

Criteria-Based Risk Assessment for Sustainable Water Quality in Municipal Wells

A Guide for Sustainable Water Quality

This project is intended to be a guide for determining new municipal well locations based on sustainable water quality. Wells with sustainable water quality help municipalities be resilient by anticipating change in water quality. This can be done by using a set of risk factors/criteria to assess potential well locations. Two questions were researched during this project:

- 1) How can future well sites be assessed for sustainable water quality?
- 2) How is this criteria applied?

This research is important to municipal water policy development given that nearly half of Arizona's water supply comes from groundwater

Important Criteria

- 1) **Superfund Site**-This represents if the status of the site is "Contaminated ground water migration is not under control", then the risk assessment of water contamination can be continued by looking at the number of Contaminants of Concern (COC) for the site listed by the EPA.
- 2) **Existing Wells with Contaminants**-This represents surrounding wells with one or more contaminants. Those registering above 76% of the Maximum Contaminant Level (MCL) pose a higher risk that the contaminants could show up in the new well.
- 3) **UST**- This represents if an Underground Storage Tank is present, it automatically is assessed as high risk due to the equally likely chances USTs have of leaking.
- 4) **Industry**- This represents the gallons of hazardous liquids located on an industrial site according to Hazardous Materials Management Plans (HMMP).

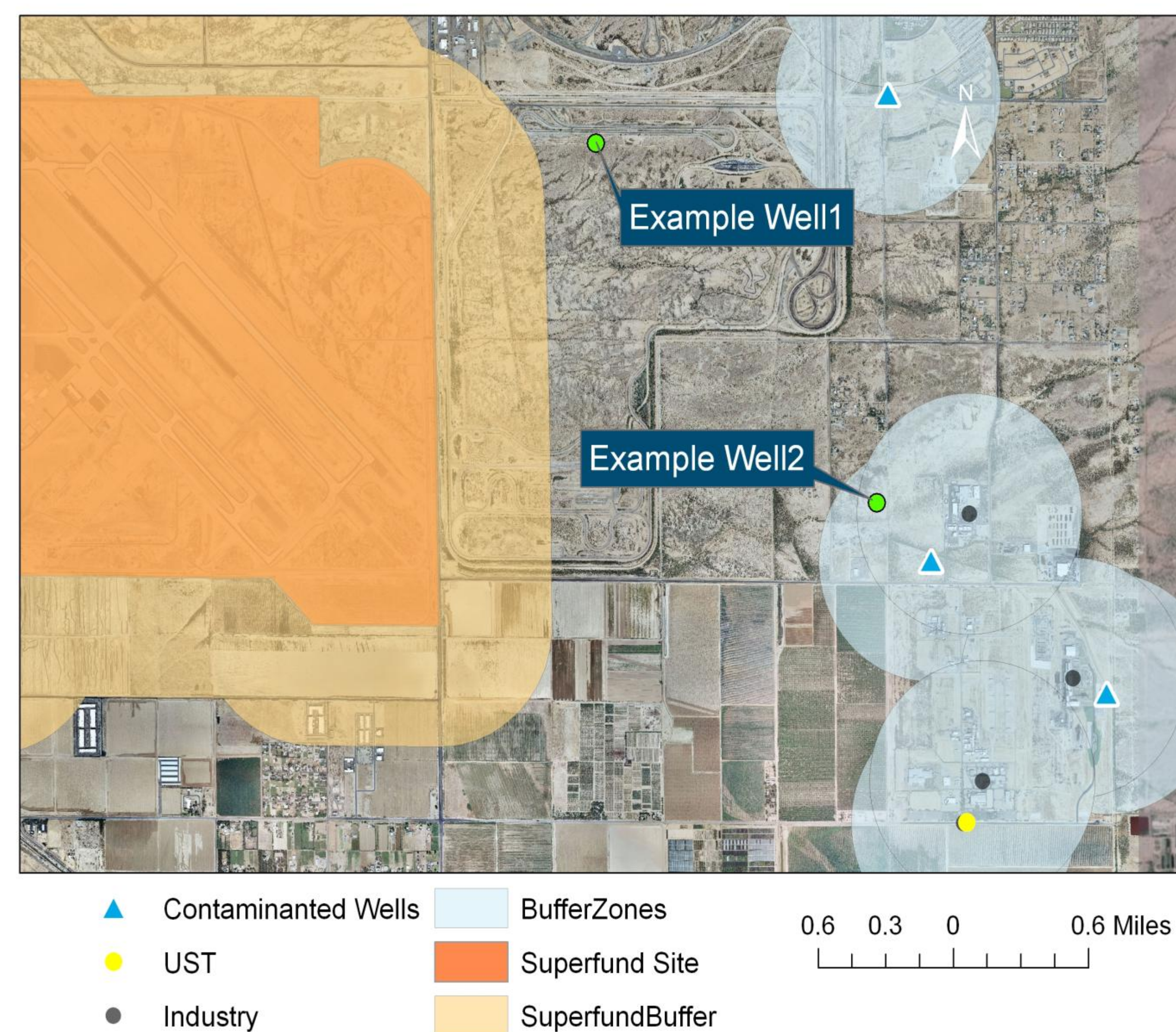
Method of Application

Once a municipality has one or more future well locations available, the water quality risk criteria can be applied. This can be done by first determining the buffer zone circumference using capture zone data out to 50 years for the chosen area.

This buffer zone is applied to the potential well site and to the four criteria points listed to the left. If the potential well buffer zone crosses one or more of the criteria buffer zone, then the risk assessment ranking system can be applied. This application is possible through research of each criteria of the given location.

For a more thorough assessment, the buffer zones can be based off of 100 years of projected capture zones.

Application Results



This map serves as a demonstration area. Two hypothetical wells have been placed on the map to explain the criteria. After thorough research the risk assessments are as follows:
 Example Well 1: 4
 Example Well 2: 8
 In this demonstration Example Well 1 would be the better option.

Risk Assessment Criteria Results

Criteria	0 Excluded	1 Very Low Risk	2 Low Risk	3 Medium Risk	4 High Risk
Superfund sites	N/A	1-5 COCs	6-10 COCs	11-15 COCs	16< COCs
Existing Contaminants	0 contaminants	1 or more with 1-25% of MCL	1 or more with 26-50% of MCL	1 or more with 51-75% of MCL	1 or more with 76<% of MCL
Underground Storage Tanks (UST)	0 USTs	N/A	N/A	N/A	1 or more UST
Industry	0 Gallons	0-100 Gallons	101-1,000 Gallons	1,001-10,000 Gallons	10,000< gallons

This chart demonstrates the ranking system researched to determine low risk vs. high risk well locations in terms of water quality.

Future Research

The information presented in this project is intended to provide municipalities with the knowledge to assess new well sites for long term, sustainable water quality.

All criteria assessed in this project can be remediated to a certain extent. So to further this project's results, monetary remediation expenses need to be researched in order to add weight to risk criteria that is more expensive to remediate.

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