

AMENDMENT # 1 TO AGREEMENT Little Blue NRD and Lower Big Blue NRD Hazard Mitigation Plan JEO PROJECT NO. 181464.00

November 2018

<u>REFERENCE:</u> Standard form of agreement between Owner and Engineer for professional services dated September 18, 2018. Except as noted below, all other terms and conditions remain unchanged.

AMENDMENT: The additional and revised scope of services described below will be performed for this project.

ADDITIONAL TASK DESCRIPTIONS:

Task 6: Dam Inundation Mapping

Task 6.1 Dam Inundation Mapping

Dam Breach Mapping is used to help delineate the area potentially impacted by inundation should a dam fail and can be used to aid in dam hazard classification. JEO will develop breach maps for up to 56 dams within the planning area. These breach maps will be used to inform the dam failure risk assessment.

For the purposes of this project, calculation of peak breach discharges will be developed using the methods outlined in NRCS TR-60 Earth Dams and Reservoirs, using existing geometry obtained from as-built information. Breach propagation will be modeled using two-dimensional analysis in HEC RAS 5.0, using the most recently available LiDAR elevation data. Impacts to downstream structures will be assessed through the use of aerial photography and ArcGIS based analysis, until the breach inundation extents are fully contained within FEMA's regulatory 100-year floodplain.

For each dam assessed as part of this project, a breach map will be developed which includes the following information:

- Breach Inundation Extents
- Estimated Maximum Inundation Depth
- Impacted Structures (If Any)
- Upstream and Downstream Boundary Conditions (Peak Flow, and Normal Depth respectively)
- Regulatory Floodplain Extents from DFIRM database (if available)

SERVICES NOT INCLUDED (If desired, a fee for these services can be negotiated):

Specific items not included in this amendment are:

Field survey or site visits of existing dams

8108-18-11

ASSUMPTIONS

It is assumed that as-built information is available for the dams mentioned above. If as-built information is not available or is inadequate, JEO will update the NRD and discuss how to proceed.

	August 2019* December 2020
	CT FEE*: tion Mapping\$112,000.00 Fee:\$112,000.00
Amendment #1 Fee .	\$150,000.00 \$112,000.00 ract: \$262,000.00
	beyond JEO's control occur, a contract revision may be required to account s and outstanding tasks after January 2021.
Owner will be billed n	ces stated above will be billed hourly, not to exceed the above estimated fee. nonthly for services to date. Invoices are due upon receipt. JEO will provide tyour request according to the applicable general hourly rates.
OWNER:	Little Blue Natural Resources District
	By: Michael D. Onnen, Manager
	Date:
ENGINEER:	JEO Consulting Group, Inc.
	By: Keyin Kruse Senior Project Manager Water Resources

Date: 11-21-2018

LITTLE BLUE NATURAL RESOURCES DISTRICT

BREACH ROUTING SUMMARY FOR WATERSHED DAMS

October 10, 2018

LEGEND: Blue highlighted structures are complete, yellow structures need breach routing.

Year Built

1962 1962

1962

BOWMAN SPRINGS WATERSHED - THAYER COUNTY 3-D Thayer 3-E Thayer 3-C Thayer 1-C Thayer 1-B Thayer 2-A Thayer 1-A Thayer Dam Name & County SE¼ SE¼ 23-1-2 S 1/2 22-1-2 SE% SE% 19-1-1 SE% NE% 34-1-2 SE1/4 SW 1/4 2-1-1 E½ SW½ 2-1-1 NE 1/4 11-1-2 Location Drainage 10926.0 2,400 2,737 2,832 Acres 1,180 480 379 Surface Acres 178.9 38.4 11.4 42.7 18.8 12.5 28.1 27 Ac Ft Flood Storage 3200.5 535.3 433.6 153.7 189 792 770 Flood, Livestock Purpose Date Breach February-06 Complete Route May-07 Conducted By **Breach Route** NRCS NRCS

BUCKLEY CREEK WATERSHED - JEFFERSON COUNTY

Date Breach

1972 1972 1966 1966

				3620.8	184.6	10880.0			
,			Recreation	134	13.4	7,133	14 TO-T-TE	2 3611613011	1//1
7			Watershed, Flood Cont.,	121	10 /	1 105	NIW/ 1 // 10-1-15	3_E lefferson	1071
1			Flood Cont., Irrigation	621.9	28	1,860	S 1/2 18-2-1E	1966 3-C Jefferson	1966
-			Erosion, Livestock, Flood	1,015.50	49	3,085	NW 1/4 22-2-1E	4-A Jefferson	1971
be			Erosion, Livestock, Flood	674.5	34.3	2,080	SE 1/4 30-2-1E	3-A Jefferson	1970
7			Erosion, Livestock, Flood	471.9	27	1,510	N 1/2 33-2-1E	3-D Jefferson	1963
1			Erosion, Livestock, Flood	403	26.9	1,150	SW 1/4 34-2-1E	4-B Jefferson	1962
	Conducted By	Complete	Purpose	Storage	Acres	Drainage	Location	t County	Year Built
	Breach Route	Route		Ac Ft Flood	Surface	Acres		Dam Name &	

32-MILE CREEK WATERSHED - ADAMS COUNTY

	1984		1982	Year Built			BIG SAN		1970	1968	1976	1976	1968	1968	1967	Year Built		
	Fillmore	Bruning Dam,	MARC-Clay	County	Dam Name &		BIG SANDY CREEK WATERSHED		K-Dike-Adams	K-Adams	J-Adams	H-Adams	E-Adams	D-Adams	C-Adams	County	Dam Name &	
	SE 1/4 35-5-2		SE 1/4 20-6-7	Location			TERSHED		26, 27, 28 -T8N-R12W	SE¼ NW¼ 31-8-11	NE¼ SE¼ 29-7-10	SW¼ NE¼ 31-7-10	SE 1/4 32-7-11	SE 1/4 29-7-11	SE 1/4 15-7-11	Location		
42944 N	15,936		27,008	Drainage	Acres			34015.0	4,180	5,907	4,340.00	9,978.00	1,470	6,860	1,280	Drainage	Acres	
1866	258.6		228	Acres	Surface	132		374.9		92.9	83.8	64.9	44.8	65.8	22.7	Acres	Surface	
13596 /	6,706.40		6,890.00	Storage	Ac Ft Flood			9712.6	1,372.00	1,705.60	1,047.10	3,074.40	523.7	1,764.10	225.7	Storage	Ac Ft Flood	
	Flood Cont. Rechard		Flood Cont. Recharge	Purpose					Flood Protection	Flood, Erosion	Water, Flood, Rec.	Water, Flood, Rec.	Flood, Erosion	Flood, Erosion	Flood, Erosion	Purpose		
	April-16		July-11	Complete	Route	Date Breach				July-07						Complete	Route	Date Breach
	JEO Consulting		USACE	Conducted By	Breach Route					NRCS						Conducted By	Breach Route	

LITTLE SANDY CREEK, FILLMORE, JEFFERSON, SALINE, THAYER COUNTIES

			5,482.4	289.7	24,884.0			
		Flood Control	858.21	56.43	3,994	SE 6-5-1E	2012 73 - Saline	2012
1		Flood Control, Recreation	1,341.95	74.83	5,536	SW 12-5-1W	61 - Fillmore	2006
April-16 JEO Consulting	April-16	Flood Control, Recharge	3,141.50	146.36	14,528	SE 2-4-1W	40 - Thayer	2008
		Flood Control, Recharge	140.76	12.09	826	NW 13-4-1W	30 - Thayer	2003
Conducted By	Complete	Purpose	Storage	Acres	Drainage	Location	t County	Year Built
Breach Route	Route		Ac Ft Flood	Surface	Acres	*	Dam Name &	
	Date Breach							