Water (DTW) from pressure gauge reading.

Gauge Reading (PSI) * 2.31 = feet above pressure gauge



For Status & Trend Networks, record Depth to Water (DTW) from MPE.

Because gauge & MPE are not at same height, we must adjust the reading.

If adjusted DTW is above MPE, record as negative number.

E.G. Gauge = 1.30
(1.30) x (2.31) = 3.01
Above MPE: record as
- 2.01 ft.

DETERMINING DTW
CLOSED SYSTEMS AND IN-PLACE PLUMBING

- For many wells with in-place plumbing, it is not possible to measure DTW.
- Select “DTW not measured” on the field sheet and describe reason.

  (e.g., “Closed system In-Place plumbing”)

INITIAL DEPTH TO WATER FROM MEASURING POINT (DTW)

Select one method, measure twice, report second number. Measurements must be within ± 0.01ft. Report as negative # if above MPE.

◯ **1) Electronic Sensor** 1st Reading _____ft 2nd Reading _____ft

◯ **2) Tape / Chalk** (Held At - Wetted At) = DTW 1st Reading (_____ ft - _____ ft) = _____ ft

2nd Reading (_____ ft - _____ ft) = _____ ft

◯ **3) Hose / Tape for Flowing Artesian Well** (meas. from top of hose to MPE) 1st Reading _____ft 2nd Reading _____ft

◯ **4) Pressure Gauge for Flowing Artesian Well** 1st Reading _____ PSI X (-2.31) = _____ ft

2nd Reading _____ PSI X (-2.31) = _____ ft Adjust for diff. btwn. gauge & MPE (if needed) _____ft

◯ **5) DTW Not Measured.** List reason in DTW result comment below.

DTW Value (ft):	**DTW Qualifier(s):**	**DTW Result Comment:**

CALCULATING WCH

- Use measured DTW to calculate WCH:

  WCH = Total depth - (DTW - stickup).

WATER COLUMN HEIGHT (WCH) Do not complete if using purge method #2 above. **DTW = NA in calc. if negative or if not meas.

_____ ft – (_____ ft – _____ ft) = _____ ft

Total Depth DTW Stickup WCH

OR ◯ Check here if WCH calculation not performed. List reason: _____

- Use “NA” for DTW in calculation if DTW is negative number or not measured.
- Always double check your calculation before proceeding.

WCH CALCULATION
EXAMPLE

Total depth (TD) = 30.00 ft.

DTW = 15.00 ft.

Stickup (SU) = 1.00 ft.

TD - (DTW - SU) = WCH

30.00 - (15.00 - 1.00) = 16.00 ft.

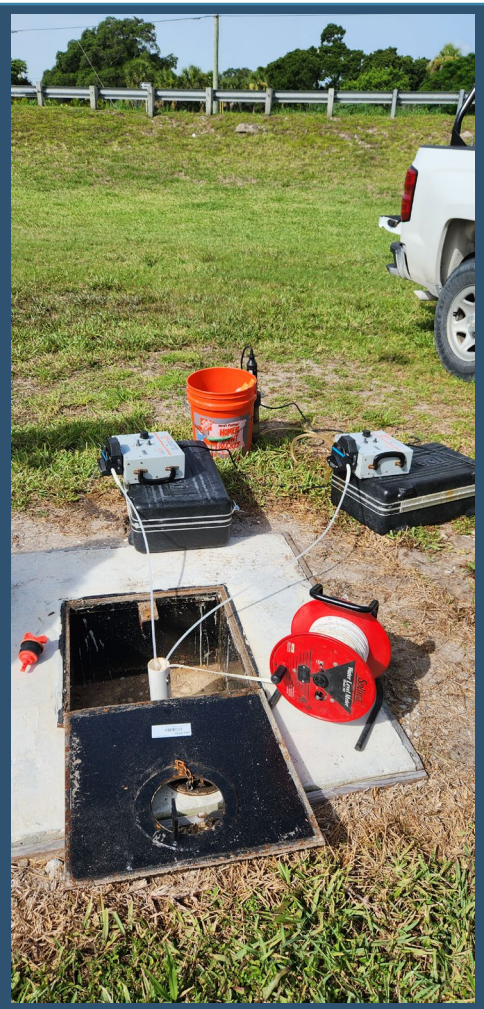
Source: Pexels

WELL PURGING
SET UP

- Keep area clean.
- Place gas power sources downwind.
- Direct water away from well and surface water bodies.

WELL PURGING
EQUIPMENT

- Purge with centrifugal, peristaltic or submersible pump.
  - Do not sample with centrifugal pump.
- Check valve to prevent backflow when using a centrifugal or submersible pump.
- Appropriate tubing (see page 35 of sampling manual).



Well being sampled/purged with peristaltic pumps.

Submersible pump lowering into well.

PURGING METHOD
DOCUMENTATION

Field ID:_____ **Project Name:** _____ **Date:**_____

Purge Method: #1) Conventional Purge Method: ____ at least 1.5 well volumes & stability;
____ ≥ 5 well volumes without stability; ____ Outer / Middle well in series of concentric wells.
____ **#2)** In-place plumbing w/ Continuous / Intermittently running pump purge & stability;
____ **#3)** Other _____

Action	Equip. Type	Fuel Powered	Pump Name	Tubing Material(s) (Describe Other in Comments)	Equip. Vol. (gal)	Pump/Intake Placement (ft)	Corrected Due to Drawdown?
Purge	IPP / Sub. / Perist. / Centrif.	Y / N		PE / PP / PVC / Si / Other / NA			Y / N
Sample	IPP / Sub. / Perist. / NA	Y / N		PE / PP / PVC / Si / Other / NA			NA

Document equipment used for purging and sampling (back of field sheet).

- Type of pump and unique ID (e. g., Peristaltic #1).
- Tubing Material(s).
- Equipment Volume.
- Pump/intake placement.
- Use of fuel powered equipment (Y/N).

PURGING METHOD
CONVENTIONAL

Conventional Purge Method:

1A) ≥ 1.5 well volumes (V) and stability.

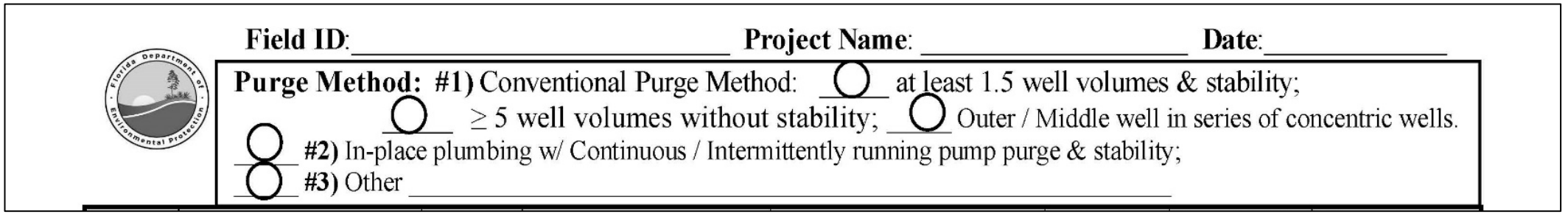
1B) ≥ 5.0 V.

1C) ≥ 1.5 V and stability for series of concentric wells.

- In-place plumbing and stability.
  - Method depends on frequency of pump use.

- Other (e. g. Fully dry purge) – Not used.

PURGING METHOD
CONVENTIONAL



Field ID: _____ **Project Name:** _____ **Date:** _____

Purge Method: **#1)** Conventional Purge Method: (O) at least 1.5 well volumes & stability;
( ) ≥ 5 well volumes without stability; ( ) Outer / Middle well in series of concentric wells.
( ) **#2)** In-place plumbing w/ Continuous / Intermittently running pump purge & stability;
( ) **#3)** Other _____

- Use WCH to calculate V.
- Purge at least 1 V before initiating stability readings
- Purge at least ¼ V between subsequent stability readings.
- Purge at least 1½ V before samples are collected.

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CALCULATING PURGE VOLUME
EQUATION 1 EXAMPLE

V = one well volume in gallons

d = well diameter in inches

h = height of the water column in feet

Equation 1:

V = 0.041 x d x d x h

2 in. diameter well

90 ft. water column height

V = 0.041 x 2 x 2 x 90

V = 14.8 gallons (1st stability readings)

0.25 V = 3.7 gallons

1.25 V = 18.5 gallons (2nd readings)

1.5 V = 22.2 gallons (3rd readings; this is your minimum purge volume)

pg. 36 of Sampling Manual

CALCULATING PURGE VOLUME
EQUATION 2 EXAMPLE

V = one well volume in gallons

Gfw = gallons per foot of water (constant, based on diameter)

h = height of the water column in feet

Equation 2:

V = Gfw x h

2 in. diamter well

90 ft. water column height

pg. 36 Sampling manual

WELL VOLUME CONSTANTS

Casing Internal Diameter	GFW (Gallons per Foot of Water)
0.75”	0.02
1”	0.04
1.25”	0.06
2”	0.16
3”	0.37
4”	0.65
5”	1.02
6”	1.47
8"	2.62
10"	4.10
12”	5.88

pg. 36 of Sampling Manual

CALCULATING PURGE VOLUME
EQUATION 2 EXAMPLE

V = one well volume in gallons

Gfw = gallons per foot of water (constant, based on diameter)

h = height of the water column in feet

Equation 2:

V = Gfw x h

2 in. diamter well

90 ft. water column height

V = 0.016 x 90

V = 14.4 gallons

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Note: If the constant for a particular well diameter is unknown – use equation 1.

MINIMUM PURGE VOLUME

MINIMUM PURGE VOLUME DETERMINATION (Do not complete if using purge method #2 above.)

Well Diameter inches → Gfw Gallons per foot of water) If diameter not listed use Equation 1.

0.75" → 0.02; 1" → 0.04; 1.25" → 0.06; 2" → 0.16; 3" → 0.37; 4" → 0.65; 5" → 1.02; 6" → 1.47; 8" → 2.62; 10" → 4.10; 12" → 5.88

◯ Equation 1: _____gal + (0.041 X _____in X _____in X _____ft X 1.5) = _____gal
Storage Tank Diameter Diameter WCH Min. Purge Vol.

◯ Equation 2: _____gal + (_____ft X _____ X 1.5) = _____gal
Storage Tank WCH Gfw Min. Purge Vol.

◯ Outer / Middle well in series of concentric wells (show calc. in comments): _____ Well Diameter; _____Inner Well Diameter.

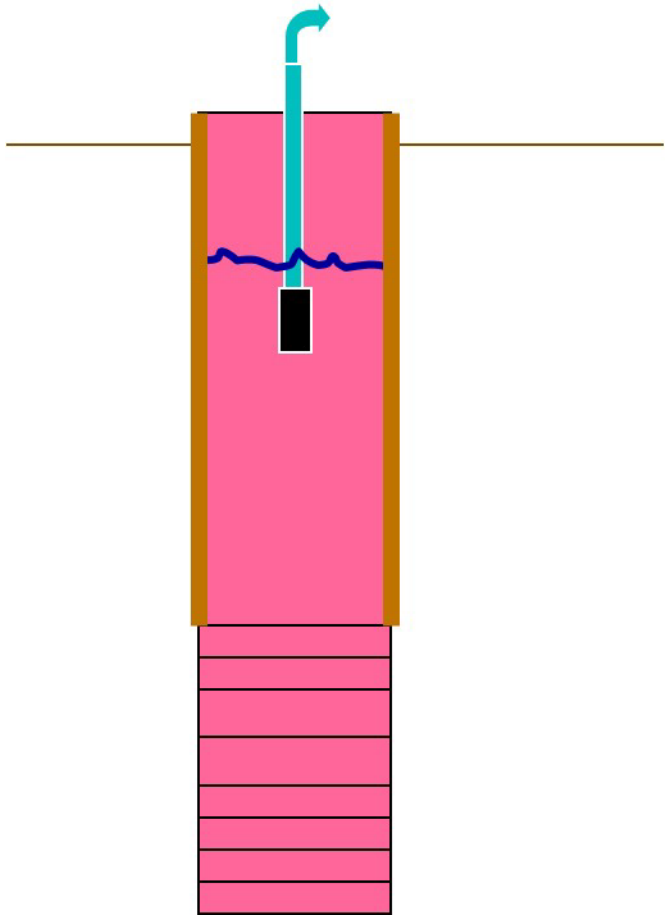
Purge Rate (gal/min):	**Manual check of all calculations complete?** Y / N		
Description	**# of Well Vol. (Purge Method 1)**	**Vol. (gal)**	**Time (min)**
Volume to purge before first stability reading.	1 + storage tank		
Volume to purge between subsequent stability readings.	0.25		
Min. purge vol. before sample collection (if stability criteria met).	1.5 + storage tank		

- Enter calculated WCH value into either purge volume equation.

WELLS WITHOUT IN-PLACE PLUMBING
CONVENTIONAL PURGE PROCEDURES

Purge Procedures:

- Position pump near top of water column.
- Measure DTW during purging.
- Avoid draw down by adjusting pumping rate to make it equivalent to the well recovery rate.



PURGE RATE

- Use stopwatch and graduated bucket/container to measure flow rate of water being purged.

PURGING

MINIMUM PURGE VOLUME DETERMINATION (Do not complete if using purge method #2 above.)

Well Diameter inches → Gfw Gallons per foot of water) If diameter not listed use Equation 1.

0.75" → 0.02; 1" → 0.04; 1.25" → 0.06; 2" → 0.16; 3" → 0.37; 4" → 0.65; 5" → 1.02; 6" → 1.47; 8" → 2.62; 10" → 4.10; 12" → 5.88

◯ Equation 1: _____gal (Storage Tank) + (0.041 X _____in (Diameter) X _____in (Diameter) X _____ft (WCH) X 1.5) = _____gal (Min. Purge Vol.)

◯ Equation 2: _____gal (Storage Tank) + (_____ft (WCH) X _____ (Gfw) X 1.5) = _____gal (Min. Purge Vol.)

◯ Outer / Middle well in series of concentric wells (show calc. in comments): _____ Well Diameter; _____Inner Well Diameter.

Purge Rate (gal/min): **Manual check of all calculations complete?** Y / N

Description	# of Well Vol. (Purge Method 1)	Vol. (gal)	Time (min)
Volume to purge before first stability reading.	1 + storage tank		
Volume to purge between subsequent stability readings.	0.25		
Min. purge vol. before sample collection (if stability criteria met)	1.5 + storage tank		

Time Purge Begin (24hr):_____ **Time Purge Stop (24hr):** _____

Total Purge Time (min): _____ **Total Purge Volume (gal):** _____

Time Sampling Begin (24hr): _____ **Time Sampling Stop (24hr):** _____

(Time sampling begin must be same as time purge stop or later. "N/A" if only collecting field measurements.)

Sulfur Odor? Y / N

Water Color: _____

- Document purge rate and start time.
- Calculate minimum purge time (minimum purge volume/purge rate).
- Calculate purge volume and time before 1st stability reading.
- Calculate purge volume and time between subsequent stability readings.

PURGING

Action	Equip. Type	Fuel Powered	Pump Name	Tubing Material(s) (Describe Other in Comments)	Equip. Vol. (gal)	Pump/Intake Placement (ft)	Corrected Due to Drawdown?
Purge	IPP / Sub. / Perist. / Centrif.	Y / N		PE / PP / PVC / Si / Other / NA			Y / N
Sample	IPP / Sub. / Perist. / NA	Y / N		PE / PP / PVC / Si / Other / NA			NA

WATER COLUMN HEIGHT (WCH) Do not complete if using purge method #2 above. **DTW = NA in calc. if negative or if not meas.

_____ ft (Total Depth) – (_____ ft (DTW) – _____ ft (Stickup)) = _____ ft (WCH)

OR ◯ Check here if WCH calculation not performed. List reason: _____

MINIMUM PURGE VOLUME DETERMINATION (Do not complete if using purge method #2 above.)

Well Diameter inches → Gfw Gallons per foot of water) If diameter not listed use Equation 1.

0.75" → 0.02; 1" → 0.04; 1.25" → 0.06; 2" → 0.16; 3" → 0.37; 4" → 0.65; 5" → 1.02; 6" → 1.47; 8" → 2.62; 10" → 4.10; 12" → 5.88

◯ Equation 1: _____ gal (Storage Tank) + (0.041 X _____ in (Diameter) X _____ in (Diameter) X _____ ft (WCH) X 1.5) = _____ gal (Min. Purge Vol.)

◯ Equation 2: _____ gal (Storage Tank) + (_____ ft (WCH) X _____ (Gfw) X 1.5) = _____ gal (Min. Purge Vol.)

◯ Outer / Middle well in series of concentric wells (show calc. in comments): _____ Well Diameter; _____ Inner Well Diameter.

Purge Rate (gal/min): **Manual check of all calculations complete?** Y / N

Description	# of Well Vol. (Purge Method 1)	Vol. (gal)	Time (min)
Volume to purge before first stability reading.	1 + storage tank		
Volume to purge between subsequent stability readings.	0.25		
Min. purge vol. before sample collection (if stability criteria met).	1.5 + storage tank		

Time Purge Begin (24hr): _____ **Time Purge Stop (24hr):** _____

Total Purge Time (min): _____ **Total Purge Volume (gal):** _____

Time Sampling Begin (24hr): _____ **Time Sampling Stop (24hr):** _____

(Time sampling begin must be same as time purge stop or later. "N/A" if only collecting field measurements.)

Sulfur Odor? Y / N

Water Color: _____

- Document pump placement and drawdown.
- Note watercolor and presence of sulfur odor.

PURGING CRITERIA

Purging objective: to reach chemical/physical stabilization.
(once reached ⟶ sample)

Three consecutive measurements **within range**:

• Dissolved Oxygen (DO)	≤ 20% of saturation
• Turbidity	≤ 20 NTUs
• Temperature	± 0.2 °C
• pH	± 0.2 standard units
• Specific Conductance	± 5.0% of reading

pg. 41-42 of Sampling Manual

EXAMPLE OF STABILITY

pH ± 0.2 standard units) (Three consecutive measurements) PV = Purge volume

• PV	pH	Criteria Met?
• 1.00	7.2	
• 1.25	7.4	
• 1.50	7.6	
• 1.75	**7.0**	No
• 2.00	**7.1**	No
• 2.25	**7.2**	No
		Yes

PURGING CRITERIA

Alternatively, if DO and/or turbidity are high (>20% or >20 NTU), purge until three consecutive measurements are within:

• Temperature	± 0.2 °C
• pH	± 0.2 standard units
• Specific Conductance	± 5% of reading
• DO	± 0.2 mg/L, or 10% (greater)
• Turbidity	± 5 NTUs, or 10% (greater)

Note presence of conditions that may contribute to high DO or turbidity.

pg.41-42 of Sampling Manual

PURGING CRITERIA FORM

CHEMICAL STABILITY MONITORING (Continue on 2nd Field Sheet if Needed)

Field Meter ID: | **Turbidity Meter ID:**

Stability Criteria (3 consecutive meas.): Temp. ± 0.2°C; Specific Conductance ± 5.0% of reading; DO ≤ 20%; pH ± 0.2 SU; Turbidity ≤ 20 NTU.
If DO > 20% or Turbidity > 20 NTUs then: DO ± 0.2 mg/L or 10%, whichever is greater; Turbidity ± 5 NTU or 10%, whichever is greater.

	Time (24hr)	**Volume Purged** (gal)	**Purge Rate** (gal/min)	**DTW** (feet)	**Temp** (°C)	**D.O.** (% SAT)	**D.O.** (mg/L)	**Sp. Cond.** (umhos/cm)	**pH** (SU)	**Turbidity** (NTU)	**Stable** (Y/N)
1											NA
2											NA
3											Y / N
4											Y / N
5											Y / N
6											Y / N
7											Y / N
8											Y / N
9											Y / N

WHAT IF?
STABILIZATION NOT MET AFTER 5 V

If field measurements do not stabilize after purging 5 V:

- Check calibrations, connections, flow rate.
- Contact Project Manager or Quality Assurance (QA) officer.
- Proceed to sample collection and document conditions on field sheet.

pg. 42 of Sampling Manual

WELLS WITH IN-PLACE PLUMBING

- Always select the spigot nearest wellhead.
- Spigot must be before any softeners or filters.
- Select spigot before storage tanks if possible.

Photo taken during an audit performed by DEP.

WELLS WITH IN-PLACE PLUMBING

Select purge method based on frequency of pump use.

- How often is pump used for purposes other than sampling?
  - Infrequent/unknown (conventional).
  - Continuous/intermittent.

WELLS WITH IN-PLACE PLUMBING

1. If pump is **infrequently run or**
   if pump use **frequency is unknown.**

- Use conventional purge methods: (1A, 1B)
- If DTW cannot be measured:
  - Calculate minimum purge volume as though entire well was full of water.
  - For purge equations, enter:

    (Total Depth + Stickup) as WCH.

WELLS WITH IN-PLACE PLUMBING

2. If pump is **continuously/intermittently running.**
   - Use purge method #2 (i.e., in-place plumbing)

Field ID:_____ **Project Name**: _____ **Date**:_____

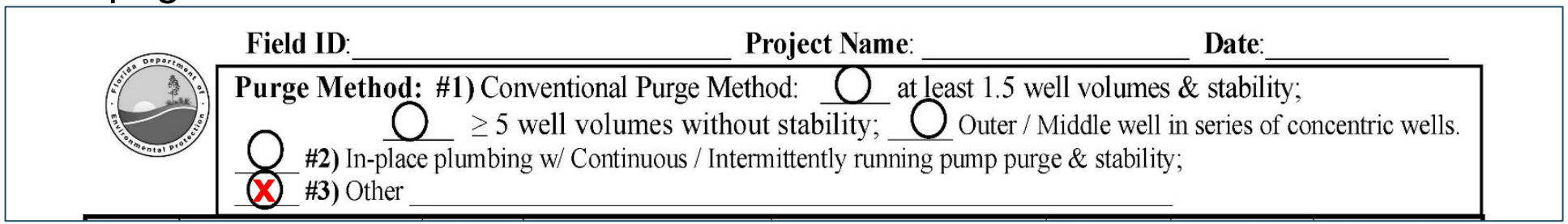
Purge Method: **#1)** Conventional Purge Method: ( ) at least 1.5 well volumes & stability;
( ) ≥ 5 well volumes without stability; ( ) Outer / Middle well in series of concentric wells.
(X) **#2)** In-place plumbing w/ Continuous / Intermittently running pump purge & stability;
( ) **#3)** Other _____

- Collect stability measurements no sooner than two minutes apart.
- Use 1 if you have any doubt as to 1 or 2.

ALTERNATE PURGE METHODS

- Fully dry purge not recommended.
- Requires special considerations to avoid damaging equipment.
- DEP's Watershed Monitoring Section (WMS) does not recommend using other alternative methods.

See page 41 if interested.



Field ID:_____ **Project Name**: _____ **Date**:_____

Purge Method: #1) Conventional Purge Method: ___O___ at least 1.5 well volumes & stability;
___O___ ≥ 5 well volumes without stability; ___O___ Outer / Middle well in series of concentric wells.
___O___ **#2)** In-place plumbing w/ Continuous / Intermittently running pump purge & stability;
___X___ **#3)** Other _____

PURGING

- Record purge time stop.
- Sampling start time must be the same as or later than purge stop time.
- Total Purge Vol ≥ Minimum Purge Vol.

Time Purge Begin (24hr): _____	**Time Purge Stop (24hr):** _____	**Sulfur Odor?** Y / N
Total Purge Time (min): _____	**Total Purge Volume (gal):** _____	**Water Color:** _____
Time Sampling Begin (24hr): _____	**Time Sampling Stop (24hr):** _____	
(Time sampling begin must be same as time purge stop or later. "N/A" if only collecting field measurements.)		

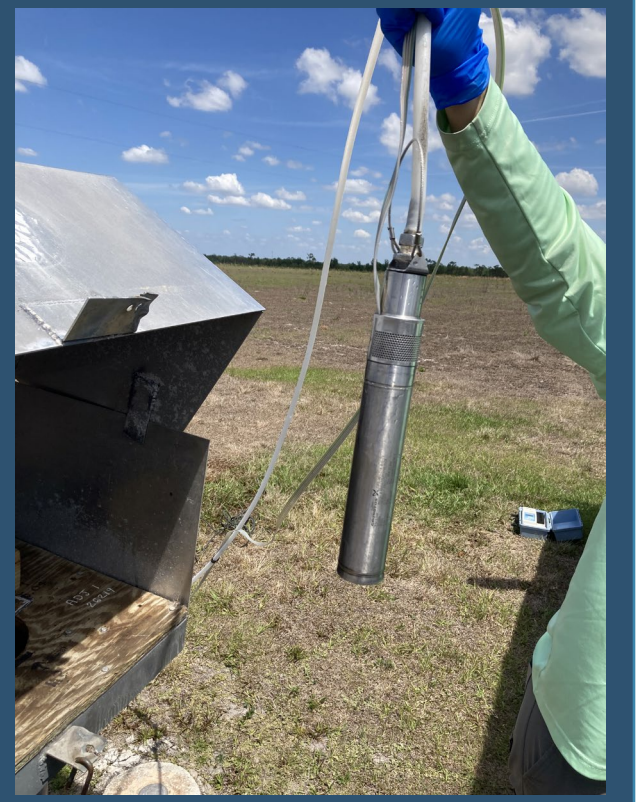
SAMPLING PUMPS

Without in-place plumbing:

- Peristaltic or submersible pumps.
  - Constructed of stainless steel, Teflon and other approved materials.
  - When possible, use a variable-speed pump.
- **Do not use a centrifugal pump to collect samples!**

With in-place plumbing:

- You'll have to use pump installed in the well.
  - Typically, these will be submersible, jet, centrifugal or turbine pump.



APPROVED SAMPLING PUMPS

Source: Geopump.com

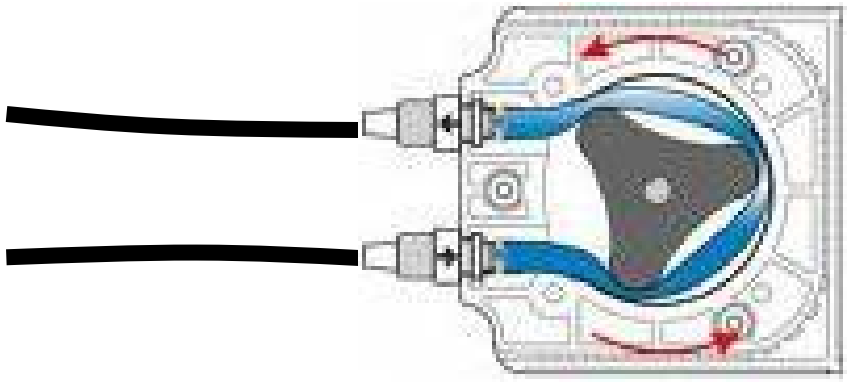
Source: Geopump.com

- Submersible.
  - Variable Speed.
  - Will pump water from most depths encountered.
  - Must be used with a check valve.
- Peristaltic.
  - Low flow.
  - Variable Speed.
  - Will not pump water when the water is 28 ft. (1 atmosphere) below pump.

SAMPLING EQUIPMENT

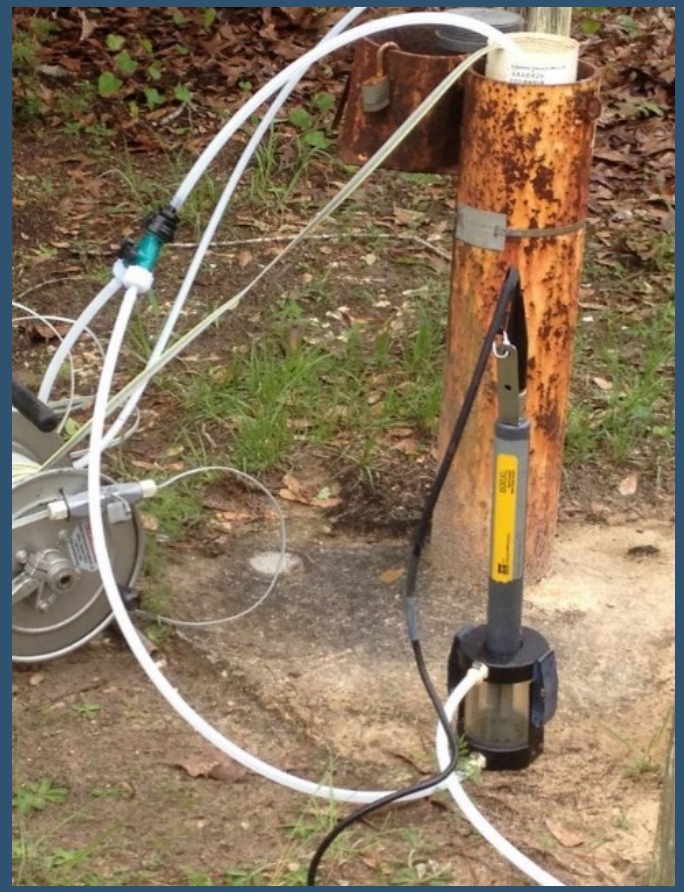
Peristaltic Pumps:

- Install 1-ft. maximum length of silicone tubing in pump head assembly.
- Decontaminate or replace silicon tubing for each well.



Source: Bing.com/images

FIELD ANALYTES

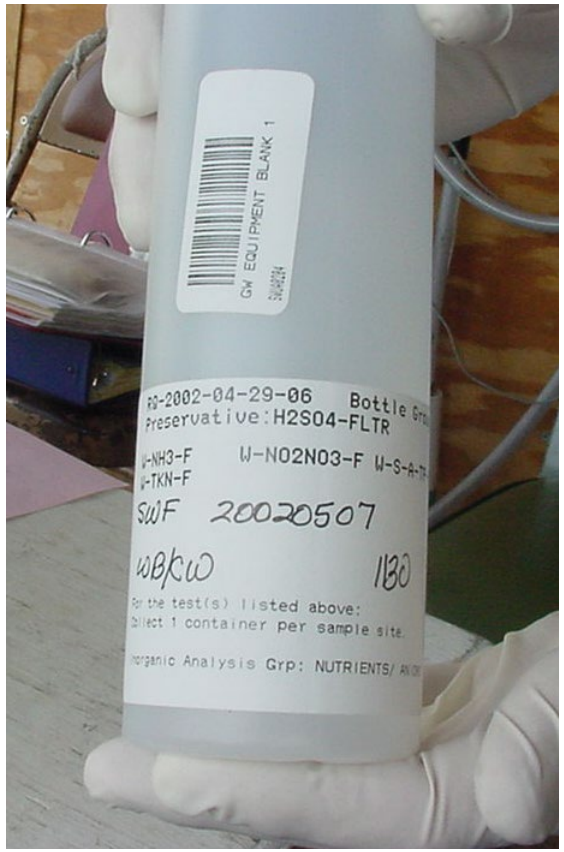


- Measure field analytes using flow chamber.
- Fill flow chamber from the bottom up (**water covers probes**).
- Keep flow slow to avoid damage to the probes from pressure.

TURBIDITY

- Place meter on level surface.
- Use only clean cuvettes.
- Rinse cuvette with sample water.
- Fill with sample water, avoid air bubbles.
- Wipe dry with lint-free cloth.
- Always rinse the cuvette with de-ionized (DI) water at end of each sampling event.

SAMPLING CONTAINER LABELING



- Place Station ID Label vertically on all sample containers.
- Record date, time and sampler initials on Lab ID label of each container.
- Time on sample bottle must match sampling start time on back of field sheet.

Time Purge Begin (24hr): _____	**Time Purge Stop (24hr):** _____	**Sulfur Odor?** Y / N
Total Purge Time (min): _____	**Total Purge Volume (gal):** _____	**Water Color:** _____
Time Sampling Begin (24hr):	**Time Sampling Stop (24hr):** _____	
(Time sampling begin must be same as time purge stop or later. "N/A" if only collecting field measurements.)		

SAMPLE COLLECTION

- Collect samples immediately after purging – do not stop flow.
- Wear **clean** gloves whenever handling sample containers.
- Reduce flow to fill bottles (< 500 mL/min).
- Do not rinse bottles.
- Leave slight air space.

SAMPLE COLLECTION ORDER

STATUS NETWORK

Follow order on the Groundwater Sample Details Page.

Check Boxes for Each Container Submitted to Lab				Preservation (Must be completed within 15 min of sample collection)	# Bottles sent to Lab	Bottle Group
Parameter Suite	Lab Test Codes Trend Core	Lab Test Codes Status Core	Lab Test Codes Special Projects			
Tracers (BG-500ML)			☐ W-E8321-DI / W-E8321-MS	☐ Ice		
Pesticides – Carbamates (BG-500ML)			☐ W-CARB-AA	☐ 1 vial MCAA Buffer ☐ Ice MCAA Lot #: _____		
Pesticides - Organochlorine (BG-500ML)			☐ W-PCL-TQ-R	☐ Ice		
Pesticides – Organo-N/P (BG-500ML)			☐ W-PSNP-TQ	☐ Ice		
Nutrients (P-500ML)	☐ W-NH3 / W-NO2NO3 / W-S-T-P / W-TN / W-TOC	☐ W-NH3 / W-NO2NO3 / W-S-T-P / W-TN / W-TOC		☐ 2ML H_2SO_4 ☐ pH < 2 ☐ Ice		
Metals (P-500ML)	☐ W-HARD / W-ICP / W-ICPMS	☐ W-HARD / W-ICP / W-ICPMS		☐ 2ML HNO_3 ☐ pH < 2 ☐ Ice		
Anion / Phys. Aggregate (P-1L)	☐ ALKALINITY / TURBIDITY / W-CL-IC / W-COLOR / W-COND / W-F/ W-SO4-IC / W-TDS	☐ ALKALINITY / TURBIDITY / W-CL-IC / W-COLOR / W-COND / W-F/ W-SO4-IC / W-TDS		☐ Ice		
Microbiology (P-250ML or P-120ML)	☐ ECOLI-18QT / TCOLI-18QT	☐ ECOLI-18QT / TCOLI-18QT		☐ Ice		
Filtered Nutrient (P-125ML)	☐ W-PO4-F			☐ Field Filtered w/ in-line 0.45 um PES filter ☐ Ice		

1. 500 mL: nutrients.
2. 50 mL: metals
3. 1 L: anions, turbidity and physical analytes.
4. Bacteria container(s).

SAMPLE COLLECTION ORDER
TREND NETWORK

Check Boxes for Each Container Submitted to Lab				Preservation (Must be completed within 15 min of sample collection)	# Bottles sent to Lab	Bottle Group
Parameter Suite	Lab Test Codes Trend Core	Lab Test Codes Status Core	Lab Test Codes Special Projects			
Tracers (BG-500ML)			☐ W-E8321-DI / W-E8321-MS	☐ Ice		
Pesticides – Carbamates (BG-500ML)			☐ W-CARB-AA	☐ 1 vial MCAA Buffer ☐ Ice MCAA Lot #: _____		
Pesticides - Organochlorine (BG-500ML)			☐ W-PCL-TQ-R	☐ Ice		
Pesticides – Organo-N/P (BG-500ML)			☐ W-PSNP-TQ	☐ Ice		
Nutrients (P-500ML)	☐ W-NH3 / W-NO2NO3 / W-S-T-P / W-TN / W-TOC	☐ W-NH3 / W-NO2NO3 / W-S-T-P / W-TN / W-TOC		☐ 2ML H_2SO_4 ☐ pH < 2 ☐ Ice		
Metals (P-500ML)	☐ W-HARD / W-ICP / W-ICPMS	☐ W-HARD / W-ICP / W-ICPMS		☐ 2ML HNO_3 ☐ pH < 2 ☐ Ice		
Anion / Phys. Aggregate (P-1L)	☐ ALKALINITY / TURBIDITY / W-CL-IC / W-COLOR / W-COND / W-F/ W-SO4-IC / W-TDS	☐ ALKALINITY / TURBIDITY / W-CL-IC / W-COLOR / W-COND / W-F/ W-SO4-IC / W-TDS		☐ Ice		
Microbiology (P-250ML or P-120ML)	☐ ECOLI-18QT / TCOLI-18QT	☐ ECOLI-18QT / TCOLI-18QT		☐ Ice		
Filtered Nutrient (P-125ML)	☐ W-PO4-F			☐ Field Filtered w/ in-line 0.45 um PES filter ☐ Ice		

1. 500 mL: nutrients.
2. 50 mL: metals.
3. 1 L anions, turbidity and physical analytes.
4. Bacteria container(s).
5. Then attach in-line filter, flush, and collect 125 mL **Ortho-Phosphate** bottle (Only for Trend Network).

AFTER SAMPLES ARE COLLECTED

Place Station ID barcode (digital barcode or barcode label) on the sample details page.

Lab Page _____ of _____

RQ-2020-_____ **Collected By (Agency Code)**:_____

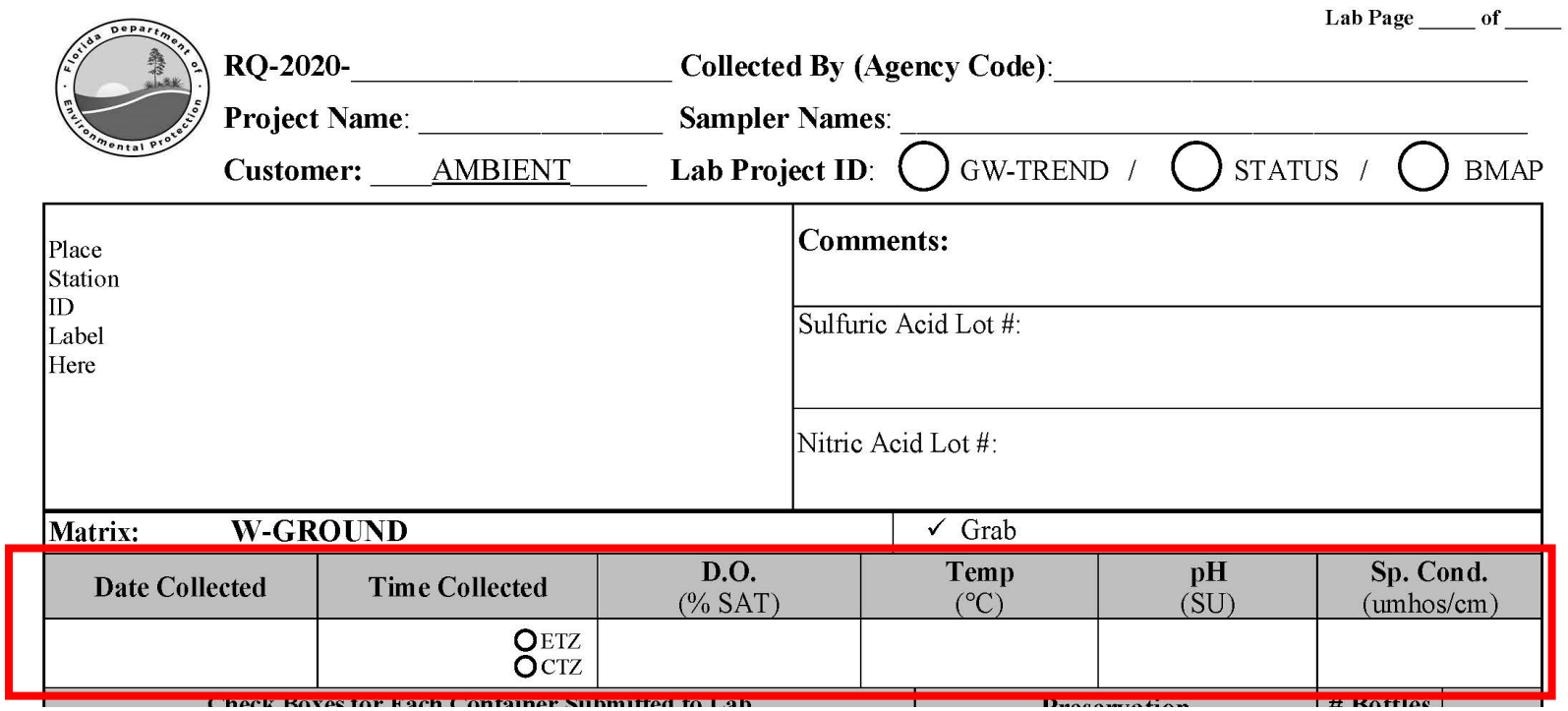
Project Name: _____ **Sampler Names**: _____

Customer: ____AMBIENT_____ **Lab Project ID**: ◯ GW-TREND / ◯ STATUS / ◯ BMAP

Place Station ID Label Here	**Comments:**
	Sulfuric Acid Lot #:
	Nitric Acid Lot #:

Matrix: W-GROUND					✓ Grab
Date Collected	**Time Collected**	**D.O.** (% SAT)	**Temp** (°C)	**pH** (SU)	**Sp. Cond.** (umhos/cm)
	◯ ETZ ◯ CTZ				
Check Boxes for Each Container Submitted to Lab			**Preservation**		**# Bottles**

CUSTODY SHEETS/SAMPLE DETAILS PAGE



Lab Page _____ of _____

RQ-2020-_____ Collected By (Agency Code):_____

Project Name: _____ Sampler Names: _____

Customer: ____AMBIENT_____ Lab Project ID: ◯ GW-TREND / ◯ STATUS / ◯ BMAP

Place Station ID Label Here	Comments:
	Sulfuric Acid Lot #:
	Nitric Acid Lot #:

Matrix: W-GROUND	✓ Grab

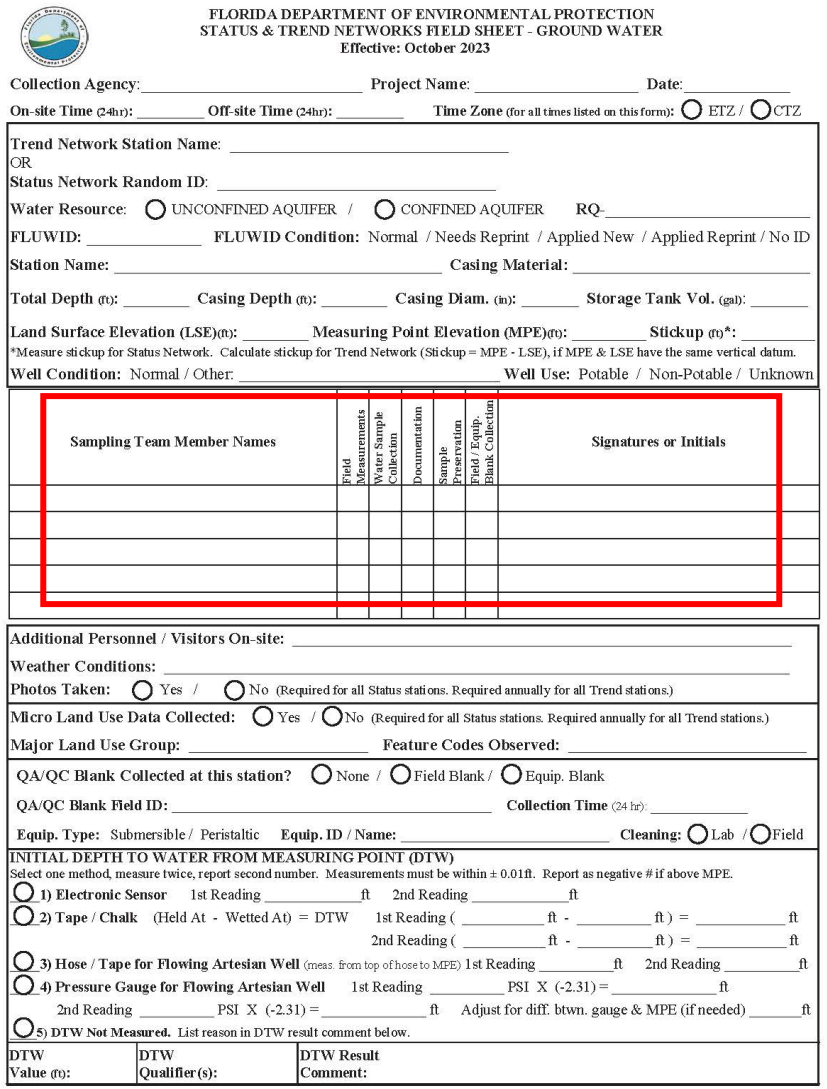
Date Collected	Time Collected	D.O. (% SAT)	Temp (°C)	pH (SU)	Sp. Cond. (umhos/cm)
	◯ETZ ◯CTZ				

Check Boxes for Each Container Submitted to Lab | Preservation | # Bottles

- Transfer sampling event information to GW sample details page.
- Field data must be last set of field measurements recorded for stability monitoring.
- Time collected must match time recorded on bottles.

FIELD SHEET FRONT PAGE

Record printed names, tasks performed and signatures or initials of all samplers.



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATUS & TREND NETWORKS FIELD SHEET - GROUND WATER
Effective: October 2023

Collection Agency: _____ **Project Name:** _____ **Date:** _____

On-site Time (24hr): _____ **Off-site Time** (24hr): _____ **Time Zone** (for all times listed on this form): ◯ ETZ / ◯ CTZ

Trend Network Station Name: _____
OR
Status Network Random ID: _____

Water Resource: ◯ UNCONFINED AQUIFER / ◯ CONFINED AQUIFER **RQ-**_____

FLUWID: _____ **FLUWID Condition:** Normal / Needs Reprint / Applied New / Applied Reprint / No ID

Station Name: _____ **Casing Material:** _____

Total Depth (ft): _____ **Casing Depth** (ft): _____ **Casing Diam.** (in): _____ **Storage Tank Vol.** (gal): _____

Land Surface Elevation (LSE)(ft): _____ **Measuring Point Elevation (MPE)**(ft): _____ **Stickup** (ft)*: _____
*Measure stickup for Status Network. Calculate stickup for Trend Network (Stickup = MPE - LSE), if MPE & LSE have the same vertical datum.

Well Condition: Normal / Other: _____ **Well Use:** Potable / Non-Potable / Unknown

Sampling Team Member Names	Field Measurements	Water Sample Collection	Documentation	Sample Preservation	Field / Equip. Blank Collection	Signatures or Initials

Additional Personnel / Visitors On-site: _____

Weather Conditions: _____

Photos Taken: ◯ Yes / ◯ No (Required for all Status stations. Required annually for all Trend stations.)

Micro Land Use Data Collected: ◯ Yes / ◯ No (Required for all Status stations. Required annually for all Trend stations.)

Major Land Use Group: _____ **Feature Codes Observed:** _____

QA/QC Blank Collected at this station? ◯ None / ◯ Field Blank / ◯ Equip. Blank

QA/QC Blank Field ID: _____ **Collection Time** (24 hr): _____

Equip. Type: Submersible / Peristaltic **Equip. ID / Name:** _____ **Cleaning:** ◯ Lab / ◯ Field

INITIAL DEPTH TO WATER FROM MEASURING POINT (DTW)
Select one method, measure twice, report second number. Measurements must be within ± 0.01ft. Report as negative # if above MPE.

◯ **1) Electronic Sensor** 1st Reading _____ft 2nd Reading _____ft

◯ **2) Tape / Chalk** (Held At - Wetted At) = DTW 1st Reading (_____ft - _____ft) = _____ft
2nd Reading (_____ft - _____ft) = _____ft

◯ **3) Hose / Tape for Flowing Artesian Well** (meas. from top of hose to MPE) 1st Reading _____ft 2nd Reading _____ft

◯ **4) Pressure Gauge for Flowing Artesian Well** 1st Reading _____ PSI X (-2.31) = _____ft
2nd Reading _____ PSI X (-2.31) = _____ft Adjust for diff. btwn. gauge & MPE (if needed) _____ft

◯ **5) DTW Not Measured.** List reason in DTW result comment below.

DTW Value (ft):	DTW Qualifier(s):	DTW Result Comment:

PHOTO DOCUMENTATION

- Six photos per well (north, east, south, west, overall, FLUWID tag on well).
- Required for all Status Network wells.
- Required once per year for Trend Network wells.

ZA-UA-12002 N

ZA-UA-12002 E

ZA-UA-12002 S

ZA-UA-12002 W

Note, Lid is up.

ZA-UA-12002
Overall (well)

ZA-UA-12002
FLUWID

PHOTO DOCUMENTATION

- Recommend taking photos with Survey123 app and tablet computers.
  - Photos will be stamped with station ID, date and direction (N/E/S/W) in lower-left corner.
  - Photo files will be automatically named and transferred to DEP OneDrive.

MICRO LAND USE

Micro Land Use Form:

- Complete annually for Trend Network.
- Every well in Status Network.
- Draw and check off major land uses around well, take pictures.

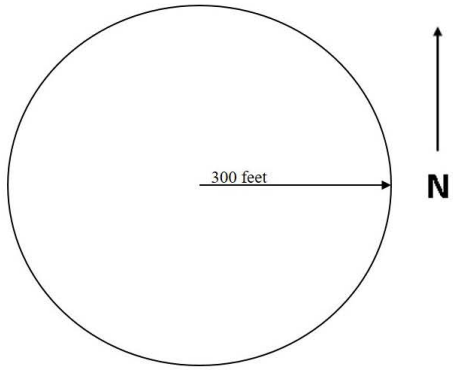
MICRO LAND USE FORM

DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATUS & TREND NETWORKS - MICRO LAND USE
Effective: October 2020

Collection Agency:_____ Project Name:_____ Date:_____

Trend Network Station Name
OR Status Network Random ID:
(Use station ID label if available.)

Micro Land Use Sketch



Major Land Use Group (check one):

	1 - Low Impact (LI)
	2 - Urban/Suburban (US)
	3 - Mining/Excavation ME)
	4 - Intense Agriculture (AG)
	5 - Industrial (IN)

List Codes for All Features Observed Within 300 Feet of Well:

Micro Land Use Comments or Other Unlisted Features:

Reference Table of Feature Codes (listed alphabetically)

(47) Agri. Chemical Mixing/Storage	(55) Dry Cleaners	(04) Landfill	(16) Roads, Major Highway	(19) Transmission Lines and Towers
(02) Airports	(41) Food Processing Plant	(11) Mine	(36) Roads, Other	(29) Water Softener
(52) Animal Feeding Operation	(12) Golf Course	(43) Mineral Processing Plant	(13) Septic Tank(s)	(30) Well(s), Injection
(10) Borrow Pit	(48) Groves, Citrus	(01) Nursery / Greenhouse	(07) Service Station	(31) Well(s), Irrigation
(57) Campground	(49) Groves, Other	(20) Parking Lot(s)	(14) Sewage Treatment Plant	(32) Well(s), Oil & Gas
(21) Canal(s)	(23) Holding Pond(s), Industrial	(44) Petroleum Processing Plant	(15) Sewage Treatment Sprayfield	(33) Well(s), Private Supply
(40) Cave(s)	(24) Holding Pond(s), Urban	(17) Pipeline(s) & Pump Station	(39) Sinks/Sinkholes	(34) Well(s), Public Supply
(03) Cemetery	(45) Hospitals/Clinics	(46) Power Plant	(27) Spring(s)	(28) Wetland(s)
(51) Crops, Field	(56) Hunting Camp	(18) Railroad(s)	(08) Storage Tanks (Above Ground)	(54) Zoos
(50) Crops, Row	(35) Junk Yard	(06) Repair Shops (e.g. Automotive)	(09) Storage Tanks (Below Ground)	
(22) Ditch, Drainage	(53) Kennel(s)	(05) Residence	(38) Stream(s)	
(37) Ditch, Irrigation	(25) Lake(s)	(26) River	(42) Timber Processing Plant	

ADDITIONAL STEPS
(TO BE COVERED SEPARATELY)

- Sample preservation.
- Sample shipment.
- Equipment cleaning.
- Quality assurance.

QUESTIONS?

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Additional information is available at:

https://publicfiles.dep.state.fl.us/dear/Watershed%20Monitoring/Info%20Center/

THANK YOU

Rick Copeland
Division of Environmental Assessment and Restoration/Water Quality Monitoring Program
Florida Department of Environmental Protection

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