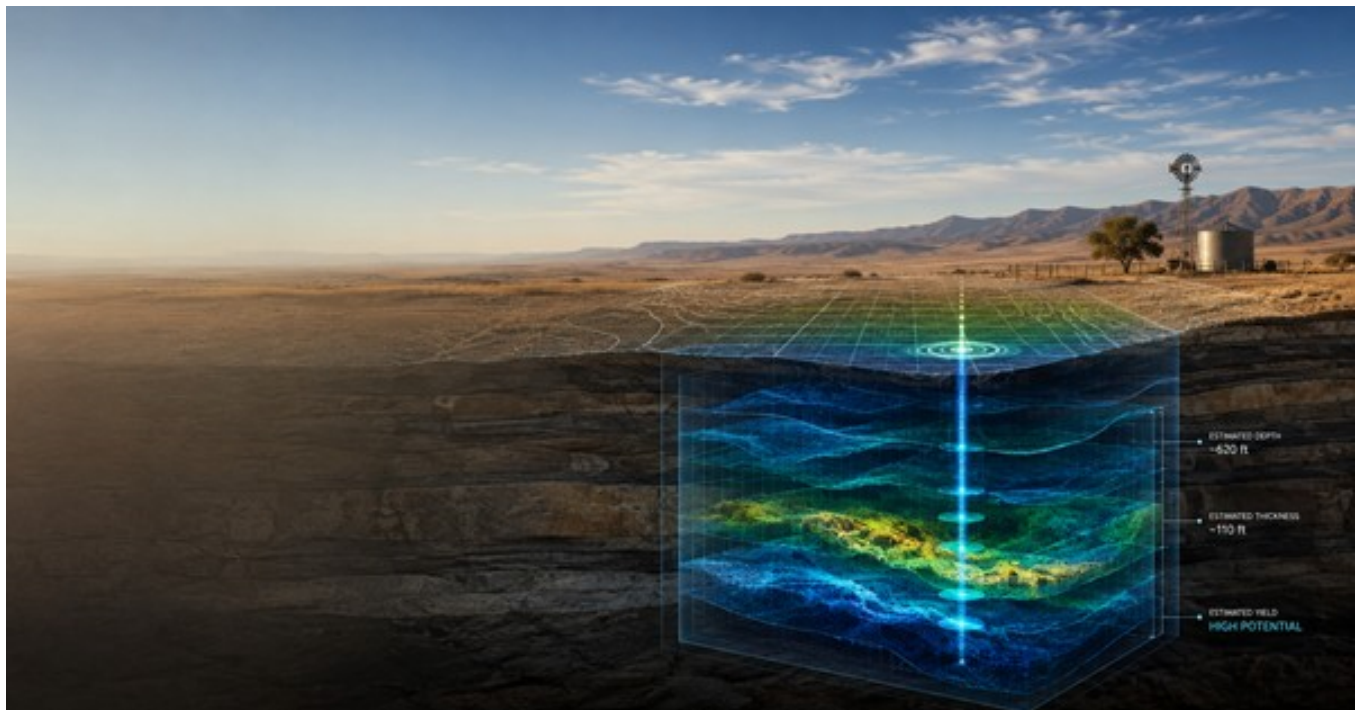


Know Before You Drill

A Science-Based Path from Groundwater Assessment to Recommended Well Locations

How AquaterreX Phase I and Phase II progressively reduce uncertainty before drilling—and how Phase III confirms the result.

WHITE PAPER



Executive Summary

A water well is ultimately confirmed by drilling, but the decision about where to drill does not have to begin with guesswork. AquaterreX uses an advanced staged groundwater-exploration process designed to move from broad property-scale understanding to a specific, scientifically supported drilling recommendation.

Phase I is a remote Groundwater Resource Assessment. AquaterreX geologists and hydrogeologists integrate multiple independent sources of geological, hydrological, geospatial, topographic and well information to identify Areas of Interest (AOIs)—portions of a property where the combined evidence supports more detailed investigation.

Phase II moves the investigation into the field. Within selected AOIs, the team collects complementary subsurface measurements using patented instrumentation, compares them with known geology and available well information, and develops two-dimensional and three-dimensional interpretations. The goal is to narrow the search to a recommended well location and create a “Virtual Well”: an informed prediction of what a future wellbore may encounter. The virtual well delivers exact drilling location; depth to water (both shallow and deep); thickness of the water-bearing layers; estimated flow rates; and general quality of water.

Phase III is drilling and testing. AquaterreX does not operate drilling rigs; it works with qualified drilling professionals so the recommended target can be physically tested. The well itself—and proper development and pumping tests—provides the final confirmation of depth, formations, water quality and sustainable production.

The core idea
Property → Area of Interest → Target Zones → Recommended Well Locations → Virtual Wells → Drilling & Testing

This staged approach is designed to answer one practical question with progressively better information: Where should we drill—and what can we reasonably expect to find there?

The Three-Phase Groundwater Exploration Path

PHASE I Where should we investigate?	PHASE II Where should we drill?	PHASE III What did the well confirm?
Remote scientific assessment Integrate independent data sources and identify promising Areas of Interest.	On-site scientific investigation Refine the target, model the subsurface and develop recommended bore locations / Virtual Wells.	Drilling, development and testing Physically confirm subsurface conditions and determine actual sustainable production.

Why Groundwater Exploration Is Difficult

Groundwater is controlled by hydrogeology. It may be stored or transmitted through porous formations, sands and gravels, fractures, faults, weathered zones, buried channels and other structures. Those conditions can change over surprisingly short distances. As a result, two wells in the same general area can perform very differently.

For agriculture, municipalities, development, industry, data centers and other major water users, the financial consequence of that uncertainty can be significant—especially as drilling becomes deeper and more expensive.



A better process does not attempt to eliminate the complexity of the subsurface. It gathers more evidence before the largest drilling expense is committed.

Phase I: Find the Areas Worth Investigating

Phase I begins remotely, before a field crew or drill rig arrives. The property is evaluated within its broader geological and hydrological setting using multiple independent sources of scientific information.

Depending on the property and the information available, the assessment may incorporate:

- Remote sensing and satellite/aerial information
- Terrain and surface characteristics
- Geological and hydrogeological information

- Available subsurface geoscientific information
- Existing groundwater and water-well records
- Maps, reports and scientific information from recognized sources

No single map, image or dataset is treated as proof of groundwater. The value comes from integration: our scientists employ proprietary computer algorithms to look for relationships among independent sources and give greater weight to locations where multiple indicators point toward a consistent geological interpretation.

Convergence of evidence

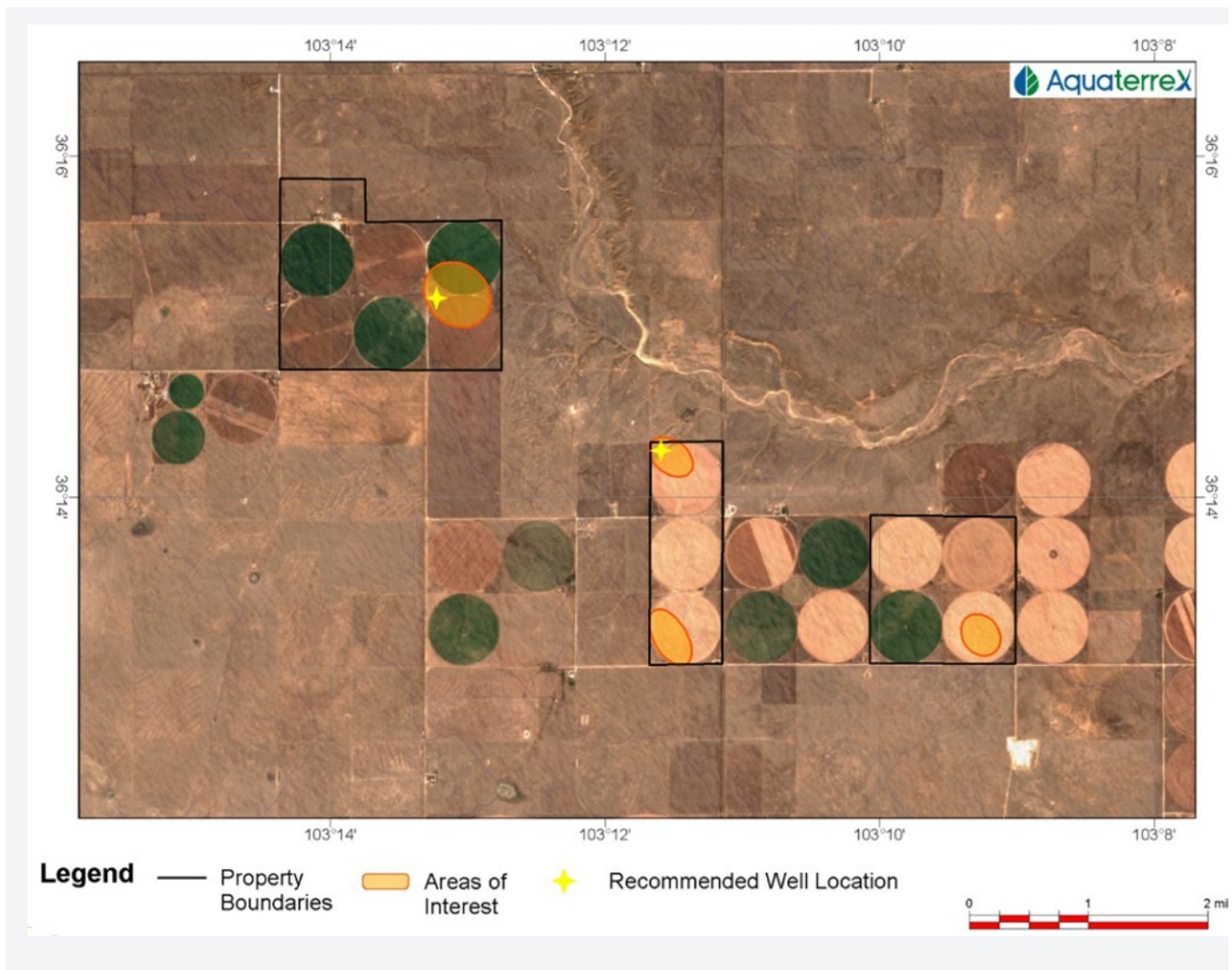
A single anomaly can be interesting. A location where several independent lines of scientific evidence support the same interpretation is more useful for decision-making.



From Property Scale to Areas of Interest

The principal Phase I deliverable is the identification of Areas of Interest, or AOIs. An AOI is not yet the final drilling point. It is a portion of the property where the best available evidence coincides to justify more detailed on-site investigation.

This distinction matters. Instead of treating every acre of a large property as equally uncertain, Phase I concentrates the next stage of work on selected areas with stronger scientific support.



What Phase I does—and does not—tell you

Phase I DOES	Phase I DOES NOT
Build a property-scale geological and groundwater interpretation.	Claim to directly “see” groundwater underground.
Identify AOIs that warrant more detailed field investigation.	Replace Phase II field investigation or drilling confirmation.

Phase II: Turn an Area of Interest into a Drilling Decision

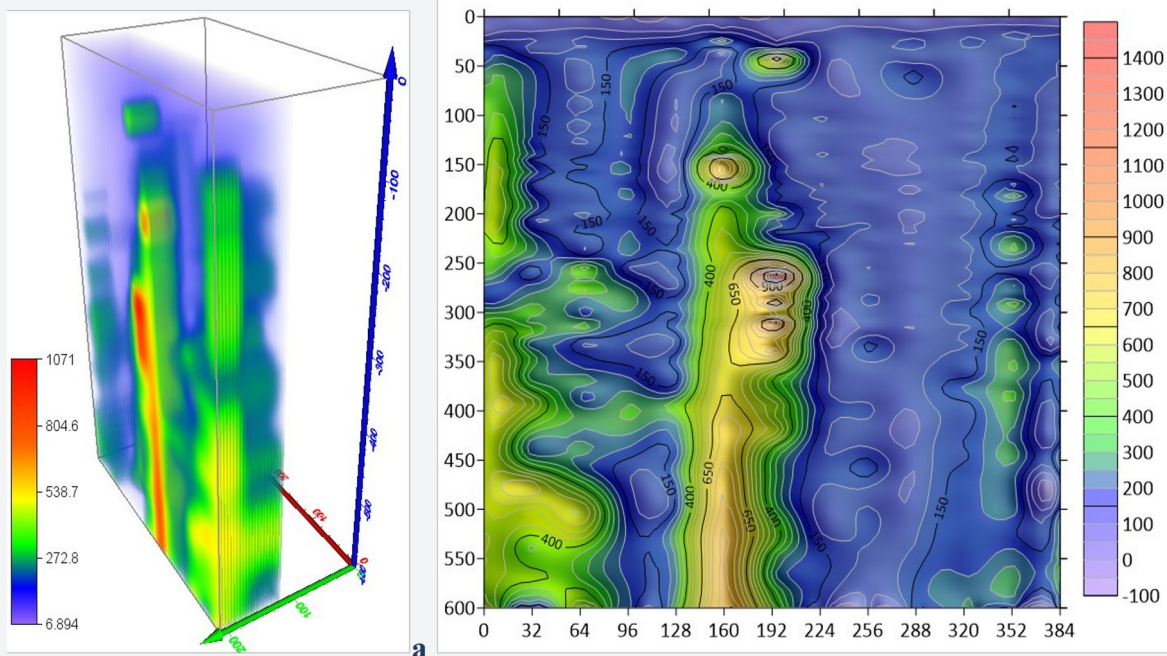
Phase II takes the strongest Phase I targets into the field. AquaterreX conducts systematic on-site investigations within selected AOIs using complementary geophysical measurements that respond to different physical characteristics of subsurface formations.

Rather than rely on a few isolated readings, the team collects measurements across a planned survey area. Early results help identify anomalies and geological features that deserve closer attention; additional work can then be concentrated around the most promising locations.



Build the subsurface picture

Field data are processed and interpreted into profiles and three-dimensional models that help geologists and hydrogeologists visualize changes beneath the property. These interpretations are compared with Phase I findings, known geology, field observations, available well information and other independent measurements.



Ground truthing strengthens the interpretation

Where reliable existing wells are available, their logs and known performance can provide valuable reference points. Information such as actual well depth, formations encountered, water levels, screened intervals and historical production can help the team calibrate and interpret measurements elsewhere on the property.

The Virtual Well

The end product of Phase II is more than a general statement that groundwater may exist in an area. AquaterreX develops a recommended drilling location and an interpretation of what a future wellbore is expected to encounter—a “Virtual Well.”

Depending on the project and the quality of the available data, the Virtual Well may include estimates of:

- Recommended drilling location by GPS coordinates
- Expected depth to groundwater targets
- Potential water-bearing zones (both shallow and deep) and approximate thickness
- Geological characteristics of the subsurface
- Estimated potential water production
- Indications of water characteristics (fresh to saline) where supported by the data

Important distinction

A Virtual Well is an interpretation—not a substitute for an actual test well. Only drilling, well development and appropriate testing can physically confirm the formations encountered and determine sustainable production.



Phase III: Drill, Confirm and Test

The scientific work in Phases I and II is designed to make the drilling decision better informed. Phase III is where that interpretation meets the physical subsurface.

AquaterreX does not operate drilling rigs. Once a target is selected, the project proceeds with a qualified water-well drilling contractor. AquaterreX can work with the drilling team to translate the recommended location and target depths into field execution and, when appropriate, help compare what is encountered in the borehole with the pre-drilling interpretation.

What drilling confirms

- The actual geological formations encountered
- The depth at which water-bearing zones are reached
- Actual water levels and physical well conditions
- Water quality based on appropriate sampling and analysis
- Well performance after development and pumping tests

A well that produces water immediately is not, by itself, enough to establish long-term performance. Proper well development and pumping tests are needed to evaluate actual and sustainable production.



Phase III closes the loop

Phase I reduces the search area. Phase II defines the recommended target. Phase III physically verifies the prediction and establishes actual well performance.

Why a Staged Approach Matters

No groundwater exploration method can eliminate drilling risk. The Earth is heterogeneous, and conditions can change over short distances. The practical advantage of the AquaterreX approach is that it seeks to replace a largely speculative drilling decision with a progressively better-informed one.

Focus capital where the evidence is strongest	Large properties can be narrowed to AOIs and then to specific wellbore targets before expensive drilling begins.
Combine independent evidence	Remote assessment, field measurements, geology and available well information are interpreted together rather than relying on a single indicator.
Know more before committing	A Virtual Well can provide a practical expectation of target depth, water-bearing intervals and potential production before the rig arrives.
Use drilling as confirmation	The final well is still the ground truth—but it is drilled after a structured scientific investigation has narrowed the uncertainty.

Know Before You Drill

The objective is not to promise certainty where none exists. It is to bring substantially more science, context and decision-quality information to the process before the most expensive step begins.

From Uncertainty to a Defensible Drilling Target

Groundwater development will always end with a drill bit entering the ground. The question is how much a project can learn before that moment.

AquaterreX's three-stage workflow is designed to progressively reduce uncertainty: first by understanding the property at scale, then by investigating the most promising areas in the field, and finally by using drilling and testing to confirm the prediction.

For organizations that depend on reliable groundwater, the value is straightforward: investigate first, narrow the target, and make the drilling decision with more information.

READY TO UNDERSTAND YOUR GROUNDWATER POTENTIAL?

AquaterreX can help evaluate the property, identify the strongest areas for investigation and develop a scientifically supported drilling target.

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Source Articles

[Finding Groundwater Before Drilling: The Science Behind AquaterreX Phase I Analysis](#)

[Phase II Groundwater Exploration: Creating a "Virtual Well" Before You Drill](#)

[Texas Case Study: A Sustainable Well for Many Generations](#)