

**SOURCE WATER PROGRAM**

**SITE ASSESSMENT RESULTS ADDENDUM**

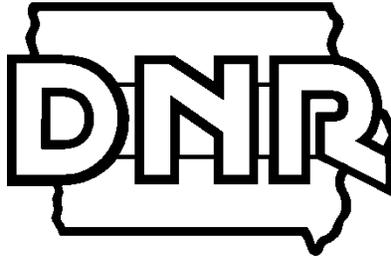
For

**CITY OF ELLIOTT MUNICIPAL WATER SUPPLY  
MUNICIPAL WELL #1 (DNR Well ID # 1419)**

**ELLIOTT, MONTGOMERY COUNTY, IOWA**

**September 2, 2010**

**IOWA DEPARTMENT OF NATURAL RESOURCES**



Prepared by

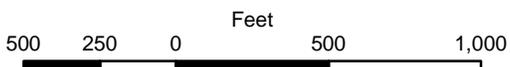
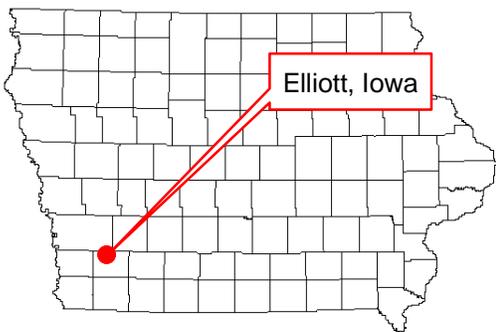
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Contaminated Sites Section**

Iowa Department of Natural Resources staff collected two additional groundwater samples for the City of Elliott Source Water Protection Site Assessment to determine if the marsh area northeast of the City of Elliott was causing denitrification of the groundwater as the groundwater passed underneath. As noted in the December 22, 2008 Site Assessment Results, the level of nitrates in the groundwater samples were found to be higher northwest of Municipal Well Number 1 and lower to the southeast corresponding to the sediment conditions at the site. Samples collected in the coarse oxidized sands east of Municipal Well Number 1 were significantly lower than the samples collected in the fine silty unoxidized sediments around and west of well number 1 (Figure 1). It was further noted in the December 22<sup>nd</sup> report that additional sampling would be required in order to determine exactly why the coarse oxidized sands contain lower levels of nitrates but with the lower levels found right next to the higher levels in the unoxidized silty sands.

The two groundwater samples were collected north of Elliott to determine the level of nitrate in the groundwater as it migrates south southwest under the city. The locations for the two new sample points are found on Figure 2. The analysis of sample point 1 showed the level of nitrate at 8.5 mg/L and sample point 2 at 7.1 mg/L, both comparable with the level of nitrate routinely found in Municipal Well No. 1 (7 to 10 mg/L).

As noted before, denitrification is a microbial facilitated process of dissimilatory nitrate reduction that may ultimately produce molecular nitrogen (N<sub>2</sub>) through a series of intermediate gaseous nitrogen oxide products. This respiratory process reduces oxidized forms of nitrogen in response to the oxidation of an electron donor such as organic matter. With this additional testing, the wetland located directly up gradient (groundwater flow wise) of the coarse oxidized sands appear to be providing the organic matter creating the source for the electron donors. Surface water infiltration from the marsh provides electron donors to the groundwater then the groundwater flows more freely through the coarse sands than the silt laden unoxidized sands providing the oxidized sands with more denitrification potential. Reestablishing (Extending) the marsh across the north side of Elliott most likely will have the same effect on the groundwater (reducing the nitrate levels in Municipal Well No. 1) and provide a recreational area and wildlife viewing opportunities for the residents of Elliott. Figure 3 shows the area that would be most beneficial for the marsh restoration/expansion.

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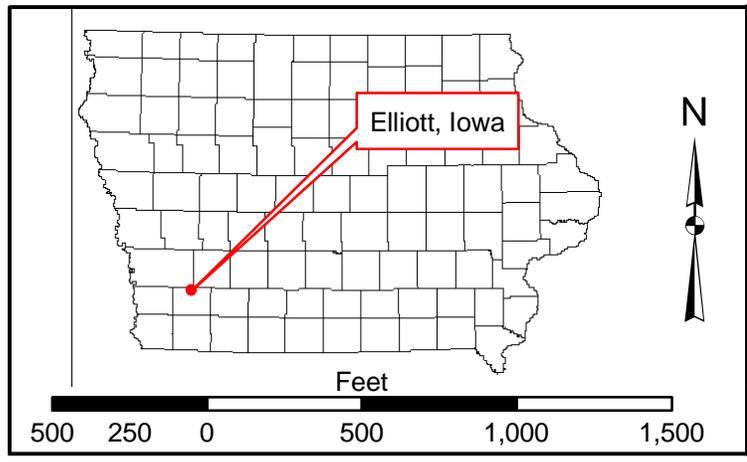
City of Elliott SWP Site Assessment  
Elliott, Montgomery County, Iowa

Sand Units  
Figure 1



**Sample Location 2**  
Nitrate - 7.1 mg/L

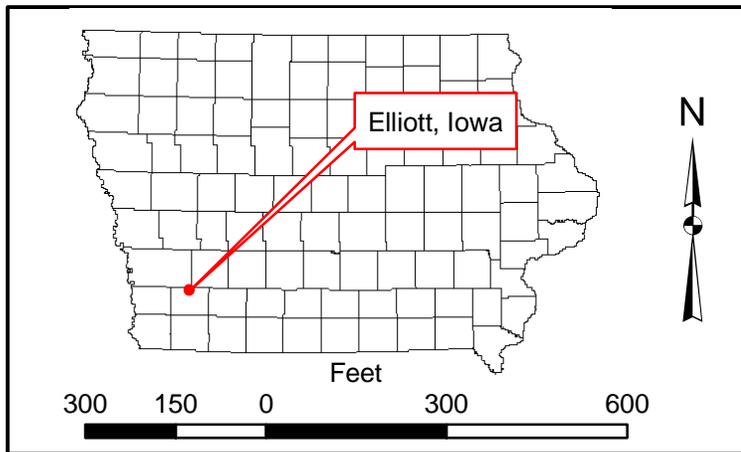
**Sample Location 1**  
Nitrate - 8.5 mg/L



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● Background Sample Locations



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Marsh Restoration/Expansion  
Figure 3