MEMORANDUM

To:	Jordan Schaefer, P.E., Kimley-Horn and Associates, Inc.
From:	Ryan Chiene and Alex Pohlman, Kimley-Horn and Associates, Inc.
Date:	July 22, 2022
Subject:	Francis Harris Lane Air Quality Technical Memorandum

PURPOSE

The purpose of this memorandum is to evaluate the potential air quality and health effects of future residents at the proposed Francis Harris Lane Single Family Master Plan (Project) site.

PROJECT DESCRIPTION

The Project site is a 136.9 acres tract of land located at 900 Francis Harris Lane in San Marcos, Hays County, Texas. The Project site is currently comprised of one lot with a portion being utilized as residential and the remainder as agricultural. The proposed development will be comprised of approximately 470 residential lots, parks/open space, and public improvements. The public improvements that will be constructed as part of the development will consist of streets, sidewalks, utility infrastructure, and drainage infrastructure; see <u>Figure 1: Conceptual Site Layout</u>. Water and wastewater services will be extended approximately 9,000 LF and 6,000 LF, respectively, to serve the proposed development. Storm water runoff will be detained in a various ponds spread throughout the site and released at a rate no greater than existing conditions.

REGULATORY SETTING

National Environmental Policy Act

The National Environmental Policy Act (NEPA) applies to all federally-funded projects. Air quality is an environmental concern within the broad purview of NEPA. The requirements of NEPA have been defined in the Council of Environmental Quality's (CEQ) NEPA regulations that apply to all federal agencies and the Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) joint NEPA procedures. The text of the NEPA statute, the CEQ NEPA regulations (40 CFR 1500) and FHWA's NEPA regulations (23 CFR 771) however do not contain specific requirements for air quality analyses. As the Project does not involve federal funding, NEPA does not apply.

Figure 1: Conceptual Site Layout



National Ambient Air Quality Standards

Pursuant to the Federal Clean Air Act of 1970 (CAA), the U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for major pollutants known as "criteria pollutants." Currently, the EPA regulates six criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), ozone (O₃), particulate matter, and sulfur dioxide (SO₂). Particulate matter (PM) is organized in two particle size categories: particles with a diameter less than 10 micrometers (PM₁₀) and those with a diameter of less than 2.5 micrometers (PM_{2.5}).

<u>Table 1: National Ambient Air Quality Standards</u> shows the primary and secondary NAAQS for the criteria pollutants. The NAAQS are two-tiered. The first tier (primary) is intended to protect the public health of "sensitive" populations such as asthmatics, children, and the elderly; the second tier (secondary) is intended to prevent further degradation of the environment (e.g., protection against deceased visibility and damage to animals, crops, vegetation, and buildings).

Pollutant	Averaging Time	Primary Standards ¹	Secondary Standards ¹	
CO	8- hour	9 ppm (10 mg/m ³)	None	
	1- hour	35 ppm (40 mg/m ³)	None	
Pb ^[2]	Rolling 3-Month Average ¹	0.15 μg/m³	Same as Primary	
NO	Annual Arithmetic Mean ²	53 ppb	Same as Primary	
NO ₂	1-hour	100 ppb	None	
PM ₁₀	24-hour	150 μg/m³	Same as Primary	
514	Annual Arithmetic Mean	15 μg/m³	Same as Primary	
PIVI _{2.5}	24-hour	35 μg/m³	Same as Primary	
O ₃	8-hour ³	0.070 ppm	Same as Primary	
60	1-hour ⁴	75 ppb	None	
3U ₂	3-hour	None	0.5 ppm	

Table 1: National Ambient Air Quality Standards

Notes:

1 In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m3 as a calendar quarter average) also remain in effect.

2. The level of the annual NO₂ standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

3. Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O₃ standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O₃ standards.

4. The previous SO₂ standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO₂ standards or is not meeting the requirements of a SIP call under the previous SO₂ standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Source: United States Environmental Protection Agency, NAAQS Table, https://www.epa.gov/criteria-air-pollutants/naaqs-table

San Marcos Development Code

The City of San Marcos adopted a new Development Code (SMDC) on April 17, 2018, which was later amended in 2020. The Development Code has provided San Marcos with a better process for managing growth that is in line with Vision San Marcos Comprehensive Plan. Chapter 7, Supplemental Development Standards of the Development Code includes standards development standards related to air quality.

Section 7.4.2.2 Smoke and Particulate Matter

- A. Standards. No operation or use shall cause, create, or allow the emission for more than three minutes in any one hour of air contaminants which at the emission point or within the bounds of the property:
 - 1. Are of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke or contaminants in the standard prescribed by the ASTM, except when the presence of uncombined water is the only reason for failure to comply, or when such contaminants are emitted inside a building which prevents their escape into the atmosphere;
 - 2. Exceed 0.5 pounds per acre of property within the plant site;
 - 3. Exceed four grains of dust or particulate matter per 1,000 cubic feet of air at any boundary line of the tract on which the use is located, as a result of open storage or open processing operations, including on-site transportation movements which are the source of wind or air borne dust or other particulate matter, or operations such as paint spraying, grain handling, sand or gravel processing or storage or sand blasting.

AFFECTED ENVIRONMENT

Climate and Meteorology

Climate in this area is characterized by hot, humid summers and generally mild to cool winters, with some winter frost at night. Based on data provided by the National Weather Service, the average annual temperature for the San Antonio area (representing data closest to the San Marcos area) is 69.6 degrees Fahrenheit. The area typically receives 32.38 inches of rainfall annually and up to 0.2 inches of snow.¹

Wind data from the San Antonio meteorological station located approximately 33 miles to the southwest of the Project was used to generate a wind rose. The values presented in Figure 2: San <u>Antonio Wind Rose</u> represent the percent of the time the wind blows from a particular direction at a given speed. As shown in Figure 2, predominant winds blow from the southeast to the northwest.

¹ National Weather Service, https://www.weather.gov/wrh/Climate?wfo=ewx, accessed on July 19, 2022.

Kimley *Whorn*

Figure 2: San Antonio Wind Rose



WRPLOT View - Lakes Environmetrial Software

Existing Emissions Sources

The Project area includes Hays Energy Facility, a 989-megawatt (MW) Combined Cycle Gas Turbine (CCGT) power plant, located approximately 880 feet to the southeast of the Project site. The power plant consists of four General Electric (GE) natural gas turbines which generate electricity. Exhaust heat from the gas turbines is captured and used to power four GE steam turbines which generate additional electricity. The Hays Energy Facility has had no compliance violations for air pollutants or Toxic Air Contaminants (TACs) in the past five years.²

National Ambient Air Quality Standard Attainment Status

Section 176(c) of the CAA requires Federal agencies to assure that all of their actions conform to applicable implementation plans for achieving and maintaining the NAAQS. Federal actions must not cause or contribute to any new violation of any standard, increase the frequency or severity of any existing violation, or delay timely attainment of any standard. The standards in <u>Table 1</u> apply to the concentration of a pollutant in outdoor ambient air. If the air quality in a geographic area is equal to or is better than the national standard, it is called an attainment area. Areas where air quality does not meet the national standard are called nonattainment areas. Once the air quality in a non-attainment area improves to the point where it meets the standards and the additional redesignation requirements in the CAA [Section 107(d) (3)(E)], EPA redesignates the area as a "maintenance area." The Clean Air Act Amendments (CAAA) of 1990 requires states to designate the status of all areas within their borders as being in or out of compliance with the NAAQS. The CAAA further defines non-attainment areas for O_3 , CO, and PM based on the severity of the violation as marginal, moderate, severe, and extreme.

Attainment Classifications

The Project is located in the southern portion of Hays County area which is included in Texas Commission on Environmental Quality's (TCEQ) Austin Region and is classified by the EPA as being in attainment for all pollutants.³

Air Quality Monitoring Data

The existing air quality of the study area was estimated using monitoring data reported by the TCEQ Office of Air Quality Monitoring and the EPA for the most recent three-year period available (2019 to 2021). The analysis focused on regulated air pollutants contained in the NAAQS; including SO₂, CO, NO₂, O₃, PM₁₀, and PM_{2.5}.

² United States Environmental Protection Agency, Hays Energy Facility Detailed Facility Report,

https://echo.epa.gov/detailed-facility-report?fid=110021082816#/, accessed on July 19, 2022.

³ United States Environmental Protection Agency, *Texas Nonattainment/Maintenance Status for Each County by Year for all Criteria Pollutants*, https://www3.epa.gov/airquality/greenbook/anayo_tx.html, accessed on July 19, 2022.

Kimley *Whorn*

For the short-term average period (i.e., 1-hour, 3-hour, 8-hour, and 24-hour averages), the highest of the second highest observations were selected for the background concentration for each year, except 24-hour PM_{2.5} which represents the 98th percentile and O₃ which represents the fourth highest daily 8-hour maximum within each year. For long-term averages (i.e., annual averages), the highest observation was used as the background concentration for each pollutant in each year. The highest background concentration among the three years of monitoring data was then selected to represent the 3-year background level of each pollutant. These averaging periods are consistent with the shortterm and long-term ambient air quality standards.

The Project is located in Hays County, part of the Austin Region. However, the closest monitoring stations to the Project area are actually located in the San Antonio Region. No single monitoring station near the Project measures all six criteria pollutants, therefore measurements from four nearby stations are used to estimate background levels. The nearest active monitoring stations range in distance from 28 miles to 37 miles to the southwest. A summary of the background air quality concentrations are presented in Table 2: Ambient Air Quality Data. Measured levels from the nearest monitoring stations are all below the NAAQS except for ozone. However, the Project is located in Hays County which is in attainment for all pollutants.

Pollutant	Averaging Period	2019	2020	2021	NAAQS		
CO (ppm) ¹	1-Hour 8-Hour	1.6 ppm 1.1 ppm	1.7 ppm 1.2 ppm	1.2 ppm 0.9 ppm	35 ppm 9 ppm		
NO ₂ (ppb) ¹	1-Hour Annual	42.1 ppb 16.7 ppb	39.2 ppb 17.2 ppb	39.9 ppb 15.2 ppb	100 ppb 53 ppb		
PM ₁₀ (μg/m ³) ²	24-Hour	5 μg/m³	79 μg/m³	69 μg/m³	150 μg/m³		
PM _{2.5} (μg/m³) ¹	24-Hour Annual	21.1 μg/m³ 9.1 μg/m³	19.2 μg/m ³ 8.3 μg/m ³	20.6 μg/m ³ 8.5 μg/m ³	35 μg/m³ 15 μg/m³		
O₃ (ppm)³	8-Hour	0.075 ppm	0.074 ppm	0.078 ppm	0.070 ppm		
SO ₂ (ppb) ⁴	1-Hour	4.0 ppb	5.9 ppb	3.3 ppb	75 ppb		
NAAQS = National Ambient Air Quality Standards; ppm = parts per million; ppb = parts per billion, $\mu g/m^3$ = micrograms per cubic meter							
1 Measurements taken at San Antonio I-35 monitoring station AOS Site ID: 1069 located 31 miles southwest of Project site							

Table 2: Ambient Air Quality Data

2. Measurements taken at San Antonio Bulverde Pkwy monitoring station, AQS Site ID: 1087, located 28 miles southwest of Project site. 3. Measurements taken at Camp Bullis monitoring station, AQS Site ID: 0052, located 36 miles southwest of Project site.

4. Measurements taken at San Antonio Gardner Rd monitoring station, AQS Site ID: 1080, located 37 miles southwest of the Project site.

Source: United States Environmental Protection Agency, AirData, Interactive Map of Air Quality Monitors, https://www.epa.gov/outdoorair-quality-data/interactive-map-air-quality-monitors

IMPACT ANALYSIS

Air Quality Emissions

Depending upon the pollutant being discussed, the potential air quality impact may be of either regional or local concern. For example, ROG, NO₂, PM_{10} , and $PM_{2.5}$ are all pollutants of regional concern. NO₂ and ROG react with sunlight to form O₃, known as photochemical smog. Additionally, wind currents readily transport PM_{10} and $PM_{2.5}$. However, CO tends to be a localized pollutant, dispersing rapidly at the source.

According to the EPA's Enforcement and Compliance History Online (ECHO) facility report,⁴ the Hays Energy Facility has received no air quality violations. Therefore, the power plant is operating at approved EPA standards and would not endanger residents. The ECHO air pollutant report identifies annual emissions associated with the power plant.⁵ Ambient air quality conditions, which include the power plant, do not exceed NAAQS health based (primary) standards and Hays County is in attainment for all pollutants.

The SMDC includes additional air quality standards not associated with EPA thresholds. SMDC Section 7.4.2.2 states that no use shall cause the emissions for more than three minutes in an hour that might (1) obscure an observers view to a degree equal to or greater than smoke, except if uncombined water is present, (2) exceed 0.5 pounds per acre of property, or (3) exceed four grains of dust or particulate matter within 1,000 cubic feet of the use. The power plant includes four stacks which release CO, NOx, PM, and SO₂ emissions high above the ground (the stacks are at least 100 feet in height). As shown in Figure 2, prevailing winds would blow emissions from the plant towards the Project. However, because of the elevation of the chimney stacks and wind transport, emissions from the plant disperse rapidly and would not affect future residents at the Project site. The power plant property is 101 acres in size; thus, PM emissions would total 0.08 pounds per acre which is below the City's standard of 0.5 pounds acre of property per SMDC Section 7.4.2.2. In addition, the power plant stacks include filters which remove larger particulates and do not conflict with the restrictions under SMDC Section 7.4.2.2.

Human Health Effects

The EPA's Environmental Justice Screening and Mapping Tool (EJScreen) shows that based on 2017 data, residents in the Project area are in the 32.7 percentile for asthma cases, 44.9 percentile for heart disease, and 47.4 percentile for low life expectancy, which includes emissions from the existing power plant.⁶ These percentiles indicate residents in the Project area have longer life expectancies, and lower risk of asthma or heart disease than the more polluted areas in Texas and the United States.

⁴ United States Environmental Protection Agency, Hays Energy Facility Detailed Facility Report,

https://echo.epa.gov/detailed-facility-report?fid=110021082816#/, accessed on July 19, 2022.

⁵ United States Environmental Protection Agency, *Hays Energy Facility Air Pollutant Report*, https://echo.epa.gov/air-pollutant-report?fid=110021082816, accessed on July 19, 2022.

⁶ United States Environmental Protection Agency, *EJScreen: Environmental Justice Screening and Mapping Tool*, https://ejscreen.epa.gov/mapper/, accessed July 21, 2022.

The National Emission Standard for Hazardous Air Pollutants (NESHAP) rule sets the upper limit of acceptable cancer risk at about a 1-in-10,000 (or 100-in-1 million) lifetime cancer risk for the most exposed person. The EPA generally presumes that if the risk to an individual is 100-in-1 million or less, that risk level is considered acceptable.⁷ The EJScreen website shows that cancer risk in the Project area (including air pollutant and TAC emissions from the Hays Energy Facility) is 30-in-1 million which is below the EPA's acceptable risk level. Therefore, cancer risk at the Project site is within acceptable EPA standards and the adjacent power plant would not have a harmful effect to future residents at the Project site.

Existing overhead electrical power lines would run along the southern portion of the site, which generate low frequency non-ionizing electromagnetic field (EMF). At sufficiently high exposure levels and prolonged exposure durations, EMFs also directly affect human health. For overhead transmission and power lines, the strength of an EMF is typically the highest directly under the overhead line and decreases rapidly with increasing distance from the line.⁸ According to the national Institute of Environmental Health Sciences (NIH), EMF levels at a distance of 200 feet from a 230 kV transmission line and a 115 kV power line are reduced by approximately 97 and 99 percent, respectively. As such, at a distance of 170 feet (i.e., the setback distance from the existing power transmission lines to the proposed residential lots) EMF levels would diminish substantially and are not expected to exceed the established American National Standards Institute (ANSI), Institute of Electrical and Electronic Engineers (IEEE), or Occupational Safety and Health Administration (OSHA) safety level standards.

In addition, extensive research on EMFs has led the majority of scientists and health officials to conclude that low-frequency EMFs have no adverse health effects at typical exposure levels. Objective scientific reviews of animal studies, from which some human health risks have been extrapolated, have also concluded that existing data are inadequate to indicate a potential risk of cancer, which is the primary human health concern associated with EMF exposure.⁹

CONCLUSION

As discussed above, future residents at the Project site would not be exposed to significant air pollutant emissions and/or have an increased risk of negative human health effects from the proximity to the Hays Energy Facility or due to existing conditions in the area.

⁷ United States Environmental Protection Agency, *Residual Risk Report to Congress*, https://www.epa.gov/sites/default/files/2013-08/documents/risk_rep.pdf.

⁸ National Institute of Environmental Health Sciences, 2016.

⁹ National Institute of Environmental Health Sciences, *EMF: Electric and Magnetic Fields Associated with the Use of Electric Power Questions & Answers*, June 2002.