

Interlocal Cooperative Contract with New Braunfels Utilities for Development of Aquifer Storage and Recovery Overview of Project Monitoring

Presented to:
The Edwards Aquifer Authority
Board of Directors
February 14, 2017

Presented by: J. Mark Hamilton



Project Summary

- EAA and NBU are collaborating with regard to ASR development in the saline Edwards Aquifer.
- NBU ASR consultants: Arcadis Engineering and David Pyne.
- May 2016, Monitoring and Protective Measures Workshop held by EAA.
 - EAA Attendees : Geary Schindel, Steve Johnson, Jim Winterle, Jim Boenig, Marcus Gary, Jennifer Adkins, Julia Carrillo, and Mark Hamilton
 - Consultant Attendees : Charles Kreidler (Retired LBG-Guyton), Bill Stein (LBG-Guyton), and Brian Smith (Barton Springs)

Project Summary

- Proposed ASR location is the New Braunfels Airport.
- Estimated project total storage volume = 14,000 AF.
- Estimated recoverable volume = 7,000 AF.
- Geologic and hydrologic data for the project site are very limited.
- Project is currently in the feasibility stage.

ASR Project Site and Vicinity

Freshwater/Saline Water Boundary

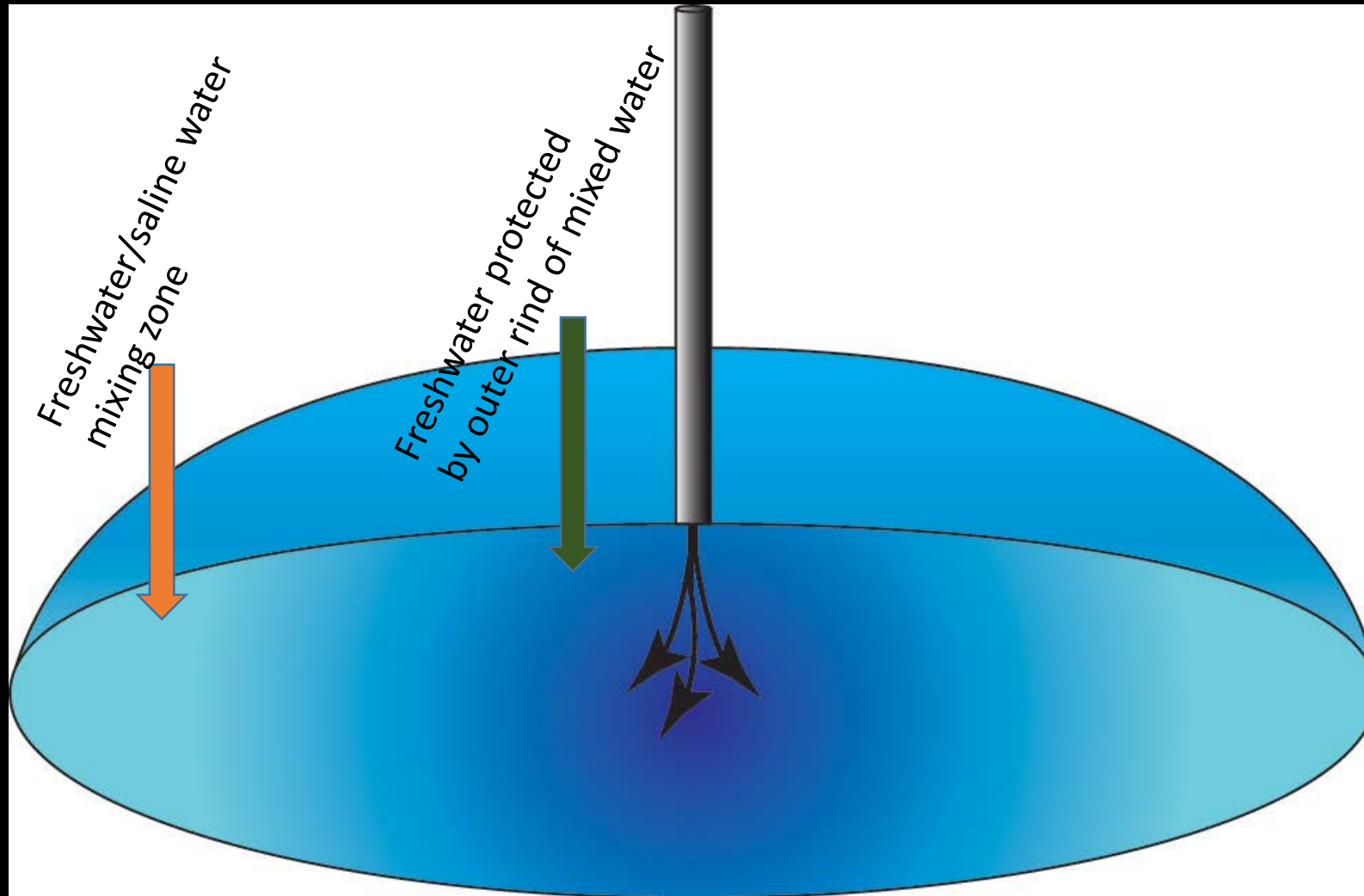
Comal/Guadalupe Co. Line

Comal Springs

Approximately Five Miles

New Braunfels Airport
(ASR Project Site)

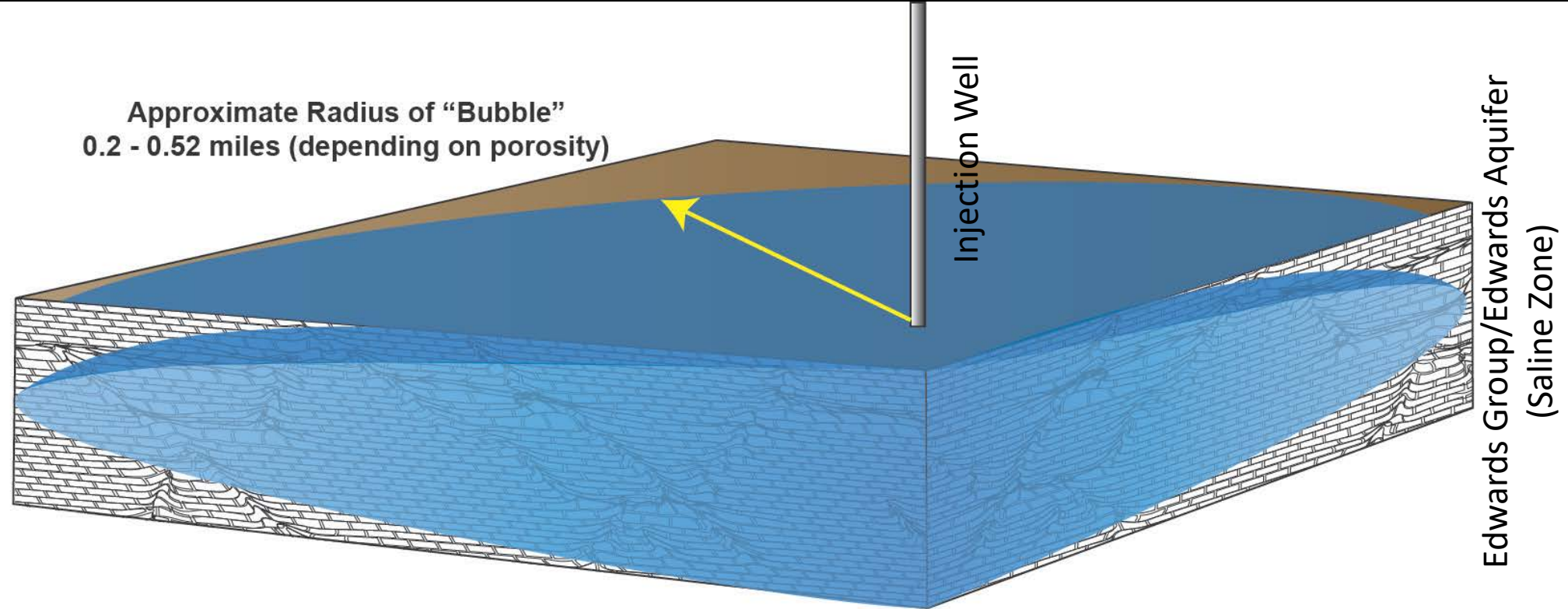
Generalized Freshwater Bubble



Scenarios for the ASR Freshwater Bubble

- A 14,000 AF subsurface “bubble” of freshwater could behave in various ways.
- Two ends of the spectrum:
 - Homogeneous/isotropic media (not expected in nature) bubble radius could be .25-.5 miles.
 - Heterogeneous/anisotropic (with preferential flowpaths) bubble size is much larger.
- As additional data are collected, accurate estimates of “bubble” behavior/size can be made.

Estimates of “freshwater bubble” size for 14,000 AF



Assumptions: homogeneous/isotropic
with porosity range of 5%-30%

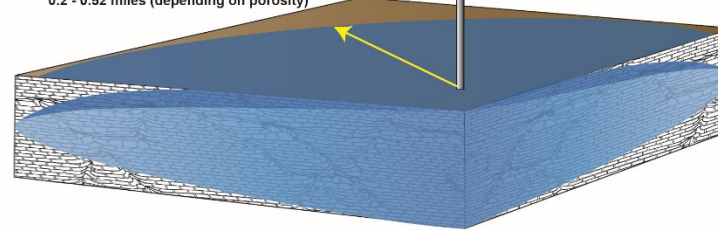


Assumptions will be clarified with data collected during coring at site

ASR Project Site and Vicinity

Comal Springs

Approximate Radius of "Bubble"
0.2 - 0.52 miles (depending on porosity)



Assumptions: homogeneous/isotropic
with porosity range of 5%-30%

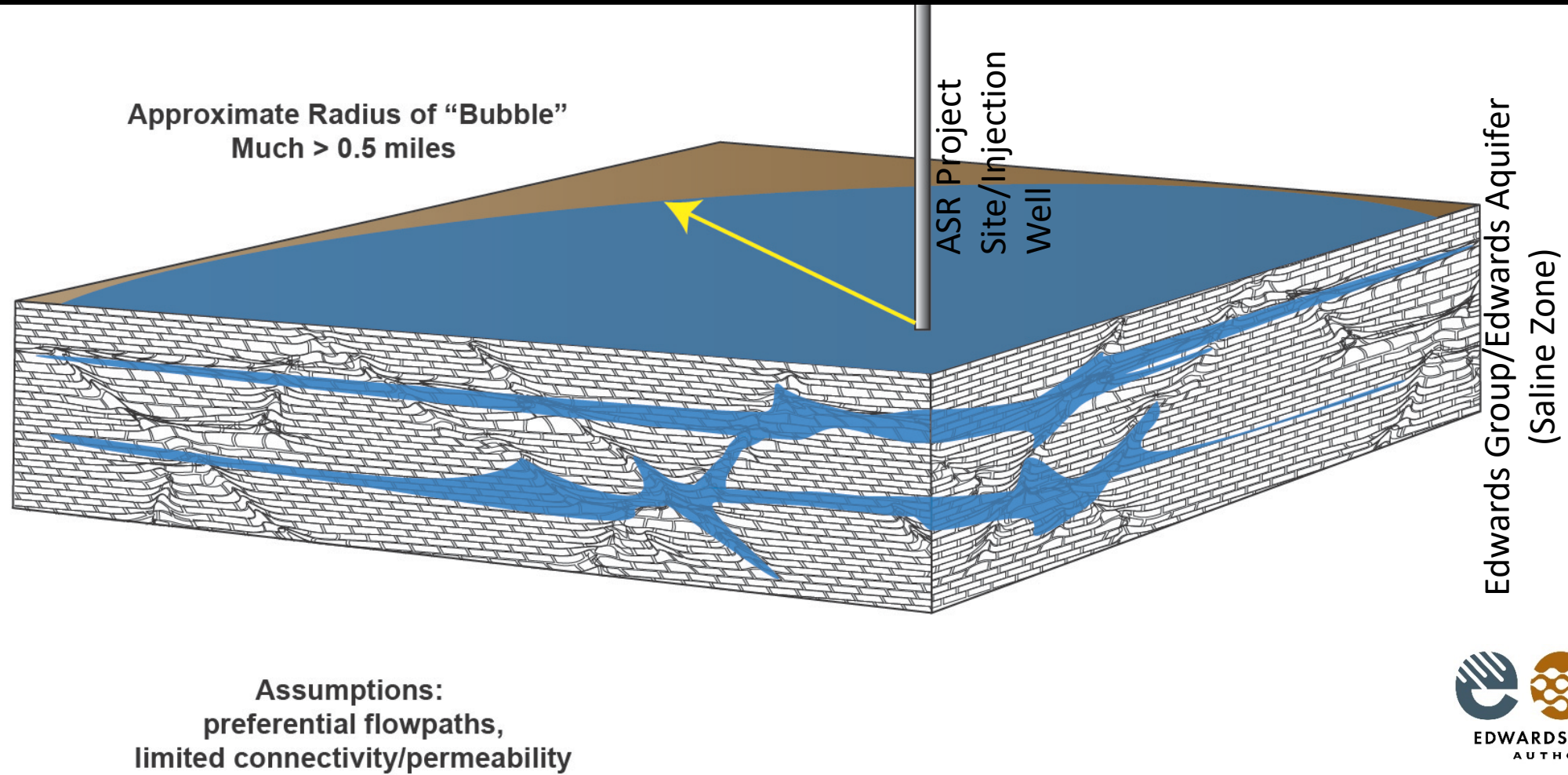
0.2 and 0.5 mile radius circles

Project Site



Source: Esri, DigitalGlobe, GeoEye, USDA, USGS, AEX, Getmapping, Aergrid, IGN, IGP, swisstopo, and the GIS User Community

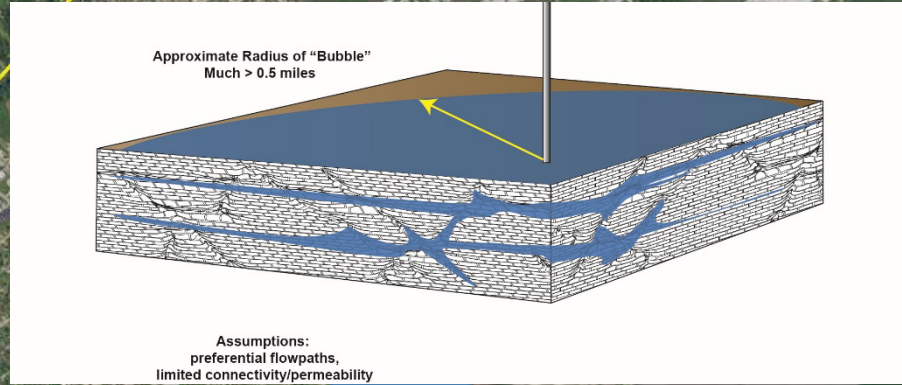
Estimates of “freshwater bubble” size for 14,000 AF



Assumptions will be clarified with data collected during coring at site

ASR Project Site and Vicinity

Comal Springs



> 0.5 mile radius

Project Site

Project Monitoring

The EAA and NBU will work collaboratively to ensure that ASR related activities are protective of the freshwater portion of the Edwards Aquifer.

ASR Workgroup

- NBU and EAA will establish a workgroup to:
 - Develop planning/monitoring documents;
 - Oversee development of an analytical model;
 - Maintain a long term collaborative approach for monitoring and protecting freshwater zone.

Baseline Monitoring

- EAA staff will monitor multiple locations adjacent to Comal Springs for background conditions.
 - EAA staff will develop a baseline conditions report prior to any injection activities.

Project Monitoring

Water Quality Monitoring Plan

- The Workgroup will develop a long term monitoring plan that dictates sampling and water level monitoring protocols for the project.
- EAA General Manager must approve the final plan(s).

Mitigation Plan

- The workgroup will develop a mitigation plan that provides the appropriate trigger(s) to cause injection activities to be reduced, or halted if needed.
 - To include evaluation of potential impacts to springflow(s) related to injection/withdrawal of water at the ASR.

Baseline Monitoring Points

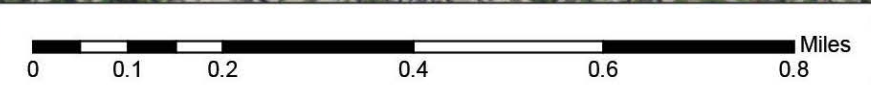
Real Time
Water Quality
Monitoring Stations

DX-68-23-302

DX-68-23-304

DX-68-23-619
DX-68-23-624

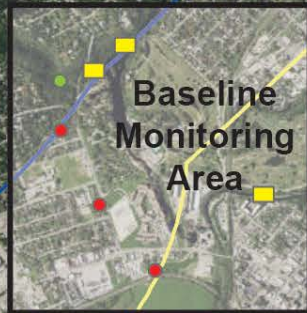
DX-68-23-616
DX-68-23-623



Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerognd, IGN, IGP, Swisstopo, and the GIS User Community



Additional Monitoring Points
(Added as Project Progresses)
Locations to be determined



MW-4

MW-2

MW-5

MW-3

MW-1

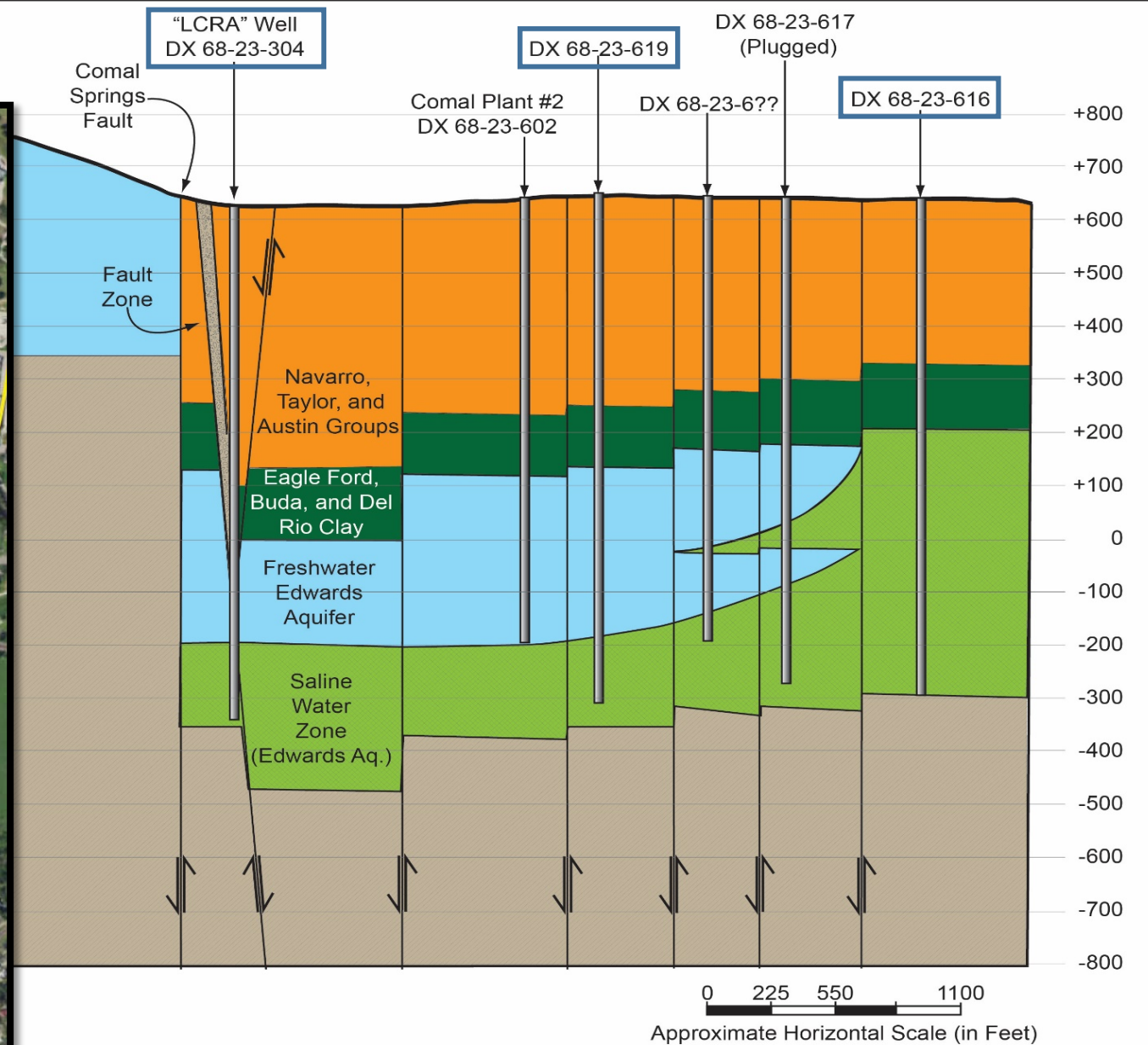
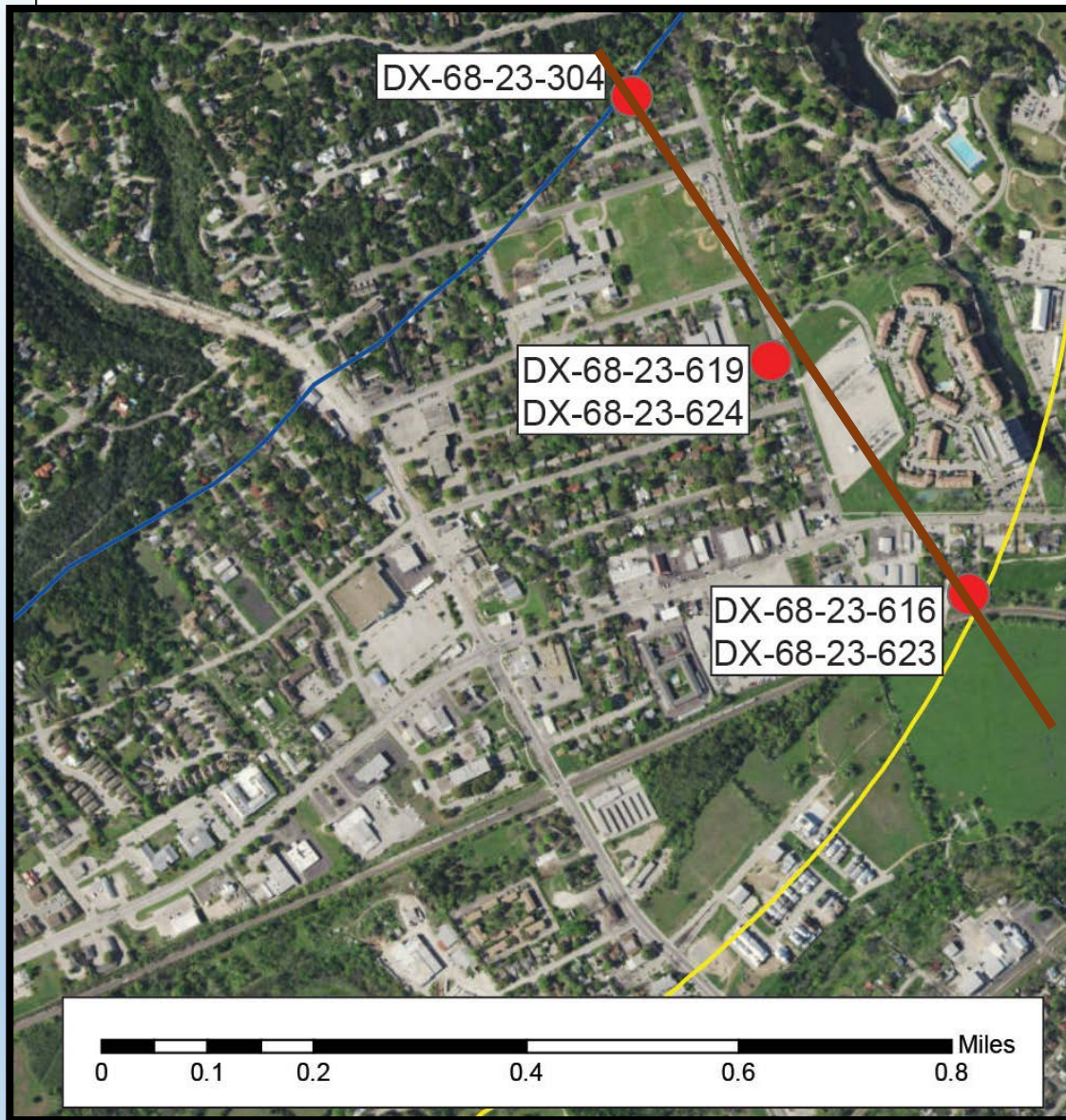
Proposed
ASR Project Site

Project Site and Surrounding Area

Subsurface data for the saline zone in the vicinity of the project site are limited. However, the project provides opportunities for learning more about the aquifer.

- EAA Staff have compiled available information for the subsurface geology in baseline monitoring area.
- EAA staff will utilize new information gained from ASR activities to refine the conceptual model of the project area.

Baseline Monitoring Area, Geological Cross Section

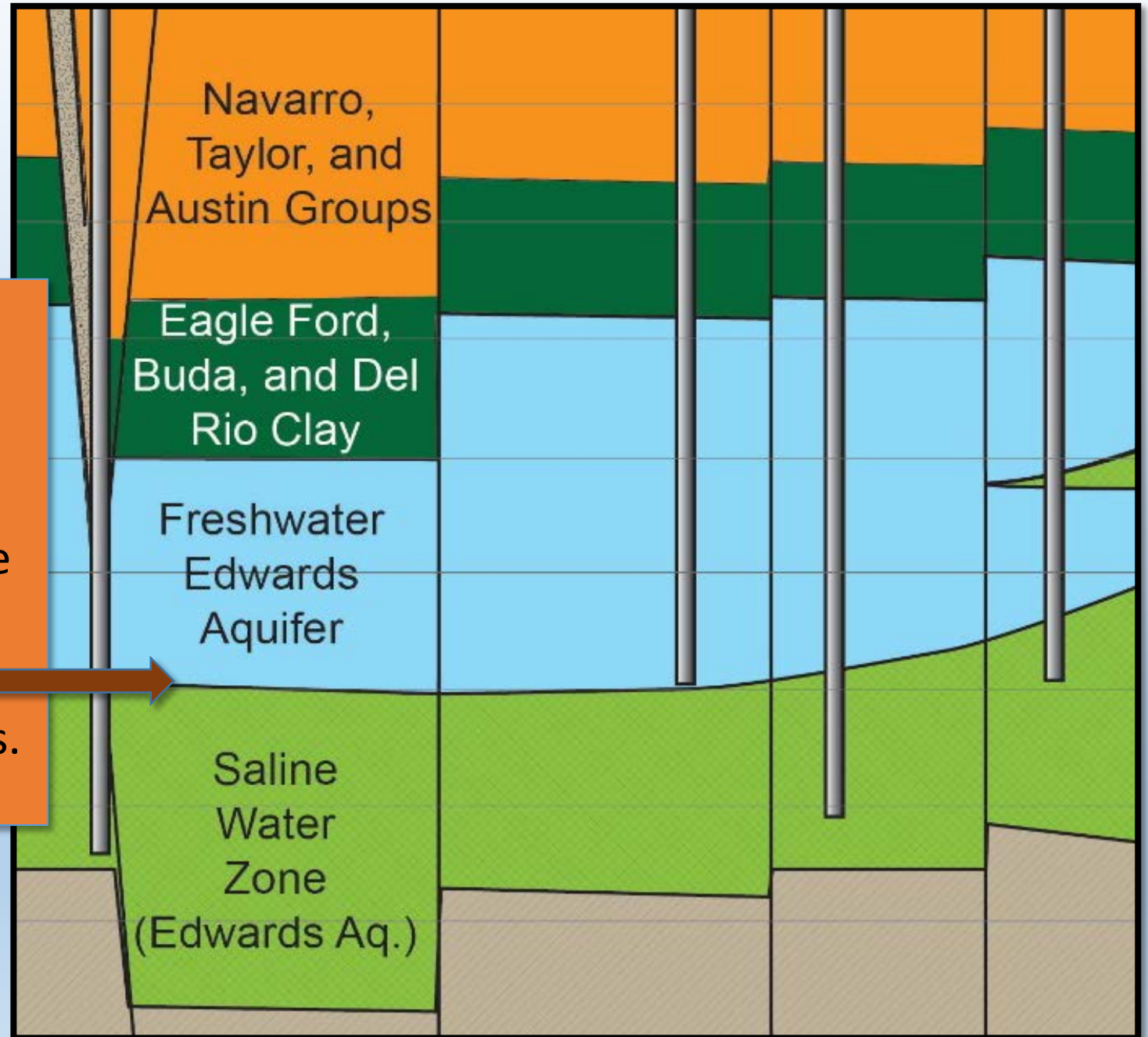


Interface Behavior at LCRA Well:

Data collected to date indicate some fluctuation of the FW/SW interface.

With a 48' rise in freshwater levels, the 1,000 mg/l interface is depressed 26'.

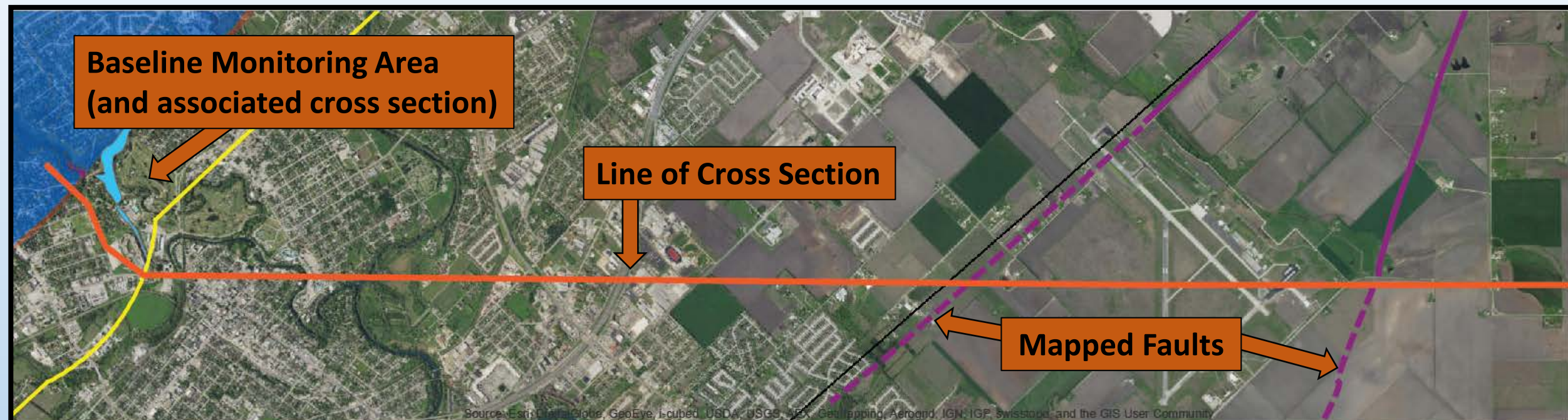
(Interface depth range 811' to 837' bgs.)



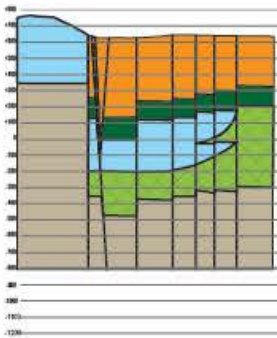
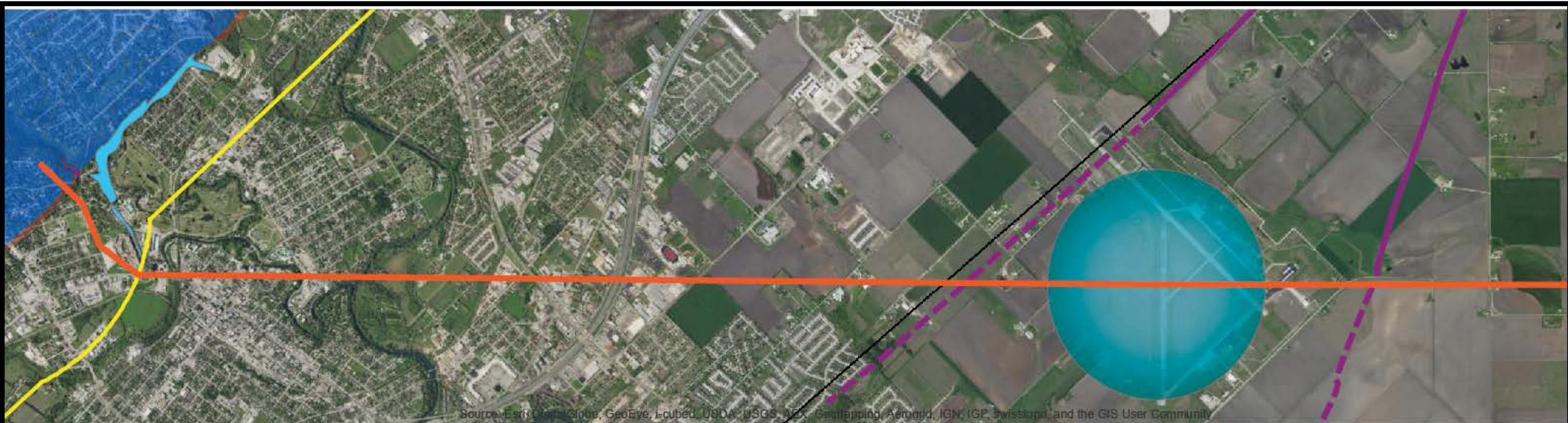


Freshwater pressure at LCRA is commonly sufficient to raise the water level about 15' above ground surface.

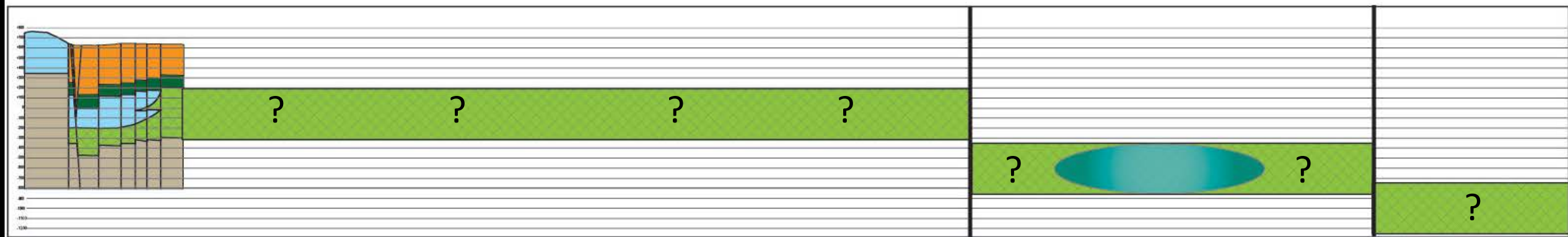
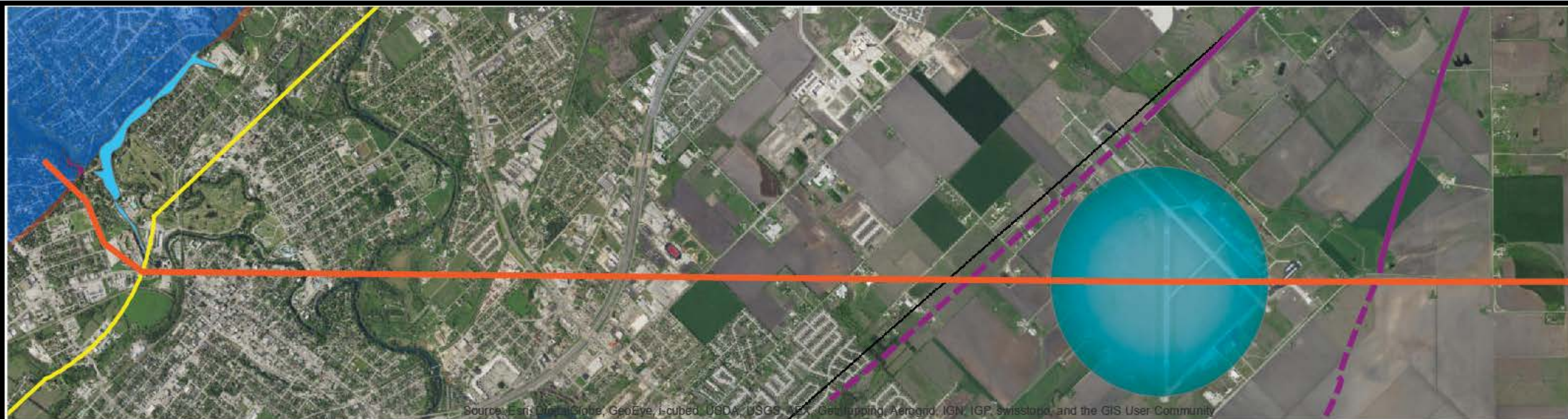
What We Know Today



Idealized Freshwater Bubble



Data Gaps to be Addressed



Conclusions

- EAA will monitor six wells and three surface water sites.
 - Baseline data set.
- The Workgroup will develop detailed planning documents.
 - Sampling, water-level monitoring, and mitigation.
- Up to five additional monitoring wells will be installed.
 - By NBU, locations to be determined based on what we learn as we go.
- NBU will develop an analytical model.
 - To assist in analyses of project impacts to saline and freshwater zones.
 - EAA will collaborate in the modeling process.