

ITEM # 4



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

November 2018

REFERENCE: 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

2018-12-11

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.

ANTICIPATED SCHEDULE:

Notice to Proceed August 2019*
Final Inundation Maps..... December 2020

*Following award of PDM grant

AMENDED PROJECT FEE*:

Task 6: Dam Inundation Mapping \$112,000.00
Total Amendment Fee: \$112,000.00

Original Contract Fee \$150,000.00
Amendment #1 Fee \$112,000.00
Total Revised Contract:..... \$262,000.00

*If schedule delays beyond JEO's control occur, a contract revision may be required to account for additional services and outstanding tasks after January 2021.

The Additional Services stated above will be billed hourly, not to exceed the above estimated fee. Owner will be billed monthly for services to date. Invoices are due upon receipt. JEO will provide additional services at your 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: Kevin Kruse, Senior Project Manager, Water Resources

Date: 11.21.2019

32-MILE CREEK WATERSHED - ADAMS COUNTY

Year Built	Dam Name & Location		Acres Drainage	Surface Acres	Ac Ft Flood Storage	Purpose	Date Breach	
	County	Location					Route Complete	Breach Route Conducted By
1967	C-Adams	SE 1/4 15-7-11	1,280	22.7	225.7	Flood, Erosion		
1968	D-Adams	SE 1/4 29-7-11	6,860	65.8	1,764.10	Flood, Erosion		
1968	E-Adams	SE 1/4 32-7-11	1,470	44.8	523.7	Flood, Erosion		
1976	H-Adams	SW¼ NE¼ 31-7-10	9,978.00	64.9	3,074.40	Water, Flood, Rec.		
1976	J-Adams	NE¼ SE¼ 29-7-10	4,340.00	83.8	1,047.10	Water, Flood, Rec.		
1968	K-Adams	SE¼ NW¼ 31-8-11	5,907	92.9	1,705.60	Flood, Erosion	July-07	NRCS
1970	K-Dike-Adams	26, 27, 28 -T8N-R12W	<u>4,180</u>		<u>1,372.00</u>	Flood Protection		
			34015.0	374.9	9712.6			

BIG SANDY CREEK WATERSHED

Year Built	Dam Name & Location		Acres Drainage	Surface Acres	Ac Ft Flood Storage	Purpose	Date Breach	
	County	Location					Route Complete	Breach Route Conducted By
1982	MARC-Clay	SE 1/4 20-6-7	27,008	228	6,890.00	Flood Cont. Recharge	July-11	USACE
1984	Bruning Dam, Fillmore	SE 1/4 35-5-2	15,936	258.6	6,706.40	Flood Cont. Recharge	April-16	JEO Consulting
			42944.0	486.6	13596.4			

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

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

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LITTLE BLUE NATURAL RESOURCES DISTRICT BREACH ROUTING SUMMARY FOR WATERSHED DAMS

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

October 10, 2018

Year Built	Dam Name & County	Location	Acres Drainage	Surface Acres	Ac Ft Flood Storage	Purpose	Date Breach Route Complete	Breach Route Conducted By
BOWMAN SPRINGS WATERSHED - THAYER COUNTY								
1962	1-A Thayer	SE¼ NE¼ 34-1-2	1,180	28.1	433.6	Flood, Livestock		
1962	1-B Thayer	S 1/2 22-1-2	2,832	42.7	535.3	Flood, Livestock	February-06	NRCS
1962	1-C Thayer	SE¼ SE¼ 23-1-2	2,737	38.4	792	Flood, Livestock	May-07	NRCS
1966	2-A Thayer	SE¼ SE¼ 19-1-1	2,400	27	770	Flood, Livestock		
1966	3-C Thayer	NE 1/4 11-1-2	379	11.4	153.7	Flood, Livestock		
1972	3-D Thayer	E½ SW¼ 2-1-1	480	12.5	189	Flood, Livestock		
1972	3-E Thayer	SE1/4 SW 1/4 2-1-1	<u>918</u>	<u>18.8</u>	<u>326.9</u>	Flood, Livestock		
			10926.0	178.9	3200.5			

Proposed

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BUCKLEY CREEK WATERSHED - JEFFERSON COUNTY

Year Built	Dam Name & County	Location	Acres Drainage	Surface Acres	Ac Ft Flood Storage	Purpose	Date Breach Route Complete	Breach Route Conducted By
1962	4-B Jefferson	SW 1/4 34-2-1E	1,150	26.9	403	Erosion, Livestock, Flood		
1963	3-D Jefferson	N 1/2 33-2-1E	1,510	27	471.9	Erosion, Livestock, Flood		
1970	3-A Jefferson	SE 1/4 30-2-1E	2,080	34.3	674.5	Erosion, Livestock, Flood		
1971	4-A Jefferson	NW 1/4 22-2-1E	3,085	49	1,015.50	Erosion, Livestock, Flood		
1966	3-C Jefferson	S 1/2 18-2-1E	1,860	28	621.9	Flood Cont., Irrigation		
1971	3-F Jefferson	NW 1/4 10-1-1E	<u>1,195</u>	<u>19.4</u>	<u>434</u>	Watershed, Flood Cont., Recreation		
			10880.0	184.6	3620.8			

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