



A SADDs Time in Texas: Technical Overview of Subsurface Area Drip Dispersal Systems

April Hoh, P.G.

Alan Barraza

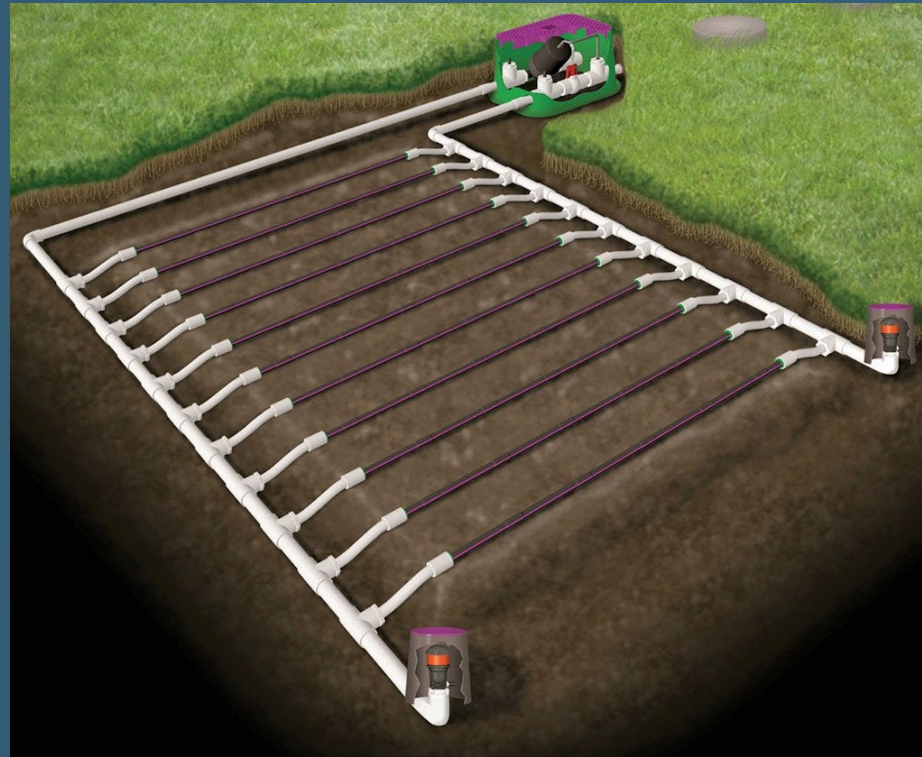
Water Quality Assessment Team, Water Quality Division

Texas Land Application Permits (TLAP)

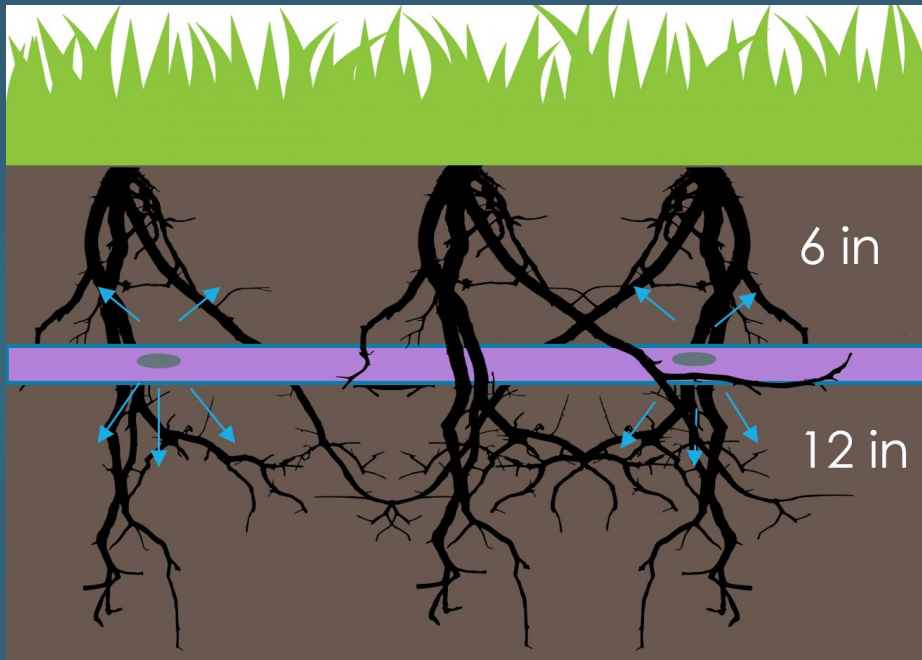
- ▶ Types of TLAPs
 - ▶ Evaporation – 30 TAC 309
 - ▶ Surface irrigation – 30 TAC 309
 - ▶ Subsurface irrigation – 30 TAC 309
 - ▶ Subsurface Area Drip Dispersal System (SADDS) – 30 TAC 222
 - ▶ Pond requirements are in 30 TAC 217
- ▶ No discharge into waters of the state

What is a SADDs?

- ▶ SADDs stands for Subsurface Area Drip Dispersal System
- ▶ By definition in TAC 222: A wastewater disposal system that injects processed commercial, industrial, or municipal wastewater into the ground at a depth of not more than 48 inches and spreads the wastewater over a large enough area that the soil hydrologic absorption rate and crop/plant root absorption rate are not exceeded.



SADDS



SADDS Goals

- ▶ Zero discharge of effluent to surface and groundwater resources
- ▶ A net zero system... all effluent and nutrients will be applied within the root zone to be fully utilized by the actively growing crops. Effluent and nutrients may be temporarily held within the root zone to be fully uptaken by the proposed crops.

Permit Application Forms

- ▶ Domestic Wastewater Permit Application, Technical Reports – Form TCEQ-10054
 - ▶ [Domestic Worksheet 3.0 – Land Application of Effluent](#)
 - ▶ Domestic Worksheet 3.1 – Surface Land Disposal of Effluent
 - ▶ Domestic Worksheet 3.2 – Subsurface Land Disposal of Effluent
 - ▶ [Domestic Worksheet 3.3 – Subsurface Area Drip Dispersal Systems \(SADDS\)](#)
- ▶ Instructions for Completing the Domestic Wastewater Permit Application – Form TCEQ-10053ins

Required Plans---30 TAC 222, Subchapter C

- ▶ Recharge Feature Plan
- ▶ Soil Evaluation
- ▶ Site Preparation Plan
- ▶ Soil Testing Plan

Water Quality Assessment Team



Agronomy Review

Overall Completeness (Pre-tech Review)

- ▶ Daily application rate
- ▶ Size, slope, and location
- ▶ Warm and cool season crops
- ▶ Cropping plan
- ▶ NRCS soil map of actual area
- ▶ Quality of irrigation effluent
- ▶ Soil analyses results
- ▶ Soil evaluation
- ▶ Site preparation plan

Worksheet 3.0

- ▶ Warm and cool season crop must be listed if year-round application is intended
- ▶ If multiple phases are proposed, list each phase and its corresponding information (acres and GPD)
- ▶ Public access will require higher level of disinfection and no access during times of irrigation
- ▶ SADDs require a minimal of 3 days storage



Worksheet 3.0

Annual Cropping Plan

- ▶ Soils map with crops
- ▶ Cool and warm season plant species
- ▶ Crop yield goals
- ▶ Crop growing season
- ▶ Crop nutrient requirements
- ▶ Additional fertilizer requirements
- ▶ Minimum/maximum harvest height (for grass crops)
- ▶ Supplemental watering requirements
- ▶ Crop salt tolerances
- ▶ Harvesting method/number of harvests
- ▶ Justification for not removing existing vegetation to be irrigated

Worksheet 3.0

NRCS Soil Map

- ▶ Map out actual application area instead of entire property.
- ▶ Identify soil depth, permeability, available water capacity, & curve number from available information on Web Soil Survey.
- ▶ Identify whether any of the properties could have an adverse effect on potential application rate.



Worksheet 3.3

- ▶ Irrigation Operation
 - ▶ Area in acres
 - ▶ Infiltration Rate in inches/hour
 - ▶ Slopes (average and max)
 - ▶ Depth to groundwater
- ▶ Dosing Information
 - ▶ Number of doses per day
 - ▶ Dosing duration, in hours
 - ▶ Rest period in between doses, in hours
 - ▶ Dosing amount per area, in inches/day
 - ▶ Number of zones
- ▶ Are trees being used as a crop?



Worksheet 3.3

Application Rate (continued)

The hydraulic application rate for a subsurface area drip dispersal system located east of the boundary shown in Figure 1 of this paragraph or in any part of the state when the vegetative cover is any crop other than nonnative grasses, the permittee shall use the equations in Figure 2 or 3 of this paragraph to establish the rate

30 TAC §222.839(d)(2)

Figure 2: 30 TAC 222.83(a)(2)

$$AR = ET - RAINE + LEACH$$

Where:

AR = hydraulic application rate (inches per month)

ET = $ET_o \times K_c$, the actual water requirement of crop (inches per month)

ET_o = potential evapotranspiration (inches per month)

K_c = crop coefficient (decimal) K_c ranges from 0.5 to 1.0

RAINE = $RAIN \times EF\%$, the effective rainfall (inches per month)

RAIN = total rainfall (inches per month)

EF% = effective rainfall percentage is the portion of rainfall/precipitation (inches) that infiltrates into the soil. An EF% of any value other than 0.67 must be justified by the applicant and approved by the executive director.

LEACH = leaching volume (inches per month). The leaching fraction may be determined using the electrical conductivity (millimhos/cm at 25° C) of the applied water and targeted soil salinity level (see §309.20(b)(3)(A) of this title (relating to Land Disposal of Sewage Effluent)); or

Figure 3: 30 TAC §222.83(a)(2)

$$SMA = ET - RAINE + LEACH - AR$$

Where:

SMA - change in available soil moisture and is calculated from the soil depth and soil water holding capacity. Soil water holding capacity is defined as the volume of water (inches) held in the soil between field capacity and permanent wilting point.

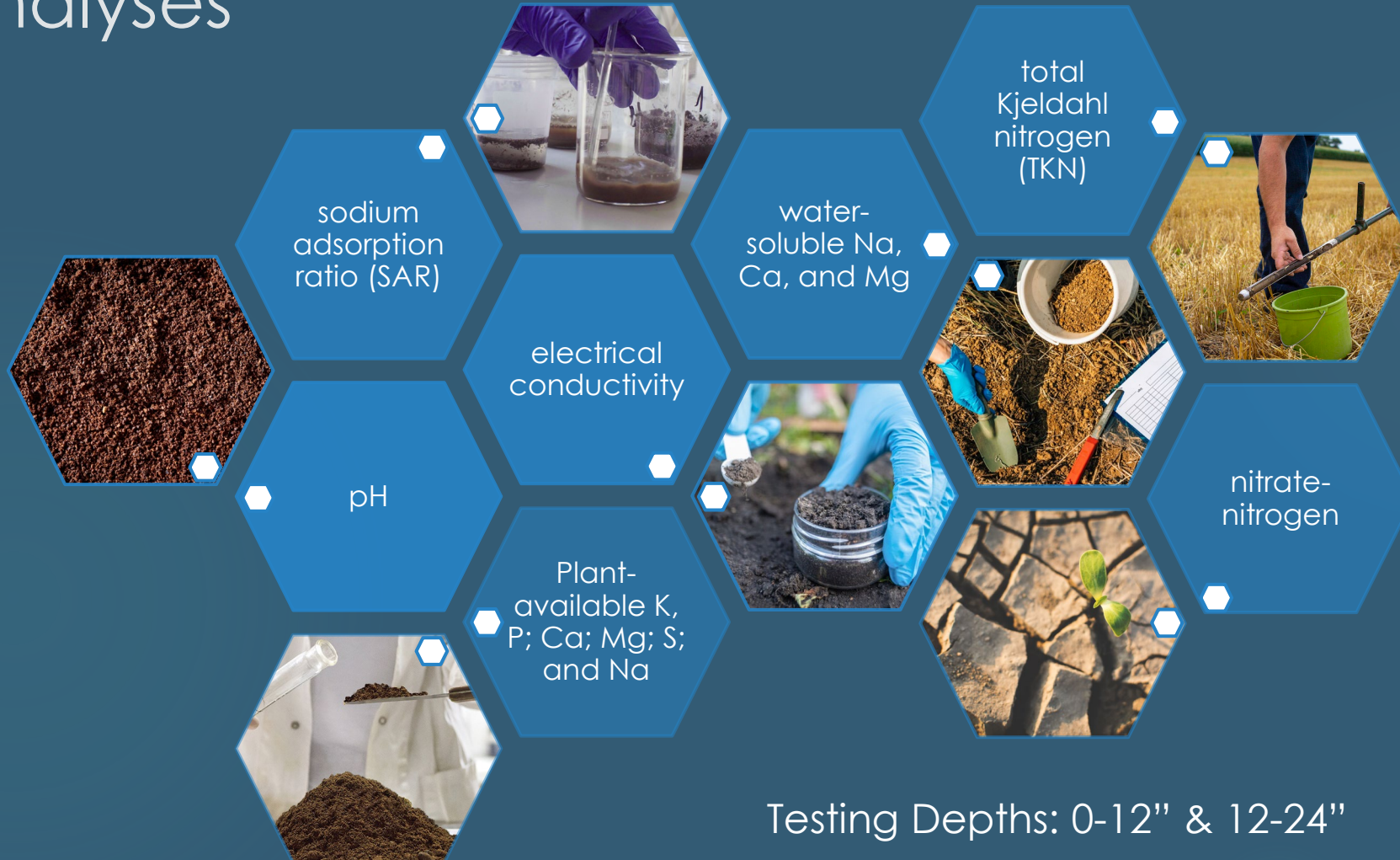
Worksheet 3.3

Site Preparation Plan

- ▶ site plan to minimize rainfall run-on and maximize rainfall runoff from the dispersal zones
- ▶ design criteria to compensate for any restrictive horizons within the soil column
- ▶ soil importation with descriptions of the chemical and physical characteristics of the proposed import material
- ▶ any planned removal of existing vegetation

Worksheet 3.3

Soil Analyses



Testing Depths: 0-12" & 12-24"

Worksheet 3.3

Soil Evaluation



Total depth of profile hole

Primary rooting depth

Secondary rooting depth

Horizon description

Boundary description

Restrictive horizons

Potential water bearing zones

Active water bearing zones

Other Requirements

▶ Dispersal Zone

- ▶ Lines at least 6 inches below surface
- ▶ Lines shall not exceed 1% lateral slope
- ▶ Removal of large rocks
- ▶ Installation of soil sensing monitors

▶ Vertical Separation

- ▶ At least 5 feet of soil over any sand or gravel strata
- ▶ At least 1 foot of soil over any restrictive soil horizons
- ▶ At least 2 feet of soil over any permanent or seasonal saturated zone of groundwater.

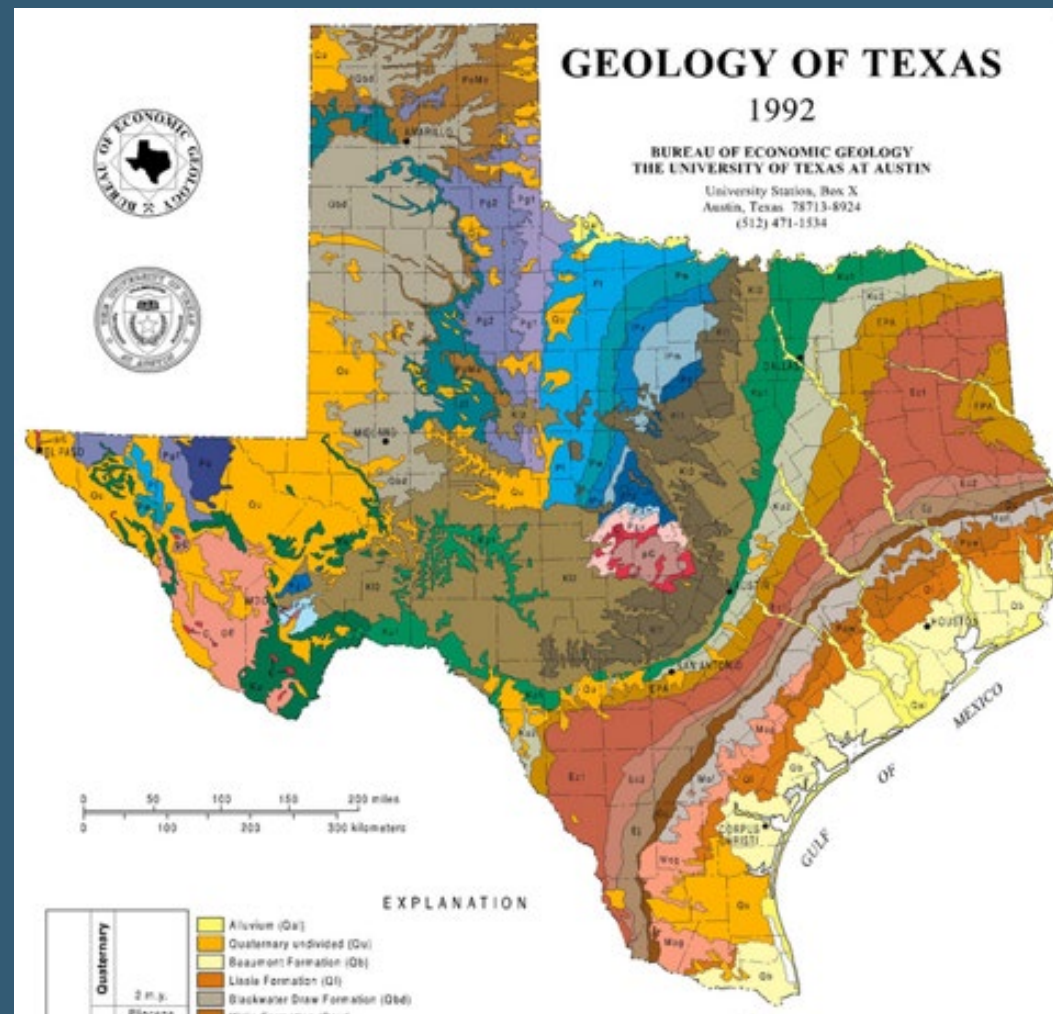
Agronomy Final Notes

- ▶ Application rate – 0.1 gal/ft²/day unless east of the boundary line or proposing native grasses
- ▶ Minimal of 18 inches of soil required (more in some circumstances)
- ▶ System is designed for no discharge into ground or surface waters. All the effluent applied will remain in the root zone and/or be utilized by the grasses
- ▶ All recommendations to permit writer are based on site-specific conditions

Geology Review

Purpose of Geology Review

- To identify potential recharge features on the site.
- To identify potential waters in the state on or adjacent to the site.
- To assess whether site is on an Edwards aquifer regulatory zone.
- To ensure that the application complies with state rules, policy, and guidelines written to protect groundwater and connected surface water.
- Geology review concludes with recommended permit provisions designed to protect groundwater and surface water quality.



Geology Pre-tech Review

- ▶ Water wells onsite and within 1 mile of the property are identified.
- ▶ Surface waters in the state are identified
 - ▶ Includes roadside ditches
- ▶ Site map shows appropriate buffers
- ▶ Recharge Feature Plan
- ▶ Site is not on Edwards Aquifer recharge or transition zones

Worksheet 3.0—Geology Review

26

- ▶ Pond liner information provided (if ponds are used for storage)
- ▶ Wells and map information section is fully completed and contain all water wells found on Texas Water Development Board's website.
 - ▶ Ensure wells labels match on map and table.
- ▶ Groundwater Quality Technical Report



Worksheet 3.3—Geology Review

27

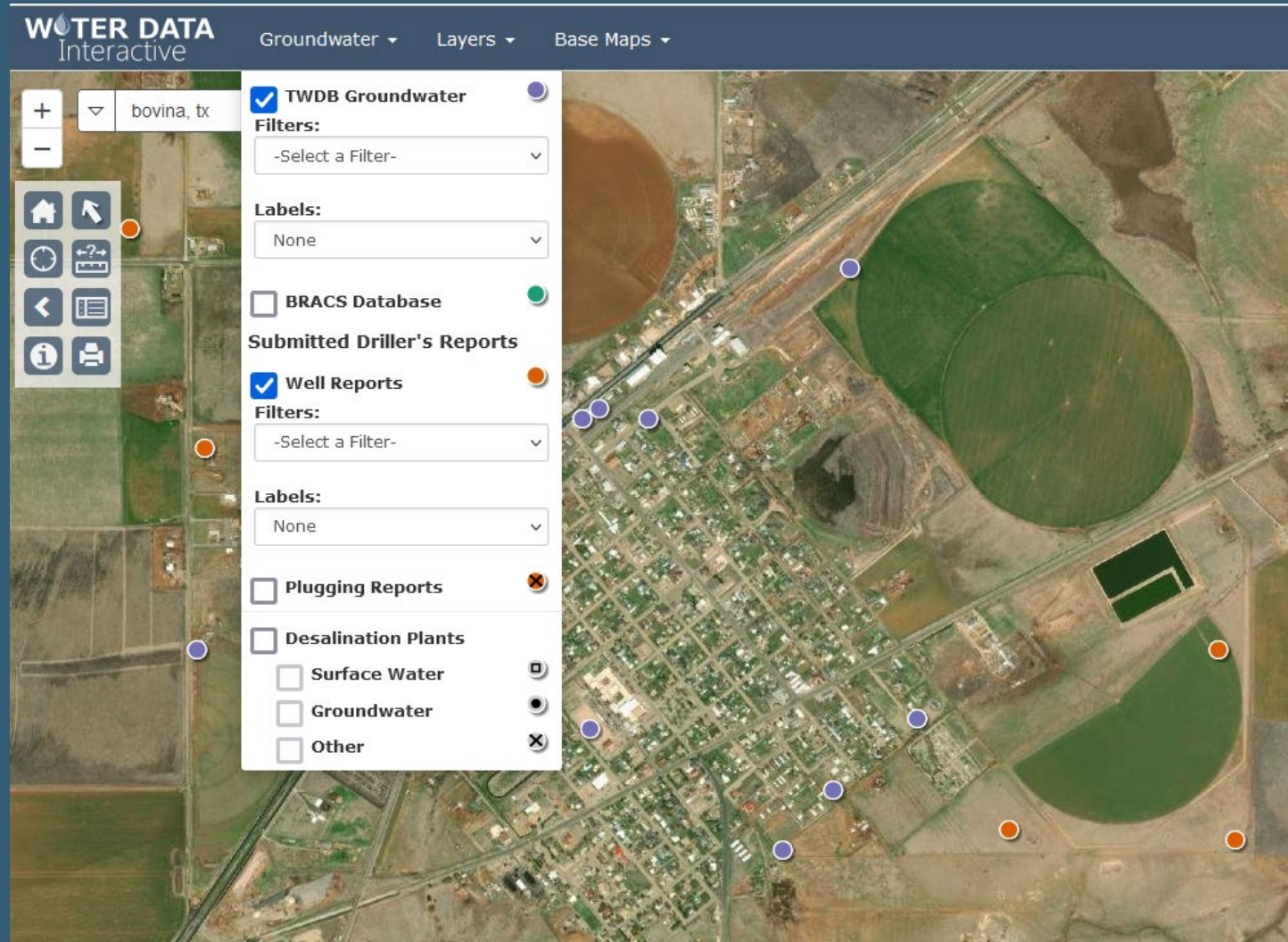
- ▶ Recharge Feature Plan—certified by a Texas licensed professional geoscientist or engineer with knowledge of recharge features.
- ▶ Buffer map--shows buffers between SADDs and surface water in the state and water wells.
- ▶ Edwards aquifer information is accurately completed.



Public Information on Water Wells

28

- Ensure all rule-required databases are searched:
 - TWDB
 - Railroad Commission
 - TCEQ
 - Groundwater Conservation District
 - NRCS
 - Previous landowner (if available)
- Onsite inspection
 - Make sure that you look for water wells during site visit (special care around existing structures, cisterns, stock ponds, stock troughs, etc).



<https://www3.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer>

Recharge Feature Plan

- ▶ Must be signed and sealed by a Texas licensed professional geoscientist or engineer who has inspected the site of the proposed SADDs.
- ▶ Document presence or absence of recharge features.
- ▶ Requires search of specific public sources (RRC, GCD, TWDB, TCEQ, NRCS, previous owner).
- ▶ Requires on-site inspection.
- ▶ The purpose of the plan is to identify recharge features, springs, waters in the state, water wells, caves, sinkholes, etc. and propose best management practices (BMPs) to protect groundwater and surface water quality.
- ▶ May propose groundwater monitoring.

Surface Waters in the State

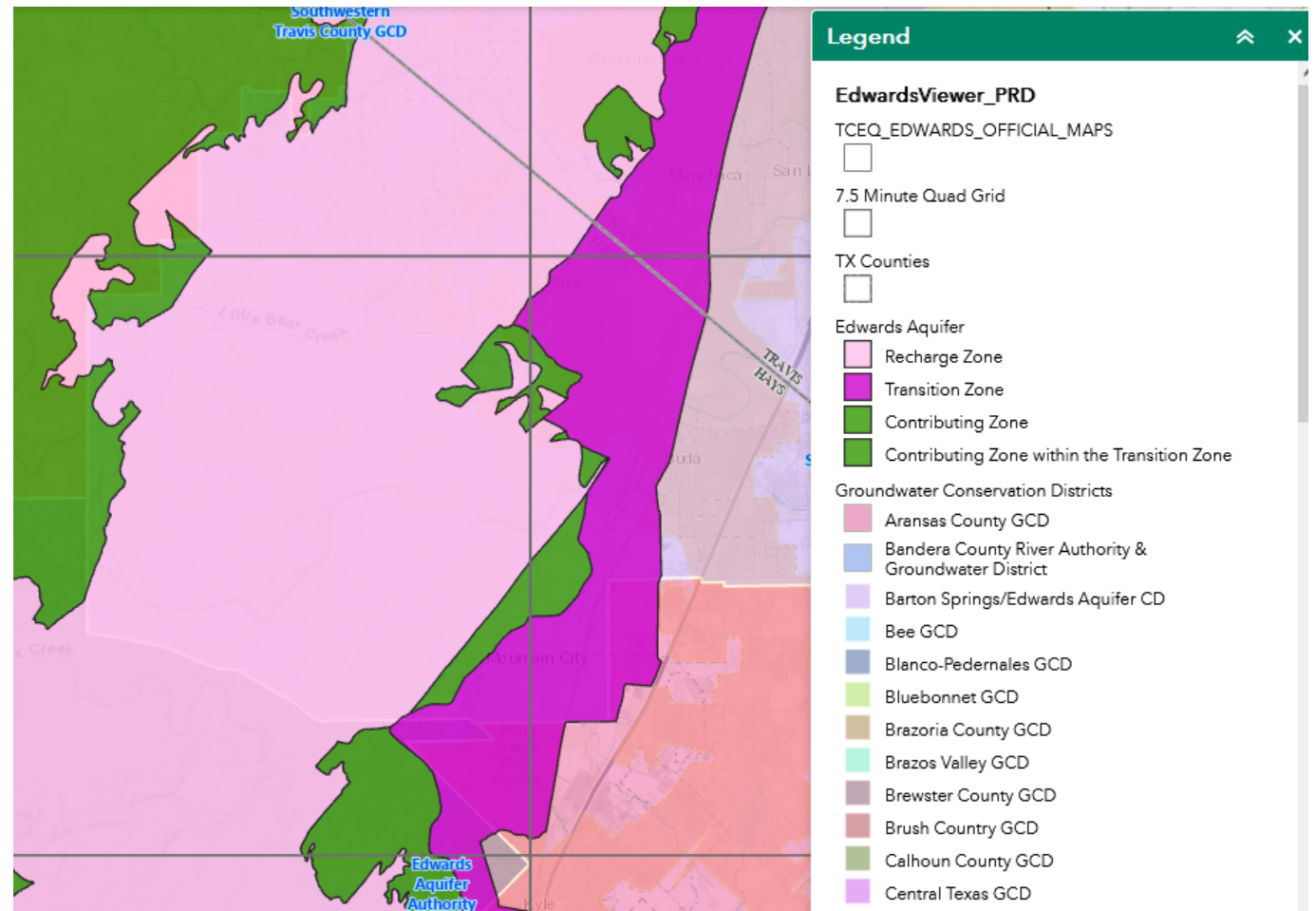
30

- ▶ Waters in the state
 - ▶ Includes most roadside ditches that convey stormwater runoff to creeks.
 - ▶ Smaller creeks identified on the USGS topographic map.
 - ▶ Stock ponds
- Sources of information:
 - USGS topographic maps
 - Aerial photographs
 - Site visit



Edwards Aquifer

- ▶ SADDs are prohibited on the Edwards Aquifer recharge and transition zone.
 - ▶ Edwards Aquifer Map Viewer
 - ▶ <https://www.tceq.texas.gov/gis/edwards-viewer.html>



Edwards Aquifer Prohibitions

- ▶ 30 TAC 213.8(a)(1)—prohibits waste disposal wells regulated under 30 TAC 331 on Recharge Zone
- ▶ 30 TAC 213.8(b)(1)- prohibits waste disposal wells regulated under 30 TAC 331 on Transition Zone
- ▶ Per 30 TAC 331, SADDs are defined as subsurface fluid distribution system and is regulated as a Class V injection well.

Site Location Requirements

- ▶ SADDS must be located a minimum horizontal distance of:
 - ▶ 500 feet from public water supply wells, springs, or other sources of public drinking water;
 - ▶ 150 feet from private water wells
 - ▶ 100 feet from surface water in the state
- ▶ WWTP needs to comply with above and 250 feet from private water well.
- ▶ SADDS cannot be located within a floodway (FEMA map).
- ▶ SADDS are prohibited on the Edwards Aquifer recharge and transition zones.

Other Items

- ▶ Make sure permit application is consistent throughout and matches your design goals.
- ▶ Maps should be consistent and easy to interpret.
 - ▶ Show all required information.
- ▶ Use plain language to discuss your proposal.

Questions?

Email April Hoh at April.Hoh@tceq.Texas.gov

Email Alan Barraza at Alan.Barraza@tceq.Texas.gov