

CEEn-2019CPST-014

Mapleton City Well Source Protection Plan

TJ^2

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Introduction

- **The well source water protection plans included three separate and major aspects, the Reports, Arc GIS, and the Well Protection zones.**
- **The reports are required by the state and contain all the technical aspects of the source water protection plans.**
- **Arc GIS, is used by the City of Mapleton to coordinate their projects and proposed projects in the city. A shape file was created and contains the protection zones and other points of interest for water protection.**
- **WhAEM, provided by the EPA, was used to delineate the protection zones. These zones were then exported as shape files to be used in Arc GIS.**

Project Tasks and Deliverables

- **Updated protection plans that had every section filled out.**
- **A list of potential contamination sources.**
- **A water model.**
- **A shape file of the delineated water zones from the water model and the location of potential contamination sources.**

Design and Analysis

▪ WhAEM

▪ Required variables and assumptions:

- K value: determined through a MODFLOW program Darcy's equation to be approximately 66 ft/day
- The direction of the flow, assumed to be 155 Degrees which is relatively perpendicular to the mountain slopes.
- Porosity of the ground was found in the previous reports and assumed to be correct at .28
- Aquifer depths and elevations were also found in the previous reports to be approximately 400 ft deep at an elevation of 4200 feet

▪ Limitations/Tried designs:

- Could not individually trace particles for each individual well. Had to use the Multiple Wellhead protection function verses the calculate function which was exhaustively tried.
- No topographic map options to be imported into the program.

Design and Analysis Cont'd

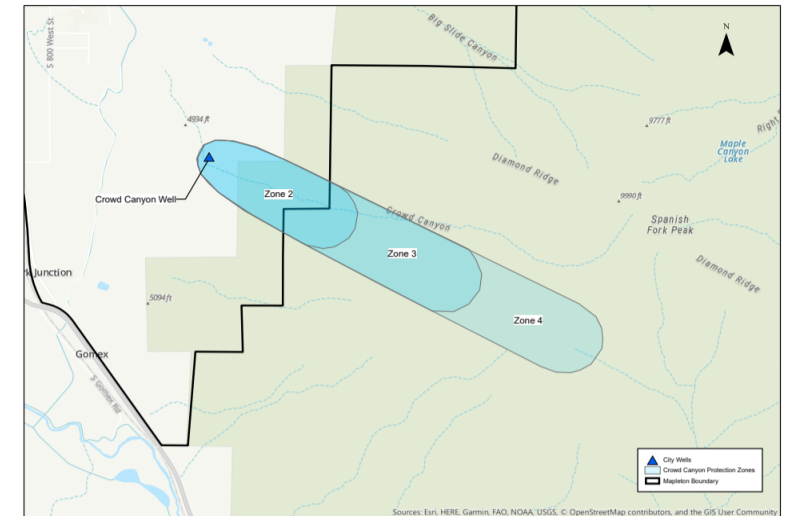
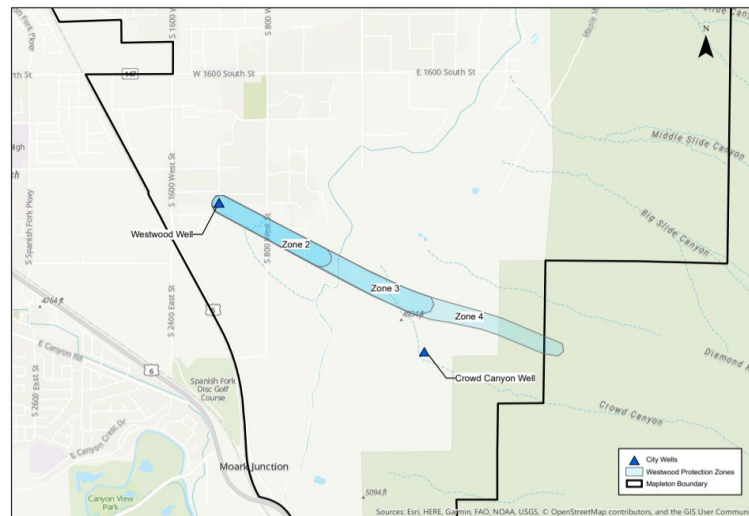
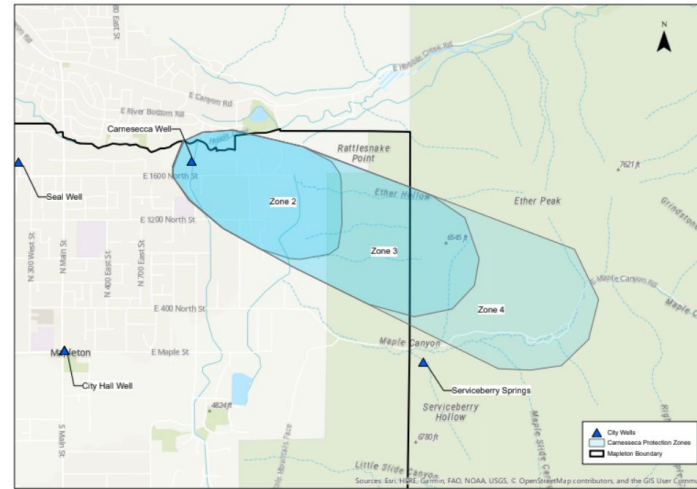
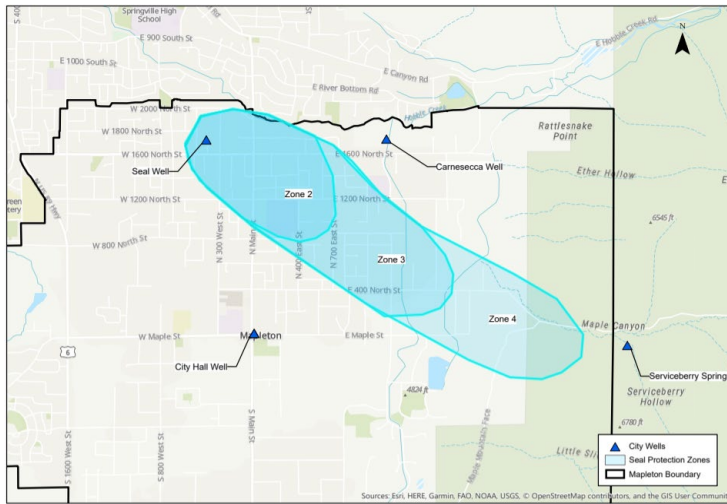
■ Protection Plans

- **Reports were obtained from RB&G, Utah Division of Water Quality, and Cascade Water Resources.**
 - Preliminary Evaluation Reports (PER) were not used.
 - The Seal Well does not have a report between 2009 and 2019.
 - The Crowd Canyon Well does not have a report between 2007 and 2019.
 - The 2019 Seal Well and Crowd Canyon Well reports were used, but they have not been approved by the Utah Division of Water Quality yet.
- **Each Well's reports were used along with the new water model and updated protection plans.**

Discussion of Results

- **A water model made in WhAEM that delineates the protection zones for each well.**
- **GIS maps of the water sources, protection zones, and potential contamination sources.**
- **New protection plans for each water source that used the new water model, the updated potential contamination sources, have compiled all the data from their preceding reports, and no longer have "No changes" sections.**

Discussion of Results Cont'd



Conclusions

- **A useable Water Source Protection has been created. The results of the model have been exported as a shape file that the City of Mapleton can now use on their master city Arc GIS file.**
- **Reports for each well were made and delivered in a manner which would allow for easy editing for future reports. These reports worked on will be able to serve as a working template for the City of Mapleton in the future.**
- **The location of all contamination sources and private septic tanks has been created on as a shape file for the use of City of Mapleton.**
- **Overall, the entire process of preparing and analyzing Source Water Protection documents for the State have been streamlined to allow the City of Mapleton to easily update their reports without having to outsource to an outside engineering firm.**

Recommendations

▪ Water Model

- **Only revise the water model if major changes in discharge rate or another well is added.**
 - Through testing the program with different parameters, a few 100's of cfs of discharge won't affect the protection zones noticeably.
- **When setting the K value to use, use the most conservative K value on all wells.**
- **Keep the model simple.**
 - Modeling the trace particles of each well individually does not work out efficiently
 - It is difficult to try to add elevation values and no topographic map can be imported.

Recommendations Cont'd

■ Protection Plans

■ Simplify

- Submit all the reports at the same time for uniformity and efficiency.
- Make Sections 4-11 universal. A lot of the information could be copied in each report.
- Section 11 only had to be done once. You can simply state that it has already been completed. For your information, this is the second paragraph in your Annual Drinking Water Quality report.
- Briefly report on EBCo. In depth discussions are not needed anymore.
- Don't add more contamination sources if you're not going to do anything about it. For example, adding sewer lines to the report when the Utah Department of Water Quality isn't asking for them and you're not going to change your behavior by adding them.

■ Remove

- Remove in-depth discussions on small individual contamination sources. For example, don't report that a homeowner keeps sheep on his farm for two months during the year to help them give birth. Just report all the properties with farm animals on them at once.
- Remove insignificant ordinances. For example, citing an ordinance that states 8 sheep = 1 animal unit.
- Remove protection actions that you're not using. For example: Do you inspect Whiting campground every year on April 1st? Do you use the record keeping forms?

■ **Obtain a list of active waivers from DDW and report them. Most the previous plans state that you have waivers, but not what they are.**

- **Follow the spirit of the law. The Utah Division of Water Quality has very detailed requirements, but it is clear from previous reports that they ignore those requirements when it seems reasonable to do so.**

The End

Any Questions?