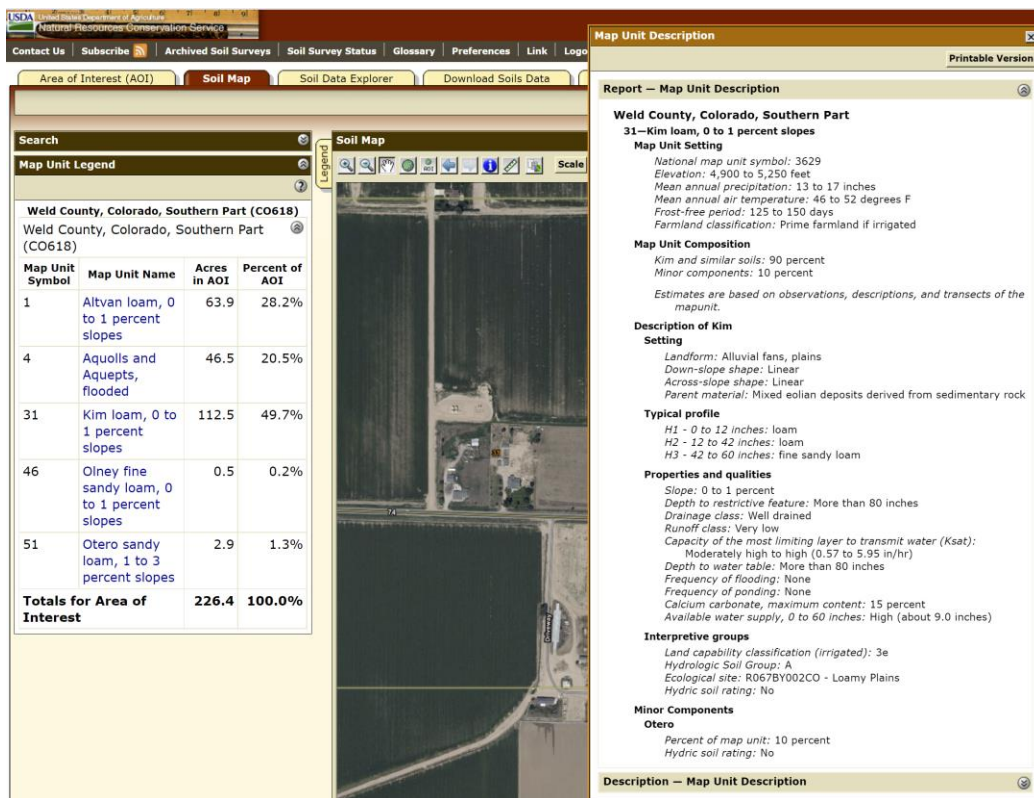




It is the professional opinion of Lone Tree Services that the pH and SAR ranges that are present in the provided soil analysis for Lamb EF Pad and Wellsite fall within the natural range of soil characteristics, and therefore are not in need of further reclamation actions. To reach this conclusion, a review of USDA NRCS NSSC lab characterization data was conducted. USDA Web Soil Survey shows the pad existing entirely within the Kim loam 0 to 1 percent slopes map unit.



\*Location of pad in soil survey showing it lies in the Kim loam mapunit

The Kim series consists of very deep, moderately permeable, well drained soils that formed in alluvium and mixed eolian and alluvial material derived from sandstone and shale. Kim soils are on alluvial fans below escarpments of sedimentary rock and uplands. Slopes are 0 to 20 percent. The mean annual precipitation is about 13 inches, and the mean annual temperature is about 51 degrees F.

Upon review of Kim loam laboratory data, housed at the USDA NRCS NSSC Lab Data Mart it shows that Kim loam has the potential to have high SAR and pH levels, both near the surface and in the subsoil.

Below is an excerpt from NSSC Lab Data Mart characterization data for Kim loam Pedon ID: 07CO087004. It shows that SAR below 101cm or 40 inches is 7 and starting at 57 inches the SAR climbs to 10. Both numbers are higher than the sampled value at Lamb 33-24 wellhead of SAR of 6.5. The Lamb 33-24 sampled depth is 7.5 ft or 90 inches. Based on the lab data the SAR is lower than the native value for the soil type.

Salt				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
(----- Water Extracted From Saturated Paste -----)																							
Layer	Depth (cm)	Horz	Prep	Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	F	Cl	PO <sub>4</sub>	Br	OAC	SO <sub>4</sub>	NO <sub>2</sub>	NO <sub>3</sub>	H <sub>2</sub> O	Total Salts	Elec Cond	1:2 Elec Cond	Exch Na	SAR
				(----- mmol(+) L <sup>-1</sup> -----) 4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	(----- % -----) 4F2	(----- dS m <sup>-1</sup> -----) 4F2	(----- dS m <sup>-1</sup> -----) 4F1a1a1
07N00798	0-12	A	S	5.3	1.8	0.8	0.6	--	4.1	tr	1.0	--	--	--	2.6	tr	0.1	40.3	tr	0.78	0.28	--	tr
07N00799	12-29	C1	S	6.1	2.2	1.4	0.1	--	3.1	0.1	0.7	--	--	--	6.3	tr	--	44.2	tr	0.93	0.33	tr	1
07N00800	29-59	C2	S	16.5	7.0	1.9	0.5	--	2.2	0.1	1.5	--	--	--	23.1	--	--	42.1	0.1	2.15	0.72	--	1
07N00801	59-101	C31	S	26.4	17.9	3.3	0.8	--	1.6	0.1	3.4	0.4	--	--	45.2	--	0.2	42.2	0.1	3.49	1.85	1	7
07N00802	101-146	C32	S	20.4	33.4	34.9	0.5	--	1.2	0.2	3.4	--	--	--	86.2	--	--	40.1	0.2	6.21	2.54	11	10
07N00803	146-198	C4	S	19.0	16.7	43.4	0.4	--	0.7	--	0.5	1.1	--	--	72.5	--	--	28.9	0.2	7.23	2.87	18	10

Review of the same pedon for pH indicates that the native pH values range from 7.9 to 8.5 natively. This lab data shows that the naturally occurring pH is greater than 8.3 for the majority of the profile. Comparing the WSP SS01 and SS06 which were taken at 0.5 ft these soils exist within the C1 horizon are within the pH range. In addition, the top 24 inches of solum are within normal pH values and should not negatively impact agricultural production when compared to a native, undisturbed site.

pH & Carbonates				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	
				(----- pH -----)						(-- Carbonate --)		(-- Gypsum --)			
				CaCl <sub>2</sub>		H <sub>2</sub> O		Sat	As CaCO <sub>3</sub>				As CaSO <sub>4</sub> *2H <sub>2</sub> O		Resist
Layer	Depth (cm)	Horz	Prep	KCl	0.01M	1:1	Paste	Oxid	NaF	<2mm	<20mm	<2mm	<20mm	ohms	
				1:2	4C1a2a	4C1a2a	4F2								
				(----- % -----)											
07N00798	0-12	A	S		7.8	8.3	7.7			4					
07N00799	12-29	C1	S		7.8	8.4	7.7			4					
07N00800	29-59	C2	S		7.8	8.1	7.7			4					
07N00801	59-101	C31	S		7.8	7.9	7.7			4		--			
07N00802	101-146	C32	S		8.1	8.2	8.0			4					
07N00803	146-198	C4	S		8.3	8.5	8.2			3		--			

Review of the land use history, the aerial imagery dating back to 1985, the area of interest has been under agricultural production and has been flood irrigated during that time. Under these conditions it is normal for salts, and other soil compounds, including those that affect soil pH to move downward in the soil profile. This means that upper horizon pH values are reduced, while subsoil horizon pH increases. These processes are described in Cox et al., 2018, and Murray et al., 2007.

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