Bone and Long Pine Creeks Watershed Plan-EA

NeSCAP Calculation Spreadsheet

	Baseline (Pre project)	D1	D1-1	D2	D3	D4	D4-1	D4-2	D5	D6	D7	D8	D9	D10
1	Hydraulic Conveyance and Sediment Dynamics	0.75	0.75	0.10	0.25	0.10	0.10	0.10	0.10	0.50	0.50	0.50	0.10	0.25
2	In-stream Habitat/Available Cover	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.25	0.75	0.75	0.75	0.50	0.50
3	Floodplain Interaction-Connectivity	0.75	0.75	0.10	0.25	0.25	0.25	0.25	0.10	0.25	0.25	0.25	0.25	0.25
4a	Riparian Vegetation Composition	0.10	0.10	0.10	0.50	0.75	0.75	0.75	0.50	1.00	0.50	0.50	0.50	0.50
4b	Riparian Vegetation Composition	0.10	0.10	1.00	0.10	0.75	0.75	0.75	1.00	0.50	0.10	0.10	0.50	0.25
5	Buffer continuity & Width	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00
6	Land use adjacent to Active Flood plain zone	1.00	1.00	0.75	0.75	0.75	0.75	0.75	0.75	0.50	0.50	0.50	0.50	0.50
	Stream Condition Index	1	1	1	0	1	1	1	1	1	1	1	0	0
	Left descending bank -Length (ft)	622	449	408	1,429	510	370	529	800	693	1,315	1,023	1,451	524
	Right descending bank -Length (ft)	622	449	408	1,429	510	370	529	800	693	1,315	1,023	1,451	524
	width (ft)	15	20	3	18	7	5	5	18	12	55	30	90	105
	Area	9,330	8,980	1,225	25,717	3,571	1,850	2,645	14,397	8,319	72,346	30,679	130,590	55,007
	Stream condition Index * area	5,598	5,388	621	12,307	2,091	1,083	1,549	7,610	5,348	37,207	15,778	57,833	25,539

	Baseline (Pre project)	D11	D12	D13	D14	D15	D16	D17	D17-1	D18	D19	D19-1	D19-2	D20
1	Hydraulic Conveyance and Sediment Dynamics	0.50	0.50	0.50	0.50	0.25	0.25	0.25	0.25	0.50	0.10	0.10	0.10	0.10
2	In-stream Habitat/Available Cover	0.50	0.50	0.50	0.50	0.25	0.25	0.50	0.50	0.50	0.25	0.25	0.25	0.25
3	Floodplain Interaction-Connectivity	0.25	0.25	0.25	0.25	0.25	0.25	0.50	0.50	0.25	0.10	0.10	0.10	0.25
4a	Riparian Vegetation Composition	0.10	0.50	0.25	0.25	0.50	0.50	1.00	1.00	0.50	0.10	0.10	0.10	0.25
4b	Riparian Vegetation Composition	0.10	0.50	0.50	0.50	0.50	1.00	0.50	0.50	0.10	0.10	0.10	0.10	0.50
5	Buffer continuity & Width	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	Land use adjacent to Active Flood plain zone	1.00	1.00	0.50	0.75	0.50	1.00	1.00	1.00	0.50	0.50	0.50	0.50	0.50
	Stream Condition Index	0.49	0.61	0.50	0.54	0.46	0.61	0.68	0.68	0.48	0.31	0.31	0.31	0.41
	Left descending bank -Length (ft)	1,263	4,253	2,882	930	4,017	4,129	2,105	1,067	2,098	443	1,147	721	761
	Right descending bank -Length (ft)	1,263	4,253	2,882	930	4,017	4,129	2,105	1,067	2,098	443	1,147	721	761
	width (ft)	14	14	14	22	40	40	24	24	15	6	6	6	11
	Area	17,677	59,542	40,345	20,463	160,677	165,146	50,513	25,613	31,476	2,659	6,882	4,326	8,368
	Stream condition Index * area	8,712	36,151	20,172	10,962	74,600	100,267	34,276	17,380	15,064	817	2,114	1,329	3,407

	Baseline (Pre project)	D20-1	D20-2	D21	D22	D23	D24	D25	D26	D27	D29	D30	D31	D32
1	Hydraulic Conveyance and Sediment Dynamics	0.10	0.10	0.10	0.50	0.25	0.25	0.10	0.10	0.10	0.25	0.25	0.75	0.25
2	In-stream Habitat/Available Cover	0.25	0.25	0.25	0.50	0.50	0.25	0.25	0.25	0.25	0.50	0.50	0.75	0.50
3	Floodplain Interaction-Connectivity	0.25	0.25	0.25	0.25	0.50	0.25	0.10	0.25	0.25	0.50	0.25	0.25	0.25
4a	Riparian Vegetation Composition	0.25	0.25	0.25	0.10	0.10	0.10	0.25	0.10	0.10	0.25	0.10	0.25	0.25
4b	Riparian Vegetation Composition	0.50	0.50	0.50	0.25	0.25	0.50	0.50	0.50	0.50	1.00	1.00	0.25	0.25
5	Buffer continuity & Width	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00
6	Land use adjacent to Active Flood plain zone	0.50	0.50	0.50	0.75	0.75	0.50	0.75	0.75	0.75	0.50	0.75	0.50	0.50
	Stream Condition Index	0.41	0.41	0.41	0.48	0.48	0.41	0.42	0.42	0.42	0.57	0.55	0.50	0.43
	Left descending bank -Length (ft)	392	405	788	1,235	1,507	1,404	1,663	2,715	2,314	1,130	1,149	976	1,046
	Right descending bank -Length (ft)	392	405	788	1,235	1,507	1,404	1,663	2,715	2,314	1,130	1,149	976	1,046
	width (ft)	11	11	55	25	25	35	20	30	30	25	22	18	18
	Area	4,308	4,459	43,357	30,875	37,665	49,124	33,257	81,451	69,410	28,260	25,282	17,567	18,830
	Stream condition Index * area	1,754	1,815	17,652	14,776	18,025	20,000	14,015	34,326	29,251	16,149	13,905	8,784	8,070

	Baseline (Pre project)	D33	D34	D35
1	Hydraulic Conveyance and Sediment Dynamics	0.50	0.50	0.10
2	In-stream Habitat/Available Cover	0.50	0.50	0.50
3	Floodplain Interaction-Connectivity	0.25	0.10	0.25
4a	Riparian Vegetation Composition	0.50	0.25	0.10
4b	Riparian Vegetation Composition	1.00	0.50	0.50
5	Buffer continuity & Width	1.00	1.00	1.00
6	Land use adjacent to Active Flood plain zone	0.50	0.50	0.50
	Stream Condition Index	0.61	0.48	0.42
	Left descending bank -Length (ft)	1,328	532	345
	Right descending bank -Length (ft)	1,328	532	345
	width (ft)	12	20	20
	Area	15,932	10,640	6,900
	Stream condition Index * area	9,673	5,092	2,908

Bone and Long Pine Creeks Watershed Plan-EA

Stream Visual Assessment Protocol Version 2 (SVAPV2) Reach Scores

Element	D21	D25	D26	D27	D10	D24	D20	D19	D15	D35	D3	D9	D30	D29	D16	D11	D18	D23	D14
1. Channel Condition	0	1	1	1	3	2	2	3	2	2	4	2	1	2	2	5	5	3	3
3. Bank Condition	0	0	1	1	3	1	1	3	2	2	4	1	1	2	2	5	4	3	2
4. Riparian Area Quantity	0	2	1	4	0	0	1	1	1	3	1	2	4	4	1	1	3	2	1
5. Riparian Area Quality	1	1	1	1	4	2	2	1	2	0	0	2	2	2	7	0	1	1	4
6. Canopy Cover	1	1	1	1	1	1	3	4	1	0	1	1	0	0	1	1	1	1	4
7. Water Appearance	6	4	4	4	5	7	6	8	8	7	8	7	7	6	8	8	7	7	7
8. Nutrient Enrichment	7	7	7	7	7	8	7	8	8	9	8	7	8	9	8	7	9	9	7
9. Manure or Human Waste	2	2	2	2	0	2	2	2	3	2	2	0	2	2	3	0	2	2	3
10. Pools	1	1	1	1	1	1	1	4	2	2	1	1	1	3	2	5	4	4	3
11. Barriers to Movement	4	10	10	10	10	10	10	0	10	10	10	10	10	10	10	10	10	10	10
12. Fish Habitat Complexity	1	1	1	1	3	1	3	4	2	3	1	6	2	3	2	4	2	2	4
15. Riffle Embeddedness	1	3	4	4	1	4	3	N/A	3	4	6	6	7	N/A	3	6	4	7	N/A
Average Score	2.0	2.8	2.8	3.1	3.2	3.3	3.4	3.5	3.7	3.7	3.8	3.8	3.8	3.9	4.1	4.3	4.3	4.3	4.4
Condition Rating	**Severely Degraded**			**Poor**															

Element	D5	D12	D22	D32	D13	D17	D34	D1	D2	D31	D33	D4	D6	D7	D8
1. Channel Condition	1	5	4	3	4	2	4	8	5	5	5	3	3	5	5
3. Bank Condition	4	5	4	2	4	2	8	4	2	5	5	3	4	5	7
4. Riparian Area Quantity	8	1	2	1	1	6	1	6	7	1	4	7	4	2	1
5. Riparian Area Quality	7	1	2	4	4	4	4	1	6	4	5	5	3	2	3
6. Canopy Cover	1	1	1	6	4	0	4	1	2	6	4	1	7	1	4
7. Water Appearance	8	8	7	8	7	9	7	8	8	8	7	8	9	7	6
8. Nutrient Enrichment	8	7	9	9	7	8	9	9	9	9	9	8	9	9	9
9. Manure or Human Waste	2	1	2	2	3	2	2	2	2	2	2	3	2	9	9
10. Pools	0	5	4	2	3	4	2	2	2	2	2	5	4	8	8
11. Barriers to Movement	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
12. Fish Habitat Complexity	0	4	2	1	4	4	1	2	1	1	3	3	4	5	5
15. Riffle Embeddedness	N/A	6	7	6	N/A	5	4	N/A	N/A	6	3	6	6	7	7
Average Score	4.5	4.5	4.5	4.5	4.6	4.7	4.7	4.8	4.9	4.9	4.9	5.2	5.4	5.8	6.2
Condition Rating	**Poor**											**Fair**			

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	**ARA 1 - Structures G2-41-1, 2, 3**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization with habitat considerations is needed to stop existing degradation and provide improved aquatic habitat.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	Yes
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	Yes
	Rock and log riffle (410)	Yes
	Grouted Grade Control (410)	Yes
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Rock Chutes (410)	Yes
	Rock Ramps (410)	No
	Sills (410)	No. Could have adverse impacts, cause flooding and land disturbance due to aggradation.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Free Standing Rock Arch Rapids (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Rock and log riffle (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Grouted Grade Control (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Rock Chutes (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Cross Vanes (two) (410)	$18,600
	W-Weir (410)	$21,700

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	**ARA 1 - Structures G2-42**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization and reclamation of lost grade is needed to reestablish lost streambed grade due to degradation and protect the headcuts from progressing further upstream.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Sediment Basin (350)	No
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sills (410)	Yes
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Cross Vane (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	W-Weir (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Sills - 2 upstream (410)	Yes
	Sills - 1 downstream (410)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade reclamation**
	Sills - 2 upstream (410)	$89,200
	Sills - 1 downstream (410)	$33,600

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	**ARA 3 - Structure G2-43**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent impending headcut from moving upstream, which will protect AID crossing and preserve CEM of upstream sites.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	Yes
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	Yes
	Rock and log riffle (410)	Yes
	Grouted Grade Control (410)	Yes
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Rock Chutes (410)	Yes
	Rock Ramps (410)	Yes
	Sills (410)	No. Could have adverse impacts, cause flooding and land disturbance due to aggradation.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Free Standing Rock Arch Rapids (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Cross Vane (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	W-Weir (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Step pool system (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Rock and log riffle (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Grouted Grade Control (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Rock Ramps (410) - single	Yes
	Rock Ramps (410) - multiple	Yes
	Rock Chutes (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Rock Ramps (410) - single	$63,000
	Rock Ramps (410) - multiple	$83,200

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	**ARA 3 - Structure G2-44**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent lateral draw/gully from progressing upstream and damaging existing infrastructure (road).	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	Yes
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	Yes
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sills (410)	No
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Zeedyk Structures (584)	Yes
	Small pond or check dam (378 or 410)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained**
	Zeedyk Structures (584)	$4,200
	Small pond or check dam (378 or 410)	$18,800

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	**ARA 5 - Structure SC2-1**	
Step 1	**Specify and identify nature and scope of resource problem:** A stream crossing is needed to allow vehicles to cross the stream while allwing for fish passage, to prevent the migration of an existing 2.5-ft headcut, to help maintain floodplain connectivity, and to provide aquatic habitat improvements. A stream crossing is needed to allow the landowner to cross the stream due to the recent stream incision that makes it no longer feasibile to cross.	
Step 2a	**List of potential alternatives for stream crossing**	
	Alternative	**Is alternative technically feasible?**
	General Stream Crossings (578)	No. Would not address progressing headcut.
	Flexamat® or approved alternative Crossings (578)	Yes
	Small pond or check dam (378 or 410)	Yes
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Flexamat® or approved alternative Crossings (578)	Yes
	Small pond or check dam (378 or 410)	No. Would require modified embankment/spillway for fish passage, large footprint, and wide embankment to accommodate farm equipment, yielding exorbitant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Flexamat® or approved alternative Crossings (578)	$33,700

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	**ARA 6 - Structure G2-2-1**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent lateral draw/gully from progressing upstream and damaging existing infrastructure (road) and upstream agricultural land.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	Yes
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	Yes
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sills (410)	No
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Zeedyk Structures (584)	Yes
	Small pond or check dam (378 or 410)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained**
	Zeedyk Structures (584)	$2,000
	Small pond or check dam (378 or 410)	$12,600

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	**ARA 6 - Structure G2-2-2**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent degradation with additional benefits of trapping sediment and improving fishing opportunities. Aquatic organism passage is needed to accomodate fish passage.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	Yes
	Rock Chutes (410)	No. Would not provide permanent pool.
	Rock Ramps (410)	No. Would not provide permanent pool.
	Sills (410)	Yes
	Sediment Basin (350)	No. Drainage area is too large and stream is located on perennial stream.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Sill with rock riprap protection (410)	No. Cost of needed rock riprap results in exorbitant costs.
	Sill with TRM protection (410)	Yes
	Small pond or check dam (378 or 410)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/acre-ft of storage**
	Sill with TRM protection (410)	$11,690
	Small pond or check dam (378 or 410)	$17,950

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	ARA 7 - Structures G2-3-1, G2-3-2, G2-3-3, G2-3-4, G2-3-5, G2-3-6	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization with habitat considerations is needed to stop existing degradation and provide improved aquatic habitat.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	Yes
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	Yes
	Rock and log riffle (410)	Yes
	Grouted Grade Control (410)	Yes
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sills (410)	No. Could have adverse impacts, cause flooding and land disturbance due to aggradation.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Free Standing Rock Arch Rapids (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Rock and log riffle (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
	Grouted Grade Control (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Combination of Cross Vane (410) and W-Weir (410) to provide most aquatic habitat benefits.	$24,100

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	ARA 7 - Structure P2-4	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent lateral draw/gully from progressing upstream and degrading upstream pastureland.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	Yes
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sediment Basin (350)	No. Drainage area too large for NRCS criteria
	Sills (410)	Yes
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Small pond or check dam (378 or 410)	Yes
	Sills (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Small pond or check dam (378 or 410)	$11,900

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	ARA 7 - Structure G2-5	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent lateral draw/gully from progressing upstream and degrading upstream pastureland.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	Yes
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sediment Basin (350)	Yes
	Sills (410)	Yes
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Small pond or check dam (378 or 410)	Yes
	Sediment Basin (350)	Yes
	Sills (410)	No. Would require extensive excavation and large footprint, yielding exorbitant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Small pond or check dam (378 or 410)	$11,900
	Sediment Basin (350)	$2,500

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	ARA 7 - Structures BS2-6-1, BS2-6-2, BS2-6-3	
Step 1	**Specify and identify nature and scope of resource problem:** Streambank protection with habitat considerations is needed to protect streambanks from erosion and provide improved aquatic habitat.	
Step 2a	**List of potential alternatives for streambank protection**	
	Alternative	**Is alternative technically feasible?**
	Bendway Weir (580)	Yes
	Engineered Log Jams (580)	No
	Longitudinal Peaked Stone Toe (LPST) (580)	No
	Stream Barb (580)	No
	J-Hook/Straight Vanes/Boulder Vanes (580)	Yes
	Vortex Structures, Spur Logs, Hardpoint/Wing Deflectors (580)	No
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Bendway Weir (580)	Yes
	J-Hook/Straight Vanes/Boulder Vanes (580)	No. Would require large volumes of rock riprap, yielding exorbitant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of stream**
	Bendway Weir (580)	$100

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	ARA 7 - Structure G2-7	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent impending headcut from moving upstream, to preserve CEM of upstream sites, and to provide crossing for small vehicles (needed for fire control and access)	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	Yes
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Stream Crossings (578)	No
	Flexamat® or approved alternative Crossings (578)	Yes
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sediment Basin (350)	No
	Sills (410)	No
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Grouted Grade Control (410) - rock ramp with grout for crossing	Yes
	Flexamat® or approved alternative Crossings (578)	No. Flows and geometry would require extensive grading and exhorbitant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Rock Ramps with grout for crossing (410)	$44,800

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	**ARA 8 - Structures G2-8-1, G2-8-2**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent impending headcut and steep grades from moving upstream, which will preserve CEM of upstream sites and prevent onset of severe channel degradation and widening.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Rock Chutes (410)	No
	Rock Ramps (410)	Yes
	Sills (410)	No. Could have adverse impacts, cause flooding and land disturbance due to aggradation.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Rock Ramps (410) - single	No. Could cause adverse impacts to aquatic habitat, would not accomplish all objectives.
	Rock Ramps (410) - two	Yes
	Rock Ramps (410) - three	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Rock Ramps (410) - two	$52,100
	Rock Ramps (410) - three	$58,600

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	**ARA 9 - Structures G2-9-1, G2-9-2, G2-9-3**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization and reclamation of lost grade is needed to reestablish lost streambed due to extreme degradation and protect the headcuts from progressing further upstream.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Sediment Basin (350)	No
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sills (410)	Yes
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Sills (410)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade reclamation**
	Sills (410)	$14,533

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	ARA 10 - Structure BS2-30	
Step 1	**Specify and identify nature and scope of resource problem:** Streambank stabilization is needed to protect steep streambank from degrading and widening, to protect the adjacent fish and wildlife habitat area on the channel bench, and to provide additional habitat.	
Step 2a	**List of potential alternatives for streambank protection and channel alignment**	
	Alternative	**Is alternative technically feasible?**
	LUNKERS (395, 580)	No
	Bank Shaping (580)	Yes
	Clearing and Snagging (326)	No
	Critical Area Planting (342)	No
	Cedar Revetments (395, 580)	Yes
	Root Wads (395, 580)	No
	Streambank Protection (580)	No. Would not protect the habitat on the channel bench.
	Bendway Weir (580)	No. Would impact existing habitat.
	Engineered Log Jams (580)	No
	Longitudinal Peaked Stone Toe (LPST) (580)	No
	Stream Barb (580)	No. Would impact existing habitat.
	J-Hook/Straight Vanes/Boulder Vanes (580)	No. Would impact existing habitat.
	Vortex Structures, Spur Logs, Hardpoint/Wing Deflectors (580)	No
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Bank Shaping (580)	Yes
	Cedar Revetments (395, 580)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of streambank**
	Bank Shaping (580)	$130
	Cedar Revetments (395, 580)	$80

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	ARA 10 - Structure BS2-31	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent impending headcut from moving upstream, which will preserve CEM of upstream sites.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	Yes
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	Yes
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Rock Chutes (410)	Yes
	Rock Ramps (410)	Yes
	Sills (410)	No. Could have adverse impacts, cause flooding and land disturbance due to aggradation.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Free Standing Rock Arch Rapids (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Cross Vane (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	W-Weir (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Step pool system (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Rock and log riffle (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Grouted Grade Control (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Rock Ramps (410)	Yes
	Rock Chutes (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Rock Ramp (410) - single	$46,100
	Rock Ramp (410) - multiple	$61,700

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	**ARA 11 - Structure G2-32**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to protect an existing vertical drop in the streambed	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	Yes
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	Yes
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	Yes
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Rock Chutes (410)	Yes
	Rock Ramps (410)	No.
	Sills (410)	No. Proposed sill downstream so additional sill could cause excess flooding and land disturbance due to aggradation.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Free Standing Rock Arch Rapids (410)	No. Velocities would require exhorbinant riprap/boulder costs.
	Cross Vane (410)	No. Velocities would require exhorbinant riprap/boulder costs.
	W-Weir (410)	No. Velocities would require exhorbinant riprap/boulder costs.
	Step pool system (410)	No. Velocities would require exhorbinant riprap/boulder costs.
	Grouted Grade Control (410)	Yes
	Rock Chutes (410)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Grouted Grade Control (410)	$76,900
	Rock Chute (410)	$61,500

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	**ARA 11 - Structures G2-33**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization and reclamation of lost grade is needed to reestablish lost streambed grade due to degradation and protect the headcuts from progressing further upstream.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Sediment Basin (350)	No
	Rock Chutes (410)	No
	Rock Ramps (410)	No
	Sills (410)	Yes
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Sill (410)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade reclamation**
	Sill (410)	$49,975

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	ARA 11 - Structure CP2-34	
Step 1	**Specify and identify nature and scope of resource problem:** Debris removal and planting of a floodplain bench is needed to restore approximately 5.3-acres of floodplain.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Oxbow (410, 582)	No
	Obstruction Removal (500)	No
	Aquatic Organism Passage (396)	No
	Headwaters Excavation (646, 659)	No
	Gravel Enhancement (395)	No
	Pool Construction (395)	No
	Boulder Clusters (395)	No
	LUNKERS (395, 580)	No
	Bank Shaping (580)	No
	Clearing and Snagging (326)	No
	Critical Area Planting (342)	No
	Cedar Revetments (395, 580)	No
	Root Wads (395, 580)	No
	Streambank Protection (580)	No
	Obstruction Removal (500) and Critical Area Planting (342)	Yes
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Critical Area Planting (342) and Obstruction Removal (500)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/acre**
	Critical Area Planting (342) and Obstruction Removal (500)	$17,700

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	**ARA 12- Structure G2-70**	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent existing headcut from moving upstream and causing excessive degradation.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	No
	Cross Vane (410)	No
	W-Weir (410)	No
	Step pool system (410)	No
	Rock and log riffle (410)	No
	Grouted Grade Control (410)	No
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Rock Chutes (410)	No
	Rock Ramps (410)	Yes
	Sills (410)	No. Could have adverse impacts, cause flooding and land disturbance due to aggradation.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Rock Ramps (410)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Rock Ramps (410)	$121,600

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	**ARA 12 - Structure BS2-71**	
Step 1	**Specify and identify nature and scope of resource problem:** Streambank protection is needed to protect the bankline from further erosion and loss of land to protect the nearby home and infrastructure.	
Step 2a	**List of potential alternatives for streambank protection**	
	Alternative	**Is alternative technically feasible?**
	LUNKERS (395, 580)	No
	Bank Shaping (580)	No
	Clearing and Snagging (326)	No
	Critical Area Planting (342)	No
	Cedar Revetments (395, 580)	No
	Root Wads (395, 580)	No
	Streambank Protection (580)	Yes
	Bendway Weir (580)	Yes
	Engineered Log Jams (580)	No
	Longitudinal Peaked Stone Toe (LPST) (580)	No
	Stream Barb (580)	No
	J-Hook/Straight Vanes/Boulder Vanes (580)	Yes
	Vortex Structures, Spur Logs, Hardpoint/Wing Deflectors (580)	No
	J-Hook and Bendway Weir (580)	Yes
	Sill (580)	Yes
	Home and Infrastructure Relocation	No. Not socially acceptable.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	J-Hook and Bendway Weir Combination	Yes
	Streambank Protection (580)	Yes
	Sill	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of streambank**
	J-Hook and Bendway Weir	$1,300
	Streambank Protection (580)	$1,400
	Sill	$720

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	ARA 12 - Structure BS2-72	
Step 1	**Specify and identify nature and scope of resource problem:** Streambank protection is needed to protect the bridge from damage due to potential stream migration and streambank erosion.	
Step 2a	**List of potential alternatives for streambank protection**	
	Alternative	**Is alternative technically feasible?**
	LUNKERS (395, 580)	No
	Bank Shaping (580)	No
	Clearing and Snagging (326)	No
	Critical Area Planting (342)	No
	Cedar Revetments (395, 580)	No
	Root Wads (395, 580)	No
	Streambank Protection (580)	Yes
	Bendway Weir (580)	Yes
	Engineered Log Jams (580)	No
	Longitudinal Peaked Stone Toe (LPST) (580)	Yes
	Stream Barb (580)	No
	J-Hook/Straight Vanes/Boulder Vanes (580)	Yes
	Vortex Structures, Spur Logs, Hardpoint/Wing Deflectors (580)	Yes
	Buried Flank Protection (580)	Yes
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Streambank Protection (580)	Yes
	Bendway Weir (580)	No. Would require extensive quantities of riprap, leading to exorbitant costs.
	Longitudinal Peaked Stone Toe (LPST) (580)	No. Would require extensive quantities of riprap, leading to exorbitant costs.
	J-Hook/Straight Vanes/Boulder Vanes (580)	No. Would require extensive quantities of riprap, leading to exorbitant costs.
	Vortex Structures, Spur Logs, Hardpoint/Wing Deflectors (580)	No. Would require extensive quantities of riprap, leading to exorbitant costs.
	Buried Flank Protection (580)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of streambank**
	Streambank Protection (580)	$2,000
	Buried Flank Protection (580)	$670

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Utilizing cost effectiveness or least cost analysis (611.0301(f))

Stage 1 - Cost effective analysis of alternatives

Site:	ARA 13 - Structure BS2-45	
Step 1	**Specify and identify nature and scope of resource problem:** Streambank stabilization is needed to protect the streambank from erosion and threatening the adjacent home.	
Step 2a	**List of potential alternatives for streambank stabilization**	
	Alternative	**Is alternative technically feasible?**
	LUNKERS (395, 580)	No
	Bank Shaping (580)	No
	Clearing and Snagging (326)	No
	Critical Area Planting (342)	No
	Cedar Revetments (395, 580)	No
	Root Wads (395, 580)	No
	Streambank Protection (580)	Yes
	Bendway Weir (580)	No
	Engineered Log Jams (580)	No
	Longitudinal Peaked Stone Toe (LPST) (580)	No
	Stream Barb (580)	No
	J-Hook/Straight Vanes/Boulder Vanes (580)	No
	Stone Toe Protection (580)	Yes
	Vortex Structures, Spur Logs, Hardpoint/Wing Deflectors (580)	No
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Streambank Protection (580)	Yes
	Stone Toe Protection (580)	Yes
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of streambank**
	Streambank Protection (580)	$200
	Stone Toe Protection (580)	$140

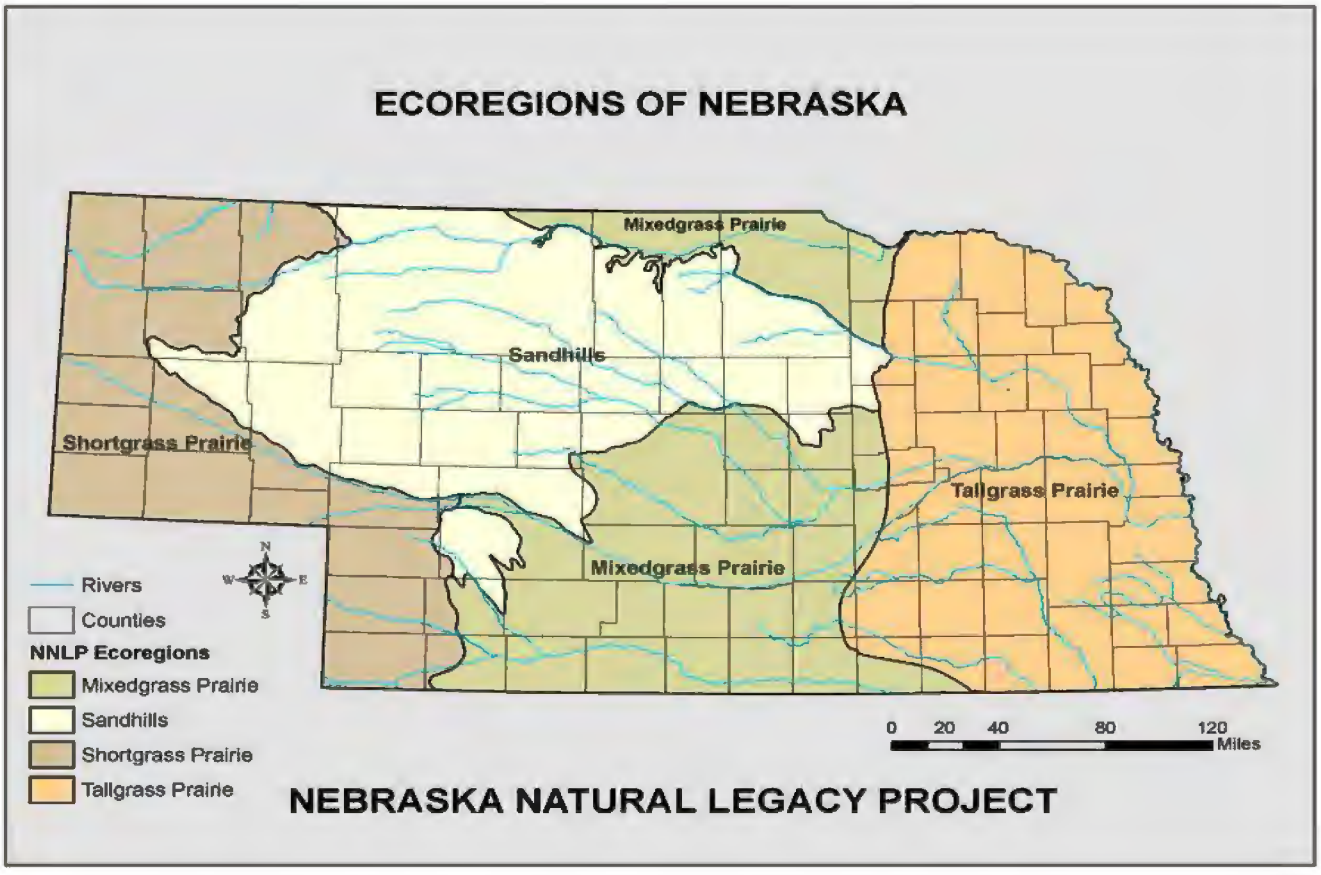
[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Site:	ARA 13- Structure G2-46	
Step 1	**Specify and identify nature and scope of resource problem:** Grade stabilization is needed to prevent impending headcut from moving upstream, which will preserve the CEM of upstream sites and prevent excessive stream degradation and widening.	
Step 2a	**List of potential alternatives for grade control**	
	Alternative	**Is alternative technically feasible?**
	Free Standing Rock Arch Rapids (410)	Yes
	Cross Vane (410)	Yes
	W-Weir (410)	Yes
	Step pool system (410)	Yes
	Rock and log riffle (410)	Yes
	Grouted Grade Control (410)	Yes
	Beaver Dam Analogues (395, 410)	No
	Zeedyk Structures (584)	No
	Channel Reconstruction, Priority 2 Stream Restoration (580)	No
	Small pond or check dam (378 or 410)	No
	Rock Chutes (410)	Yes
	Rock Ramps (410)	Yes
	Sills (410)	No. Could have adverse impacts, cause flooding and land disturbance due to aggradation.
Step 2b	**Alternatives that are technically feasible to reach goal**	
	Alternative	**Does alternative satisfy NREH 611.0301(f)?[1]**
	Free Standing Rock Arch Rapids (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Cross Vane (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	W-Weir (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Step pool system (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Rock and log riffle (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Grouted Grade Control (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
	Rock Ramps (410)	Yes
	Rock Chutes (410)	No. Would require extensive excavation and large footprint, yielding exhorbinant costs.
Step 3	**Common base for cost effectiveness analysis**	
	Alternative	**Cost/ft of grade maintained upstream**
	Rock Ramp (410) - single	$94,700
	Rock Ramp (410) - multiple	$113,600

[1] *Any conservation practice selected for installation should satisfy the requirement that it not be more costly than any reasonable alternative means of accomplishing the same specified objective.*

Invasive Plants Watch List: 2023

The purpose of the weed watch list is to collect data on the distribution of invasive plants found in various Nebraska counties. Counties were divided up into 'ecoregions' based on the Nebraska Game & Parks Commission's Legacy Plan (map of regions below). The plants in the watch list have been identified based on their invasiveness in surrounding states and their increasing range in Nebraska. Data collected on watch list plant species distribution has been used to support the listing or delisting of noxious weeds. Plant species in the weed watch list are categorized based on early detection and rapid response potential. These Categories are: **Category 1 plants** - species not known to exist in each ecoregion, but pose a significant risk if introduced; **Category 2 plants** – species are top priority for eradication of new and existing populations; and **Category 3 plants**-species established and prevention of spread to new areas is a priority. An asterisk (*) denotes a plant that is listed as a county noxious weed in one or more counties in an ecoregion. lists of invasive plants and noxious weeds can be accessed at the Nebraska Invasive Species Program website: https://neinvasives.com/plants.



Sandhills Ecoregion: Weed Watch List

Arthur, Blaine, Brown, Cherry, Garden, Garfield, Grant, Holt, Hooker, Lincoln, Logan, Loup, McPherson, Rock, Sheridan, Thomas, and Wheeler counties

Terrestrial Plant Species	
Scientific Name	**Common Name**
Category 1: Future Invasive Species	
Arundo donax L.	Giant Reed
Butomus umbellatus	Flowering Rush
Celastrus orbiculatus	Oriental Bittersweet
Category 2: Priority Species	
Alopecurus arundinaceus	Creeping Foxtail
Artemisia absinthium L.	Absinth Wormwood
Bothriochloa bladhii and ischaemum	Caucasian and Yellow Bluestem
Centaurea moncktonii	Black Knapweed
*Cynoglossum officinale**	Houndstongue
*Galium verum**	Yellow Bedstraw
Iris pseudacorus	Yellow Flag Iris
Potentilla recta L.	Sulphur Cinquefoil
Tanacetum vulgare L.	Common Tansy
Floating Aquatic Plant Species	
Category 1: Future Invasive Species	
Egeria densa	Brazilian Elodea
Eichhornia crassipes	Water Hyacinth
Hydrilla verticillata	Hydrilla
Ludwigia peploides	Creeping Water Primrose, Floating Primrose-Willow
Myriophyllum aquaticum	Parrot's Feather
Nitellopsis obtusa	Starry Stonewort
Nymphiodes peltata	Yellow Floating Heart
Pistia stratiotes	Water Lettuce
Salvinia molesta	Giant Salvinia
Category 2: Priority Invasive Species	
Najas minor	Brittle Naiad
Myriophyllum spicatum	Eurasian Watermilfoil
Rhamnus cathartica	Common Buckthorn, European Buckthorn
Category 3: Established Invasive Species	
Potamogeton crispus	Curly-Leaf Pondweed

**PROGRAMMATIC AGREEMENT/MEMORANDUM OF UNDERSTANDING
BETWEEN THE
US DEPARTMENT OF AGRICULTURE,
NATURAL RESOURCES CONSERVATION SERVICE NEBRASKA STATE OFFICE,
AND THE
NEBRASKA STATE HISTORIC PRESERVATION OFFICER,
REGARDING
THE PHASED IDENTIFICATION OF HISTORIC PROPERTIES FOR
THE BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT,
BROWN, CHERRY, AND ROCK COUNTIES, NEBRASKA**

WHEREAS, NRCS Nebraska, as authorized by the Watershed Protection and Flood Prevention Act (Public Law 83-566, as amended; 16 U.S.C. 1001-1012), is providing financial assistance to the Middle Niobrara Natural Resources District (MNNRD) to develop a watershed plan-environmental assessment (Plan-EA) to identify methods to provide watershed protection for the Bone and Long Pine Creeks Watershed (Project) including the construction of grade control structures, streambank stabilization structures, and aquatic ecosystem restoration and rehabilitation features; and

WHEREAS, the MNNRD is the non-Federal sponsor for the Project and has been invited to be an Invited Signatory to this Programmatic Agreement (Agreement); and

WHEREAS, NRCS Nebraska has determined that the Project activities constitute an undertaking, as defined in 36 C.F.R. § 800.16(y), and therefore is subject to Section 106 of the National Historic Preservation Act of 1966, 54 U.S.C. § 306108 ((formerly 16 U.S.C. § 470f), referred to hereafter as NHPA); and

WHEREAS, NRCS Nebraska has determined that the Project may have an effect on properties that are either listed or eligible for listing in the National Register of Historic Places (NRHP) and has consulted with the Nebraska State Historic Preservation Officer (SHPO) pursuant to the NHPA; and

WHEREAS, the preferred alternative of the Plan-EA identifies two phases (Tier 1 and Tier 2) of Project implementation, with the second phase (Tier 2) of the Project requiring design and site-specific environmental evaluations to be completed in the future; and

WHEREAS, in accordance with 36 CFR 800.4(d)(1), NRCS Nebraska in consultation with Nebraska SHPO and other consulting parties has determined that no historic properties will be affected by the Tier 1 Projects; and

WHEREAS, NRCS Nebraska will implement the Tier 2 Project in phases as funding and additional Project information is made available, therefore NRCS will utilize a phased process to identify

and evaluate historic properties and determine effects to those properties affected by the Tier 2 Projects, pursuant to 36 C.F.R. § 800.4(b)(2); and

WHEREAS, NRCS Nebraska, with the concurrence of Nebraska SHPO, has decided to comply with Section 106 of the NHPA for the Project through the execution and implementation of this Programmatic Agreement (Agreement) because NRCS Nebraska cannot fully determine the effects of the Project on historic properties [36 C.F.R. § 800.14(b)(1)(ii)], for all phases of the Project at this time; and

WHEREAS, this Agreement shall establish the process NRCS Nebraska shall follow for compliance with 54 U.S.C. § 306108 (formerly 16 U.S.C. § 470f, referred to hereinafter as "Section 106"), taking into consideration the views of the Signatory and Concurring Parties; and

WHEREAS, in accordance with 36 C.F.R. §§ 800.2(c)(2)(ii)(A), 800.3(f)(2), and 800.14(b)(2)(i), NRCS Nebraska is responsible for conducting Native American Tribal consultation on a government to government level and has contacted the Omaha Tribe of Nebraska, the Pawnee Nation of Oklahoma, the Rosebud Sioux Tribe, the Ponca Tribe of Indians of Oklahoma, the Ponca Tribe of Nebraska, the Santee Sioux Nation of Nebraska, the Yankton Sioux Tribe, the Apache Tribe of Oklahoma, the Cheyenne and Arapaho Tribes of Oklahoma, the Cheyenne River Sioux Tribe, the Crow Creek Sioux Tribe of the Crow Creek Reservation, the Lower Brule Sioux Tribe, the Oglala Sioux Tribe, and the Standing Rock Sioux Tribe of North and South Dakota to invite them to consult on this Project and to participate as Concurring Parties to this Agreement, and NRCS Nebraska will continue consultation throughout the duration of this agreement and

WHEREAS, all proposed Project improvements will be constructed on privately owned property outside the external boundaries of federal Indian reservations and other Indian lands; and

WHEREAS, in accordance with 36 C.F.R. § 800.14(b)(3), NRCS Nebraska notified and invited the Advisory Council on Historic Preservation (ACHP) per 36 C.F.R. § 800.6(a)(1)(C) to participate in consultation to resolve potential adverse effects of the Project, including development of this Agreement, and the ACHP declined to participate in a letter dated July 19, 2021; and

WHEREAS, NRCS has coordinated public participation and comment on this agreement through the process set forth in the National Environmental Policy Act (NEPA); and

WHEREAS the preferred alternative of the Plan-EA was presented at a public meeting on April 28, 2021, and the public has had additional opportunity to comment on the Plan-EA at previous public meetings held February 18, 2020, and August 6, 2020; and

WHEREAS, the definitions set forth in 36 C.F.R. § 800.16 are incorporated herein by reference and apply throughout this Agreement; and

NOW, THEREFORE, the signatories agree that the Project shall be implemented in accordance with the following stipulations in order to take into account the effects of the undertaking on historic properties and to satisfy NRCS Nebraska's NHPA Section 106 responsibilities for all individual aspects of the Project.

STIPULATIONS

NRCS shall ensure that the following stipulations are met and carried out:

I. Roles and Responsibilities

a. NRCS Nebraska shall Ensure that the following stipulations are completed consistent with the requirements of 36 CFR 800.2(a).

   i. Refine and document the APE in consultation with the SHPO as project design progresses, pursuant to Stipulation III of this PA. The APE may be modified to account for project changes without requiring amendment to this PA. NRCS Nebraska will make any necessary changes to the APE in accordance with Stipulation III and notify all consulting parties to this PA as required.

   ii. Complete the Section 106 process for all Tier 2 Projects including identification and evaluation of historic properties, consultation with SHPO and other consulting parties, and mitigation of any adverse effects to historic properties.

   iii. Prepare Historic Property Treatment Plans (HPTP)to govern the treatment of adversely affected historic properties identified within the APE, as necessary.

   iv. Prepare an annual letter report summarizing work undertaken pursuant to the terms of this agreement.

   v. Circulate draft documents, comments on documents, and final documents among the Consulting Parties as appropriate.

   vi. Complete National Environmental Policy Act (NEPA) environmental evaluation cultural resource guide sheets for all Tier 2 Projects in accordance with Stipulation VI.

   vii. Include the terms and conditions of this Agreement in the terms and conditions of any other future agreements issued between NRCS Nebraska and MNNRD for this Project.

b. Nebraska SHPO shall:

   i. Provide review and comment of NRCS Nebraska's area of potential effect; cultural resource identification efforts; National Register eligibility determinations for cultural resources pursuant to this PA; assessment of effects for actions carried out under this PA; and proposed mitigation to resolve adverse effects to historic properties.

ii. Review and if appropriate comment on the annual progress letter in accordance with Stipulation IX.c.

c. MNNRD shall:

i. Notify NRCS Nebraska of all proposed activities related to this Project.

ii. Submit, or have their contractor submit, shapefiles of 60% design drawings of Tier 2 Projects to the NRCS Cultural Resource Specialist/Archaeologist to aid in the development of the APE.

iii. Include a stop work order in all construction contracts that includes the provisions of Appendix B per Stipulation VII of this Agreement.

d. Concurring Parties

i. Consulting parties wishing to act as a Concurring Party to this PA must provide NRCS Nebraska with a formal request in writing to act in this capacity.

ii. Upon receipt of documents, Concurring Parties must review and provide comments, if they have any, within the designated review times pursuant to Stipulation II of this PA.

iii. Concurring Parties must agree to send communications regarding compliance with this PA as outlined in Stipulation IX.b, if they sign the PA.

e. **It is mutually agreed:**

A. The Department of Agriculture and parties and their respective agencies and offices will handle their own activities and utilize their own resources, including the expenditure of their own funds, in pursuing these objectives. Each party will carry out its separate activities in a coordinated and mutually beneficial manner.

B. Nothing in this MOU shall obligate either the Department of Agriculture or parties to obligate or transfer any funds. Specific work projects or activities that involve the transfer of funds, services, or property among the various agencies and offices of the Department of Agriculture and parties will require execution of separate agreements and be contingent upon the availability of appropriated funds. Such activities must be independently authorized by appropriate statutory authority. This MOU does not provide such authority. Negotiation, execution, and administration of each such agreement must comply with all applicable statutes and regulations.

D. This MOU is not intended to, and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by a party against the United States, its agencies, its officers, or any person.

E. Nothing in this Agreement shall be construed as requiring a Party to expend funds in violation of the Federal Anti-deficiency Act codified at 31 U.S.C. § 1341.

Third Party Beneficiary Rights-

The parties do not intend to create in any other individual or entity the status of a third-party beneficiary, and this MOU shall not be construed to create such status. The rights, duties and obligations contained in this MOU shall operate only between the parties to this MOU and shall inure solely to the benefit of the parties to this MOU. The provisions of this MOU are intended only to assist the parties in determining and performing their obligations under this MOU. The parties to this MOU intend and expressly agree that only parties' signatory to this MOU shall have any legal or equitable right to seek to enforce this MOU, to seek any remedy arising out of a party's performance or failure to perform any term or condition of this MOU, or to bring an action for the breach of this MOU.

II. Time Frames and Review Procedures

a. Unless stipulated otherwise, for all documents produced in compliance with this Agreement, NRCS Nebraska shall provide documents for review via email to all parties to this Agreement in accordance with Stipulation IX.b. Any written comments provided by parties to the Agreement within thirty (30) calendar days from the date of receipt, shall be considered in the revision of the document or deliverable.

III. Area of Potential Effects (APE)

a. The draft APE (Appendix A: Figures 1-4), includes a one-mile buffer around the streams where Tier 2 Projects are proposed. As designs for the Tier 2 Projects are developed and finalized, NRCS Nebraska will revise the APE for the Project to include all geographic areas that may be directly or indirectly affected by construction of the proposed improvements at each Tier 2 Project location.

b. Once a preliminary APE is established, NRCS Nebraska will submit maps of the APE to Nebraska SHPO for review prior to completing cultural resources inventories. Upon receipt, SHPO will have ten (10) calendar days to review and provide comments to NRCS Nebraska on the preliminary APE. NRCS Nebraska will take into account any comments on the APE and finalize the APE based on comments received. Failure of any party to comment within ten (10) days shall not preclude NRCS Nebraska from finalizing the APE.

IV. Identification and Evaluation of Historic Properties

a. NRCS Nebraska is responsible for identifying historic properties present within the project action's APE prior to any activity that has the potential to cause effects to historic properties. Identification efforts may be coordinated with the engineering design and environmental evaluation phases proposed for Tier 2 Projects in accordance with 36 CFR § 800.4(b)(2) and as land within the APE is made accessible for archaeological and historic

buildings surveys. The anticipated design and construction timeline for Tier 2 Projects is provided in Table 4 of Appendix A

V. Reports

a. All archaeological and architectural resources identified during surface and/or subsurface surveys will be recorded on the appropriate History Nebraska forms. The results of such field investigations may be documented in stand-alone documents or in combined archaeological, architectural, and/or ethnographic technical reports. As inventory efforts may be non-concurrent, based on project phase, access to land, and availability of funding, multiple technical inventory reports may be produced. If cultural resources can be evaluated for National Register eligibility based on survey-level identification efforts alone, the resulting inventory report(s) may also include the National Register evaluation(s) of those resources.

VI. Compliance with National Environmental Policy Act (NEPA)

a. NRCS Nebraska will prepare a Nebraska Environmental Evaluation Worksheet (NE-CPA-52) for each Tier 2 location as part of its NEPA requirements. The NE-CPA-52 includes a Cultural Resource Guide Sheet that documents the results of the Section 106 process. The NRCS Nebraska Cultural Resource Specialist or Archaeologist will complete the Cultural Resources Guide Sheet for all Bone and Long Pine Creek Tier 2 Projects.

b. The NE-CPA-52 environmental evaluations for Bone and Long Pine Creek Tier 2 Projects will be signed by a Level III or Level IV certified planner in the NRCS Ainsworth Field Office or by someone with job approval authority at the Nebraska State Office only after Step 5 of the Cultural Resources Guide Sheet is complete.

c. Construction of Tier 2 Projects will not begin until after the NE-CPA-52 is completed and signed.

d. The NE-CPA-52 Cultural Resource Guide Sheet for Bone and Long Pine Creek Tier 2 Projects is included in Appendix c of this Agreement and Appendix E of the Plan-EA.

VII. Post-Review Discoveries

a. If a previously undiscovered archaeological, historical, or cultural property is encountered during construction, or previously known properties will be affected or have been affected in an unanticipated adverse manner, NRCS Nebraska will ensure that the procedures outlined in Appendix B are followed. Provisions of Appendix B will be included in a stop-work clause for all construction contracts related to this Project.

b. Historic and prehistoric human remains from non-federal, non-tribal lands are subject to protection under the Nebraska Unmarked Human Burial Law (Nebraska Revised Statute 28-1301). As such, if human remains are discovered during construction, work in that portion of the project shall stop immediately. The remains shall be covered and/or protected in place in such a way that minimizes further exposure of and damage to the remains, and the NRCS Nebraska shall immediately consult with the County Attorney,

SHPO, State Archaeologist, and all consulting parties. Provisions of the Nebraska Unmarked Human Burial Law are included in Appendix B.

VIII. **Native American Consultation and Participation**

a. NRCS Nebraska will invite federally recognized Tribes to review and provide input on the identification, evaluation, and proposed treatment of historic properties, including but not limited to archaeological sites and TCPs, as stipulated elsewhere in this PA. Invitations for input may be extended through letters of notification, individual consultation meetings, public meetings, and site visits facilitated by NRCS Nebraska. NRCS Nebraska will afford federally recognized Tribes thirty (30) calendar days from the receipt of a document for review to respond with comments, unless otherwise stipulated. Failure by any reviewers to comment within this time period shall not preclude NRCS Nebraska from allowing reports to be finalized, treatment protocols to proceed, or otherwise move forward with the undertaking.

IX. Administrative Stipulations

a. Agreement Duration
    i. This agreement will expire 10 years from the date it is filed with the ACHP. Prior to such time, NRCS Nebraska may consult with the other signatories to reconsider the terms of the agreement and amend in accordance with Stipulation IX.f below. The anticipated design and construction timeline for Tier 2 Projects is provided in Table 4 of Appendix A

b. Communication Among the Parties of this Agreement

    i. Electronic mail (email) will serve as the official correspondence method for all communications regarding this Agreement and its provisions. See Appendix D for a list of contacts and email addresses. Contact information in Appendix D may be updated as needed without an amendment to this Agreement. It is the responsibility of each signatory to immediately inform NRCS Nebraska of any change in name, address, email address, or phone number of any point-of-contact. NRCS Nebraska will forward this information to all signatories and concurring parties by email.

c. Monitoring and Reporting

    i. Each year following the execution of this Agreement until it expires, is terminated, or all stipulations are met, NRCS Nebraska shall submit to all parties to this agreement a letter summarizing the work undertaken pursuant to its terms. Such letter shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in NRCS Nebraska's efforts to carry out the terms of this Agreement. Communications for this letter will be submitted in accordance with Stipulation IX.b.

d. Confidentiality

    i. All parties to this PA will ensure that shared data, including data concerning the precise location and nature of archaeological historic properties and properties of religious and cultural significance, are

protected from public disclosure to the greatest extent permitted by law, including conformance to Section 304 of the NHPA, as amended (54 U.S.C. § 307103) and implementing regulations under 36 CFR § 800.6(a)(5) and 36 CFR § 800.11(c); FOIA; E.O. 13007, and FR 61-104, dated May 24, 1996.

e. Dispute Resolution
    i. Should any signatory to this agreement object at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, NRCS Nebraska shall consult with the objecting party(ies) to resolve the objection. If NRCS Nebraska determines, that such objection(s) cannot be resolved, NRCS Nebraska will:

        1. Forward all documentation relevant to the dispute, including NRCS Nebraska's proposed resolution, to the ACHP in accordance with 36 CFR 800.2(b)(2). The ACHP will provide NRCS Nebraska with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation upon the resolution of the objection within 30 days. Prior to reaching a final decision on the dispute, NRCS Nebraska shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories and concurring parties, and provide them with a copy of this written response. NRCS Nebraska will then proceed according to its final decision.
        2. If the ACHP does not provide its advice regarding the dispute within thirty (30) days, NRCS Nebraska may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, NRCS Nebraska shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories and concurring parties to the MOA and provide them and the ACHP with a copy of such written response.
        3. NRCS Nebraska's responsibility to carry out all other actions subject to the terms of this Agreement that are not the subject of the dispute remain unchanged.

f. Amendments
    i. Any signatory to this Agreement may request, in writing, to the other Signatories that it be amended, whereupon the signatories will consult for a period of no more than thirty (30) business days to consider such amendment. The amendment will be effective on the date a copy signed by all of the original signatories is filed with the ACHP. If the signatories cannot agree to appropriate terms to amend the PA, any signatory may terminate the agreement in accordance with Stipulation IX.g below.

g. Termination
    i. If any signatory to this Agreement determines that its terms will not or cannot be carried out, that party shall immediately consult with the other signatories to attempt to develop an amendment per

Stipulation IX.f, above. If within thirty (30) days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory may terminate the Agreement upon written notification to the other signatories. Once the Agreement is terminated, and prior to work continuing on the undertaking, NRCS Nebraska must either (a) execute an Agreement pursuant to 36 CFR § 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. NRCS Nebraska shall notify the signatories as to the course of action it will pursue.

ii. In the event of termination, if work remains to be completed under the Agreement, then NRCS Nebraska will consult in accordance with 36 CFR § 800.14(b) to develop a new Agreement. Beginning with the date of termination, NRCS Nebraska will ensure that until and unless a new Agreement is executed for the actions covered by this PA, Undertakings will be reviewed individually for Section 106 compliance in accordance with 36 CFR § 800.4 – 800.6.

EXECUTION of this Agreement by NRCS Nebraska and Nebraska SHPO, its submission to the ACHP, and subsequent implementation of its terms, evidence that NRCS Nebraska has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

Signatures:

In witness whereof, the parties to this MOU through their duly authorized representatives have executed this MOU on the days and dates set out below, and certify that they have read, understood, and agreed to the terms and conditions of this MOU as set forth herein.

SIGNATURE PAGE

PROGRAMMATIC AGREEMENT
BETWEEN THE
US DEPARTMENT OF AGRICULTURE,
NATURAL RESOURCES CONSERVATION SERVICE NEBRASKA STATE OFFICE,
AND THE
NEBRASKA STATE HISTORIC PRESERVATION OFFICER,
REGARDING
THE BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT, BROWN, CHERRY, AND ROCK COUNTIES, NEBRASKA

ROBERT LAWSON Digitally signed by ROBERT LAWSON Date: 2022.09.22 08:05:34 -05'00' Date: 9/22/2022

NRCS Nebraska State Conservationist, Robert Lawson

Jill Dolberg Date: 9-19-22

Nebraska State Historic Preservation Officer, Jill Dolberg

Tim Nollette Date: 9-12-22

Chairman, Board of Directors, Middle Niobrara Natural Resources District, Tim Nollette

Michael Murphy - MNRD Date: 09/12/22

General Manager, Middle Niobrara Natural Resources District, Mike Murphy

SIGNATURE PAGE – CONCURRING PARTIES

PROGRAMMATIC AGREEMENT

BETWEEN THE
US DEPARTMENT OF AGRICULTURE,
NATURAL RESOURCES CONSERVATION SERVICE NEBRASKA STATE OFFICE,
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THE BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT, BROWN, CHERRY, AND ROCK COUNTIES, NEBRASKA

Joseph M. Reed _____ Date: 1/5/23

Joseph M. Reed, Tribal Historic Preservation Officer, Pawnee Nation of Oklahoma

BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT
PROGRAMMATIC AGREEMENT

Appendix A: Maps and Tables

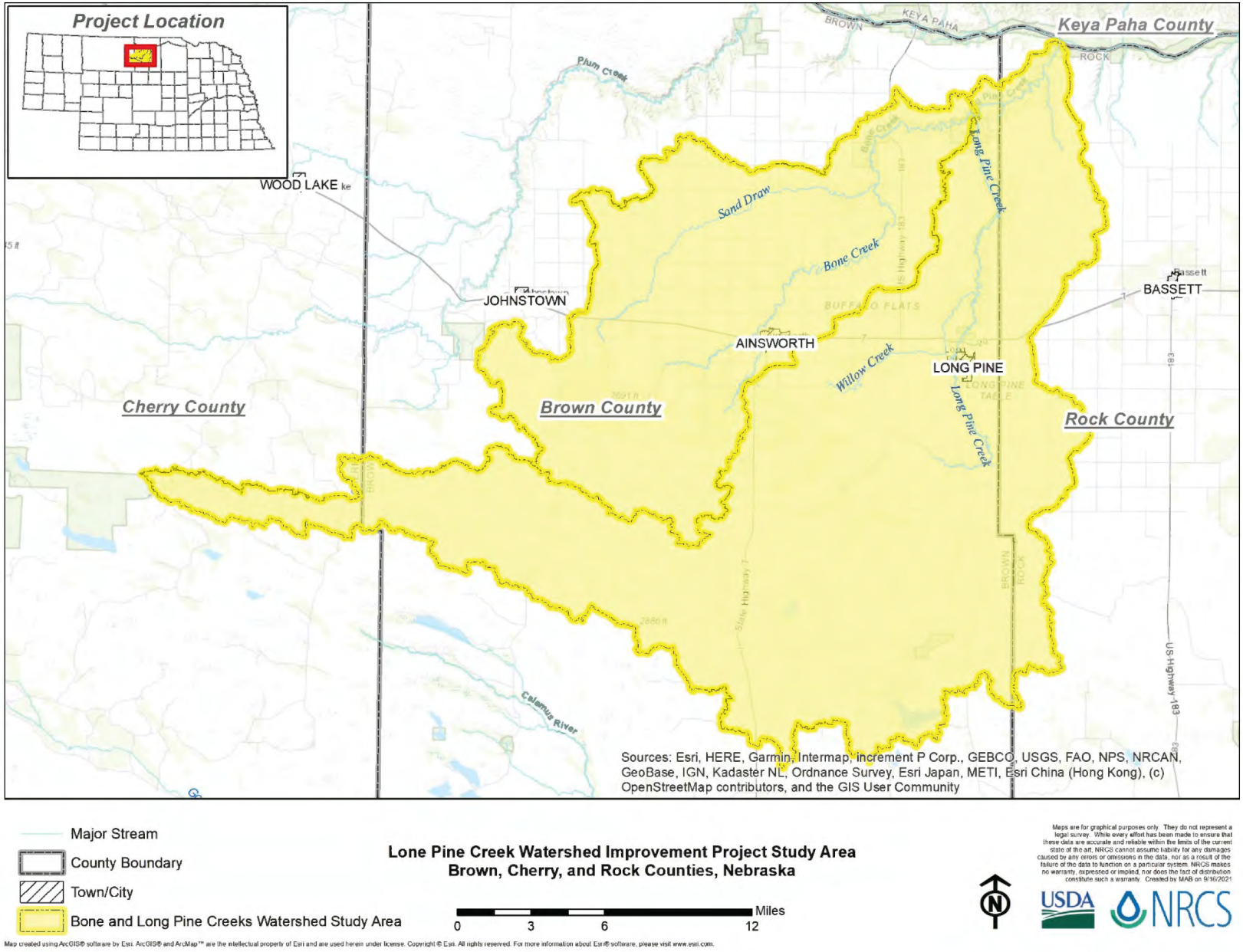
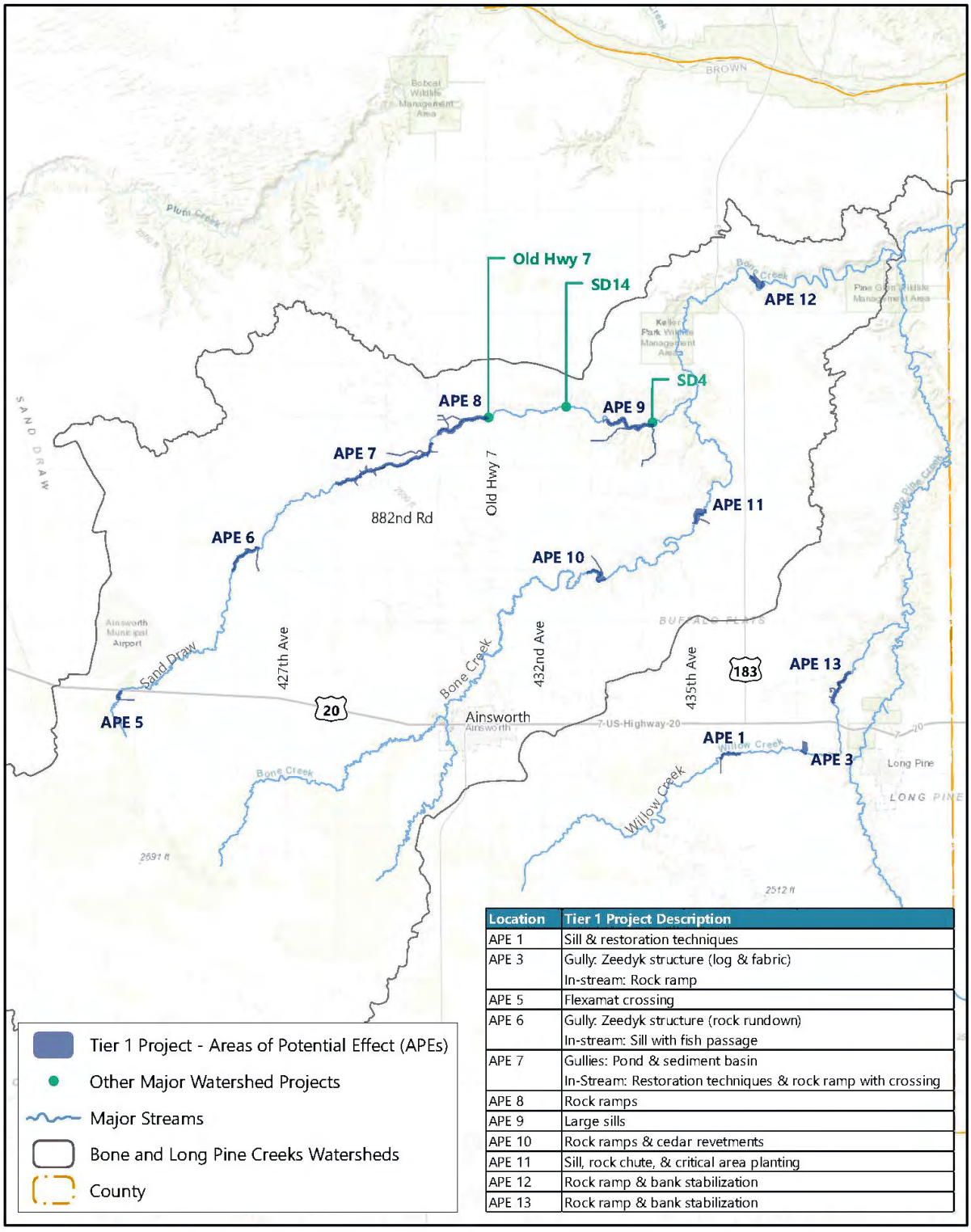


Figure 1. Long Pine Creek Watershed Improvement Project Study Area.

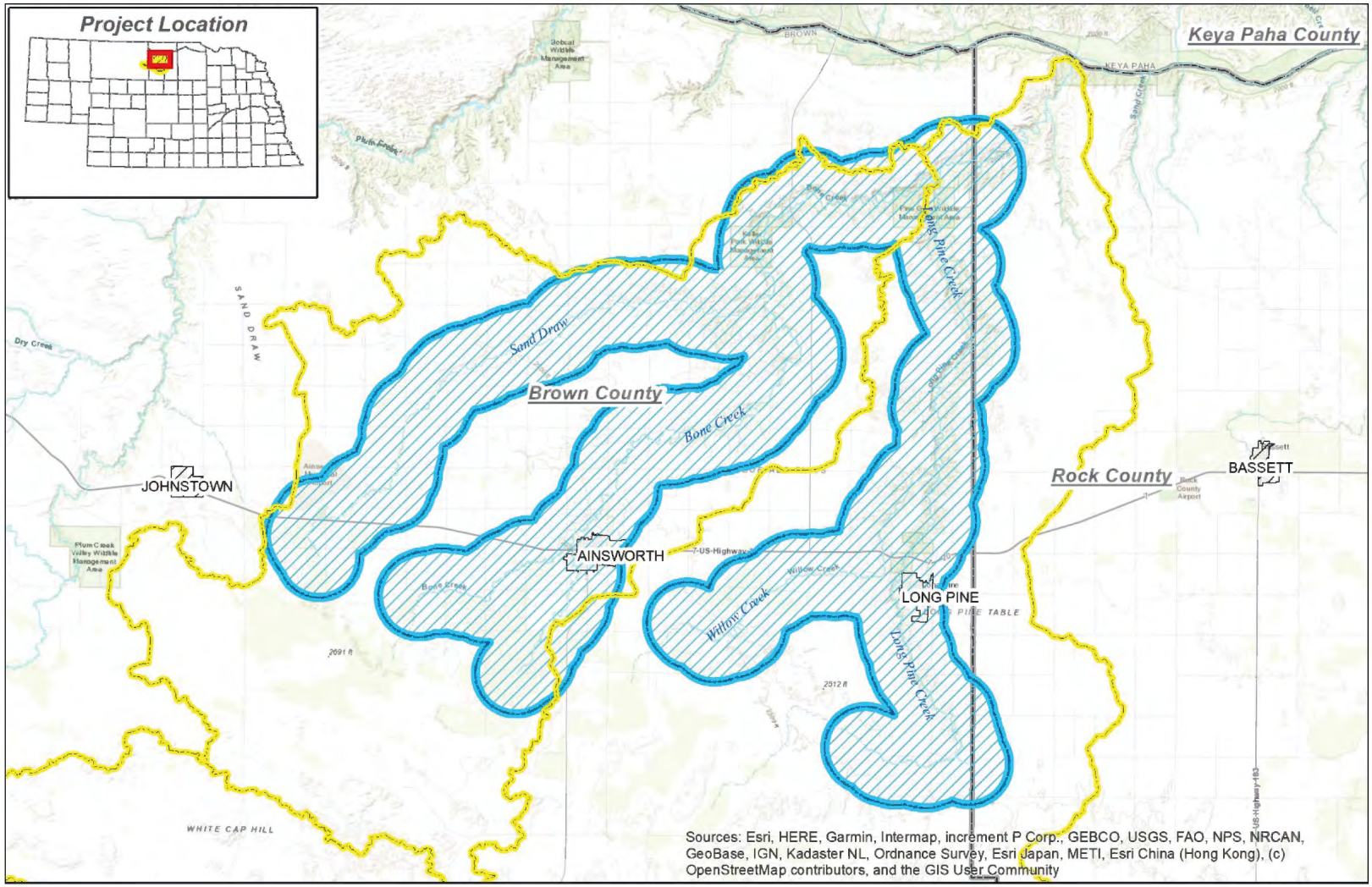


Location	Tier 1 Project Description
APE 1	Sill & restoration techniques
APE 3	Gully: Zeedyk structure (log & fabric) In-stream: Rock ramp
APE 5	Flexamat crossing
APE 6	Gully: Zeedyk structure (rock rundown) In-stream: Sill with fish passage
APE 7	Gullies: Pond & sediment basin In-Stream: Restoration techniques & rock ramp with crossing
APE 8	Rock ramps
APE 9	Large sills
APE 10	Rock ramps & cedar revetments
APE 11	Sill, rock chute, & critical area planting
APE 12	Rock ramp & bank stabilization
APE 13	Rock ramp & bank stabilization

Tier 1 Location Map
Long Pine Creek Watershed Improvement Project
USDA Natural Resources Conservation Service
Middle Niobrara Natural Resources District

0 2.5 Miles

Figure 2. Location of Tier 1 Projects.



Major Stream
Phase 2 Area of Potential Effects
County Boundary
Town/City

Lone Pine Creek Watershed Improvement Project Study Area
Brown, Cherry, and Rock Counties, Nebraska

0 2 4 8 Miles

Maps are for graphical purposes only. They do not represent a legal survey. While every effort has been made to ensure that these data are accurate and reliable within the limits of the current state of the art, NRCS cannot assume liability for any damages caused by any errors or omissions in the data, nor as a result of the failure of the data to function on a particular system. NRCS makes no warranty, expressed or implied, nor does the fact of distribution constitute such a warranty. Created by MAB on 9/16/2021

USDA NRCS

Figure 3. Preliminary Area of Potential Effects for Tier 2 Projects.

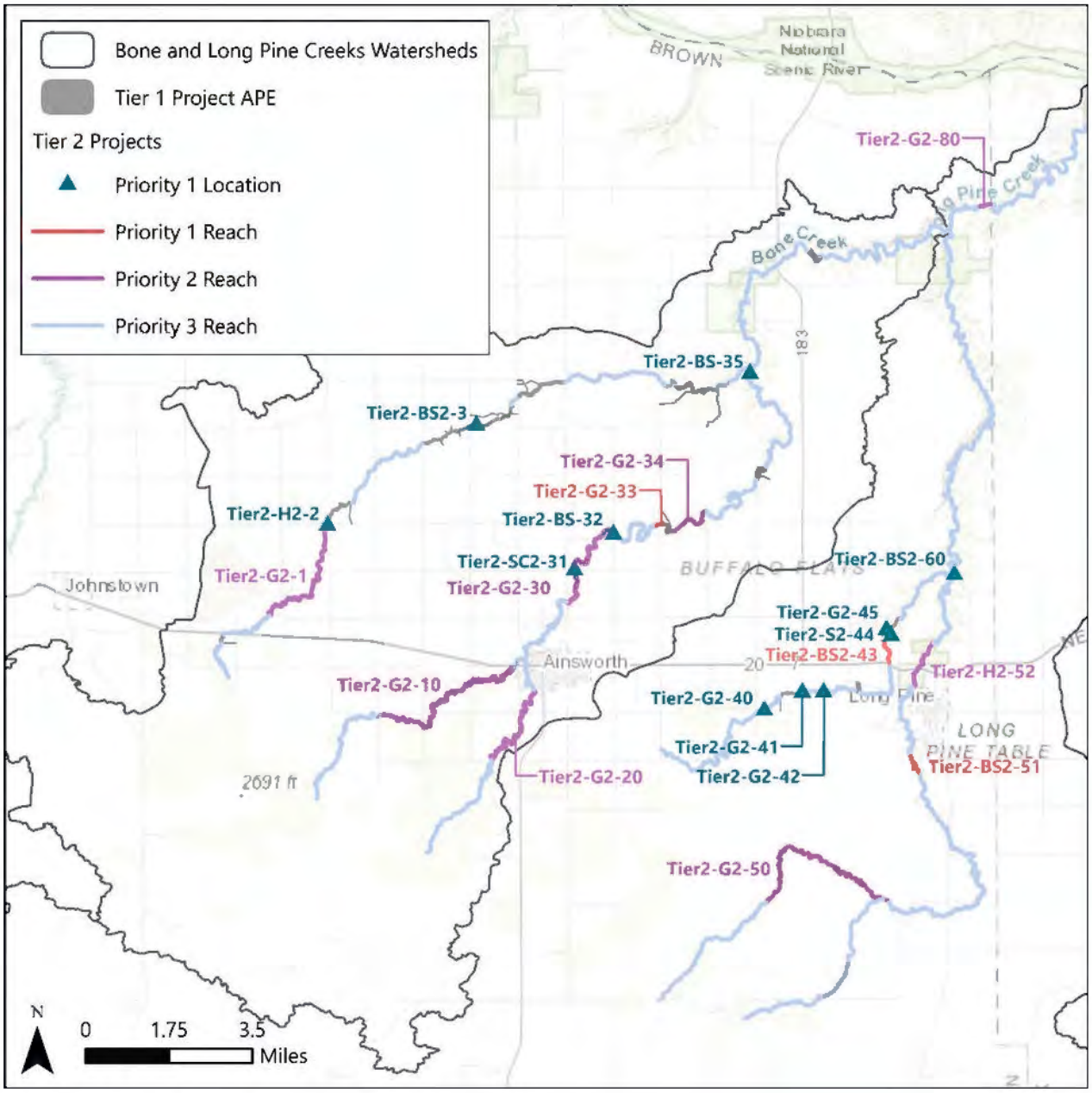


Figure 4. Approximate locations of proposed Tier 2 Projects.

BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT PROGRAMMATIC AGREEMENT
APPENDIX A

Table 1. Tier 1 project locations, improvement descriptions, and cultural resource effects.

APE	Cultural Resource Sites	NRHP Eligibility	Determination of Effect
1	No cultural resources identified	N/A	No historic properties affected
3	No cultural resources identified	N/A	No historic properties affected
5	No cultural resources identified	N/A	No historic properties affected
6	25BW137 – collapsed windmill and stock tank	Not eligible	No historic properties affected
7	H7-1 – farmstead outside APE	Unevaluated	No historic properties affected – outside APE
	H7-2 – farmstead outside APE	Unevaluated	
8	25BW138 – maintained and recently updated windmill	Not eligible	No historic properties affected
9	25BW139 – shallowly buried ceramic period site	Potentially eligible	No historic properties affected – site will be avoided
	H9-1 – farmstead outside APE	Unevaluated	No historic properties affected – outside APE
10	No cultural resources identified in APE. Site 25BW502 (Sisson Mill) is west of APE.	N/A	No historic properties affected -outside APE
11	25BW140 – farmstead	Not eligible	No historic properties affected
12	H12-1 – occupied farmstead	Not eligible	No historic properties affected
13	No cultural resources identified	N/A	No historic properties affected

BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT PROGRAMMATIC AGREEMENT
APPENDIX A

Table 2. Types of improvements proposed for Tier 2 Projects.

Practice (NRCS Practice No.)	Description
Habitat improvements	
Oxbow (410, 582)	Restoring and reconnecting remnant oxbows once previously a meander of the stream
Obstruction Removal (500)	Disposal of unwanted, unsightly, or hazardous buildings, structures, vegetation, landscape features, trash, and other material.
Aquatic Organism Passage (396)	Modification of barriers that restrict or impede movement of aquatic organisms
Headwaters Excavation (646, 659)	Excavation of narrowleaf cattails and other invasives that have taken over wetlands and open water
Gravel Enhancement (395)	Gravel added to streambed to enhance fish spawning sites
Pool Construction (395)	Deep water pools constructed above and below other instream structures
Boulder Clusters (395)	Clusters of boulders for additional habitat
Habitat improvements with stream bank protection	
LUNKERS (395, 580)	Hard structures to protect stream banks and create fish habitat
Bank Shaping (580)	Floodplain reconnection, increased sediment capacity for variety of flows, protect bankfull flows
Clearing and Snagging (326)	Removing logs, boulders, drifts, and other obstructions from a channel
Critical Area Planting (342)	Establishes permanent vegetation on sites that have high erosion rates or conditions that prevent the establishment of vegetation with normal practices.
Cedar Revetments (395, 580)	Use of cedars to stabilize banks
Root Wads (395, 580)	Trenching tree trunk into stream bank and roots placed at upstream angle to redirect stream flow and provide overhead and bank cover for fish
Streambank Protection (580)	Immediate way to stabilize eroding channel banks with rock riprap, articulated concrete block, geosynthetics, etc.
Restoration techniques with channel alignment benefits	
Bendway Weir (580)	Controls channel depth and diverts stream energy away from banks using "rock dikes" facing upstream
Engineered Log Jams (580)	Log jams reduce stream energy directed towards banks by deflecting and diffusing energy away from banks
Longitudinal Peaked Stone Toe (LPST) (580)	Provides long term bank stability due to rock mobilizing into scour holes. Unstable conditions during short-term
Stream Barb (580)	Similar to bendway weirs but designed for smaller streams, small dikes facing upstream
J-Hook/Straight Vanes/Boulder Vanes (580)	Maintain scour pool in center of stream with deposition along stream bank due to flow redirection
Vortex Structures, Spur Logs, Hardpoint/Wing Deflectors (580)	Rocks and/or logs to redirect water flow and create deep clean pool habitat
Restoration techniques with grade control	
Free Standing Rock Arch Rapids (410)	Stabilizes abrupt and significant grade changes
Cross Vane (410)	Directs flow towards center of channel, maintaining a deep pool
W-Weir (410)	Similar to cross vanes but can concentrate flow across wider streams
Step pool system (410)	Dissipates energy in steep gradient channel by a series grade control drops
Rock and log riffle (410)	Diversify flow regimes and provide grade control
Grouted Grade Control (410)	Handle significant headcuts where inadequate riprap is easily available

BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT PROGRAMMATIC AGREEMENT
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Practice (NRCS Practice No.)	Description
Beaver Dam Analogues (395, 410)	Log structures that mimic beaver dam activity
Zeedyk Structures (584)	Low profile, hand-built treatments made of rock or wood intended to restore hydrologic and ecological function of wet meadows and small streams
Channel Reconstruction, Priority 2 Stream Restoration (580)	Total reconstruction of the stream channel to mimic or promote 'natural' conditions
Grade control	
Stream Crossings (578)	Stabilized area or structure constructed across a stream to provide controlled access
Flexamat® Crossings (578)	Flexamat® crossings that allow for fish passage
Small pond or check dam (378 or 410)	Help stabilize eroding channels and create pools for increased habitat diversity (intended for smaller drainage areas)
Rock Chutes (410)	Maintain existing headcuts/drops
Rock Ramps (410)	Captures imminent headcut progression
Sills (410)	A series of weirs (sills) that establishes a pool-riffle system and can re-establish grade
'Passive' solutions to grade control	
Irrigation Water Management (449)	Controlling volume, frequency, and application rate of irrigation water
Off-Stream Water Development (614)	Off-stream water for livestock

Table 3. Tier 2 Projects (Priority 1 and 2)

Site or Reach	Name	Description	Priority	Anticipated NRCS Codes
Site	Tier2-BS2-3	Bank stabilization with cedars that were removed	1	580
Reach	Tier2-BS2-43	Grade control, bank stability, bank stability at house. NDOT has project upstream.	1	410, 580
Reach	Tier2-BS2-51	Bank stability	1	580
Site	Tier2-BS2-60	Bridge out, bank instability (within ARA 14)	1	580
Site	Tier2-BS-32	Oxbow restoration/habitat improvements, bank stability	1	395, 580, 582
Site	Tier2-BS-35	Bank stabilization near house	1	580
Reach	Tier2-G2-33	Restoration with grade control, oxbow restoration (within ARA 10)	1	410, 582
Site	Tier2-G2-40	Protect road and cowboy trail, grade control, habitat improvements	1	410, 584
Site	Tier2-G2-41	Grade control for Willow Creek and northern tributary	1	410, 580
Site	Tier2-G2-42	Protect AID crossing	1	410
Site	Tier2-G2-45	Grade control, headcut moving up tributary	1	410
Site	Tier2-H2-2	Headwater excavation, improve habitat	1	646, 659
Site	Tier2-IW2-90A	Weather Station	1	449
Site	Tier2-IW2-90B	Weather Station	1	449
Site	Tier2-IW2-90C	Weather Station	1	449
Site	Tier2-IW2-90D	Weather Station	1	449
Site	Tier2-IW2-90E	Weather Station	1	449
Site	Tier2-IW2-90F	Weather Station	1	449
Site	Tier2-IW2-91A	Automated Gate	1	587
Site	Tier2-IW2-91B	Automated Gate	1	587
Site	Tier2-S2-44	Grade control in gully (prefer permanent water)	1	638
Site	Tier2-SC2-31	Stream crossing out	1	578
Reach	Tier2-G2-1	Grade control, habitat improvements	2	410, 584
Reach	Tier2-G2-10	Restoration with grade control, habitat improvements	2	410, 584
Reach	Tier2-G2-20	Restoration with grade control, habitat improvements	2	410, 584
Reach	Tier2-G2-30	Habitat improvements, grade control, bank stability	2	395, 410, 580, 584
Reach	Tier2-G2-34	Grade control (large) to protect upstream	2	410
Reach	Tier2-G2-50	Watershed BMPs to reduce erosion, Restoration with grade control, habitat improvements	2	395, 410, 580, 584
Reach	Tier2-G2-80	Grade control, bank stability, infrastructure protection (bridge)	2	410
Reach	Tier2-H2-52	Habitat improvements, grade control, bank stability	2	410, 582, 584, 395

Table 4. Anticipated Design and Construction Timeline for Tier 2Projects

Final Design	Construction	Name
2022	2023	Tier2-BS2-51
	2023	Tier2-IW2-90A
	2023	Tier2-IW2-90B
	2023	Tier2-IW2-91A
	2023	Tier2-IW2-90E
	2023	Tier2-IW2-90C
	2023	Tier2-IW2-90F
	2023	Tier2-IW2-90D
	2023	Tier2-IW2-91B
2023	2024	Tier2-G2-33
	2025	Tier2-BS2-43
	2026	Tier2-G2-42
	2026	Tier2-G2-40
	2026	Tier2-SC2-31
	2026	Tier2-G2-45
	2025	Tier2-BS2-3
	2024	Tier2-BS-35
2024	2026	Tier2-BS2-60
	2026	Tier2-H2-2
	2026	Tier2-BS-32
	2025	Tier2-G2-41
	2026	Tier2-S2-44
2026	2028	Tier2-G2-20
	2029	Tier2-G2-50
	2028	Tier2-G2-10
	2028	Tier2-G2-1
	2030	Tier2-G2-34
	2029	Tier2-G2-30
	2027	Tier2-H2-52
	2027	Tier2-G2-80

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Appendix B: Post-Review Discovery Plan

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Post-review discoveries of cultural resources or historic properties and unanticipated effects to historic properties shall be addressed as follows:

a. When a cultural resource is discovered after NHPA Section 106 review is complete, the NRCS shall consult with the SHPO and consulting parties to seek avoidance or minimization strategies and/or to resolve adverse effects in accordance with 36 CFR Part 800.6.
    i. The NRCS shall ensure that every contract for assistance includes provisions for halting work/construction in the area when potential historic properties are discovered or unanticipated effects to historic properties are found after implementation, installation, or construction has begun. When such a discovery occurs, the MNNRD or their contractor shall immediately notify the NRCS State Conservationist's Office, NRCS Cultural Resource Specialist (CRS), supervisory NRCS personnel for the area, and the landowner/applicant.
        1. NRCS CRS shall inspect the discovery within 24 hours, if weather permits, and shall establish a protective buffer zone surrounding the discovery in consultation with the local NRCS official (field office supervisor or District or Area Conservationist), concerned Indian tribes, the SHPO, the NRCS State engineering or program supervisor, as appropriate), and the landowner/producer (whomever NRCS is assisting). This action may require inspection by tribal cultural resources experts in addition to the CRS.
        2. All NRCS contact with media shall occur only under the direction of the NRCS Public Affairs Officer, as appropriate, and the State Conservationist.
        3. Security shall be established to protect the resources/historic properties, workers, and private property. Local law enforcement authorities will be notified in accordance with applicable State law and NRCS policy in order to protect the resource(s). Construction and/or work may resume outside the buffer only when the State Conservationist determines it is appropriate and safe for the resources and workers.
        4. NRCS CRS shall notify the SHPO, consulting parties, and the ACHP no later than 48 hours after the discovery and describe NRCS' assessment of the National Register eligibility of the property, as feasible and proposed actions to resolve any adverse effects to historic properties. The eligibility determination may require the assessment and advice of concerned Indian tribes, the SHPO, and technical experts (such as historic landscape architects) not employed by NRCS.
        5. The SHPO, consulting parties, and ACHP shall respond within 48 hours from receipt of the notification with any comments on the discovery and proposed actions.
        6. NRCS shall take any comments provided into account and carry out appropriate actions to resolve any adverse effects.
        7. NRCS shall provide a report to the SHPO, consulting parties, and the ACHP of the actions when they are completed.

b. This undertaking will take place entirely on non-Federal, non-Tribal land. Any human remains discovered during construction will be subject to protection under the Unmarked Human Burial Sites and Skeletal Remains Protection Act (Nebraska Revised Statues 12-1201 to 12-1212). If human remains are discovered, NRCS shall also refer to the ACHP's Policy Statement regarding Treatment of Burial Sites, Human Remains and Funerary Objects and the ACHP's Section 106 Archaeology Guidance. NRCS shall also follow USDA and NRCS policy on treatment of human remains and consultation.
    i. If human remains are discovered during construction, the following procedures will be followed in accordance with Nebraska Revised Statues 12-1201 to 12-1212
        1. All ground disturbing activities in the area shall stop immediately. The remains shall be covered and/or protected in place in such a manner that minimizes further exposure of and damage to the remains. MNNRD or it's contractor shall immediately contact local law enforcement.
            a. The MNNRD shall contact the NRCS State Conservationist's Office and the NRCS Cultural Resource Specialist within 24 hours of the discovery by phone and email.
            b. NRCS shall notify the signatories of this agreement of the inadvertent discovery by phone call within 48 hours of the discovery. A letter regarding the inadvertent discovery will be sent to SHPO and consulting parties within 72 hours of the discovery.
        2. Per Nebraska Revised Statute 12-1207 and 12-1208, disposition of the human remains shall be the responsibility of History Nebraska.
        3. Construction may resume once all human remains and/or burial goods have been removed from the project area, and the State Conservationist determines it is appropriate and safe for the resources and workers.

Appendix C: NRCS-CPA-52 Cultural Resources Guide Sheet for Bone and Long Pine Watershed Improvement Plan Tier 2 Projects

BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT
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CULTURAL RESOURCES / HISTORIC PROPERTIES (Required) NECH 610.25 **Evaluation Procedure Guide Sheet**	Client/Plan Information:
Check all that apply to this Guide Sheet review: ☐ Alternative 1 ☐ Alternative 2 ☐ Other	

This Guide Sheet must be completed and signed by the State Cultural Resource Specialist or Archaeologist

NOTE: This Guide Sheet has been tailored to reflect the PROGRAMMATIC AGREEMENT BETWEEN THE US DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE NEBRASKA STATE OFFICE, AND THE NEBRASKA STATE HISTORIC PRESERVATION OFFICER, REGARDING THE PHASED IDENTIFICATION OF HISTORIC PROPERTIES FOR THE BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT, BROWN, CHERRY, AND ROCK COUNTIES, NEBRASKA For additional information regarding compliance with Section 106 of the NHPA and NRCS cultural resource policy refer to Title 420, General Manual (GM), Part 401, Cultural Resources; for current operating procedures see Title 190, National Cultural Resource Procedures Handbook (NCRPH), Part 601.

NOTE regarding consultations: When dealing with undertakings with the potential to affect cultural resources or historic properties, it is important to follow NRCS policy and the regulations that implement Section 106 and complete consultation with mandatory (SHPOs, THPOs, federally recognized Tribes, and native Hawaiians) and identified consulting parties during the course of planning. This consultation is not documented on this guide sheet but would occur with Steps 2 thourgh 6 and these must be conducted in accordance with NRCS State Office operating procedures to ensure appropriate oversight by Cultural Resources Specialists who meet the Secretary of Interior's Qualification Standards.

STEP 1.

Is the action(s) funded in whole or part or under the control of NRCS? To make this determination, answer the following:

Is technical assistance carried out by or on behalf of NRCS?	☐ No	☑ Yes	☐ Unknown
Is it carried out with NRCS financial assistance?	☐ No	☑ Yes	☐ Unknown
Does it require Federal approval with NRCS as the lead federal agency (permit, license, approval, etc.)?	☐ No	☑ Yes	☐ Unknown
Is it a joint project with another Federal, State, or local entity with NRCS functioning as lead federal agency?	☐ No	☑ Yes	☐ Unknown

- **If all of your responses are "No," document on the NRCS-CPA-52, or notes section below, the finding, rationale, and information sources used and proceed with planning.**
- **If any responses are "Yes," go to step 2.**
- **If "Unknown,"** consult with your State Cultural Resources Coordinator or Specialist (CRC or CRS) to determine if this is an action/undertaking that requires review and then **complete Step 1.**

STEP 2.

Is the action(s) identified as an "undertaking" (as defined in the 190-NCRPH and 420-GM) with the potential to cause effects to cultural resources/historic properties? See eFOTG Section II, Classification of NRCS Conservation Practices for Purposes of the NHPA. Practices with the potential to cause effects are those with the status symbol of "+" or "√". If the action is listed as "**-**" but you think it may need reviewed then contact the State Office Cultural Resources Specialist (CRS). If an action is not listed then contact the CRS for guidance.

☐ No	**If "No," document on the NRCS-CPA-52, or notes section below, the finding, rationale, and information sources used and proceed with planning.**
☑ Yes	**If "Yes," go to Step 3.**

CULTURAL RESOURCES (continued)

STEP 3.

Has the undertaking's area of potential effect (APE) been determined? NOTE: Include all areas to be altered or affected, directly or indirectly: access and haul roads, equipment lots, borrow areas, surface grading areas, locations for disposition of sediment, streambank stabilization areas, building removal and relocation sites, disposition of removed concrete, as well as the area of the actual conservation practice. Consultation is essential during determination of the APE so that all historic properties (buildings, structures, sites, landscapes, objects, and properties of cultural or religious importance to American Indian tribal governments and native Hawaiians) are included. Have a map that indicates the established APE.

☐ No
☐ Unknown — **If "No," or "Unknown,"** consult with your state specific protocols or CRS/Archaeologist to **determine the APE.**

☐ Yes — **If "Yes," go to Step 4.**

STEP 4.

Have the appropriate records (National, State and local registers and lists) been checked or interviews conducted to determine whether any known cultural or historic resources are within or in close proximity to the proposed APE or project area? **Note:** This record checking does not substitute for mandatory consultation with SHPO, THPO, Tribes, and other identified consulting parties.

Client knowledge of existing artifacts, historic structures, or cultural features?	☐ No	☐ Yes	☐ Unknown
Property listed on the National Register of Historic Places?	☐ No	☐ Yes	☐ Unknown
Potential historic resources based on information from a map, land record, etc. (LIDAR, topographic or aerial map, GLO map, county atlas or plat book)	☐ No	☐ Yes	☐ Unknown
The SHPO's statewide inventory or data base?	☐ No	☐ Yes	☐ Unknown

Do NOT proceed with finalizing project design or project implementation until receiving documentation from the CRS or archaeologist that cultural resource compliance is complete (Step 5).

CULTURAL RESOURCES (continued)

STEP 5.

Cultural Resource Inventory. A cultural resource inventory (field survey) of the APE is required and must be completed by the NRCS CRS, the NRCS Archaeologist, or a professional cultural resource specialist who meets the Secretary of Interior's Standards for Archeology and Historic Preservation (36 CFR 61). Contracted cultural resource specialists must be reviewed and approved by the CRS or archaeologist. The results of the cultural resource inventory will be documented in a separate report. The CRS or archaeologist will make a determination of effect, and consult on the results of the cultural resource inventory with the Nebraska State Historic Preservation Office and federally recognized Tribes with ancestral ties to the area per 36 CFR Part 800. After the NHPA Section 106 consultation is completed, the CRS or archaeologist will fill out the Cultural Resources Guide Sheet Supplement and the Cultural Resources fields under Section J of this CPA-52 and submit these forms to the field office along with copies of all responses received during the Section 106 consultation process. Do not sign the NE-CPA-52 until this Guide Sheet has been signed by the CRS or Archaeologist.

Note: If Adverse Effects to historic properties are identified during the Section 106 process, changes to the design may be necessary to avoid or minimize the effect. If design changes cannot be made, mitigation may be necessary. Mitigation may include archeological excavations, historic building documentation, or other actions that would be identified through consultaiton with SHPO and other consulting parties. A Treatment Plan will be developed that outlines the actions required to satisfy NRCS Section 106 obligations.

Do NOT proceed with finalizing project design or project implementation until Step 5 is complete and this Guide Sheet has been signed by the the CRS or Archaeologist

Determination of Effect:

- ☐ No Historic Properties Affected
- ☐ No Adverse Effect
- ☐ Adverse Effect, Mitigation Required ☐ Mitigation Complete

CRS or Archaeologist Signature: _____

Date:

Notes:

Cultural Resources Guide Sheet
Supplement
NHPA Section 106 Documentation

1 Tier 2 project location APE submitted to SHPO for comment _____
2 Cultural resource inventory completed _____
3 Cultural resource inventory report reviewed and approved by CRS _____
4 Section 106 consultation letters submitted _____

Name	Date submitted	Phone Call (if needed)	Email Sent (if needed)	Response Received
Nebraska SHPO				
Omaha Tribe of Nebraska				
Pawnee Nation of Oklahoma				
Rosebud Sioux Tribe				
Ponca Tribe of Indians of Oklahoma				
Ponca Tribe of Nebraska				
Santee Sioux Nation of Nebraska				
Yankton Sioux Tribe				
Apache Tribe of Oklahoma				
Cheyenne River Sioux Tribe				
Cheyenne and Arapaho Tribes of				
Crow Creek Sioux Tribe of the Crow Creek Reservation				
Oglala Sioux Tribe				
Standing Rock Sioux Tribe of North and South Dakota				
Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota				

5 Historic Properties identified? _____
6 Determination of Effect _____
7 Is mitigation required? _____
7a. Has Treatment Plan been developed? _____
7b Has mitigation been completed? _____
8 Can final design and implementation proceed? _____

CRS or Archaeologist Signature: _____
Date: _____

Appendix D: Contact Information

BONE AND LONG PINE CREEKS WATERSHED IMPROVEMENT PROJECT PROGRAMMATIC AGREEMENT
APPENDIX D

Name	Title	Email	Phone Number	Mailing Address
John Swigart	SHPO Archaeologist	john.swigart@nebraska.gov	(402) 560-0574	1500 R St. Lincoln, NE 68508-1651
History Nebraska		hn.hp@nebraska.gov		
Melissa Baier	NRCS Archaeologist	Melissa.Baier@usda.gov	(402) 437-4065	100 Centennial Mall North Room 152 Lincoln, NE 68506
Elisha Mackling	NRCS Cultural Resource Specialist	Elisha.Mackling@usda.gov	402) 437-4128	100 Centennial Mall North Room 152 Lincoln, NE 68506
Michael Murphy	MNNRD General Manager	mmurphy@mnnrd.org	(402) 376-3241	303 E Highway 20, Valentine, NE 69201
Chandler Schmidt	MNNRD Watershed Coodinator	cschmidt@mnnrd.org	(402) 376-3241	303 E Highway 20, Valentine, NE 69201
	NRCS Watershed Coordinator			100 Centennial Mall North Room 152 Lincoln, NE 68506
Allen Gehring	NRCS State Conservation Engineer	Allen.Gehring@usda.gov	(402) 437-4037	100 Centennial Mall North Room 152 Lincoln, NE 68506
Joseph M. Reed	Tribal Historic Preservation Officer, Pawnee Nation of Oklahoma	jreed@pawneenation.org	(918) 762-2180	PO Box 470 657 Harrison Street Pawnee, OK 74058