PRIORITY CLIMATE ACTION PLAN

Poarch Band of Creek Indians

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Atmore, AL 36502

Created by Alabama Technology Network

ALABAMA TECHNOLOGY NETWORK

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This Priority Climate Action Plan is submitted on behalf of the Poarch Band of Creek Indians (hereafter referred to as “The Tribe”), a recognized federally recognized Tribe of Native Americans with reservation lands in lower Alabama. This PCAP is a narrative report that provides an overview of the Tribe’s significant greenhouse gas sources, and establishes near-term greenhouse gas emission reduction goals, and provides strategies and identifies measures that address the highest priority areas to help the Tribe to meet these goals.

This PCAP is organized into 8 sections:

1. Executive Summary
2. Introduction
3. Greenhouse Gas (GHG) Emissions Inventory
4. Scope
5. Baseline Calculations (Base Year 2022)
6. GHG Reduction Measures and Benefits Analysis
7. Review of Authority to Implement
8. Appendix A—Calculations and Rationale

Executive Summary

This Priority Climate Action Plan addresses greenhouse gas emissions from the operations of the tribal government, headquartered near Atmore, Alabama, and the commercial activity of Wind Creek Hospitality. The Scope 1 activities include emissions generation that takes place on the location of the study; Scope 2 activities address items used at the location of the study, but which produce greenhouse gas emissions at a location distant from the study site. Scope 1 activities include combustion of fuel or natural gas and wastewater treatment and handling that results in GHG emissions; the primary Scope 2 emissions considered in this report are the usage of electricity generated off-site.

Total greenhouse gas emissions generated by the above-referenced scopes total 31,207.5 Metric Tons of CO2e per year (for base year 2022).

Planned reductions will include a reduction of approximately 1802.5 Metric Tons of CO2e per year.

Introduction

The Poarch Band of Creek Indians aspires to produce this priority climate action plan (PCAP) to support investment in policies, practices, and technologies that reduce pollutant emissions, create high-quality jobs, spur economic growth, and enhance the quality of life for all members, reservation residents and employees of the PBCI.

This project has been funded wholly or in part by the United States Environmental Protection Agency (EPA). The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend the use of any commercial products mentioned in this document.

Greenhouse Gas Emissions Inventory

PBCI has developed an inventory of major sources of GHG emissions resulting from tribal functions. This inventory was prepared using the following data resource(s):

- EPA's Emission Factors for Greenhouse Gas Inventories (located at https://www.epa.gov/climateleadership/ghg-emission-factors-hub)
- EPA's Tribal Greenhouse Gas Emissions Tool (located at https://www.epa.gov/statelocalenergy/tribal-greenhouse-gas-inventory-tool)
- EPA's Direct Emissions from Mobile Combustion Sources (located at https://www.epa.gov/sites/default/files/2020-12/documents/mobileemissions.pdf)
- EIA's CO2 Carbon Dioxide Emissions Coefficients (located at https://www.eia.gov/environment/emissions/co2_vol_mass.php)
- Data procured from the Tribe.

Detailed calculations, with accompanying rationales, executed in preparation of this inventory are contained in Appendix A.

Scope

The Tribal inventory includes the following sectors and gases:

Sectors	**Greenhouse Gases (across all sectors)**
1. Transportation 2. Electricity use (Commercial, governmental and residential buildings and infrastructure) 3. Natural gas use (Commercial) 4. Backup Generator Operation (Commercial) 7. Wastewater	Carbon Dioxide (CO_2) Methane (CH_4) Nitrous Oxide (N_2O)

It should be noted that this inventory specifically addresses only Scope 1 (direct) and Scope 2 (indirect) emissions.

The majority of activity being evaluated include offices and facilities associated with tribal governance and civic activities. Examples include tribal several office buildings, membership benefits building, fire departments, ball fields, water wells, sewage lift stations, school buses, wastewater treatment and recreational facilities. Commercial activities are included in this study that include primarily Wind Creek Hospitality, a hotel and casino complex.

Since the primary source of emissions are from commercial, governmental and residential sources, industrial activity is not addressed in this study. As such, the GHGs that are typically used as solvents, for example, are not considered since there is vanishingly small usage of these chemicals.

Although refrigeration and air conditioning is used, HFCs and fluorinated gases are not included because there is no way of estimating emissions without any historical data collected.

Baseline Calculations: Base Year 2022

The selected base year is 2022. This year was chosen because it is recent, and the pandemic of COVID 19 had begun to subside. This year was chosen believing that the year was representative of relatively normal operations for the Tribe.

Table 1 details GHG emissions in metric tons (MT) of carbon dioxide equivalents (CO2e) for all economic sectors. Table 2 details emissions of specific GHGs across all sectors.

Table 1 **Poarch Band of Creek Indians GHG Emissions of CO_2e by Sector (MT/yr)**	
Transportation	140.7
Electricity Use	27,985.5
Natural Gas Combustion	2,937.9
Backup Generators (Diesel and Propane)	90.8
Wastewater	52.6
Total	31,207.5

Table 2 **Poarch Band of Creek Indians GHG Emissions in CO_2e by Gas (MT/yr)**		
CO_2	Transportation	139.7
	Electricity Use	27,922.3
	Natural Gas Combustion	2,935.0
	Backup Generators (Diesel and Propane	90.5
	Wastewater	0
CH_4	Transportation	0.05
	Electricity Use	27.1
	Natural Gas Combustion	1.5
	Backup Generators (Diesel and Propane	0.1
	Wastewater	0
N_2O	Transportation	0.9
	Electricity Use	36.1
	Natural Gas Combustion	1.5
	Backup Generators (Diesel and Propane	0.2
	Wastewater	52.6
Total		31,207.5

GHG Reduction Measures and Benefits Analysis

1. Solar Electricity Generation—Solar Panels on Wind Creek Buildings

While other measures are still being developed, the primary expected measure to reduce GHG emissions is the installation of solar power generation on solar canopies at the Wind Creek Hospitality casino and hotel. The estimated cost will be $15,000,000. According to engineering estimates provided to the Tribe, the reductions are estimated to be as outlined in Table 3 below.

Table 3
Benefit Analysis: Emissions Reduction
Solar Panel Installation

CO_2	Solar Panel Generation	1793.6 (MT/yr)
CH_4	Solar Panel Generation	3.8 CO2e (MT/yr)
N_2O	Solar Panel Generation	5.1 CO2e (MT/yr)
Total CO2e Reduction		1,802.5 CO2e (MT/yr)
Other Criteria Pollutants		
SO_2	Solar Panel Generation	453.1 (kg/yr)
NO_x	Solar Panel Generation	19.2 (kg/yr)

The emission factors for the non-GHG criteria pollutants were procured from the EPA's e-GRID database, located at https://www.epa.gov/egrid/power-profiler#/.

The implementing agency is the Poarch Band of Creek Indians; as the government, PBCI is also the implementing authority.

2. Solar Electricity Generation—Replacing LED Street Lights with Solar

It is the desire of the Tribe to replace current LED streetlights with solar powered streetlights. There are 200 streetlights within a residential subdivision, and 120 streetlights on the Tribal governmental campus. While precise wattages are unavailable, an LED streetlight manufacturer (MOKO Light LED Manufacturing (www.mokolight.com) indicates that residential LED streetlights are approximately 100 Watts, while main streets typically use 150 Watt lamps. All lights are dusk-to-dawn lights, so they are operated approximately 4,380 hours per year. According to calculations using the above data, the reductions are estimated to be as outlined in Table 4 below.

The average cost of replacement streetlight lamps was procured from a solar lighting manufacturer (HEI Solar). On average, 100W lamp fixtures cost $1,450 each, while 150W lamp fixtures cost approximately $3,000 each. This comes to an expected cost of $650,000.

Table 4 Benefit Analysis: Emission Reduction Streetlight Replacement		
CO_2	Solar Streetlights	63.5 (MT/yr)
CH_4	Solar Streetlights	0.136 CO2e (MT/yr)
N_2O	Solar Streetlights	0.180 CO2e (MT/yr)
Total CO2e Reduction		63.8 CO2e (MT/yr)

The emission factors for the non-GHG criteria pollutants were procured from the EPA's e-GRID database, located at https://www.epa.gov/egrid/power-profiler#/.

The implementing agency is the Poarch Band of Creek Indians; as the government, PBCI is also the implementing authority.

3. Partial Replacement of Diesel Buses with Electric Buses

PBCI has a small fleet of school buses and recreational buses that operate on diesel and gasoline internal combustion engines. The plan going forward is to replace some of the older diesel buses with electric buses. While reducing total emissions of greenhouse gases, this switch will reduce Scope 1 greenhouse gas emissions, but will increase the Scope 2 emissions resulting from a new use of electrical power. Despite this cancelling effect, the overall result will be a reduction of CO2e emissions by about 50%.
The cost of replacing two school buses with new electric buses is estimated to be $800,000.

According to calculations based on sizing and mileage data provided by PBCI, reductions have been calculated, with the results in Table 5 below.

Table 5a Benefit Analysis: Replacing Buses with Electric Vehicles Emissions Reduction		
CO_2	Electric Buses	48.2 CO2 (MT/yr)
CH_4	Electric Buses	0.0057 CO2e (MT/yr)
N_2O	Electric Buses	0.0508 CO2e (MT/yr)
CO2e Total Decrease		48.27 CO2e (MT/yr)

However, though removing diesel buses remove this level of CO2e emissions from the inventory (Scope 1), replacing them with electric buses will add an increase of CO2e emissions from electricity usage (Scope 2). According to calculations based vehicle miles travelled (provided by PBCI), on charge time and charger station capacity (procured from an electric bus manufacturer, Kerlin bus (kerlinbus.com)), and emission factors from the EPA's e-GRID database, (located at https://www.epa.gov/egrid/power-profiler#/), increases have been calculated, with the results in Table 4b below.

Table 5b Benefit Analysis: Replacing Buses with Electric Vehicles Emissions Increase		
CO_2	Electric Buses	22.9 CO2 (MT/yr)
CH_4	Electric Buses	0.0489 CO2e (MT/yr)
N_2O	Electric Buses	0.0650 CO2e (MT/yr)
CO2e Total Decrease		23.0 CO2e (MT/yr)

The difference results in total decrease in CO2e of 25.26 MT/yr.

The implementing agency is the Poarch Band of Creek Indians; as the government, PBCI is also the implementing authority.

4. Increasing Rate of Waste Recycling

An investigation of GHG emission reductions from waste recycling delves into Scope 3 emissions, but it is an activity that is currently taking place, and an activity which the Tribe wishes to increase.

Because the Tribe is already recycling, it is already receiving some emission reduction of GHGs. If the Tribe were to increase recycling by a rate of 20%, then there would be a corresponding GHG emission rate reduction resulting from that increase.

Using recycling volumes in 2022, the EPA's WARM Version 16 (located at https://www.epa.gov/warm/versions-waste-reduction-model#v16), the current reductions resulting from recycling are calculated, and future state emissions, assuming a 20% increase in volume, are also calculated, and the difference is calculated. Results are tabulated in Table 6.

It is estimated that additional recycling management will require additional manhours (estimated at $45,000), additional usage and maintenance of vehicles (estimated at $45,000) and efforts to promote the effort to members of the tribe (estimated at $10,000), for a estimated total cost of $100,000.

Table 6
Benefit Analysis: Increase Recycling Rates
Emissions Reduction

Types of Recycled Material	2022 TPY (Short Tons)	CO2e Emissions (MT/yr)	Future State TYP (Short Tons)	Future State CO2e Emissions (MT/yr)	Decrease in Emissions (MT/yr)
Mixed Paper	266.0	943.11	319.2	1131.73	188.62
PET Plastic	1.75	1.81	2.1	2.17	0.36
Mixed Electronics	8.29	8.29	9.95	8.99	1.49
Aluminum	0.25	0.25	0.3	2.74	0.46
Steel/Tin	18.49	81.19	22.19	97.43	16.24
Total Emissions		1035.88		1243.06	207.18

The implementing agency for all is the Poarch Band of Creek Indians; as the government, PBCI is also the implementing authority.

Authority to Implement

PBCI is a Federally Recognized Tribe and as such is a sovereign entity. PBCI is authorized to implement measures identified in the PCAP on land owned by the Tribe. All measures identified in the PCAP will require approval from the Tribal Council in the form of a signed Tribal Resolution. The installation of solar canopies at Wind Creek Atmore will require additional approval from the Tribal Gaming Commission (TGC) in the form of a signed resolution from the TGC in addition to the Tribal Council resolution.

APPENDIX A
CALCULATIONS AND RATIONALES

Emissions Calculations

Buses

Description	Engine Type	GVW	Year Model	Miles/Year	Miles/Gallon (Est)	EF CO2 (kg/gal)	CO2 (kg)	EF CH4 (g/vmt)	CH4 (kg)	CH4 CO2e (kg)	EF N2O (kg)	N20 (kg)	N2O CO2e (kg)
72 Bus	Cummins Diesel	31,000		20,000	9	10.21	22688.889	0.0095	0.19	5.32	0.0431	0.862	228.43
Lift Bus	Cummins Diesel	26,000		20,000	9	10.21	22688.889	0.0095	0.19	5.32	0.0431	0.862	228.43
42 Cultural	Cummins Diesel	26,000		20,000	9	10.21	22688.889	0.0095	0.19	5.32	0.0431	0.862	228.43
42 BGC	Cummins Diesel	26,000		20,000	9	10.21	22688.889	0.0095	0.19	5.32	0.0431	0.862	228.43
Old School Bus	International Diesel	23,000	1991	20,000	8	10.21	25525	0.0051	0.102	2.856	0.0048	0.096	25.44
Archery	E450 Gas	14,500	2009	8,000	9	8.78	7804.4444	0.034	0.272	7.616	0.0015	0.012	3.18
25 PSG	E450 Gas	14,500	2010	8,000	9	8.78	7804.4444	0.0339	0.2712	7.5936	0.0015	0.012	3.18
25 PSG	E450 Gas	14,500	2008	8,000	9	8.78	7804.4444	0.032	0.256	7.168	0.0015	0.012	3.18
						Totals (kg)	139,693.89			46.51			948.70
						Totals (MT)	139.69389			0.0465136			0.9487
						Grand Total (MT)	140.6891						

Data Sources
Emission Factors: epa.gov, ghg-emission-factors-hub-2024
Vehicle Data, including miles/year: Supplied by tribe
Miles per gallon: estimates averaged from manfacturers and various users

Emissions Calculations

Generators

Name	KW	Fuel	Fuel Rate (gal/hr)	Total Hours	EF: CO2 (kg/gal)	CO2 /year (kg)	EF CH4 (g/gal)	CH4/year (kg/year)	CH4 CO2e (kg/year)	EF N2O (g/gal)	N2O/year (kg/yr)	N20 CO2e (kg/year)
Wind Creek #1	1500	Diesel	64.8	34	10.19	22450.61	0.42	0.93	25.91	0.08	0.18	46.71
Wind Creek #2	1500	Diesel	78.8	36.3	10.19	29147.88	0.42	1.20	33.64	0.08	0.23	60.64
Wind Creek #3	1500	Diesel	82.4	33.9	10.19	28464.34	0.42	1.17	32.85	0.08	0.22	59.22
Campus #1	40	Propane	6.69	34	5.72	1301.071	0.27	0.06	1.72	0.05	0.01	3.01
Campus #2	40	Propane	6.69	34	5.72	1301.071	0.27	0.06	1.72	0.05	0.01	3.01
Campus #3	40	Propane	6.69	34	5.72	1301.071	0.27	0.06	1.72	0.05	0.01	3.01
Campus #4	40	Propane	6.69	34	5.72	1301.071	0.27	0.06	1.72	0.05	0.01	3.01
Campus #5	40	Propane	6.69	34	5.72	1301.071	0.27	0.06	1.72	0.05	0.01	3.01
Campus #6	40	Propane	6.69	34	5.72	1301.071	0.27	0.06	1.72	0.05	0.01	3.01
Campus #7	40	Propane	6.69	34	5.72	1301.071	0.27	0.06	1.72	0.05	0.01	3.01
Campus #8	40	Propane	6.69	34	5.72	1301.071	0.27	0.06	1.72	0.05	0.01	3.01
					Total kg/yr	90471.4			106.16			190.68
					Total MT/yr	90.4714			0.1061551			0.1906792
					Total MT/yr	90.76823						

Fuel Rate: Diesel came from Manufacturer Specs; Propane came from Learn Metrics HVAC Systems based on Specifications. All calculations assume 100% load

Total Hours: Diesel came from tribe; Campus came from estimate

Emission Factors: Diesel CO2 comes from US EIA. Propane and Diesel CH4 and N2O come from epa.gov, ghg-emission-factors-hub-2024

Assumption: Since CO2 EF from EIA are almost exactly same as #1 Fuel Oil in GHG Efs, CH4 and N2O EFs from #1 Fuel Oil were also used

Emissions Calculations

Natural Gas Usage

Natural Gas Usage (Therms)	CO2 EF (kg/mmBtu)	CO2 (kg/yr)	CH4 EF (g/mmBtu)	CH4 (kg/yr)	CH4 CO2e (kg/yr)	N2O EF (g/mmBtu)	N20 (kg/yr)	N2O CO2e (kg/yr)
553,247	53.05	2,934,975.34	1.00	55.32	1,549.09	0.10	5.53	1,466.10

Total CO2e (kg/yr)	2,937,990.53
Total CO2e (MT/yr)	2,937.99

Total Usage (Therms) from Tribal report.
Calculation: 553,247 Therms * (100,000 Btu/Therm) * 1mmBtu/1,000,000 Btu) = 55,324.7 mmBtu
Calculation CO2: 55,324.7 mmBtu * 53.05 kg/mmBtu = 2,934,975.34 kg CO2/year
Calculation CH4: 55,324.7 mmBtu * 1.0 g/mmBtu * (1 kg/1000 g) = 55.32 kg/yr CH4
Calculation N2O: 55,324.7 mmBtu * 0.10 g/mmBtu * (1 kg/1000 g) = 5.53 kg/yr N2O

Emissions Calculations
Wastewater

Total CO_2e (MT/yr) 52.56

Calculations from ICF.com's "Tribal GHG Inventory Tool Government Operations Module 1.31
Approximation of 2443 WWTP users. Based on estimates from 2017 Air Emissions Inventory. Includes residents, employees, WCI guests and Travel Plaza users.
It is reported that the tribe's WWTP is aerobic, and therefore emits virtually no methane. However, aerobic treatment has emissions of N_2O, which results in CO_2e emissions

Emissions Calculations
Electricity Usage

Acct #		Address	Jan	Feb	Mar	Apr	May	June	July	August	Sept	Oct	Nov	Dec	
			KWH												
		Emergency Wrning Si	35	34	33	36	35	38	36	38	37	36	37	36	
		Building 800	3056	2722	1141	1213	2030	2803	2470	2222	2199	1514	1522	2046	
		Pow-Wow Grounds	7140	5700	4340	5440	4660	7620	6260	6420	6260	3620	5380	6340	
		Tribal Member Benefi	2680	5600	3560	3200	5360	7120	6520	6480	6320	4000	4400	4680	
		Community Fire Stn	5520	5880	5000	5000	5840	6280	6280	6280	6000	4680	4720	4720	
		Environmental Hwy 2	1775	1819	1822	1576	2209	2695	2393	2966	2508	1609	1960	1725	
		Parking Lot/Pole #5	3230	3230	3310	80	3270	3430	3185	3390	3230	3230	3270	3310	
		Stomp Grounds	253	422	325	155	253	624	499	468	447	327	385	405	
		Water Tank and Well	5060	4520	6020	2221	6680	7460	7480	5920	8320	7920	6820	3320	
		Utilities Dept/ Water	4395	3700	5220	3740	4500	6660	6100	5100	1720	1100	940	6120	
		UTW Water Tank and	5360	3863	2865	4860	1404	1410	1361	1465	1546	1581	2435	2839	
		PCI Utilities Dept (UT	625	631	524	478	338	308	306	321	325	448	550	546	
		Sewage Lift Sta #2	455	428	352	333	265	268	281	303	309	358	386	414	
		M Branch North Cam	1617	2935	2551	1511	1951	4129	4239	2396	1379	1472	2154	1935	
		Magnolia Branch Sho	331	299	368	396	391	352	325	315	324	287	455	225	
		Magnolia Branch Gaz	0	0	0	0	1	0	1	124	1	0	0	0	
		Campsite	80	80	80	0	80	80	80	80	80	80	80	80	
	11095020	Magnolia Branch Campsite		2478	1993	807	2695	2474	2928	2058	2835	1689	702	326	
	11095019	Magnolia Branch Campsite		2589	2335	1745	2204	4540	3574	1913	1821	645	1557	1469	
	11095002	Perdido River Farms I	7800	7720	ni	6560	7720	9280	8880	8880	8480	6880	6760	6520	
	22013006	Perdido River Farms S	49	47	81	90	66	63	51	49	40	38	43	44	
	22013002	Perdido River Farms	141	284	287	222	315	240	101	99	427	99	103	127	
	604522020	Magnolia Branch Car	1294	325	1220	724	919	2222	1680	1011	1499	1689	1445	912	
	604522019	Magnolia Branch Car	81	97	96	194	57	4540	198	153	55	645	550	45	
	604522014	Magnolia Branch Car	523	1277	1345	872	1219	2375	2699	1537	1467	1553	911	435	
	604522013	Magnolia Branch Car	1680	1801	1951	1518	2001	2945	2667	3078	3269	2162	1734	1175	
	604522012	Sardine Campsite	1383	613	888	828	1145	2166	2314	1848	1266	515	899	332	
	604522007	Sardine/Campsite	129	197	167	223	203	1164	858	228	2038	106	201	112	
	604522008	Sardine/Campsite	1127	984	833	1331	2421	3383	2782	1554	336	964	862	564	
	604522006	Sardine/Campsite	215	67	462	600	568	528	1074	462	297	292	137	67	
	604522005	Sardine/Campsite	616	336	129	0	294	729	569	45	488	34	145	23	
	604522004	Sardine/Campsite	69	74	49	10	307	556	805	72	388	3	11	11	
	604522003	Sardine/Campsite	75	104	389	73	97	787	1328	0	217	115	192	282	
	604522002	Sardine/Campsite	160	161	161	0	274	361	225	497	233	162	163	162	
	22013080	Bell Creek Rd Perdido	25	57	1058	312	41	47	39	39	30	28	29	31	
	22013079	Atmosphere Rd Perdi	17	28	16	14	13	19	20	20	11	16	24	48	
	11095008	Matnolia Branch NO I	1446	1146	1915	50	1536	1953	1378	2417	1754	1106	1449	1024	
	11095006	Magnolia Branch Offi	1250	1250	1250	640	1250	1250	1250	1250	1250	1250	1250	1250	* aDd ons
Multiple		Magnolia Branch Util	2112	3499	6817	1782	5488	9039	9433	9014	3545	8643	7214	1507	(Accounts 604522011-604522030)
Multiple		Perdido River Farms	491	713	653	177	565	618	528	563	388	8654	268	202	(Accounts 617902001-617902009)
Multiple		Sunset Dr. Lift Stn	4621	4167	3432	3599	3685	4971	5377	3	5188	3613	3658	3962	(Accounts 26674003--26674012)
Multiple		Red Oak Sec Lights C	41	40	37	42	40	41	40	6632					(Accounts 609181010--609181033)
Multiple		Tribal Admn Bldg 600	77164	71108	82355	71199	105149	147522	140766	121952	115148	88618	80873	77569	(Accounts 26674006-26674014)
Multiple		Softball Field	213545	178490	200434	179370	241570	309161	283242	246624	229394	198040	185038	183862	(Accounts 615547003--615547019)
Multiple		Moniac Subdiv 004	671	833	461	477	332	261	189	191	218	247	346	393	(Accounts 24239001-24239021)
Multiple		Football Field	2495	2270	1715	2134	4671	4304	4159	5432	2921	2492	2198	2939	(Accounts 615547001-615547022)
Multiple		Bldg 500	355908	355315	358857	309530	424627	525773	637212	463484	441705	295130	334117	329927	(Accounts 11095013--11095065)
Multiple		Cultural Resource Ct	96082	73184	68000	57340	91103	129635	128345	110483	98286	72868	76086	84311	(Accounts 22013010-22013099)
Multiple		Perdido River Farms \	18136	17604	16079	15546	18649	28216	25727	27408	20958	20635	18739	19686	(Accounts 11095017--11095060)

Emissions Calculations
Electricity Usage

Multiple		Lift Station	27613	27528	26129	27789	30817	41584	33248	33098	31590	20967	20090	19058	(Accounts 22013016--22013070)
	609181039	PC Housing Fred Wal	45												
	22013127	PC Housing Fred Wal	16												
	22013123	PC Housing 55 Red E	189												
	22013132	PC Housing Willow Creek #230		156											
	22013131	Moniac Sub Div 455			101										
	22013104	Moniac Sub Div 452			181										
	22013104	Madison Lane 70 Apr #417			146										
	22013087	Madison Lane 70 Apt #416			296										
		Townhouse 2A				284									
		Townhouse 5D				271									
		Rolin Hills #102				115									
		Madison Lane 70 #414				390									
	22013111	Townhouse 3D					29								
	22013106	1285 Lynn McGhee Drive #21					53								
	22013048	Red Oak #412					72								
	22013101	Red Oak #418					86								
	22013135	Red Oak #410					130								
	22013133	Willow Creek #261B						615							
	22014247	Rolin Hills #103						42							
		PC Housing Fred Walker #503							540						
		Willow Creek #230							332						
		Flurnoy Circle 128 #508							685						
		Willow Creek #204B							626						
		Lynn mcGhee Drive 777 APT 463							378						
		Townhouse 5B							124						
		Willow Creek 206A								418					
		Storm Shelter Rolin Hills									115527	981	1026	1289	
		Lynn McGhee Drive 777 APT 456									595				
		Willow Creek 211									139				
		Perdido River Farms									100				
		Townhouse 5C												377	
		Moniac #458												157	
Total By Month (KwH)			858,821	798,405	819,829	717,097	991,678	1,294,681	1,354,187	1,096,800	1,134,908	773,141	784,314	778,939	
Total Annual Campus (K		11,402,800	34.27%												
Total Annual Wind Cree		21,865,797	65.73%												
Total (KwH)		33,268,597													

Usage (KWH)	CO2 EF (lb/MWH)	CO2 (lb/yr)	CO2 (kg/yr)	CH4 EF (lb/	CH4 (lb/yr)	CH4 (kg/yr)	CH4 CO2e (kg/yr)	N2O EF (lb/	N2O (lb/yr)	N2O (kg/yr	N2O CO2e (kg/yr)
33,268,597.0	839.3	27,922,333.5	12,691,969.8	0.1	2,129.2	967.8	27,098.8	0.0	299.4	136.1	36,066.2

Total CO2e (kg/yr)	27,985,498.4
Total CO2e (MT/yr)	27,985.5

Emissions Calculations
Electricity Reduction-Solar

Usage (KWH)	CO2 EF (lb/MWH)	CO2 (lb/yr)	CO2 (kg/yr)	CH4 EF (lb/MWH)	CH4 (lb/yr)	CH4 (kg/yr)	CH4 CO2e (kg/yr)	N2O EF (lb/MWH)	N2O (lb/yr)	N2O (kg/yr)	N2O CO2e (kg/yr)
4,701,491.0	839.3	3,945,961.4	1,793,618.8	0.1	300.9	136.8	3,829.6	0.0	42.3	19.2	5,096.8
MT CO2e (MT/yr)			1793.6				3.8				5.1

Total CO2e (kg/yr)	1,802,545.2	
Total CO2e (MT/yr)	1,802.5	REDUCTION

Note: 4,701,491 KWH is calculated power generated by solar cells installed at Wind Creek

Emissions Calculations
Non-GHG Emissions Reduction

Usage (KWH)	CO2 EF (lb/MWH)	CO2 (lb/yr)	CO2 (kg/yr)	SO_2 EF (lb/MWh)	SO_2 (lb/yr)	SO_2 (kg/yr)	NO_x EF (lb/MWH)	NO_x (lb/yr)	NO_x (kg/yr)
4,701,491.0	839.3	3,945,961.4	1,793,618.8	0.212	996.7	453.1	0.009	42.3	19.2
MT CO2e (MT/yr)			1793.6			0.45			0.02

Emissions Calculations
Reduction from Solar Streetligh

Reported: 200 LED streetlights in subdivision

Reported: 120 LED streetlights on campus

Reported: All streetlights are dusk-to-dawn, therefore average 4,380 hours per year

Assumption: 100 W streetlights in subdivision, 150 W streetlights on campus (MOKO Light LED Manufacturer (www.mokolight.com)

The goal is to replace streetlights with solar units, which will wil reduce power consumption

Location	# Lamps	Watts	Hours	Usage (KWH)	CO2 EF (lb/MWH)	CO2 (lb/yr)	CO2 (kg/yr)	CH4 EF (lb/MWH)	CH4 (lb/yr)	CH4 (kg/yr)	CH4 CO2e (kg/yr)	N2O EF (lb/MWH)	N2O (lb/yr)	N2O (kg/yr)	N2O CO2e (kg/yr)
Subdivisior	200	100	4380	87,600.0	839.3	73,522.7	33,419.4	0.1	5.6	2.5	71.4	0.0	0.8	0.4	95.0
Campus	120	150	4380	78,840.0	839.3	66,170.4	30,077.5	0.1	5.0	2.3	64.2	0.0	0.7	0.3	85.5
Total (kg/yr)							63,496.9				135.6				180.4
Total (MT/yr)							63.5				0.136				0.180

Total CO2e (kg/yr)	63,812.9
Total CO2e (MT/yr)	63.8

Emissions Calculations

Reduction from Electric Buses

EMISSION REDUCTION FROM REMOVING DIESEL BUSES FROM FLEET

Description	Engine Typ	GVW	Year Model	Miles/Year	Miles/Gallon (Est)	EF CO2 (kg/gal)	CO2 (kg)	EF CH4 (g/vmt)	CH4 (kg)	CH4 CO2e (kg)	EF N2O (kg)	N20 (kg)	N2O CO2e (kg)
72 Bus	Cummins [	31,000		20,000	9	10.21	22688.88889	0.0051	0.102	2.856	0.0048	0.096	25.44
Old School	Internation	23,000	1991	20,000	8	10.21	25525	0.0051	0.102	2.856	0.0048	0.096	25.44
						CO2e Totals (kg	48,213.89			5.71			50.88
						CO2e Totals (M	48.21			0.005712			0.05088

CO2e Grand Total (MT) 48.27 DECREASE

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Data Sources

CO2 Emission Factors: epa.gov, ghg-emission-factors-hub-2024

CH4 and N2O Emission Factors: epa.gov, Direct Emissions from Mobile Combustion Sources

Vehicle Data, including miles/year: Supplied by tribe

Miles per gallon: estimates averaged from manfacturers and various users

EMISSION INCREASE FROM ADDING ELECTRIC BUSES TO FLEET

Reported: Two diesel buses to be replaced with electric. Each bus logs approximately 20,000 miles per year.

From Kerlinbus.com: A charge is needed every ~100 miles. A charge requires 2-3 hours (using 60 kW charger) or 8-9 hours (using 20 kW charger). We will assume a 60 kW charger and 2.5 hours.

Identificati	Miles/year	miles/char	kW used	hours/charge	Usage (KWH)	CO2 EF (lb/MWH)	CO2 (lb/yr)	CO2 (kg/yr)	CH4 EF (lb/MWH)	CH4 (lb/yr)	CH4 (kg/yr)	CH4 CO2e (kg/yr)	N2O EF (lb/MWH)	N2O (lb/yr)	N2O (kg/yr)	N2O CO2e (kg/yr)
72 Bus	20,000	100	60	2.5	30,000.0	839.3	25,179.0	11,445.0	0.1	1.9	0.9	24.4	0.0	0.3	0.1	32.5
Old School	20,000	100	60	2.5	30,000.0	839.3	25,179.0	11,445.0	0.1	1.9	0.9	24.4	0.0	0.3	0.1	32.5
					CO2e Totals (kg/yr)			22890.0				48.9				65.0
					CO2e Totals (MT/yr)			22.9				0.0489				0.0650

Total CO2e (MT/yr) 23.0 INCREASE

NET CHANGE FROM REPLACING DIESEL BUSES WITH ELECTRIC BUSES

Net Change (Decrease) CO2e (MT/yr) 25.27

Emissions Calculations

Totals

CO2e		CO2	CH4 (CO2e)	N2O (CO2e)
Scope 1				
Buses MT/yr	140.7	139.7	0.05	0.9
Generators MT/yr	90.8	90.5	0.1	0.2
Natural Gas Heat (MT/y	2,938.0	2935.0	1.5	1.5
Wastewater (MT/yr)	52.6	0.0	0.0	52.6
Tot Scope 1	3,222.0			
Scope 2				
Electricity MT/yr	27,985.5	27922.3	27.1	36.1
Tot Scope 2 (MT/yr)	27,985.5			
Total Generated (MT/yr	31,207.5			
Potential Reductions (M	1,891.6			
Recycling Reductions	207.2			
Total Reductions	2,098.8			
Percent Reduction	6.73%			
Totals		31087.5	28.8	91.2