

| Location   | Water Supply (acre-feet) | Structures Potentially Impacted | Cost Estimate*  | Cost Estimate/<br>Water Supply<br>(\$/acre-foot) | Land Rights (acres) | 100-Year Flow (cfs) | Delivery Distance (mi.) | Aquifer Recharge Potential |
|--|--------------------------|---------------------------------|-----------------|--|---------------------|---------------------|-------------------------|----------------------------|
| <b>Tier One:</b> These sites would all provide a good water supply, particularly when factoring the potential cost. However, several of the sites in this group would significantly impact nearby structures. If the design could address potential inundation of the two structures there, the Plum Creek site appears to be the best overall option. |                          |                                 |                 |  |                     |                     |                         |                            |
| Plum Creek   | 20,000                   | 2                               | > \$25 Million  | 1,300  | 3,170               | 27,000              | 52                      | High                       |
| Dog Creek  | 8,000                    | 3                               | \$5-10 Million  | 800  | 770                 | 9,200               | 85                      | Medium                     |
| Cuming Creek   | 10,000                   | 6                               | \$5-10 Million  | 800  | 700                 | 15,000              | 29                      | Medium                     |
| West Fork Maple Creek  | 13,000                   | 4                               | \$10-15 Million | 800  | 1,400               | 15,000              | 64                      | Low                        |
| Battle Creek   | 12,000                   | 8                               | \$10-15 Million | 1,100  | 1,650               | 18,600              | 110                     | High                       |
| <b>Tier Two:</b> As currently envisioned by this study, these sites would provide very little water supply benefits. However, these sites could be revisited in the future and may prove feasible at a different location on these creeks or if the NRD would not be concerned with potentially relocating some structures.                            |                          |                                 |                 |  |                     |                     |                         |                            |
| Silver Creek   | 1,300                    | 1                               | < \$5 Million   | 2,700  | 400                 | 10,000              | 25                      | Medium                     |
| Snyder Creek   | 1,500                    | 0                               | < \$5 Million   | 2,800  | 500                 | 23,000              | 42                      | Medium                     |
| Bell Creek   | 1,500                    | 0                               | < \$5 Million   | 1,700  | 200                 | 24,000              | 0                       | N/A                        |
| <b>Tier Three:</b> These sites would not be feasible and probably do not warrant any further study.  |                          |                                 |                 |  |                     |                     |                         |                            |
| Pebble Creek   | 1,000                    | 2                               | \$10-15 Million | 10,000   | 1,200               | 36,000              | 35                      | Medium                     |
| East Fork Maple Creek  | 150                      | 1                               | \$5-10 Million  | 50,000   | 1,000               | 21,000              | 38                      | Low                        |

\*Solely based on land rights and fill costs for comparison purposes only.

# Lower Elkhorn Natural Resources District Reservoir Evaluation Project



## INTRODUCTION

The purpose of this factsheet is to present the results of a preliminary evaluation and ranking of ten potential reservoir sites performed for the Lower Elkhorn Natural Resources District (NRD). The sites were previously identified by the Lower Elkhorn NRD as providing possible benefits including flood control, recreation, stream flow augmentation, recharge, and water quality. The sites are, in no particular order: Battle Creek, Bell Creek, Cuming Creek, Dog Creek, East Fork Maple Creek, Pebble Creek, Plum Creek, Silver Creek, Snyder Reservoir, and West Fork Maple Creek. These sites were ranked according to criteria including potential water supply, the number of structures that could be inundated, and potential cost.



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## METHODOLOGY

Using available LiDAR information, the watershed at each site was delineated using ArcGIS software.

Previously identified dam locations were used for Pebble Creek, Silver Creek, Battle Creek, and Plum Creek. Dam locations at East Fork Maple Creek, Bell Creek, Snyder Reservoir, Cuming Creek, Dog Creek, and West Fork Maple Creek were moved upstream to minimize inundation of existing structures.

World Map Imagery (2015) from ESRI was used to identify surrounding structures.

The maximum top of dam elevation was set at the highest possible elevation with minimal impact to surrounding structures. This elevation was designated as the 100-year Flood Pool.

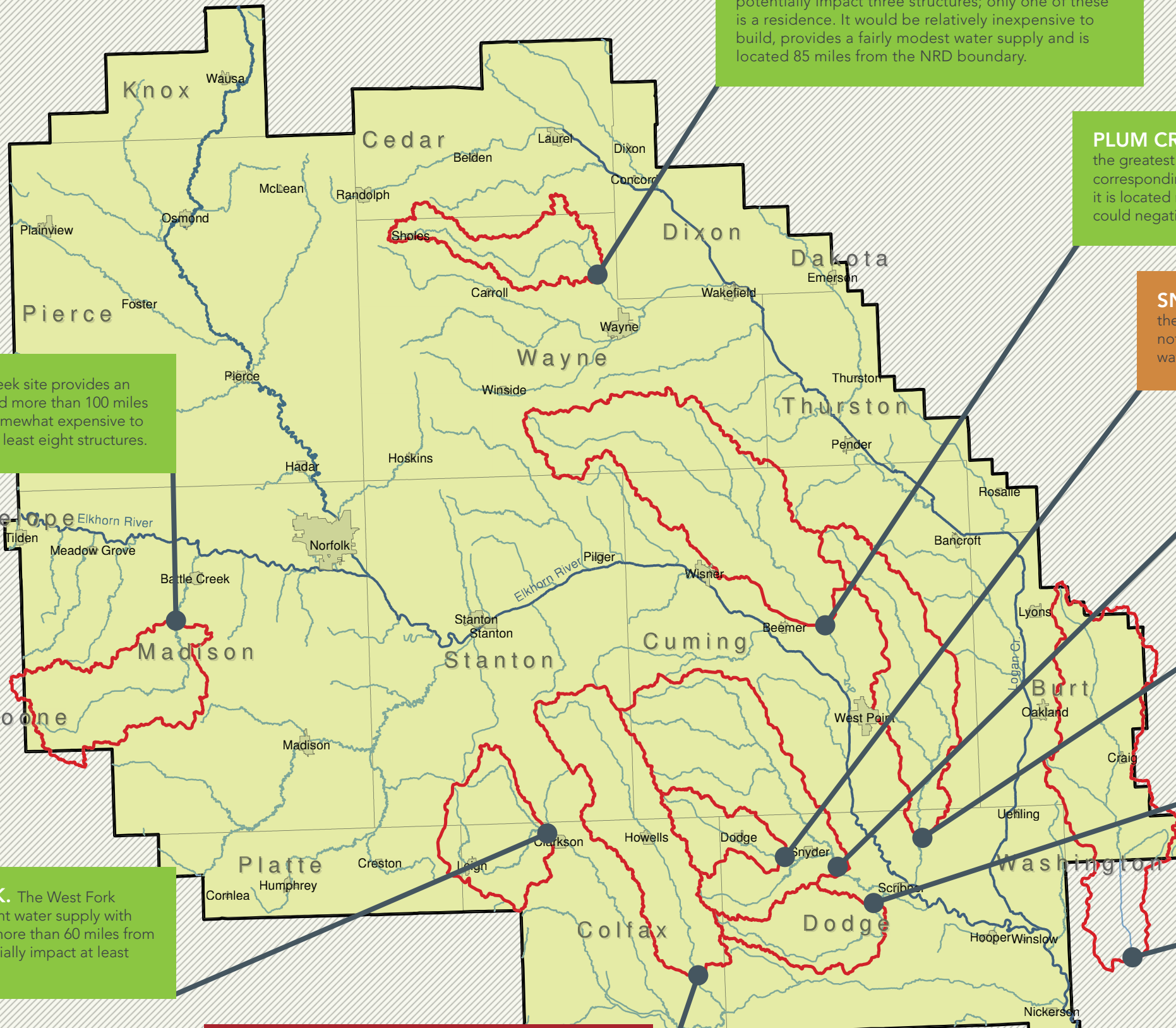
Watershed characteristics for each site were used in HydroCAD to model the effects of the 100-year, 24-hour precipitation event.

Stage-storage at each site was determined using the Area and Volume tool in ArcGIS on the LiDAR raster datasets. Storage was determined at 5-foot intervals in lower portions of the reservoir and 2-foot increments above the principal spillway. Storage was calculated in acre-feet and was entered in HydroCAD for each site.

For this preliminary evaluation, the same sized outlet was used at all sites to model the principal spillway. The Water Supply pool elevation was determined to be the highest elevation possible to contain the 100-year, 24-hour flood volume below the top of dam. Further design would warrant outlet optimization at each site.



- TIER ONE
- TIER TWO
- TIER THREE



**DOG CREEK.** The Dog Creek site would potentially impact three structures; only one of these is a residence. It would be relatively inexpensive to build, provides a fairly modest water supply and is located 85 miles from the NRD boundary.

**PLUM CREEK.** The Plum Creek site would provide the greatest amount of water supply storage and correspondingly has the highest estimated cost. However, it is located more than 50 miles from the NRD boundary and could negatively impact two structures.

**SNYDER CREEK.** The Snyder Creek Site is close to the NRD boundary, would be fairly inexpensive, and would not impact any structures, but it only provides a modest water supply.

**PEBBLE CREEK.** The Pebble Creek Site would not be a feasible option given the high cost and low water supply.

**CUMING CREEK.** The Cuming Creek site provides a good water supply, has a relatively low cost estimate, and is located near the NRD boundary. It could negatively impact six structures.

**SILVER CREEK.** The Silver Creek Site is close to the NRD boundary and would be fairly inexpensive, though it would potentially impact one structure and only provides a modest water supply.

**BELL CREEK.** The Bell Creek site is fairly inexpensive and would not impact any structures. It is actually located downstream of the NRD boundary in the Papio-Missouri River NRD and only provides modest water supply.

**BATTLE CREEK.** The Battle Creek site provides an excellent water supply but it is located more than 100 miles from the NRD boundary, would be somewhat expensive to build, and could negatively impact at least eight structures.

**WEST FORK MAPLE CREEK.** The West Fork Maple Creek site provides an excellent water supply with relatively low costs, but it is located more than 60 miles from the NRD boundary and would potentially impact at least four structures.

**EAST FORK MAPLE CREEK.** The East Fork Maple Creek site would not be a feasible option given the high cost and low water supply.

