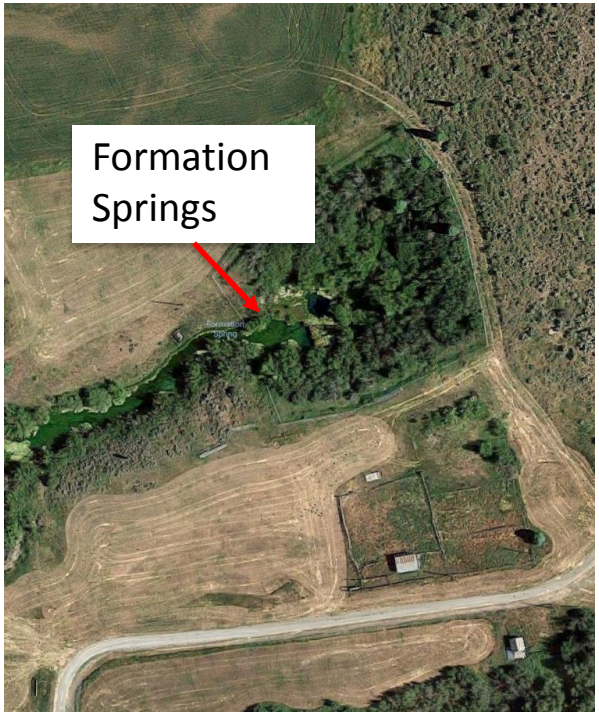
Using Technology to Eliminate Contaminated Water Used for a City Water Supply

September 2018

willowstick

The Situation

Soda Springs, Idaho Water Supply



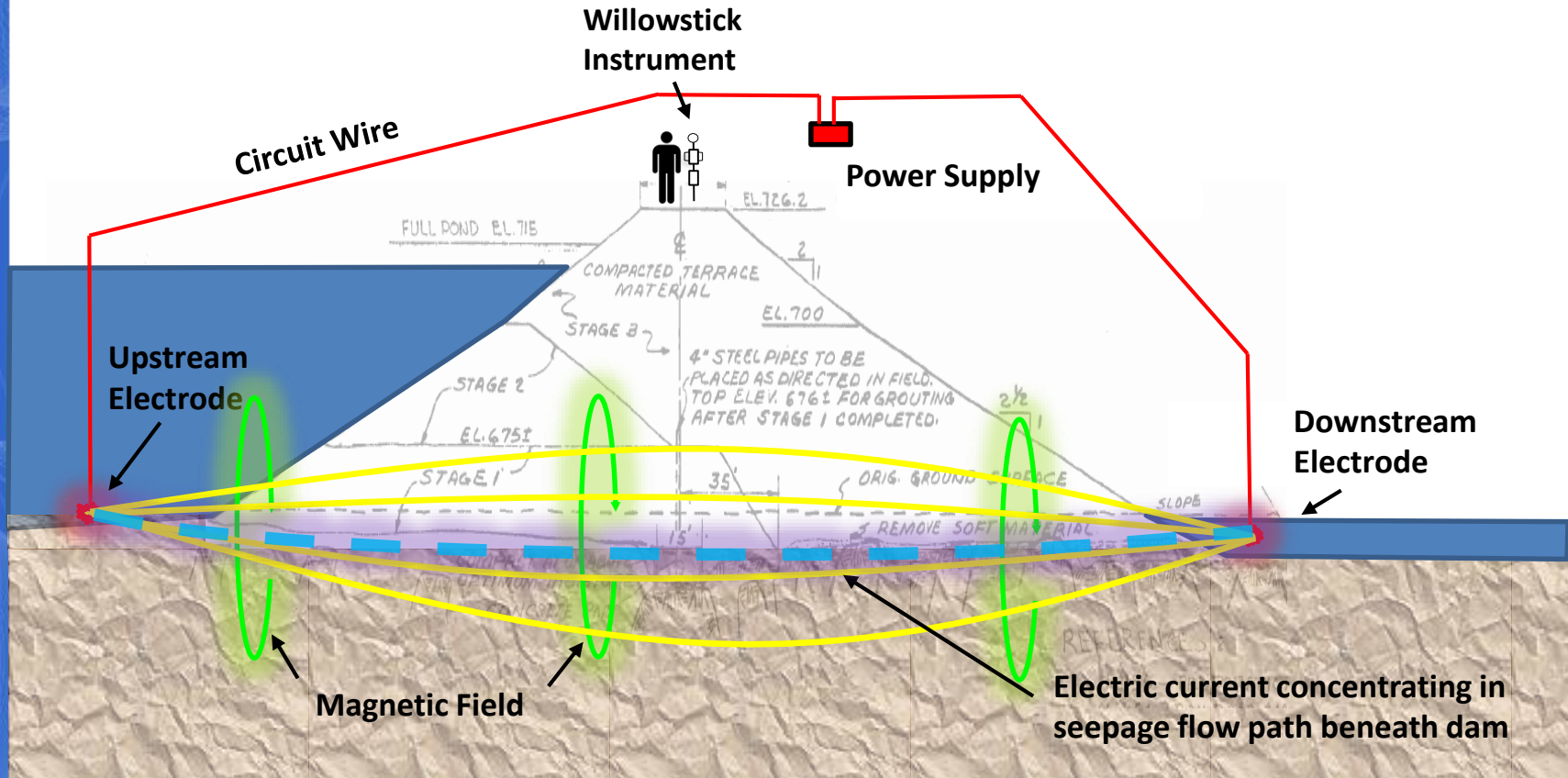
- Formation Springs supplied drinking water to residents of Soda Springs, ID
- Regulators mandated the city find a new source of drinking water due to potential surface contamination (plant and animal life and other potential surface contamination) … or build a water treatment facility
- The city wanted to find the source of groundwater that supplied the spring with water, which would eliminate any surface contamination problems

The Solution

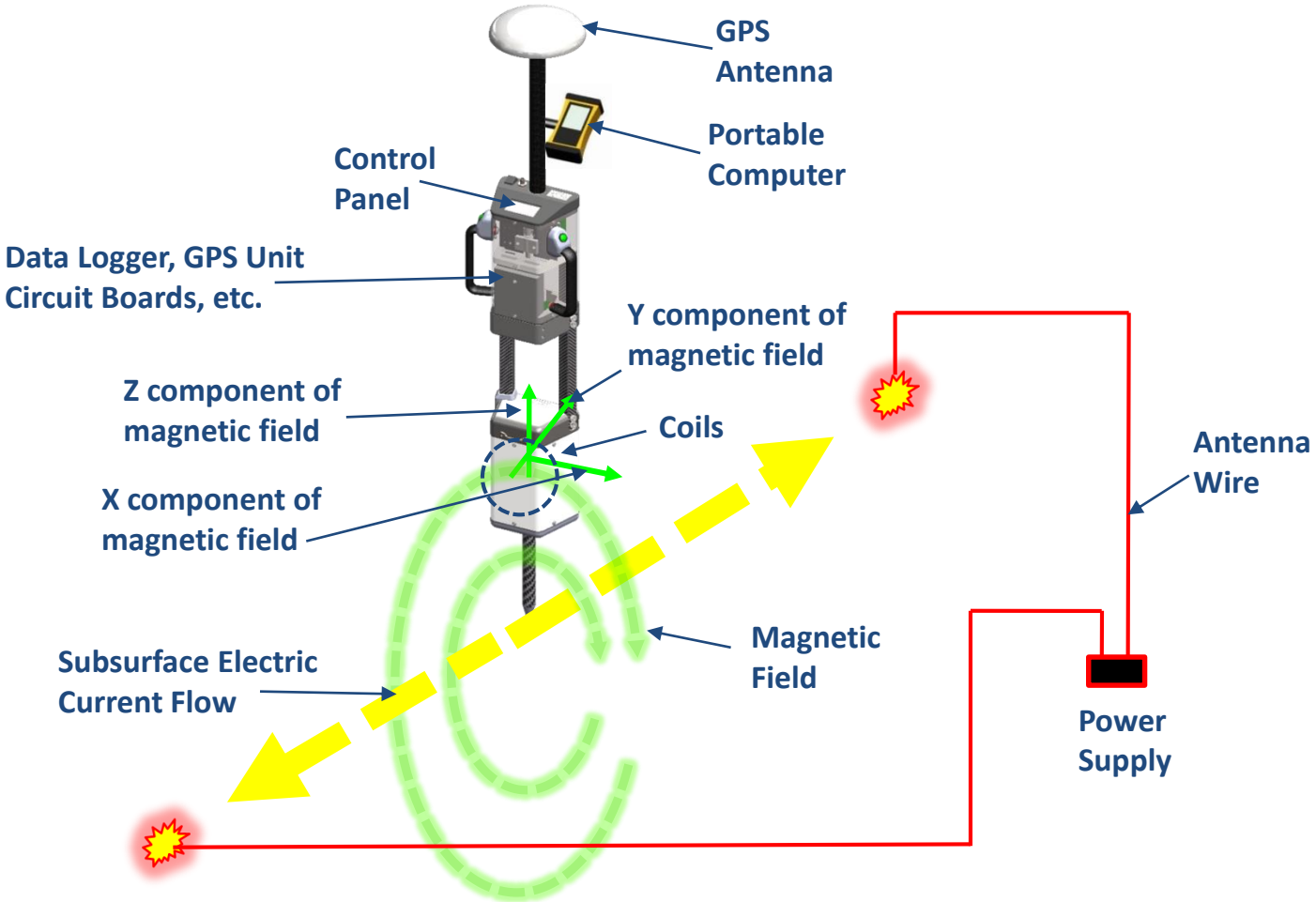
MMR - Four Basic Scientific Principles

- Earthen materials are poor electrical conductors (10^{-12} and 10^{-17} mho/m)
- Water substantially increases the conductivity of earthen materials (10^{-1} and 10^{-8} mho/m)
- Water and electric current will follow the path of least resistance
- All electrical currents generate magnetic fields and the intensity of the magnetic field is proportional to the magnitude of the electrical current (Biot-Savart Law)

Typical Survey Configuration



The Willowstick Instrument



The Process/Results

Soda Springs Idaho Well

Spring Used For Drinking Water

Survey Configuration

Willowstick Instrument

- Every measurement point takes approximately 8 seconds
- GPS data and magnetic field data are collected simultaneously
- Hundreds of thousands of data points

Expected Magnetic Field

Hundreds of Thousands of Data

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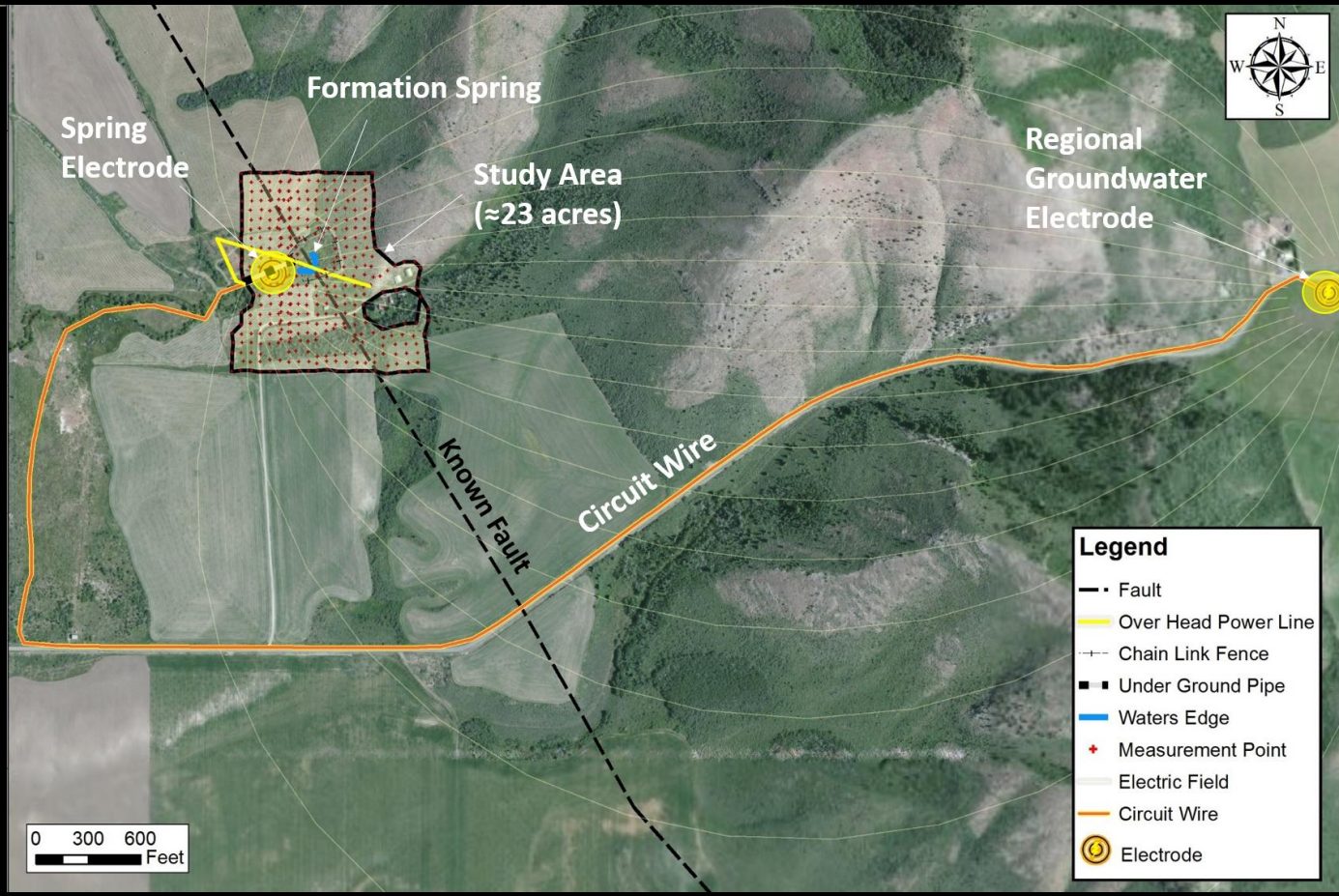
Hundreds of Thousands of Data Elements Are Collected

Measured Magnetic



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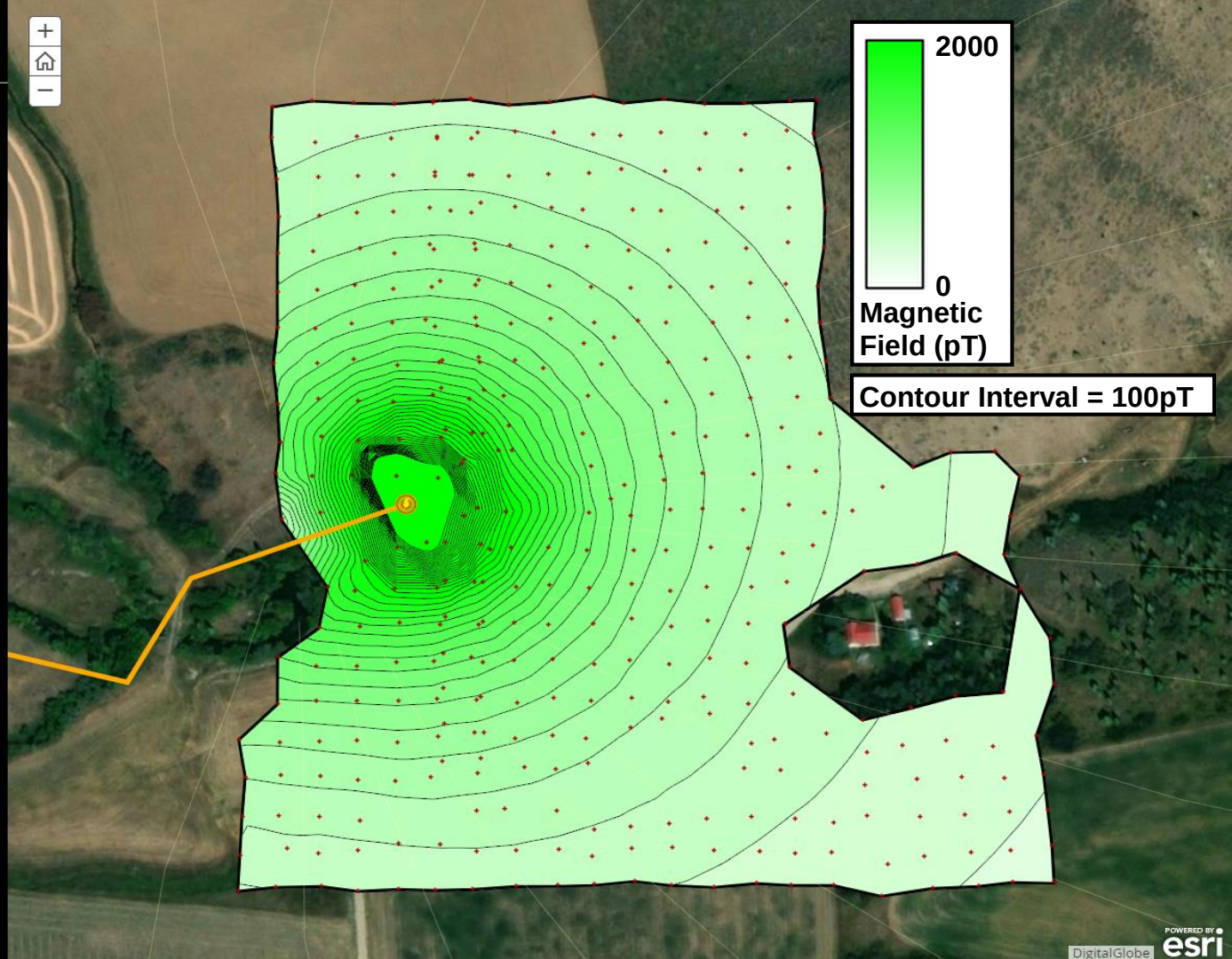
Ratio of Observed Data to Expected Readings

Preferential Groundwater Seepage Paths



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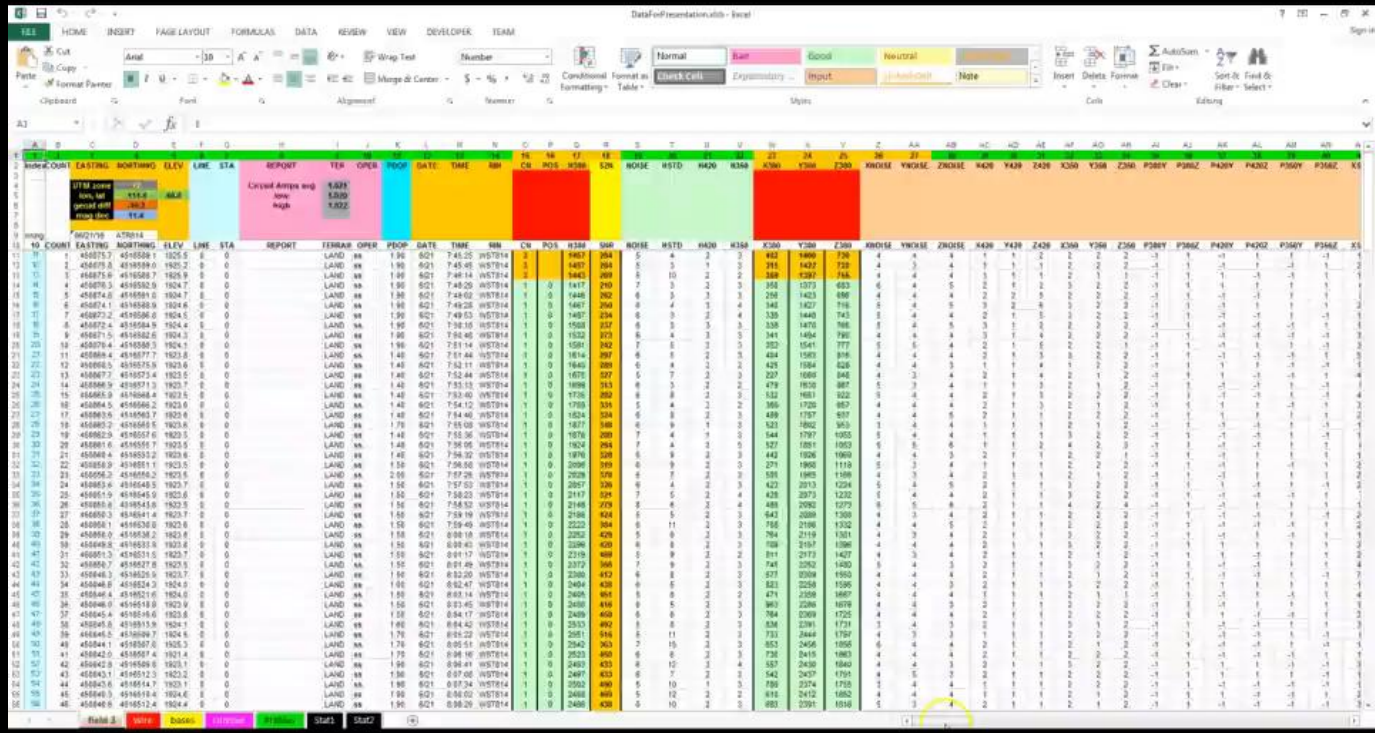

Soda Springs Idaho Well

Measured Magnetic Field

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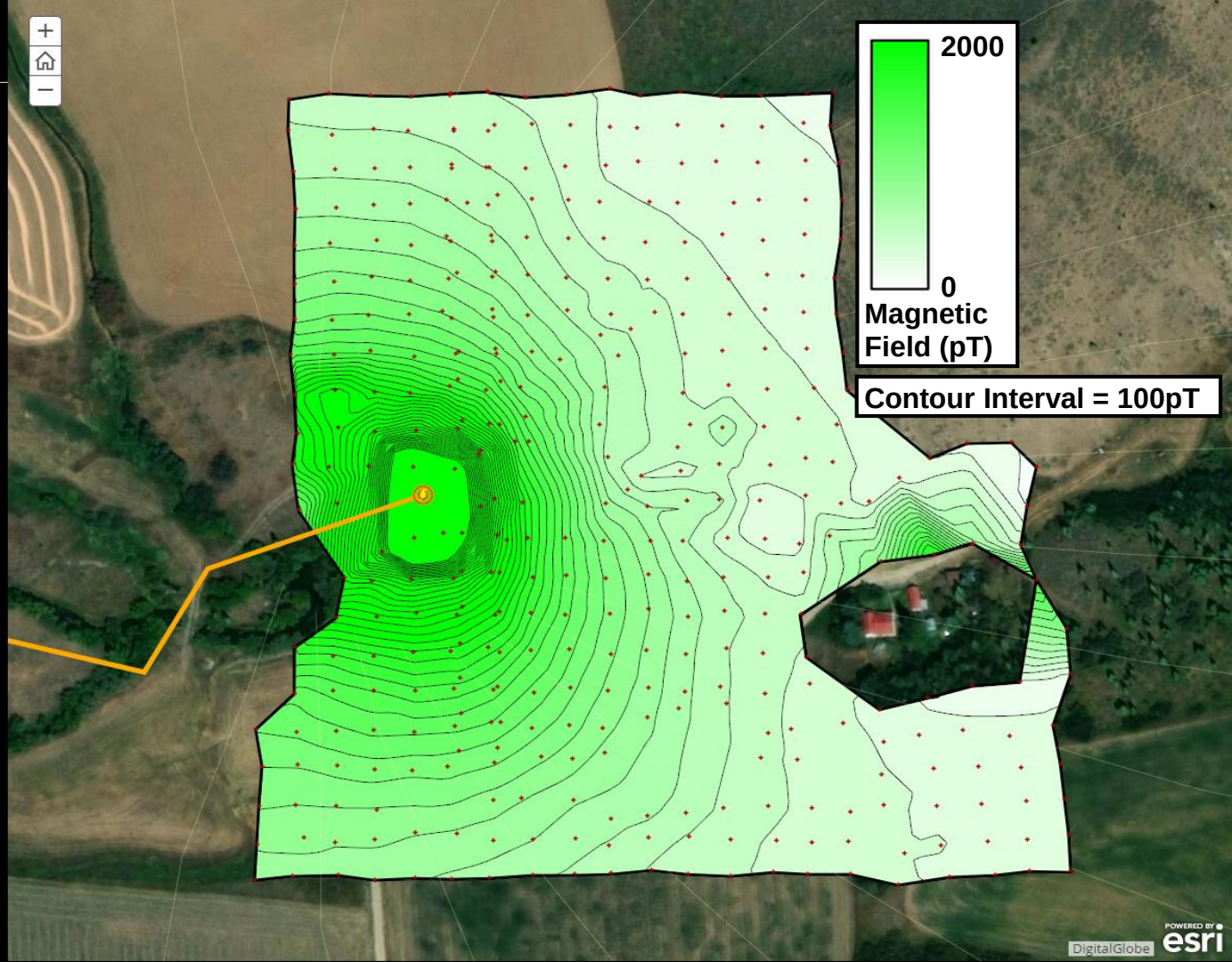
Preferential Groundwater Seepage Paths

3D Model of Subsurface Electric Current Flow Paths

3D Model to Interpret Flow Paths



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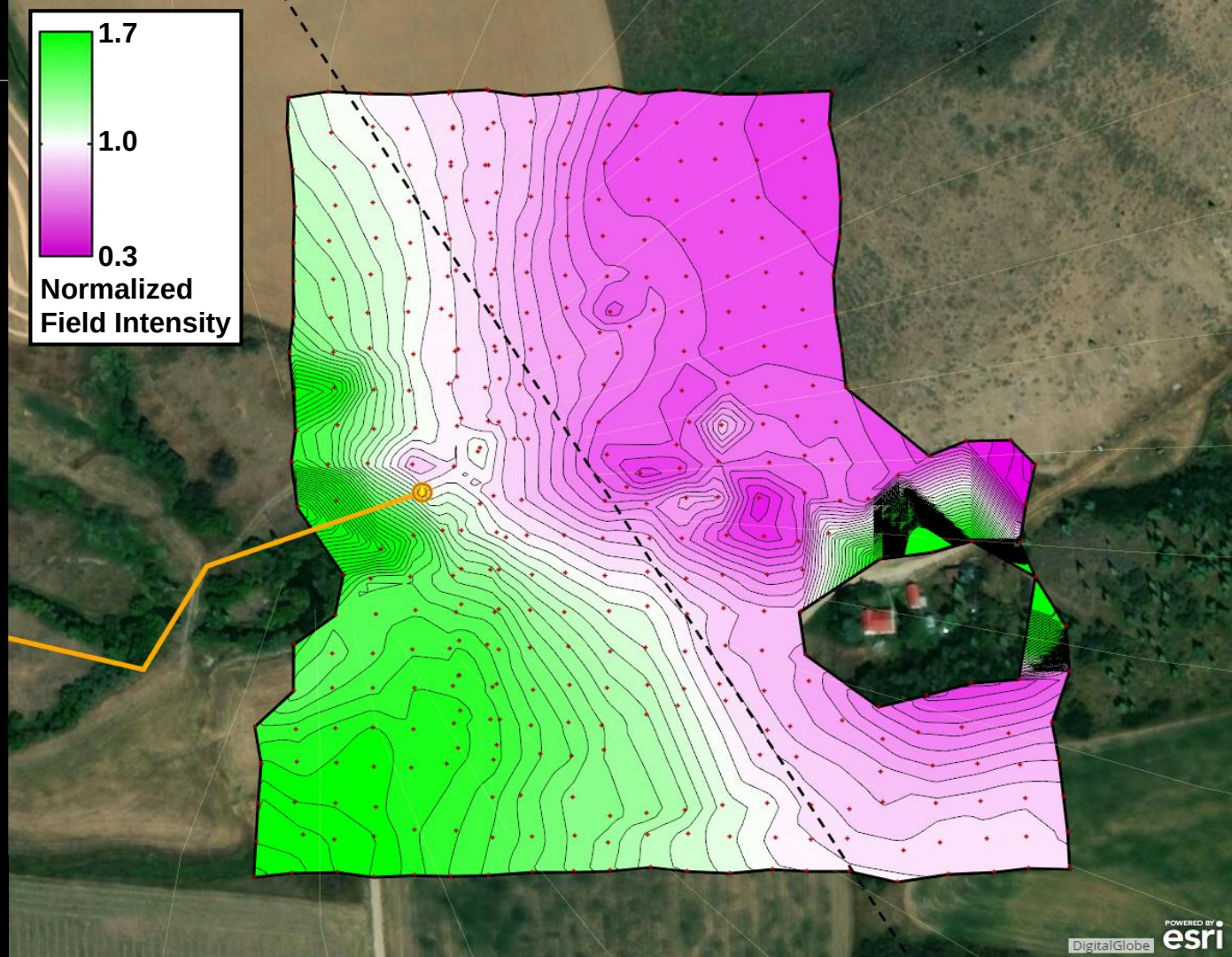

Soda Springs Idaho Well

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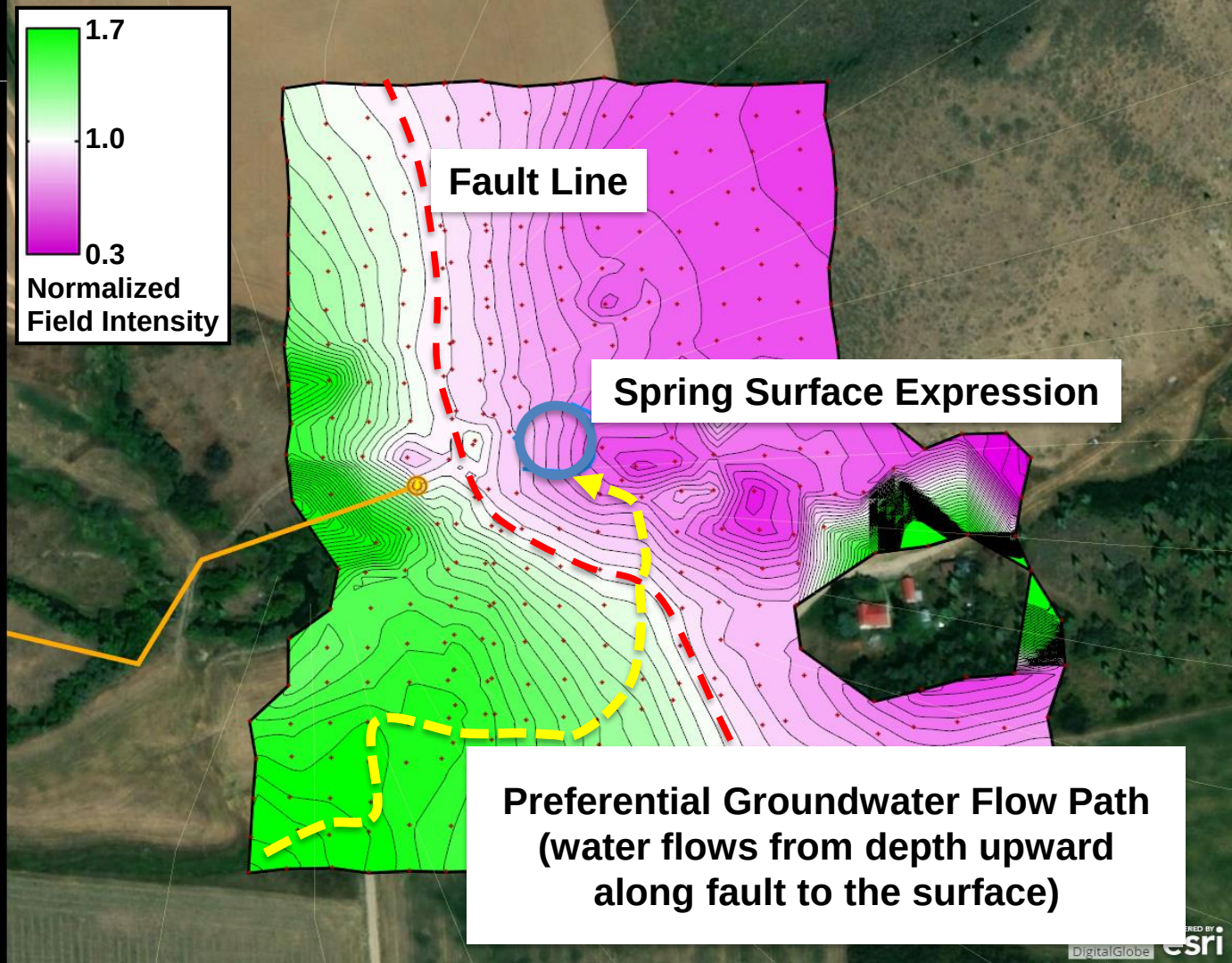
3D Model to Interpret Flow Paths

Wells Were Drilled and a Sufficient Water Supply Was Found



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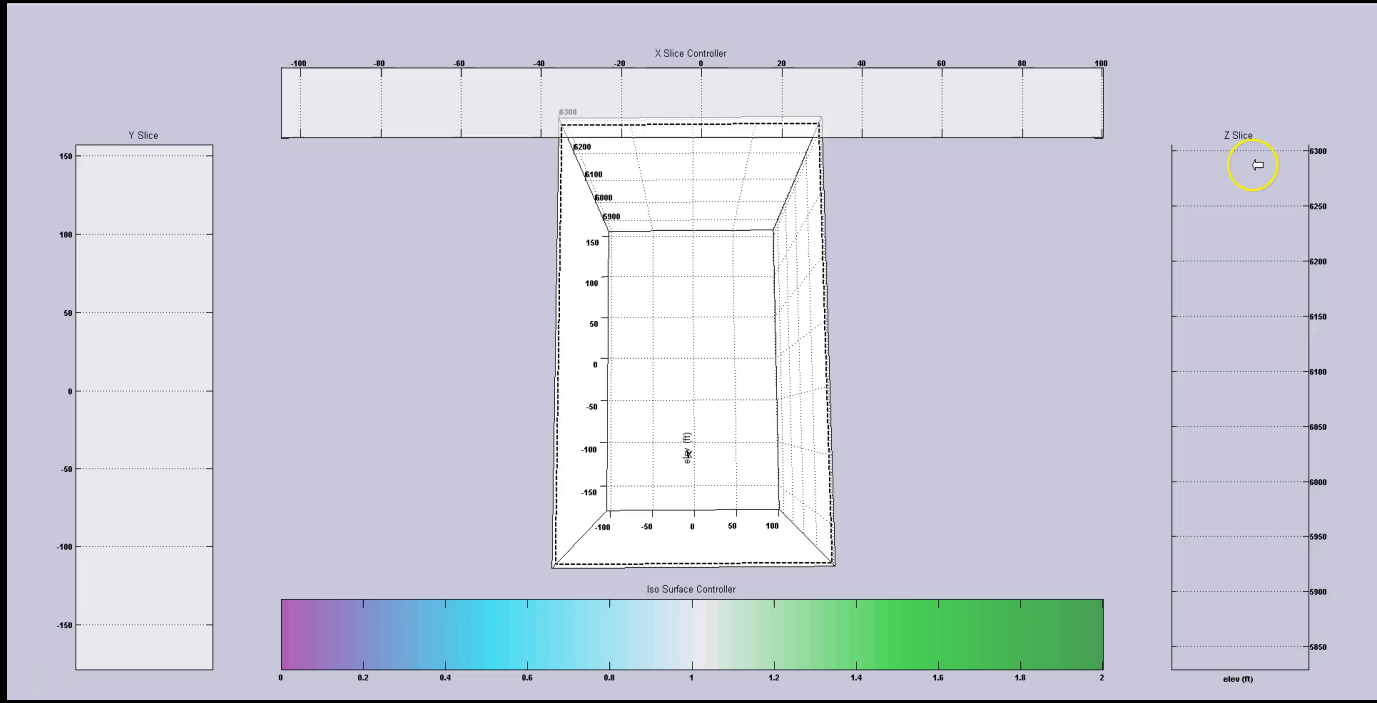

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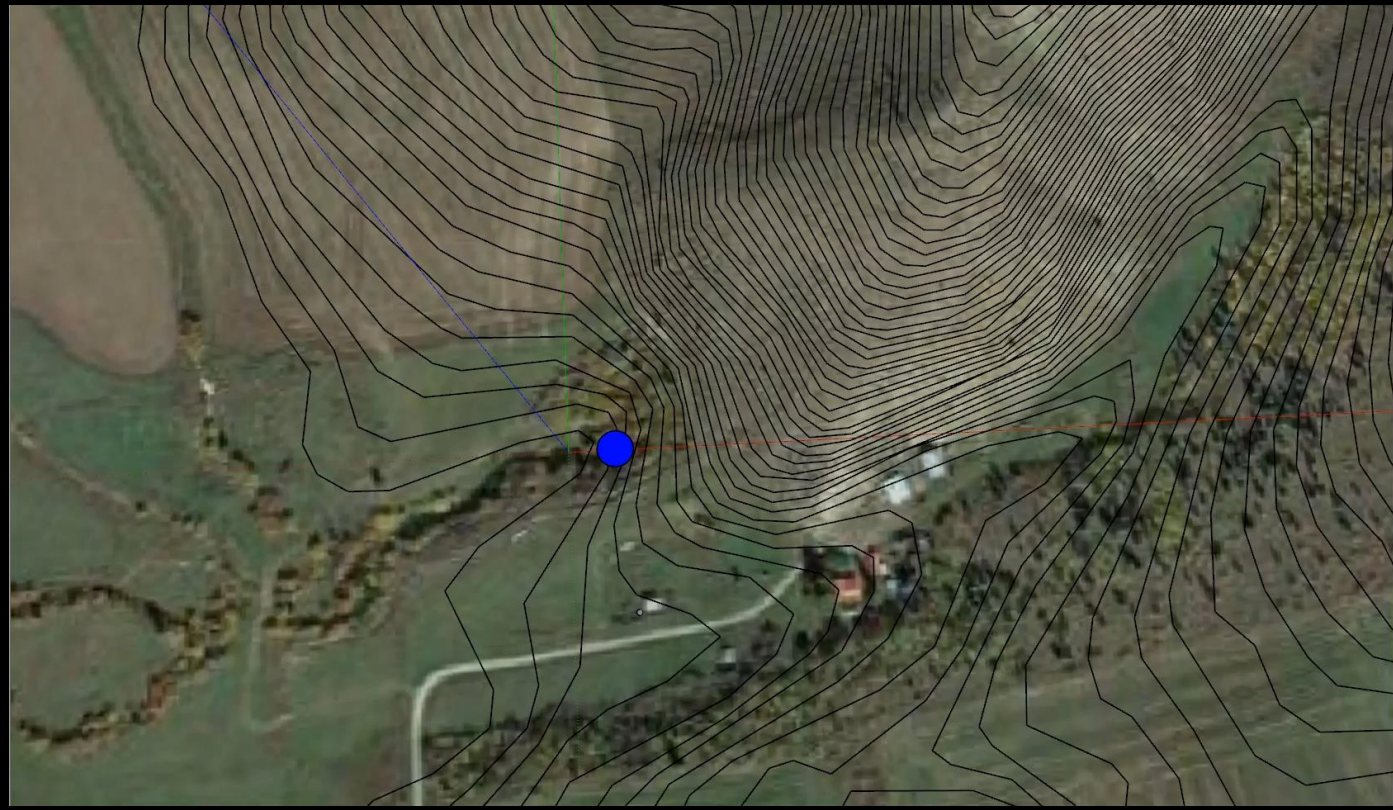

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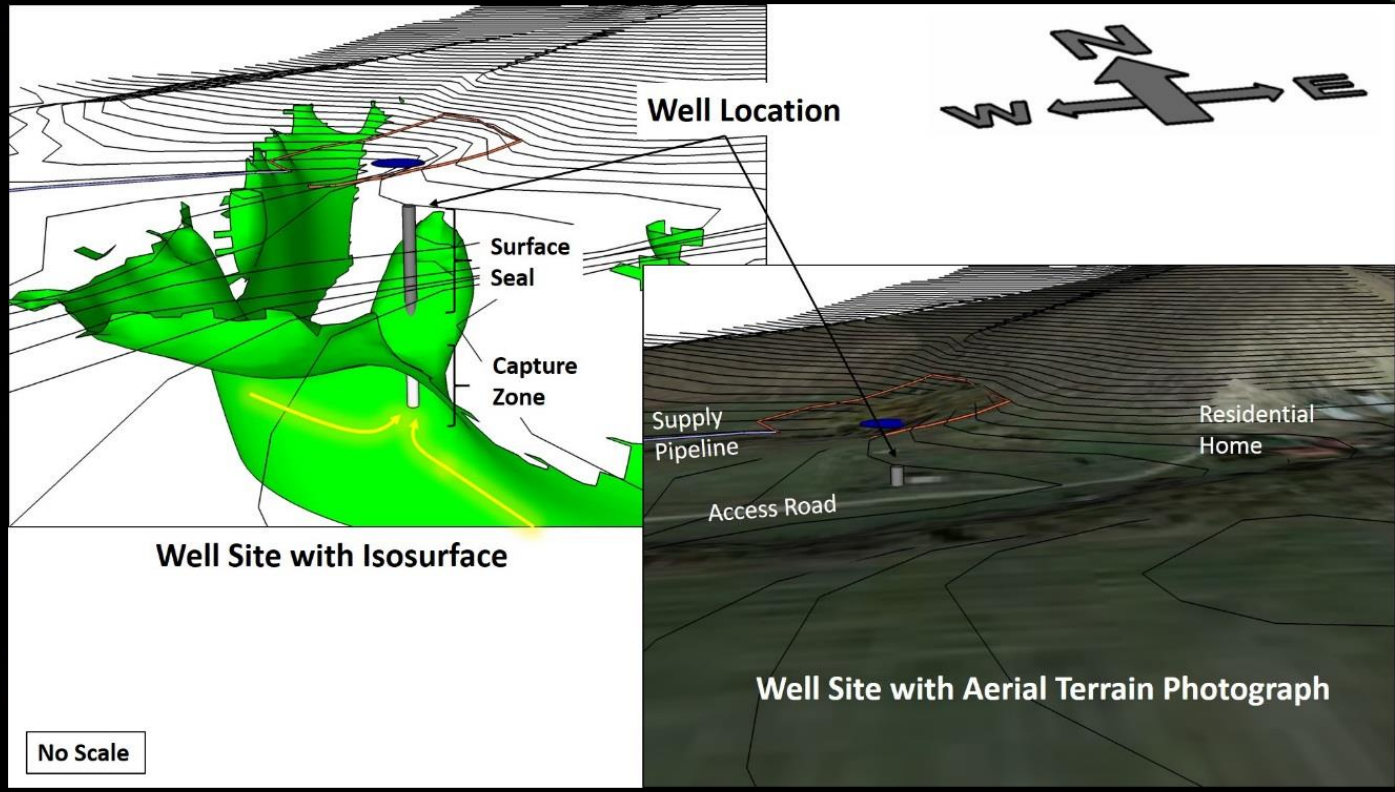

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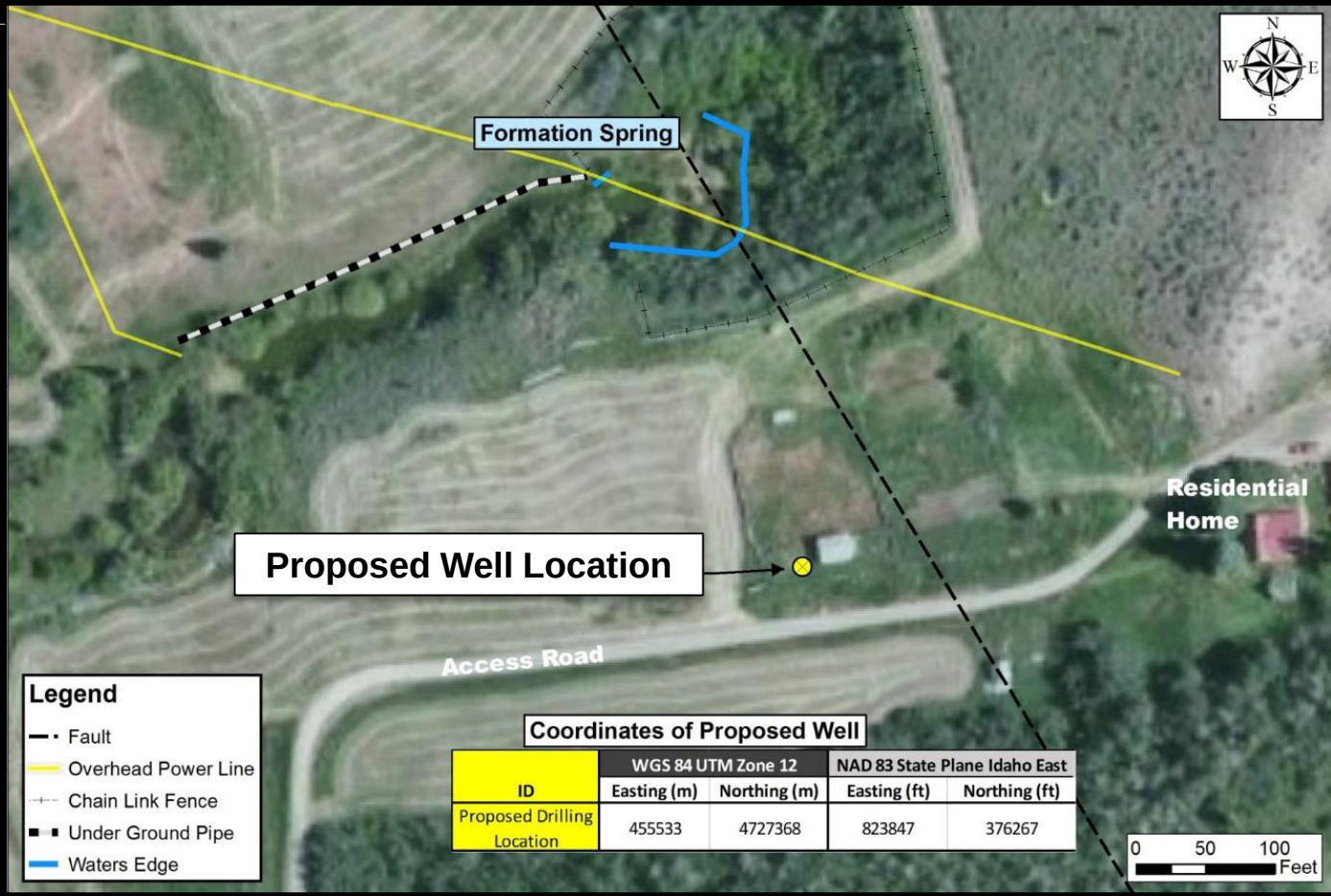

Coordinates of Proposed Well

ID	WGS 84 UTM Zone 12		NAD 83 State Plane Idaho East	
	Easting (m)	Northing (m)	Easting (ft)	Northing (ft)
Proposed Drilling Location	455533	4727368	823847	376267