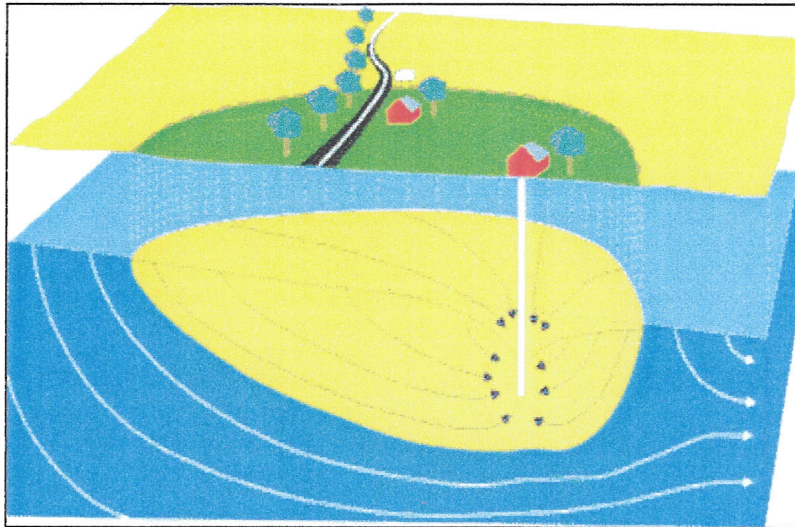


SOURCE WATER ASSESSMENT

FOR CECO UTILITIES, INC.

CECIL COUNTY, MD



Prepared By
Water Management Administration
Water Supply Program
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SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for CECO Utilities, Inc. (CECO), a community water supply at Manchester Park Subdivision, on the east side of MD Route 213, about 2.4 miles north of Elkton in Cecil County, Maryland (Figure 1). This report delineates the area that contributes water to the well, identifies potential sources of contamination within the area and determines the susceptibility of the water supply to contamination. Recommendations for protecting the water supply conclude the report.

The source of CECO's water supply is four production wells in the James Run Formation. The aquifer appears to be unconfined at this location. The Wellhead Protection area was delineated using by the WSP using EPA-approved methods.

Field inspections and databases inventories found no point sources of contamination within or near the assessment area. The Maryland Office of Planning's 2000 land use map for Cecil County was used to identify non-point sources of contamination. Maps and aerial photos showing the locations of the wells and land use are included at the end of this report.

The susceptibility analysis is based on a review of existing water quality data for the water system, the presence of potential sources of contamination, in the assessment area, well integrity and the inherent vulnerability of the aquifer. It was determined that CECO Utilities, Inc.'s water supply is not susceptible to inorganic compounds, organic compounds, radionuclides or microbiological contamination. One of the wells, Well 6, was found to be one of the most vulnerable part of the system. Construction of a protective structure around the well and clean-up of the area surrounding the well are highly recommended.

INTRODUCTION

The Water Supply Program has conducted a Source Water Assessment for CECO Utilities, Inc. (CECO), a community water supply for Manchester Park Subdivision.

As defined as part of Maryland's Source Water Assessment Plan (SWAP), "large systems" are community and noncommunity water systems that have water appropriation and use permits with average annual appropriation permit exceeding 10,000 gpd. CECO's current water appropriation and use permit (CE1967G011(05)) allows for an average annual water use of 44,000 gpd.

HYDROGEOLOGY

CECO's service area is located southeast of the Piedmont Physiographic Province. This region is underlain by crystalline igneous and metamorphic rock. The 1968 geologic map indicates that the area is underlain by the Port Deposit Gneiss, however, the 1986 geologic map renames it as James Run Formation. *The 1986 Geological Map of Cecil County re-maps the area and names the formation at this site as James Run Formation.

Locally there is a thin veneer of Potomac Group unconsolidated sediments. The Potomac Group sands tend to be productive aquifers, but at this location, they are too thin to be use as a water source. Ground water is withdrawn from the crystalline rocks below. In such rocks, water is stored in fractures and in the overlying saprolite and soils. The ground water is generally unconfined and the water table mimics the surface topography. Well yields are dependent on the number and nature of fractures penetrated by the well. Well depths in the James Run Formation typically range from about 15 to 575 feet. Yields range from 0.1 to 100 gpm, with median yield around 10 gpm.

WELL INFORMATION

For ground water systems, a Wellhead Protection Area (WHPA) is considered to be the source water assessment for the system. As defined by Maryland's SWAP, the wellhead protection area for a large public water system whose wells are completed in fractured crystalline rock is the drainage area that contributes water to the wells. This method was used to assess CECO's water supply. Figure 2 shows the locations of CECO's four production wells (Wells 3R, 4, 5 and 6) and delineates the 100.35-acre Wellhead Protection Area (WHPA). There are two standby wells and one well that will be abandoned (See Table 1). Copies of drilling permit applications and completion reports for all of the wells are included in the Appendix.

Table 1. CECO Utilities, Inc. Well Inventory

Owner's Number	Well Tag Number	Location	Total Depth	Casing Depth	Year Drilled	Status
1	CE054770	Sposato Lane	114'	63'	1963	not in use
2	CE710036	Sposato Lane	125'	64'	1970	not in use
3	CE733532	Sposato Lane	330'	72'	1980	to be abandoned
3R	CE945127	Sposato Lane	240'	108'	2002	in use
4	CE733555	Avalon Avenue	270'	76'	1980	in use
5	CE881691	Avalon Avenue	315'	114'	1991	In use
6	CE946236	Sposato Lane	600'	80'	2003	in use

POTENTIAL SOURCES OF CONTAMINATION

Potential sources of contamination can be classified as either point or non-point sources. Examples of point sources are leaking underground storage tanks, ground and surface water discharges, landfills, animal feeding operations, and ground water contamination sites. These sites are usually associated with commercial or industrial facilities that use chemicals that may, if handled inappropriately, contaminate ground water via a discrete point location. Non-point sources are associated with land use practices, such as use of pesticides, fertilizer, animal wastes or septic systems, that lead to ground water contamination over a larger area.

One potential point sources of contamination was identified within the assessment area during a from field inspection of the site. Well 6, which is located near the rental house at the end of Sposato Lane, has no protective structure around it and is vulnerable to vandals. There are also abandoned cars, machinery and containers on the site, which may contain chemicals and petroleum products that could potentially contaminate the well.

The Maryland Department of Planning's 2000 land use map for Cecil County was used to identify non-point sources of contamination (Figure 3). Five land use categories were identified within the delineated WHPA: low density residential, medium density residential, commercial, cropland and forest (Table 2). The predominant land uses are medium density residential and cropland.

Table 2. Land Use Summary for the Wellhead Protection Area

LAND USE CATEGORIES	TOTAL AREA (acres)	PERCENTAGE OF WHPA
Commercial	0.259	0.2
Cropland	32.367	32.3
Forest	4.319	4.3
Residential (low density)	16.414	16.4
Residential (medium density)	46.993	46.8

Handwritten calculations and notes:

$$\begin{array}{r} 32 \\ 20 \\ \hline 52 \\ 47 \\ \hline 99^2 \end{array}$$

99 = 400

40,900

A review of Maryland Department of State Planning's Cecil County Sewer Map (Figure 4) shows that Manchester Park is currently served by CECO Utilities, Inc sewer system and that all of the surrounding area in the WHPA is scheduled for service in 3 to 5 years. There are a few properties within the WHPA that are currently served by private septic systems.

Table 3. Sewer Service Summary for the Wellhead Protection Area

SEWAGE SERVICE AREA	TOTAL AREA (acres)	PERCENTAGE OF WHPA
Area Served by CECO Utilities, Inc.	57	57
Area to be served in 3 to 5 years	43	43

WATER QUALITY DATA

Water quality data from the Water Supply Program's (WSP) database was reviewed for Safe Water Drinking Act (SWDA) contaminants. In accordance with Maryland's SWAP, data submitted by the owner/operator of the system was compared with the Maximum Contaminant Levels (MCLs). If monitoring data is greater than 50% of the MCL, the assessment will describe the typical sources of that contaminant and locate the possible sources of the contaminant for this site. CECO's water treatment includes hypochlorination, pH adjustment, filtration and sequestration.

Inorganic Compounds

No inorganic compounds have been detected in quantities greater than 50% of the MCL. During the past five years, iron levels in raw water ranged from 2.6 to 20 ppm, exceeding the recommended maximum of 0.3 ppm. The presence of iron is generally attributed to leaching of naturally occurring minerals in the aquifer rocks.

Nitrate levels ranging from 0.2 to 0.7 were detected several times. Even though nitrates have never exceeded 50% of the MCL of 10 ppm, their occasional presence is of note. Their presence is attributed to chemicals and fertilizers applied to the surrounding lawns and cropland and/or septic effluent from nearby septic systems.

Radionuclides

Radionuclides have been measured several times since 1992 but have not exceeded 50% of the MCL. Gross alpha has been detected at levels ranging from 1 to 2 picocuries per liter (pCi/L), while the MCL is 15pCi/l. The presence of radionuclides is attributed to decay of naturally occurring minerals, like uranium, in the surrounding rocks.

Volatile Organic Compounds (VOCs)

VOCs have been sampled on multiple occasions, however, none have been detected.

Synthetic Organic Contaminants (SOC's)

SOC's have been measured periodically, but none have been detected.

Microbiological Contaminants

Raw water bacteriological testing was conducted on wells 3, 4 and 6 in 1998 and 2003. No total or fecal coliform were detected in the raw water. Routine bacteriological monitoring, which measures total coliform bacteria, is conducted in the finished water for each community water system on a monthly basis. Since CECO uses disinfection for treatment of its water supply, the negative bacteriological results may not be reflective of the quality of raw water from the wells. Total coliform bacteria are not pathogenic but are used as an indicator organism for other disease-causing microorganisms. No microbiological contaminants have been detected.

SUSCEPTIBILITY ANALYSIS

The wells serving CECO were completed in a unconfined crystalline rock aquifer. Wells completed in unconfined aquifers are generally more susceptible to contamination from surface sources. The susceptibility of source water to contamination is based on the following criteria: 1) the presence of natural and anthropogenic contaminant sources within the WHPA; 2) water quality data; 3) well integrity and 4) aquifer conditions. The susceptibility of CECO's water supply to various contaminants is shown in Table 4.

The wells used by CECO serving appear to be in fair to good condition. Water quality testing indicated low levels of naturally occurring radionuclides. Although nitrates are low, they are occasionally present and may be a result of agricultural land or from the septic systems in the area.

No IOC's were reported above 50% of the MCL. Nitrate has been detected from 0.9 to 4.2 ppm. These levels may be attributed to agricultural land or from the septic systems in the area. The CECO Utilities water Supply is not susceptible to IOCs.

No radionuclides have been reported above 50% of the MCL. Low levels of gross alpha that have been detected are attributed to decay of naturally occurring minerals, like uranium, in the surrounding rocks. The CECO Utilities water supply is not susceptible to radionuclides.

No VOCs have been reported above 50% of the MCL. Abandoned cars, machinery and containers on the site may be potential contaminant sources for the water supply. Existing water quality data indicate no impacts to the water supply. Based on this, the water supply is not susceptible to VOCs.

No SOC's have been reported above 50% of the MCL. A large portion of the WHPA is cropland and residential lands use. Fertilizers and pesticides used for agricultural purposes may be potential sources of SOC's. Lawn maintenance and landscaping practices on residential properties can also be potential sources of SOC's. Water quality data indicate no SOC's impact on water quality. Based on this, CECO Utilities water supply is not susceptible to SOC's.

No microbiological contaminants have been detected in CECO Utilities raw water. Based on the water quality data, the CECO Utilities water supply is not susceptible to bacteria or protozoans like cryptosporidia and giardia.

Table 4. Susceptibility Chart for CECO's Water Supply

CONTAMINANT TYPE	Are Contaminant Sources present in the WHPA?	Are Contaminants detected in WQ samples at 50% of the MCL?	Is Well Integrity a Factor?	Is the Aquifer Vulnerable?	Is the System Susceptible to the Contaminant?
Inorganic Compounds	YES	NO	NO	YES	NO
Volatile Organic Compounds	YES	NO	NO	YES	NO
Synthetic Organic Compounds	YES	NO	NO	YES	NO
Radionuclides	NO	NO	NO	NO	NO
Microbiological Contaminants	YES	NO	NO	NO	NO

MANAGEMENT OF THE SOURCE WATER ASSESSMENT AREA

Recommendations for maintaining the integrity of this system are listed below:

- Continue maintenance and protection of the wells
- Continue periodic monitoring for VOCs, IOCs, SOC's and radionuclides.
- Annual sampling for microbiological contaminants is recommended. It is a good indicator of the integrity of the wellhead.
- Well 6, located near the rental house, needs some kind of protective structure around it and possibly a fence in the property near the wells. Abandoned cars, machinery and containers that may contain chemicals and volatile organics need to be properly disposed of.
- Well 3 needs to be abandoned and sealed in accordance with State well regulations.

- The Consumer Confidence Report should list that this report is available to the general public through their public library or by contacting MDE.
- Any increase in pumpage or addition of new wells to the system may require extension of the WHPA. The system is required to contact the WSP when an increase in pumpage is applied for or when new wells are being considered.
- All water systems should have a Contingency Plan for their water system. COMAR 26.04.91.22 requires all community water systems to prepare and submit a plan for providing safe and adequate drinking water during emergency conditions for approval.

REFERENCES

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FIGURES

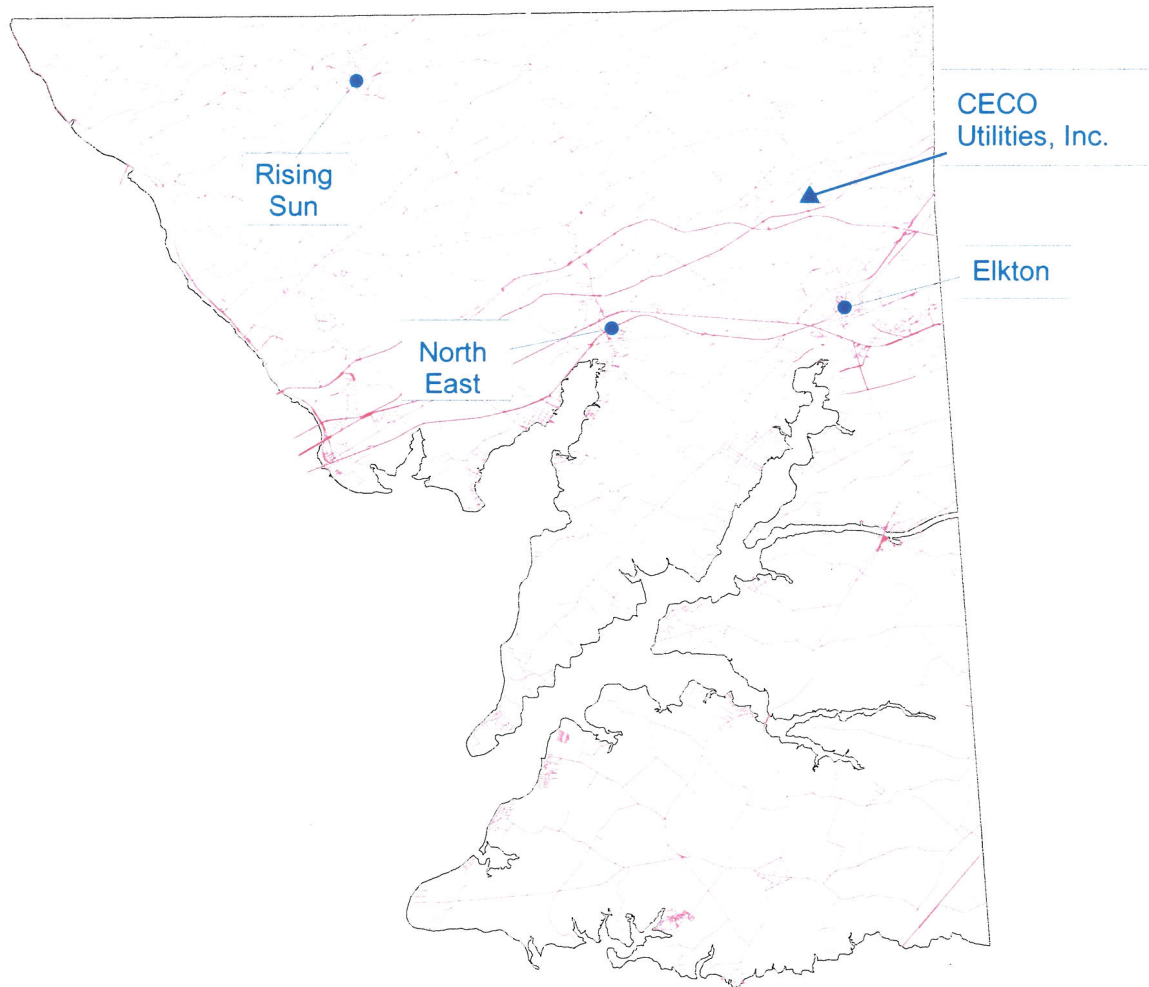


Figure 1. Location Map

Legend

State Roads

Base Map: Cecil County, Maryland

N

 2 0 2 4 Miles

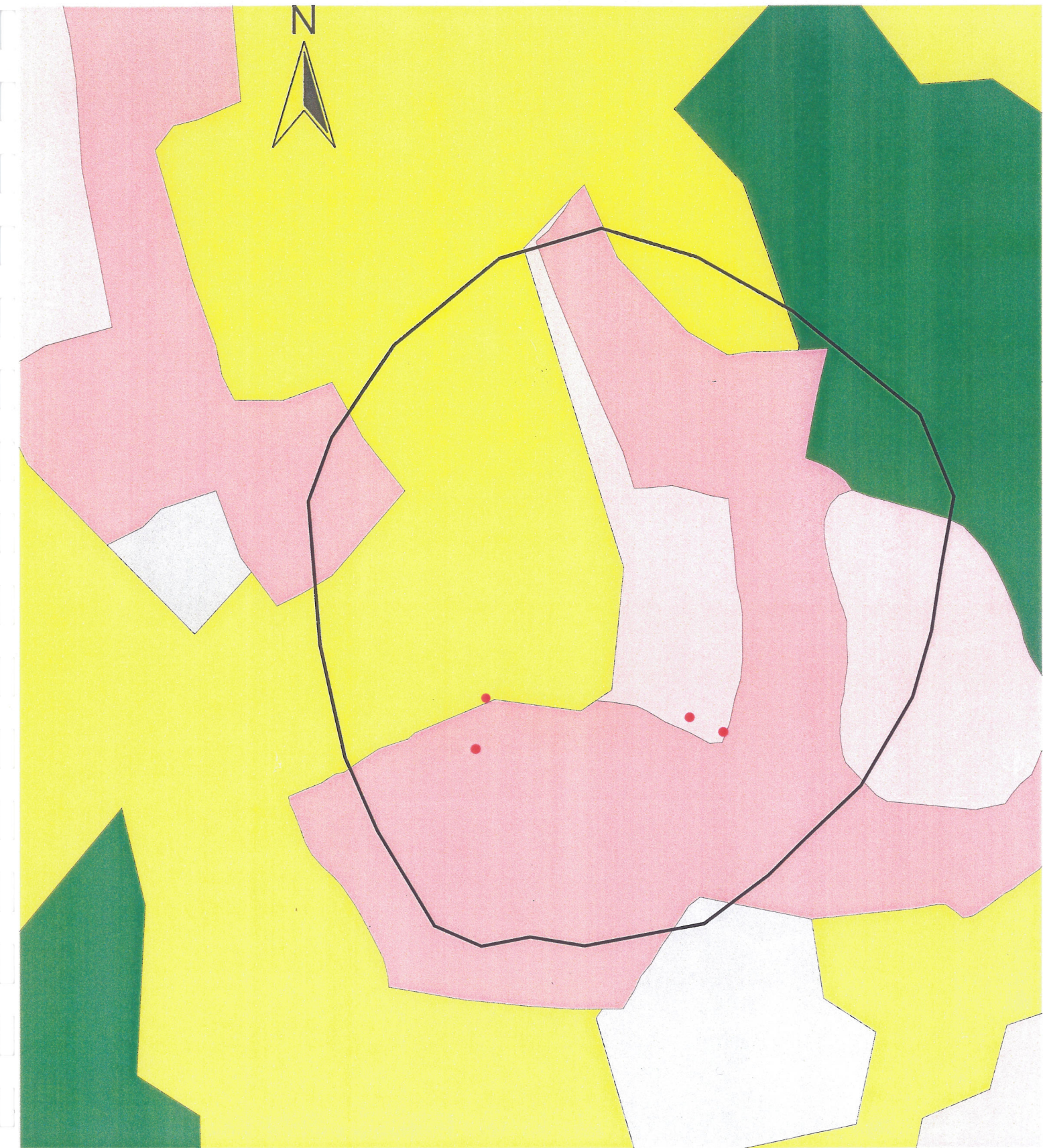
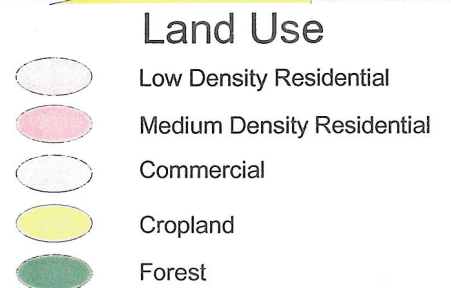
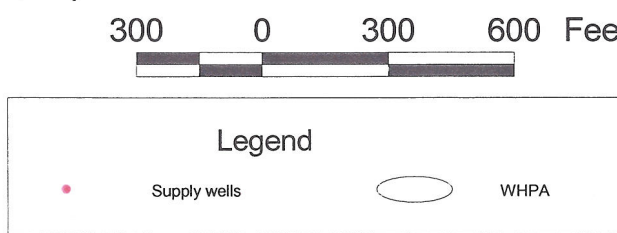


Figure 3: Landuse Map of CECO Utilities Wellhead Protection Area



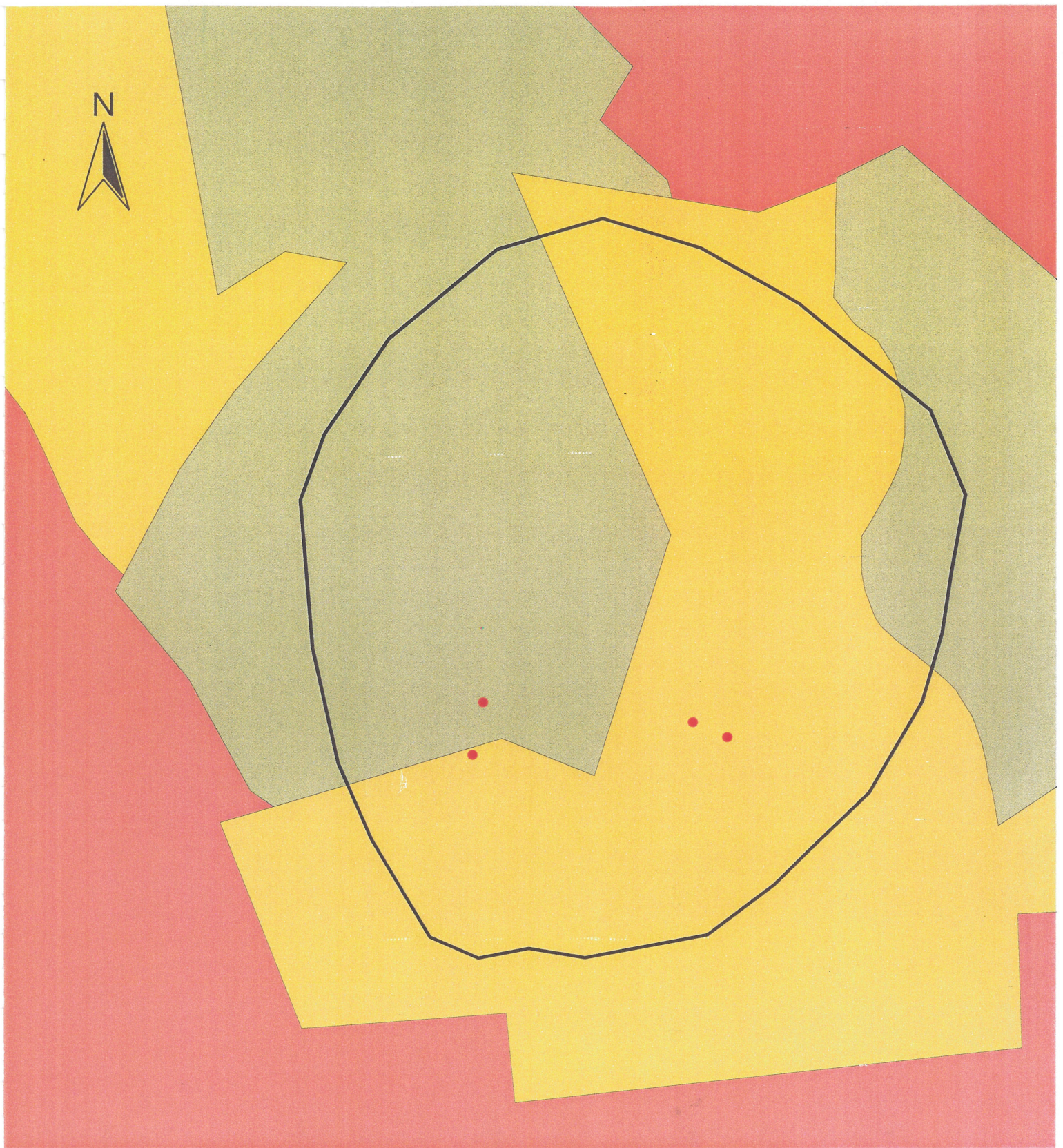


Figure 4: Sewer Service Map of CECO Utilities Wellhead Protection Area

