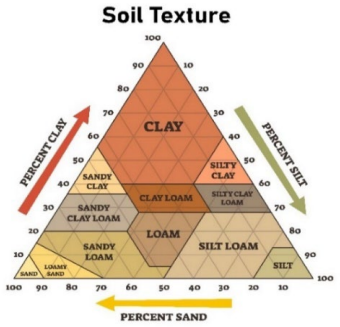
TABLE 1: Soil Report

Client	Civitas				
Operator	Bonanza Creek		**Date**	17-May-23	
Location ID - Name	CPW	North Side	**Ward**	20230512	
Type	Well, Tank Battery, Roads, Reference				

SOIL REPORT

	Soil Profile			**Physical Properties** Partical Size				
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Sand %**	**Silt %**	**Clay %**	**Texture Hydro**	**Location Ref**
Soil - 11.1	0	6	6	67	14	19	Sandy Loam	305223-Well
Soil - 11.2	6	12	6	67	16	17	Sandy Loam	
Soil - 11.3	12	18	6	63	18	19	Sandy Loam	
Soil - 11.4	18	24	6	63	18	19	Sandy Loam	
Site Average				**65**	**17**	**19**		



	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Sand %**	**Silt %**	**Clay %**	**Texture Hydro**	**Location Ref**
Soil - 5.1 REF	0	6	6	87	6	7	Loamy Sand	MU10
Soil - 5.2 REF	6	12	6	90	5	5	Sand	MU10
Soil - 5.3 REF	12	18	6	90	5	5	Sand	MU10
Soil - 5.4 REF	18	24	6	90	4	6	Sand	MU10
Soil - 6.1 REF	0	6	6	74	14	12	Sandy Loam	MU10
Soil - 6.2 REF	6	12	6	75	12	13	Sandy Loam	MU10
Soil - 6.3 REF	12	18	6	83	6	11	Loamy Sand	MU10
Soil - 6.4 REF	18	24	6	68	14	18	Sandy Loam	MU10
Soil - 10.1 REF	0	6	6	69	18	13	Sandy Loam	MU10
Soil - 10.2 REF	6	12	6	69	18	13	Sandy Loam	MU10
Soil - 10.3 REF	12	18	6	69	18	13	Sandy Loam	MU10
Soil - 10.4 REF	18	24	6	85	8	7	Loamy Sand	MU10
Soil - 15.1 REF	0	6	6	41	30	29	Clay Loam	MU10
Soil - 15.2 REF	6	12	6	53	22	25	Sandy Clay Loam	MU10
Soil - 15.3 REF	12	18	6	89	6	5	Sand	MU10
Soil - 15.4 REF	18	24	6	91	4	5	Sand	MU10
Site Ref Average				**76**	**12**	**12**		

	Soil Profile			**Chemical Properties**					
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**pH Sat Paste**	**ECe mmhos/cm**	**CEC meq/100g**	**Excess Lime**	**Organic Matter (LOI) %**	**SAR**
Soil - 11.1	0	6	6	7.5	0.5	19.1	LOW	2.3	0.7
Soil - 11.2	6	12	6	7.8	0.63	18.5	LOW	1.8	3.1
Soil - 11.3	12	18	6	7.7	1.51	18.4	NONE	1.9	4.9
Soil - 11.4	18	24	6	7.5	5.61	20.7	NONE	1.6	6.4
Site Average				**7.6**	**2.1**	**19.2**		**1.9**	**3.8**

	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	pH Sat Paste	ECe mmhos/cm	CEC meq/100g	Excess Lime	Organic Matter (LOI) %	SAR
Soil - 5.1 REF	0	6	6	8.1	0.18	7.5	NONE	0.5	0.2
Soil - 5.2 REF	6	12	6	8.3	0.15	4.4	NONE	0.3	0.1
Soil - 5.3 REF	12	18	6	8.2	0.16	3.7	NONE	0.3	0.2
Soil - 5.4 REF	18	24	6	8.3	0.17	5.2	NONE	0.3	0.2
Soil - 6.1 REF	0	6	6	7.1	0.54	8.6	NONE	1.5	0.1
Soil - 6.2 REF	6	12	6	7.5	0.47	9	NONE	1.1	0.2
Soil - 6.3 REF	12	18	6	7.9	0.44	17.3	LOW	0.7	0.5
Soil - 6.4 REF	18	24	6	8	0.49	23.2	HIGH	1.2	1
Soil - 10.1 REF	0	6	6	7	2.17	9.5	NONE	1.3	3.1
Soil - 10.2 REF	6	12	6	7.2	1.88	11.4	NONE	1.4	3.4
Soil - 10.3 REF	12	18	6	7.6	1.19	9.4	NONE	1.1	3.1
Soil - 10.4 REF	18	24	6	7.9	0.58	5.3	NONE	0.6	2.8
Soil - 15.1 REF	0	6	6	7.7	1.57	26.9	HIGH	3.4	1.4
Soil - 15.2 REF	6	12	6	7.5	1.98	21	NONE	2.6	2.5
Soil - 15.3 REF	12	18	6	8	0.29	2.7	NONE	0.3	1.4
Soil - 15.4 REF	18	24	6	8	0.3	2	NONE	0.2	1.2
Site Ref Average				**7.8**	**0.79**	**10.4**		**1.1**	**1.3**

				Extraction Method								
	Soil Profile			**KCL**	**M3**	**NH4OAc**						
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Nitrate-N ppm**	**Phosphorus P ppm**	**Potassium K ppm**	**Nitrate - N Lbs/A**		**Nitrate-N ppm**	**Phosphorus P ppm**	**Potassium K ppm**
Soil - 11.1	0	6	6	4	65	375	7	0-12	4	65	375
Soil - 11.2	6	12	6	2.5	44	206	4	12-24	4.75	41.5	186.5
Soil - 11.3	12	18	6	4.6	45	193	8				
Soil - 11.4	18	24	6	4.9	38	180	9				
Site Average				**4**	**48**	**239**	**7**				

	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Nitrate-N ppm**	**Phosphorus P ppm**	**Potassium K ppm**	**Nitrate - N Lbs/A**				
Soil - 5.1 REF	0	6	6	2.1	15	92	4	0-12	2.1	15	92
Soil - 5.2 REF	6	12	6	0.5	9	25	1	12-24	0.5	9	24
Soil - 5.3 REF	12	18	6	< 0.1	9	24	0				
Soil - 5.4 REF	18	24	6	0.5	9	24	1				
Soil - 6.1 REF	0	6	6	11.2	66	205	20	0-12	7.3	34	179
Soil - 6.2 REF	6	12	6	7.3	34	179	13	12-24	7	22	193.5
Soil - 6.3 REF	12	18	6	8.2	8	65	15				
Soil - 6.4 REF	18	24	6	10.7	5	52	51				
Soil - 10.1 REF	0	6	6	3.3	39	335	6	0-12	6.4	35	317
Soil - 10.2 REF	6	12	6	6.4	35	317	12	12-24	4.6	50	124.5
Soil - 10.3 REF	12	18	6	2.5	18	127	4				

Soil - 10.4 REF	18	24	6	0.7	31	42		3				
Soil - 15.1 REF	0	6	6	8.5	69	207		15	0-12	8.5	69	207
Soil - 15.2 REF	6	12	6	4.4	25	116		8	12-24	0.85	8	20
Soil - 15.3 REF	12	18	6	1	10	20		2				
Soil - 15.4 REF	18	24	6	0.7	6	20		1				
Site Ref Average				**4.5**	**24**	**116**		**10**				

	Soil Profile			**Plant Available**								
				NH4OAc	**NH4OAc**	**NH4OAc**	**Hot Water**	**Ca-NO3**	**M3**	**AB-DTPA**		
		Bottom Depth	Soil Thickness	**Calcium**	**Magnesium**	**Sodium**			**Sulfate**	**Copper**	**Iron**	**Manganese**	**Zinc**
Location	Top Depth (in)	(in)	(in)	**Ca**	**Mg**	**Na**	**Boron B**	**Chloride Cl**	**S**	**Cu**	**Fe**	**Mn**	**Zn**
				ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
Soil - 11.1	0	6	6	2940	391	38	1.55	6.4	24.5	3.76	16.7	2.9	5.83
Soil - 11.2	6	12	6	2809	406	137	2	13.2	31.1	5.6	19.8	2.8	12.33
Soil - 11.3	12	18	6	2599	436	301	1.82	65.8	57.4	5.59	23.2	3.3	9.24
Soil - 11.4	18	24	6	2814	492	483	1.52	165.1	390.4	5.36	19.2	2.7	10.71
Site Average				**2791**	**431**	**240**	**1.72**	**62.6**	**125.9**	**5.08**	**19.7**	**2.9**	**9.53**

		Bottom Depth	Soil Thickness	**Calcium**	**Magnesium**	**Sodium**			**Sulfate**	**Copper**	**Iron**	**Manganese**	**Zinc**
Reference	Top Depth (in)	(in)	(in)	**Ca**	**Mg**	**Na**	**Boron B**	**Chloride Cl**	**S**	**Cu**	**Fe**	**Mn**	**Zn**
				ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
Soil - 5.1 REF	0	6	6	1169	131	68	0.27	1	3.2	0.4	7.8	1.4	0.31
Soil - 5.2 REF	6	12	6	746	73	7	0.21	0.2	2.9	0.22	5.6	1.2	0.31
Soil - 5.3 REF	12	18	6	604	69	6	0.19	0.2	2.5	0.18	5.4	1.3	0.24
Soil - 5.4 REF	18	24	6	849	100	8	0.17	0	3.7	0.21	6.1	1.1	0.18
Soil - 6.1 REF	0	6	6	1272	205	7	0.66	0.9	6.3	0.55	9.2	4	0.15
Soil - 6.2 REF	6	12	6	1318	227	14	0.62	0.9	4.6	0.49	5.3	2.7	1.32
Soil - 6.3 REF	12	18	6	2973	263	18	0.4	1.1	13.5	0.3	3.6	1.4	0.5
Soil - 6.4 REF	18	24	6	3848	435	44	0.62	1.6	17.6	0.5	4.5	1.3	0.12
Soil - 10.1 REF	0	6	6	1200	224	168	1.14	61.5	111.9	0.57	13.7	3.7	0.64
Soil - 10.2 REF	6	12	6	1503	264	194	1.23	60	99.2	0.49	10.2	3.1	0.81
Soil - 10.3 REF	12	18	6	1276	242	146	0.81	48.2	53.6	0.4	5.9	2	0.31
Soil - 10.4 REF	18	24	6	769	130	65	0.41	14.5	22.6	0.27	5	1.4	0.16
Soil - 15.1 REF	0	6	6	4091	636	148	2.12	6.5	145	5.2	10.5	2.6	3.12
Soil - 15.2 REF	6	12	6	2917	611	233	1.33	11.4	142.9	1.96	14.8	2.5	1.49
Soil - 15.3 REF	12	18	6	362	80	31	0.28	3.4	12.1	0.24	6	1.1	0.24
Soil - 15.4 REF	18	24	6	266	64	24	0.33	3.2	7.8	0.15	3.8	1.2	0.25
Site Ref Average				**1573**	**235**	**74**	**0.67**	**13.4**	**40.6**	**0.76**	**7.3**	**2.0**	**0.63**

SOIL REPORT

Terms Defined

pH	A measure of the acidity or basicity (alkalinity) of a soil. pH is defined as the negative logarithm (base 10) of the activity of hydronium ion in a solution
ECe	The Electrical Conductivity of a saturated soil Extract that measures salinity
Alkalinity	Alkalinity indicates a solution's power to react with acid and buffer its pH - the power to keep its pH from changing.

The higher the Alkanility, the higher the buffering capacity against pH change.

CEC - Cation Exchange Capacity — The measure of how many cations can be retained on soil particle surfaces.

CEC Ranges

Range 11-50 — High Clay, more lime to correct a given pH, greater capacity to hold nutrients, physical effects of high clay content, high water-holding capacity

Range 1-10 — High Sand, Nitrogen and potassium leaching, less lime to correct a given pH, physical effects of high sand content, low water-holding capacity

Optimal pH range for plant growth

6.0 -7.0

Reference Key

Low

Medium

High

Optimal

Neutral

No Reference

Analytical Error

Typical Soil Concentrations sufficient for plant growth

Element	Symbol	mg/kg ppm	percent	Relative number of atoms	Notes
Nitrogen	N	15,000	1.5	1,000,000	
Potassium	K	10,000	1	250,000	
Calcium	Ca	5,000	0.5	125,000	Root Formation
Magnesium	Mg	2,000	0.2	80,000	Chlorophyll Formation
Phosphorus	P	2,000	0.2	60,000	
Sulfur	S	1,000	0.1	30,000	Proteins & NPK Uptake
Chlorine	Cl	100	--	3,000	
Iron	Fe	100	--	2,000	Chlorophyll catalyst
Boron	B	20	--	2,000	Absorption Calcium
Manganese	Mn	50	--	1,000	
Zinc	Zn	20	--	300	
Copper	Cu	6	--	100	Photosynthesis & Respiration - correlated with %OM
Molybdenum	Mo	0.1	--	1	Fixation of Organic Nitrogen
Nickel	Ni	0.1	--	1	

Source: E.Epstein, 1965