

2.0 SITE DESCRIPTION

Union Reservoir is located in a topographic depression immediately east of the City of Longmont (**Figure 1.1**). The reservoir and surrounding properties are partially framed by Weld County Road (WCR 1, aka County Line Road) on the west, WCR 28 on the north, and WCR 26 on the south. Most of the properties surrounding the reservoir are agricultural and rural residential properties commonly used as irrigated crop and pasture land.

A natural drainage basin is located on the northwest side of the reservoir and broad ridges are on the west and east sides of the reservoir. The reservoir drainage basin covers an area of approximately 6.5 square miles (including the reservoir water surface). Spring Gulch lies west of the ridge on the west side of the reservoir. The Spring Gulch valley extends southeastward past the south side of the reservoir.

The reservoir was constructed in 1905 by building an inlet from the Oligarchy Ditch on the southwest side of the reservoir. An outlet was also constructed in an excavation on the south side of the reservoir. The outlet consists of a pipe which was backfilled. The pipe leads to an excavated trench of approximately 16 to 18 feet in depth that connects to Spring Gulch south of the site. The spillway is on the southeast side of the reservoir and is a small concrete training wall structure. Because of the natural depression, the only dam at the site is the backfill embankment over the outlet pipe and a small berm providing freeboard storage on the south side of the reservoir.

2.1 Topographic Mapping and Surveying

The 1986 study utilized topography from USGS topographic quadrangle maps. For the current study, topography with two-foot contour intervals was mapped. Aerial photography for topographic mapping was performed on July 21, 2004 by IntraSearch, Inc. Tetra Tech RMC provided ground control for the aerial flight. The surveying and mapping was performed to the City of Longmont datum. The area mapped included the current reservoir, as well as surrounding areas which would be inundated by the maximum reservoir considered in this investigation. In addition, an aerial orthographic color photo of the entire reservoir area was prepared.

The new, more detailed, topographic data was utilized for evaluating borrow areas; potential reservoir, dam, and spillway designs; and hydrologic modeling. In addition, the mapping and aerial photos were utilized to assist in wetlands mapping at the site.

Horizontal and vertical survey control for this project was established using GPS methods. The horizontal coordinate basis is Colorado State Plane Coordinates (North Zone) NAD 83/92 adjusted to ground and the vertical datum is NGVD 1929 (City of Longmont datum).

The project benchmark used for ground control was the City of Longmont Benchmark No. 139 located at the south end of Union Reservoir on the west side of the boat ramp. It is a brass cap stamped No. 28, which represents the reservoir staff gauge elevation 28. The actual elevation is 4955.87 feet (NGVD 1929) with coordinates: Northing = 1,306,007.023' and Easting = 3,128,093.298.

The northwest corner of Section 6, Township 2 North, Range 68 West (intersection of County Line Road and 9th Avenue) was also surveyed by GPS. The coordinates and elevation are: Northing = 1,307,124.0049, Easting = 3,125,150.8838, Elevation = 4967.639.

The spillway training wall structure was surveyed at 17 locations. The elevation ranges from 4958.21 to 4961.25 feet. The average elevation is 4958.5 or gauge height 30.6.

2.2 Reservoir Capacity Information

A 1986 survey by Rocky Mountain Consultants, Inc. established an elevation-capacity relationship for the existing Union Reservoir up to gage height 28 feet. The resulting elevation capacity table and curve are provided in **Table 2.1** and **Figure 2.1**. As provided in the 1986 RMC report, gage height 28 was considered to be elevation 4957. The work for this project as presented in Section 5.0 is also based on that premise and used the IntraSearch 2004 mapping for lands above elevation 4957.

Upon completion of the alternatives analysis and preparation of the draft feasibility report, it was concluded that reservoir gage height 28 feet is actually at elevation 4955.87 on the City of Longmont datum, a difference of 1.13 feet from the 1986 RMC work. Based on measurement of the existing topography from the IntraSearch mapping, 846 acre-feet of additional storage would be contained between 4955.87 and 4957. Thus, the five-foot, 13-foot, and 19-foot raises described in Section 5 of this report (raising the high water line to 4962, 4970, and 4976) would actually be raises of 6.13 feet, 14.13 feet, and 20.13 feet, respectively, to those elevations with incremental added storage of 846 acre-feet greater than presented in Section 5 (and with subsequently lower costs per acre-foot of new storage). In all the alternatives, the additional storage volumes presented in Section 5 could in fact be obtained at lower dam elevations and at lower costs per acre-foot than presented. Adjusted elevation capacity data for the potential range of reservoir enlargements (including the 846 acre-feet discussed above) are included in **Table 2.1** and **Figure 2.1**.

TABLE 2.1

**CITY OF LONGMONT, UNION RESERVOIR FEASIBILITY STUDY
ELEVATION CAPACITY DATA - EXISTING RESERVOIR AND PROPOSED ENLARGMENTS**

<i>Reservoir Gage Height (feet)</i>	<i>Elevation</i>	<i>Existing Reservoir Capacity (acre-feet)</i>	<i>Baseline Raise Capacity (acre-feet)</i>	<i>Shoreline Raise Capacity (acre-feet)</i>
0	4927.87	124	124	124
1	4928.87	283	283	283
2	4929.87	466	466	466
3	4930.87	674	674	674
4	4931.87	907	907	907
5	4932.87	1,166	1,166	1,166
6	4933.87	1,451	1,451	1,451
7	4934.87	1,764	1,764	1,764
8	4935.87	2,096	2,096	2,096
9	4936.87	2,448	2,448	2,448
10	4937.87	2,815	2,815	2,815
11	4938.87	3,196	3,196	3,196
12	4939.87	3,597	3,597	3,597
13	4940.87	4,018	4,018	4,018
14	4941.87	4,458	4,458	4,458
15	4942.87	4,915	4,915	4,915
16	4943.87	5,393	5,393	5,393
17	4944.87	5,894	5,894	5,894
18	4945.87	6,416	6,416	6,416
19	4946.87	6,961	6,961	6,961
20	4947.87	7,523	7,523	7,523
21	4948.87	8,100	8,100	8,100
22	4949.87	8,698	8,698	8,698
23	4950.87	9,317	9,317	9,317
24	4951.87	9,958	9,958	9,958
25	4952.87	10,621	10,621	10,621
26	4953.87	11,310	11,310	11,310
27	4954.87	12,026	12,026	12,026
28	4955.87	12,768	12,768	12,768
29	4956.87		13,517	13,517
30	4957.87		14,326	14,287
31	4958.87		15,144	15,061
32	4959.87		15,962	15,835
33	4960.87		16,780	16,609
34	4961.87		17,598	17,383
35	4962.87		18,595	18,305
36	4963.87		19,619	19,249
37	4964.87		20,642	20,193
38	4965.87		21,666	21,136
39	4966.87		22,690	22,080
40	4967.87		23,714	23,024
41	4968.87		24,737	23,968
42	4969.87		25,761	24,911
43	4970.87		26,863	25,843
44	4971.87		27,976	26,773
45	4972.87		29,089	27,703
46	4973.87		30,203	28,633
47	4974.87		31,316	29,563
48	4975.87		32,429	30,493

Elevation Basis: Gage Height 28 feet = 4955.87, City of Longmont Datum.

Existing Capacity for Gage Heights 0 to 28, from RMC, 1986 survey with interpolation.

Enlargement Capacities for Gage Heights 29 to 48, from 2004 survey with interpolations.

FIGURE 2.1

**CITY OF LONGMONT, UNION RESERVOIR FEASIBILITY STUDY
ELEVATION CAPACITY CURVES**

