Appendix B

Air Quality and Greenhouse Gas Emissions Assessment

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December 4, 2020 Project # COF-32

Mr. Scott Johnson, AICP
Planning Manager
City of Folsom, Community Development Department
50 Natoma Street
Folsom, CA 95630

Subject: Folsom Lakeside Crematorium Project Air Quality and Greenhouse Gas Emissions Assessment

Dear Mr. Johnson:

HELIX Environmental Planning, Inc. (HELIX) has assessed the air quality and greenhouse gas (GHG) emissions associated with the construction and operation of the proposed Folsom Lakeside Crematorium Project (project), including a health risk assessment (HRA) to evaluate potential community health risks from the project's emissions. The analysis has been prepared to support environmental review under the California Environmental Quality Act (CEQA).

PROJECT LOCATION

The project would be constructed within an approximately 12-acre parcel in the City of Folsom (City) in Sacramento County, California. The project site is located west of the intersection of Forrest Street/Natoma Street with Folsom Boulevard, within the existing Lakeside Memorial Lawn Cemetery (See Figure1, *Regional Location*, attached to this letter report).

PROJECT DESCRIPTION

The project would consist of installation of an HCT Apex-250 crematory, a 10-foot by 15-foot cooler, and associated electrical and propane improvements in an existing metal shed on the grounds of the existing Lakeside Memorial Lawn Cemetery. The shed would be modified to accommodate the equipment, but the shed would not be expanded beyond the existing 1,071 square feet footprint. Two 250-gallon propane tanks would be installed on a small concrete pad along the northern side of the shed to provide power for the crematory (see Figure 2, *Detailed Site Plan*, attached to this letter report).

AIR QUALITY ANALYSIS

Environmental Setting

The City of Folsom lies within the Sacramento Valley Air Basin (SVAB), near the southeastern edge. The SVAB consists of all or parts of eleven counties spanning from Solano and Sacramento counties to the south, and Shasta County to the north. The Sacramento Metropolitan Air Quality Management District (SMAQMD) is responsible for implementing emissions standards and other requirements of federal and state laws for Sacramento County, including the project area.

The climate of the SVAB is characterized by hot dry summers and mild rainy winters. During the year the temperature may range from 20 to 115 degrees Fahrenheit with summer highs usually in the 90s and winter lows occasionally below freezing. Average annual rainfall is about 20 inches with snowfall being very rare. The prevailing winds are moderate in strength and vary from moist breezes from the south to dry land flows from the north. The mountains surrounding the Sacramento Valley create a barrier to airflow, which can trap air pollutants in the valley when certain meteorological conditions are right and a temperature inversion (areas of warm air overlying areas of cooler air) exists. Air stagnation in the autumn and early winter occurs when large high-pressure cells lie over the valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduces the influx of outside air and allows pollutants to become concentrated in the air. The surface concentrations of pollutants are highest when these conditions are combined with increased levels of smoke or when temperature inversions trap cool air, fog and pollutants near the ground. The ozone season (May through October) in the SVAB is characterized by stagnant morning air or light winds with the breeze arriving in the afternoon out of the southwest from the San Francisco Bay. Usually the evening breeze transports the airborne pollutants to the north out of the SVAB. During about half of the days from July to September, however, a phenomenon called the “Schultz Eddy” prevents this from occurring. Instead of allowing for the prevailing wind patterns to move north carrying the pollutants out of the valley, the Schultz Eddy causes the wind pattern and pollutants to circle back southward. This phenomenon’s effect exacerbates the pollution levels in the area and increases the likelihood of violating the federal and state air quality standards (SMAQMD 2020a).

Regulatory Setting

Criteria Pollutants

Ambient air quality is described in terms of compliance with state and national standards, and the levels of air pollutant concentrations considered safe, to protect the public health and welfare. These standards are designed to protect people most sensitive to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. The U.S. Environmental Protection Agency (USEPA), the federal agency that administrates the Federal Clean Air Act of 1970, as amended in 1990, has established national ambient air quality standards (NAAQS) for several air pollution constituents known as criteria pollutants, including: ozone (O_3); carbon monoxide (CO); coarse particulate matter (PM_{10}; particles 10 microns or less) and fine particulate matter ($PM_{2.5}$; particles 2.5 microns or less); sulfur dioxide (SO_2); and lead (Pb). As permitted by the Clean Air Act, California has adopted the more stringent California ambient air quality standards (CAAQS) and expanded the number of regulated air constituents. Ground-level ozone is not emitted directly into the environment but is generated from complex chemical and photochemical reactions between precursor pollutants, primarily reactive organic gases (ROGs; also known as volatile organic compounds [VOCs]), [1] and oxides of nitrogen (NO_X). PM_{10} and $PM_{2.5}$ are generated from a variety of sources, including road dust, diesel exhaust, fuel combustion, tire and brake wear, construction operations and windblown dust. In addition, PM_{10} and $PM_{2.5}$ can also be formed through chemical and photochemical reactions of precursor pollutants in the atmosphere.

The California Air Resources Board (CARB) is required to designate areas of the state as attainment, nonattainment, or unclassified for the ambient air quality standards. An "attainment" designation for an area signifies that pollutant concentrations do not violate the standard for that pollutant in that area. A "nonattainment" designation indicates that a pollutant concentration violated the standard at least once. An "unclassified" designation indicates that insufficient data was available to determine the status. The air quality attainment status of Sacramento County is shown in Table 1, *Sacramento County Attainment Status*.

Table 1
SACRAMENTO COUNTY ATTAINMENT STATUS

Pollutant	State of California Attainment Status	Federal Attainment Status
Ozone (1-hour)	Nonattainment	No Federal Standard
Ozone (8-hour)	Nonattainment	Nonattainment
Coarse Particulate Matter (PM_{10})	Nonattainment	Attainment
Fine Particulate Matter ($PM_{2.5}$)	Attainment	Nonattainment
Carbon Monoxide (CO)	Attainment	Attainment
Nitrogen Dioxide ($N0_2$)	Attainment	Attainment
Lead	Attainment	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Sulfates	Attainment	No Federal Standard
Hydrogen Sulfide	Unclassified	No Federal Standard
Visibility Reducing Particles	Unclassified	No Federal Standard

Sources: SMAQMD 2020a.

Sacramento County is designated as nonattainment for the state and federal ozone standards, the state PM_{10} standards, and the federal $PM_{2.5}$ standards. The SMAQMD is responsible for implementing emissions standards and other requirements of federal and state laws in Sacramento County. Attainment plans for meeting the federal air quality standards are incorporated into the State Implementation Plan (SIP), which is subsequently submitted to the USEPA, the federal agency that administrates the Federal CAA of 1970, as amended in 1990. The current air quality plan applicable to the project, the *Sacramento Regional 2008 NAAQS 8-Hour Ozone Attainment and Reasonable Further Progress Plan* (Regional Ozone Plan), was developed by the SMAQMD and adjacent air district to describe how the air districts in and near the Sacramento metropolitan area will continue the progress toward attaining state and national ozone air quality standards (SMAQMD 2017).

[1] CARB defines and uses the term ROGs while the USEPA defines and uses the term VOCs. The compounds included in the lists of ROGs and VOCs and the methods of calculation are slightly different. However, for the purposes of estimating criteria pollutant precursor emissions, the two terms are often used interchangeably.

Toxic Air Contaminants

Toxic air contaminants (TACs) are a diverse group of air pollutants that may cause or contribute to an increase in deaths or in serious illness or that may pose a present or potential hazard to human health. TACs can cause long-term chronic health effects such as cancer, birth defects, neurological damage, asthma, bronchitis, or genetic damage, or short-term acute effects such as eye watering, respiratory irritation (a cough), runny nose, throat pain, and headaches. TACs are considered either carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. For carcinogenic TACs, there is no level of exposure that is considered safe and impacts are evaluated in terms of overall relative risk expressed as excess cancer cases per one million exposed individuals. Noncarcinogenic TACs differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

The Health and Safety Code (§39655[a]) defines TAC as "an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health." All substances that are listed as hazardous air pollutants pursuant to subsection (b) of Section 112 of the CAA (42 United States Code Sec. 7412[b]) are designated as TACs. Under State law, the California Environmental Protection Agency (CalEPA), acting through CARB, is authorized to identify a substance as a TAC if it determines the substance is an air pollutant that may cause or contribute to an increase in mortality or an increase in serious illness, or that may pose a present or potential hazard to human health.

Crematories are a potential source of TACs as a result of trace metals and organic compounds that accumulate in the body throughout a person's life and are released during combustion of human remains, and as a result of trace organic compounds that are formed in the combustion process. These TACs include: metals and inorganics (i.e., arsenic, beryllium, cadmium, chromium, copper, hydrogen fluoride, lead, mercury, nickel, selenium, zinc); VOCs (i.e., benzene, toluene, xylenes, vinyl chloride); aldehydes (i.e., acetaldehyde, formaldehyde); polyaromatic hydrocarbons (PAHs); polychlorinated dibenzodioxins (dioxins; PCDDs); and polychlorinated dibenzofurans (furans; PCDFs). Prolonged exposure to significant concentrations of these TACS can result in a variety of adverse health effects including cancers, chronic conditions, and/or acute conditions, depending on the substance and level of exposure. Based on the results of the HRA, described below, hexavalent chromium and mercury are the primary drivers of the health risks from crematory emissions because the health risks from crematory emissions of these substances are one or more orders of magnitude greater than the health risks from other TACs in crematory emissions.

Increased Cancer Risks – Hexavalent Chromium. Hexavalent chromium is a toxic form of the element chromium. Hexavalent chromium compounds are man-made and widely used in many different industries. Prolonged exposure to airborne hexavalent chromium may result in lung cancer. Although exposure to high levels of airborne hexavalent chromium may result in irritation or damage to the nose, throat, and lungs, breathing small amounts of hexavalent chromium even for long periods does not cause respiratory tract irritation in most people (Occupational Safety and Health Administration [OSHA] 2006).

Non-Cancer Chronic and Acute Health Risks – Mercury. Mercury is a naturally occurring element that is found in its elemental form (commonly known as quicksilver), in organic compounds which accumulate in fish and shellfish, and in inorganic compounds mainly occurring in contaminated drinking water. Mercury is a neurotoxin that can result in a range of chronic neurological disorders and developmental issues. The specific health effects of mercury are dependent on the form and amount of mercury in the exposure, the duration of the exposure, and the age of the individual (USEPA 2020).

Sensitive Receptors

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved and are referred to as sensitive receptors. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers. CARB and the Office of Environmental Health Hazard Assessment (OEHHA) have identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over 65, children under 14, infants (including in utero in the third trimester of pregnancy), and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis (CARB 2005; OEHHA 2015).

Residential areas are considered sensitive receptors to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Children and infants are considered more susceptible to health effects of air pollution due to their immature immune systems, developing organs, and higher breathing rates. As such, schools are also considered sensitive receptors, as children are present for extended durations and engage in regular outdoor activities.

The closest existing sensitive receptors to the project site are multiple single-family residences adjacent to the cemetery to the north, between 450 and 750 feet from the proposed crematory location, and mobile homes across Folsom Boulevard to the east, approximately 700 feet from the proposed crematory location, see Figure 3, *Receptor Locations*, attached to this letter report. The closest school to the project site is the Folsom Montessori School approximately 3,200 feet (0.6 miles) to the northeast.

Methods

Criteria Pollutant Emissions

Criteria pollutant and precursor emissions for long-term operation of the proposed crematory were calculated using propane combustion emissions factors from the USEPA AP-42 Compilation of Emissions Factors Chapter 1.5 (USEPA 2008), and crematory emissions factors provided by the SMAQMD, which combined USEPA AP-42 data and the USEPA Factor Information Retrieval Program (SMAQMD 2020b).

Crematory Health Risks

Potential health risks to nearby sensitive receptors from the emission of TACs during operation of the proposed crematory were analyzed after consultation with the SMAQMD and in accordance with the OEHHA Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015).

TAC Emissions

Toxic emissions from the cremation process were estimated based on emissions factors provided by the SMAQMD and on maximum cremation process rates provided by Caring Service Group of 200 pounds per hour and 100,000 pounds per year. The TAC emissions factors provided by SMAQMD were based on a data in a test report from CARB that measured emissions from two propane-fires crematories (SMAQMD 2020b)

Dispersion Modeling

Localized concentrations of TACs were modeled using Lakes AERMOD View version 9.8.3. The Lakes program utilizes USEPA's AERMOD gaussian air dispersion model version 19191. Plot files from AERMOD using unitized emissions (one gram per second) from the crematory stack were imported into CARB's Hotspots Analysis and Reporting Program (HARP), Air Dispersion Modeling and Risk Tool (ADMRT) version 19121. The ADMRT calculated ground-level concentrations of TACs utilizing the imported plot files and the annual and hourly emissions inventory (provided in detail in Attachment A to this letter report).

Source Parameters

Based on data provided by the crematory manufacturer, emissions from the crematory were modeled as a point source emitting from the exhaust stack at 19.5 feet above the ground. The stack diameter was set at 20 inches, the exhaust gas temperature was set to 1080 degrees Fahrenheit (°F), the gas exit velocity was set to 14.7 feet per second, and the stack was assumed to have a rain cap resulting in a near-zero initial vertical gas velocity. Downwash from the existing shed housing the proposed crematory was modeled using the Building Profile Input Program (BPIP – a building preprocessing program for AERMOD).

Meteorological Data

SMAQMD provides pre-processed meteorological data suitable for use with AERMOD (SMAQMD 2014) for projects within Sacramento County. The available data set most representative of conditions in the project vicinity was from the Sacramento Executive Airport station, approximately 19 miles southwest of the project site. The Sacramento Executive Airport set includes 5 years of data collected between 2010 to 2014. Rural dispersion coefficients were selected in the model to reflect the existing undeveloped and open nature of the immediate project vicinity. A wind rose for the Sacramento Executive Airport shows an average speed of 6.6 miles per hour from the south (Iowa Environmental Mesonet 2019). The wind rose graphic is included in Attachment B to this letter.

Terrain Data

United States Geological Survey (USGS) National Elevation Dataset (NED) files with a 10-meter resolution covering an area approximately 500 meters (1,640 feet) around the project site were used in the model to cover the analysis area. Terrain data was imported to the model using AERMAP (a terrain preprocessing program for AERMOD).

Receptor Modeling

To develop risk isopleths (linear contours showing equal level of risk) and ensure that the area of maximum impact was captured, receptors were placed in a cartesian grid 690 meters by 490 meters (approximately 2,264 feet by 1,608 feet), centered on the proposed crematory with a grid spacing of 10 meters (33 feet) and a receptor height (flagpole height) of 1.2 meters (4 feet) above the ground. Additional discrete receptors were placed at the residential property line of the 37 closest identified sensitive receptors and the 4 closest off-site worker buildings. See Figure 3 for the discrete receptor locations relative to the TAC source.

Risk Determination

Health risks resulting from localized concentration of TACs emitted by the proposed crematory were estimated using the ADMRT. The latest cancer slope factors, chronic Recommended Exposure Limits (RELs), acute RELs and exposure paths for all TACs, as designated by CARB, are included in the ADMRT. For the residential cancer risk, an exposure duration of 30 years was selected in accordance with the OEHHA (2015) guidelines. In accordance with OEHHA guidelines, the model conservatively assumes that residents would be standing and breathing outdoors at the location of the property line closest to the crematory every day between 17 and 21 hours per day (depending on the age group, starting with infants in utero in the third trimester of pregnancy) for 30 years. For off-site worker cancer risk, an exposure duration of 25 years was selected with an assumption of 8 hours per day, 5 days per week of exposure while standing outside. The mandatory minimum exposure pathways and the OEHHA derived breathing intake rate percentile method were selected.

Significance Criteria

The following potential air quality impacts are based on Appendix G of the State CEQA Guidelines, a significant impact is identified if the project would result in any of the following:

a) Conflict with or obstruct implementation of the applicable air quality plan?
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?
c) Expose sensitive receptors to substantial pollutant concentrations?
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

While the final determination of whether or not a project has a significant effect is within the purview of the lead agency pursuant to CEQA Guidelines Section 15064(b), the SMAQMD has adopted screening tables and thresholds which lead agencies can use to determine the significance of a development project's short-term construction and long-term operational pollutant emissions. The SMAQMD's project-level thresholds of significance for mass emissions of criteria pollutant and precursors and exposure to TACs are shown in Table 2, *SMAQMD Significance Thresholds* (SMAQMD 2020c).

Table 2
SMAQMD SIGNIFICANCE THRESHOLDS

Pollutant	Operational Emissions Threshold
ROG	65 pounds per day
NO_X	65 pound per day
PM10	80 pounds per day/14.6 tons per year[1]
PM2.5	82 pounds per day/15 tons per year[1]
TAC Exposure Incremental Increased Cancer Risk	10 in 1 million
TAC Exposure Non-Cancer Hazard Index	1

Source: SMAQMD 2020c
[1] Thresholds for PM is zero unless all feasible best available control technology/best management practices (BACT/BMPs) are applied.

Air Quality Impact Analysis

a) Conflict with or obstruct implementation of the applicable air quality plan?

Less than significant. Consistency with the air quality plan is determined by whether the project would hinder implementation of control measures identified in the air quality plan or would result in growth of population or employment that is not accounted for in local and regional planning. The SMAQMD's Regional Ozone Plan and the SIP are the applicable air quality plans for the projects developed within Sacramento County.

The project would be consistent with the General Plan land use designation of Open Space, but the project would require a conditional use permit to install and operate a crematory in the Open Space and Conservation zoning designation of the project site. The project would not result in population growth in the City and employment growth would be limited to a few personnel to operate the crematory. Therefore, the project would be consistent with the local and regional growth assumptions used in developing the Regional Ozone Plan and the SIP. In addition, as described in impact discussion b), below, the project would not result in a cumulatively considerable increase of any criteria pollutant. Therefore, the project would not conflict with or obstruct implementation of the applicable air quality plan and the impact would be less than significant.

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Construction (Short-Term) Emissions

Less than Significant. Construction of the project would involve the use of a crane for several hours to unload the chiller and crematory from the truck, and the use of a mini excavator or skid steer loader for a day and one truck load of concrete to install a small pad for the two propane tanks.

According to the SMAQMD's CEQA Guide, projects that are 35 acres or less in size generally will not exceed the SMAQMD's construction NO_X or PM thresholds of significance. However, all construction projects regardless of the screening level are required to implement the SMAQMD's Basic Construction Emission Control Practices (also known as Best Management Practices [BMPs]; SMAQMD 2020b). The BMPs satisfy the requirements of SMAQMD's Rule 403, *Fugitive Dust*, which requires every reasonable precaution not to cause or allow the emissions of fugitive dust from being airborne beyond the property line from which the emission originates. ROG emissions during construction are generally associated with the application of architectural coatings. The project does not propose any new structures and would not require substantial amounts of painting and would not result in significant emissions of ROGs. Therefore, construction of the project would not result in a cumulatively considerable net increase of any criteria pollutant and the impact would be less than significant.

Operation (Long-Term) Emissions

Less than Significant. The project would result in long-term operational emissions from vehicles that drive to and from the project and from operation of the crematory.

Because there are no crematoriums currently operating in Folsom, demand for cremation services is filled by transporting the deceased to facilities outside of the City. Therefore, operations of the project would not result in new vehicle trips (nor the associated emissions in the region). Instead, the project would replace existing regional vehicle trips with shorter trips (and reduced associated emissions).

Operation of a propane-fired crematory would be considered a new stationary source of emissions. The project may be subject to SMAQMD's Rule 201, *General Permit Requirements*, and Rule 202, *New Source Review*. The project would be required to implement best available control technology (BACT) for the minimization of emissions. BACT for crematories is incorporated into the product design in the form of controls which ensure maintenance of the correct temperatures and cycle times, and a secondary combustion chamber which ensures oxygenation and complete combustions of all fuels. As described in the Methods sections, above, Criteria pollutant and precursor emissions for long-term operation of the proposed crematory were calculated using propane combustion emissions factors from AP-42 and crematory emissions factors provided by SMAQMD. The project's calculated criteria and precursors operational emissions are compared to the SMAQMD thresholds in Table 3, *Operational Criteria Pollutant and Precursor Emissions*, a printout of the calculation sheets is included in Attachment A to this letter.

Table 3
OPERATIONAL CRITERIA POLLUTANT AND PRECURSOR EMISSIONS

Pollutant	Project Emissions	SMAQMD Threshold	Exceed Threshold?
Daily Emissions (pounds per day)			
ROG	0.1	**65**	*No*
NO_X	1.2	**65**	*No*
CO	0.9	**None**	*No*
SO_X	0.4	**None**	*No*
PM_{10}	0.3	**80**	*No*
$PM_{2.5}$	0.3	**82**	*No*
Annual Emissions (tons per year)			
ROG	0.01	**None**	*No*
NO_X	0.15	**None**	*No*
CO	0.11	**None**	*No*
SO_X	0.05	**None**	*No*

Pollutant	Project Emissions	SMAQMD Threshold	Exceed Threshold?
PM_{10}	0.03	**14.6**	*No*
$PM_{2.5}$	0.03	**15**	*No*

Source: SMAQMD 2020b; SMAQMD 2020c

As shown in Table 3, the project's operational emissions of criteria pollutants and precursors would not exceed the SMAQMD daily or annual thresholds. Therefore, the project's operational emissions would not result in a cumulatively considerable net increase of any criteria pollutant and impacts would be less than significant.

c) Expose sensitive receptors to substantial pollutant concentrations?

Less than Significant. Crematories are a potential source of TACs as a result of trace metals and organic compounds that accumulate in the body and are released during combustion, and trace organic compounds that are formed in the combustion process. An HRA was conducted to determine potential community health risks from exposure to TACs emitted from the proposed crematory, as described in the Methods section above.

Health risks associated with cancer from development projects are estimated using the incremental excess cancer risk expressed as cancer cases per one million exposed individuals. The incremental excess cancer risk is an estimate of the chance a person exposed to specific sources of a TACs may have of developing cancer from that exposure beyond the individual's risk of developing cancer from existing background levels of pollutants in the ambient air. For context, the average cancer risk from TACs in the ambient air for an individual living in an urban area of California is 830 in 1 million (CARB 2015). Cancer risk estimates do not mean, and should not be interpreted to mean, that a person will develop cancer from estimated exposures to toxic air pollutants.

Health risks associated with chronic and acute effects from a development project are quantified using the maximum hazard index. A hazard index is the potential exposure to a substance divided by the reference exposure level (the level at which no adverse effects are expected). A hazard index of less than one indicates no adverse health effects are expected from the potential exposure to the substance. The maximum hazard index is the sum of hazard indices for pollutants with non-cancer health effects that have the same or similar adverse health effects.

The modeled point of maximum impact for the project (geographic point outside of the project site with the highest estimated incremental cancer risk and maximum hazard index) would be a point near the project boundary approximately 96 feet southeast of the proposed crematory exhaust stack, at approximately Universal Transverse Mercator (UTM) coordinates Zone 10, 657982 meters east, 4281757 meters north. The maximum health risk exposure at this point would be a residential incremental cancer risk of 3.2 in 1 million and a residential non-cancer chronic hazard index of 0.09. This point of maximum impact is in an area zoned as Open Space Conservation District containing dredge tailings from past gold mining. No residents or workers are anticipated to be at the point of maximum impact for prolonged periods.

The maximum estimated community incremental excess cancer, chronic and acute health risks due to exposure to the project TAC emissions from long term operation of the proposed crematory are presented in Table 4, *Maximum Exposed Individual Incremental Cancer Health Risk and Hazard Index*. These estimates are conservative (health protective) and assume that the resident or worker is outdoors for the entire exposure period. The modeled locations of the Maximum Exposed Individual Resident (MEIR) and the point of maximum impact, along with the residential cancer risk isopleths (contours of equal risk), are shown in Figure 4, *Cancer Risks*. The complete HRA model output, including tables of health risks for all modeled discrete receptors and isopleth figures for incremental cancer risk, non-cancer chronic hazard index and acute hazard index are included as Attachment B to this letter report.

Table 4
MAXIMUM EXPOSED INDIVIDUAL INCREMENTAL CANCER RISK AND HAZARD INDEX

	MEI Resident Cancer Risk	MEI Worker Cancer Risk	MEI Resident Chronic Hazard Index	MEI Worker Chronic Hazard Index	MEI Acute Hazard Index
Results	0.6 in 1 million	<0.1 in 1 million	0.02	0.02	0.20
Threshold	10 in 1 million	10 in 1 million	1	1	1
Exceed Threshold?	No	No	No	No	No

Source: Lakes AERMOD View version 9.8.3 and CARB ADMRT version 19121. See Attachment B for model inputs, outputs, and risk isopleths.
MEI = Maximum Exposed Individual.

As shown in Table 4, the maximum incremental increased cancer risks and maximum non-cancer chronic and acute hazard index due to exposure to TACs from long term operation of the proposed crematory would not exceed the SMAQMD thresholds. Therefore, operation of the project would not result in the exposure of sensitive receptors to substantial TAC concentrations and the impact would be less than significant.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Diesel equipment could generate diesel exhaust odors during construction activities. The generation of odors during the construction period would be temporary, would last for a few days and would be dispersed within a short distance from the active work area. Once operational, potential odors from human remains prior to cremation would be minimized by either by immediately processing remains or by temporarily storing remains in the proposed refrigeration chiller. Operation of the crematory would not be a significant source odors or other emissions because the BACT features of the crematory, including process temperature and cycle time controls, and secondary combustion chambers which ensure the complete combustion of all solids, liquids, and gaseous fuels. Therefore, the project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people and the impact would be less than significant.

GREENHOUSE GAS EMISSIONS

Environmental Setting

Global climate change refers to changes in average climatic conditions on Earth including temperature, wind patterns, precipitation, and storms. Global temperatures are moderated by atmospheric gases.

These gases are commonly referred to as greenhouse gasses (GHGs) because they function like a greenhouse by letting sunlight in but preventing heat from escaping, thus warming the Earth's atmosphere.

GHGs are emitted by natural processes and human (anthropogenic) activities. Anthropogenic GHG emissions are primarily associated with: the burning of fossil fuels during motorized transport; electricity generation; natural gas consumption; industrial activity; manufacturing; and other activities such as deforestation, agricultural activity, and solid waste decomposition.

The GHGs defined under California's Assembly Bill (AB) 32, described below, include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. Estimates of GHG emissions are commonly presented in carbon dioxide equivalents (CO_2e), which weigh each gas by its global warming potential (GWP). Expressing GHG emissions in CO_2e takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted. GHG emissions quantities in this analysis are presented in metric tons (MT) of CO_2e. For consistency with United Nations Standards, modeling and reporting of GHGs in California and the U.S. use the GWPs defined in the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (IPCC 2007), as shown in Table 5, *Global Warming Potential and Atmospheric Lifetimes*.

Table 5
GLOBAL WARMING POTENTIAL AND ATMOSPHERIC LIFETIMES

Greenhouse Gas	Atmospheric Lifetime (years)	GWP
Carbon Dioxide (CO_2)	50-200	1
Methane (CH_4)	12	25
Nitrous Oxide (N_2O)	114	298
HFC-134a	14	1,430
PFC: Tetraflouromethane (CF_4)	50,000	7,390
PFC: Hexafluoroethane (C_2F_6)	10,000	12,200
Sulfur Hexafluoride (SF_6)	3,200	22,800

Source: IPCC 2007.
HFC: hydrofluorocarbon; PFC: perfluorocarbon

Regulatory Setting

The primary GHG reduction regulatory legislation and plans (applicable to the project) at the State, regional, and local levels are described below. Implementation of California's GHG reduction mandates is primarily under the authority of the California Air Resources Board (CARB) at the state level, SMAQMD and the Sacramento Area Council of Governments (SACOG) at the regional level, and the City at the local level.

Executive Order S-3-05

On June 1, 2005, Executive Order (EO) S-3-05 proclaimed that California is vulnerable to climate change impacts. It declared that increased temperatures could reduce snowpack in the Sierra Nevada, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To avoid or reduce climate change impacts, EO S-3-05 calls for a reduction in GHG emissions to the year 2000 level by 2010, to year 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. Executive Orders are not laws and can only provide the governor's direction to state agencies to act within their authority to reinforce existing laws.

Assembly Bill 32 – Global Warming Solution Act of 2006

The California Global Warming Solutions Act of 2006, widely known as AB 32, requires that CARB develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is directed by AB 32 to set a GHG emission limit, based on 1990 levels, to be achieved by 2020. The bill requires CARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG emission reductions.

Executive Order B-30-15

On April 29, 2015, EO B-30-15 established a California GHG emission reduction target of 40 percent below 1990 levels by 2030. The EO aligns California's GHG emission reduction targets with those of leading international governments, including the 28 nation European Union. California is on track to meet or exceed the target of reducing GHGs emissions to 1990 levels by 2020, as established in AB 32. California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the goal established by EO S-3-05 of reducing emissions 80 percent under 1990 levels by 2050.

Senate Bill 32

Signed into law by Governor Brown on September 8, 2016, Senate Bill (SB) 32 (Amendments to the California Global Warming Solutions Action of 2006) extends California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include Section 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the State's continuing efforts to pursue the long-term target expressed in EO B-30-15 of 80 percent below 1990 emissions levels by 2050.

California Air Resources Board

On December 11, 2008, the CARB adopted the Climate Change Scoping Plan (Scoping Plan) as directed by AB 32. The Scoping Plan proposes a set of actions designed to reduce overall GHG emissions in California to the levels required by AB 32. Measures applicable to development projects include those related to energy-efficiency building and appliance standards, the use of renewable sources for electricity generation, regional transportation targets, and green building strategy. Relative to transportation, the Scoping Plan includes nine measures or recommended actions related to reducing vehicle miles traveled (VMT) and vehicle GHGs through fuel and efficiency measures. These measures would be implemented statewide rather than on a project by project basis (CARB 2008).

In response to EO B-30-15 and SB 32, all state agencies with jurisdiction over sources of GHG emissions were directed to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 targets. The mid-term target is critical to help frame the suite of policy measures, regulations, planning efforts, and investments in clean technologies and infrastructure needed to continue driving down emissions (CARB 2014). In December 2017, CARB adopted the 2017 Climate Change Scoping Plan Update, the Strategy for Achieving California's 2030 Greenhouse Gas Target, to reflect the 2030 target set by EO B 30 15 and codified by SB 32 (CARB 2017).

Sacramento Metropolitan Air Quality Management District

The SMAQMD provides direction and recommendations for the analysis of GHG impacts of a project and approach to mitigation measures in its CEQA Air Quality Guidelines (SMAQMD 2020a).

Sacramento Area Council of Governments

As required by the Sustainable Communities and Climate Protection Act of 2008 (SB 375), SACOG has developed the 2020 Metropolitan Transportation Plan and Sustainable Communities Strategy. This plan seeks to reduce GHG and other mobile source emissions through coordinated transportation and land use planning to reduce VMT.

City of Folsom

As part of the 2035 General Plan, the City of Folsom prepared an integrated Greenhouse Gas Emissions Reduction Strategy (GHG Strategy) to identify and reduce current and future community GHG emissions and those associated with the City's municipal operations. Adopted on August 28, 2018, the GHG Strategy also serves as the City's "plan for the reduction of greenhouse gases", per Section 15183.5 of the CEQA Guidelines, which provides the opportunity for tiering and streamlining of project-level emissions for certain types of discretionary projects subject to CEQA review that are consistent with the General Plan. The GHG Strategy includes goals and strategies to reduce community and municipal GHG emissions, compared to the 2005 baseline year, by 15 percent in 2020, 51 percent in 2035, and 80 percent in 2050 (City 2018a; City 2018b).

Significance Criteria

The following potential air quality impacts are based on Appendix G of the State CEQA Guidelines, a significant impact is identified if the project would result in any of the following:

a) *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

b) *Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?*

In accordance with CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of a qualified plan for the reduction of greenhouse gases. The City General Plan Policy NCR 3.2.8 provides criteria for project-level streamlining and tiering (City 2018a):

> Projects subject to environmental review under CEQA may be eligible for tiering and streamlining the analysis of GHG emissions, provided they are consistent with the GHG reduction measures included in the GHG Strategy contained in the General Plan and EIR. The City may review such projects to determine whether the following criteria are met:
>
> - Proposed project is consistent with the current general plan land use designation for the project site;
> - Proposed project incorporates all applicable GHG reduction measures (as documented in the Climate Change Technical Appendix to the General Plan EIR) as mitigation measures in the CEQA document prepared for the project; and,
> - Proposed project clearly demonstrates the method, timing and process for which the project will comply with applicable GHG reduction measures and/or conditions of approval, (e.g., using a CAP/GHG reduction measures consistency checklist, mitigation monitoring and reporting plan, or other mechanism for monitoring and enforcement as appropriate).

Greenhouse Gas Emissions Impact Analysis

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less than significant. To determine consistency with the City's GHG Strategy the criteria outlined in the Greenhouse Gas Reduction Strategy Consistency Checklist are shown and discussed in Table 6, *GHG Strategy Checklist* (City 2018c).

Table 6
GHG STRATEGY CONSISTENCY CHECLIST

Checklist Item	Consistent?	Discussion
Part 1: Lad Use Consistency		
A. The proposed project is consistent with the City's 2035 General Plan land use and zoning designations. If "Yes," proceed to Part 2 of the Checklist.	Yes	The project would be located within the footprint of an existing building in an existing cemetery in an area designated Open Space in the General Plan and zoned Open Space and Conservation District (OSC). According to the City Zoning Code Chapter 17.39, a cemetery is an allowed use in the OSC zone with a use permit. While the project may require a new conditional use permit, the project would not require a General Plan amendment or rezone. The project would be consistent with existing project site use and land use designation the General Plan.

Checklist Item	Consistent?	Discussion
Part 2: GHG Reduction Measures Consistency		
E-1: Improve Building Energy Efficiency in New Development	Not Applicable	The project does not propose new buildings or substantial modifications to existing buildings.
E-2: Water Heater Replacement in Existing Residential Development	Not Applicable	The project is not an existing residential development.
E-3: Improve Building Energy Efficiency in Existing Development	Not Applicable	The project's proposed equipment would be installed within an existing metal shed and would not include any conditioned or occupied building space.
E-4: Increase Use of Renewable Energy in Existing Development	Not Applicable	The project's proposed equipment would be installed within an existing metal shed. No expansion or retrofit of existing buildings are proposed.
T-1: Reduce VMT Through Mixed and High-Density Land Use	Not Applicable	The project does not propose, and the project site open space land use designation and zoning does not permit, high density development and mixed uses.
T-2: Improve Streets and Intersections for Multi-Modal Use and Access	Not Applicable	The project does not include construction of new streets or improvement to existing streets.
T-3: Adopt Citywide TDM Program	Not Applicable	The project is not a residential, office, commercial retail, public facility or school development. The project would not include new parking spaces.
T-5: Reduce Minimum Parking Standards	Not Applicable	The project would not include new parking spaces.
T-6: Require the Use of High-Performance Renewable Diesel in Construction Equipment	Not Applicable	The project would require minimal off-road diesel construction equipment. At most, a small excavator or skid steer loader may be used for a few hours to prepare an area for a small concrete pad.
T-8: Install Electric Vehicle Charging Stations	Not Applicable	The project is not a residential development, does not propose new parking spaces, and existing parking spaces at the project building are less than 10.
SW-1: Increase Solid Waste Diversion	Not Applicable	The project would involve minimal construction activity and would not result in substantial construction waste which could be diverted.
W-1: Increase Water Efficiency in New Residential Development	Not Applicable	The project is not a new residential development and the project does not propose new indoor or outdoor water uses.
W-2: Reduce Outdoor Water Use	Not Applicable	The project does not propose substantial addition, alteration, or expansion to existing facilities or new outdoor water uses.

Source: City 2018c

As discussed in Table 6, the project would be consistent with the project site general plan land use designation and none of the GHG reduction measures listed in the GHG Strategy are applicable to the project. Therefore, the project would be consistent with the City's GHG Strategy and the project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. The impact would be less than significant.

b) *Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases*?

Less Than Significant. As discussed in criterion a), above, the project would be consistent with the City's integrated General Plan and GHG Strategy. The GHG strategy was developed to meet the City's GHG reduction targets which were formulated to meet the statewide GHG mandates of AB 32 and SB 32. Therefore, the project would not conflict with an applicable plan adopted for the purposes of reducing GHG emissions and the impact would be less than significant.

SUMMARY

The project's emissions of criteria pollutants and precursors would be below SMAQMD thresholds and would result in a less than significant impact. Community health risks resulting from emissions of TACs from the project's operation of a crematory were evaluated in an HRA following OEHHA guidelines. Project TAC emissions would not result in increased health risks beyond the SMAQMD thresholds and the impact would be less than significant. The project would not be a substantial source of objectional odors and odor impacts would be less than significant. The project would be consistent with the City's integrated General Plan and GHG Strategy and GHG emissions impacts would be less than significant. The project would not conflict an applicable plan adopted for the purposes of reducing GHG emissions and the impact would be less than significant.

Sincerely,

Martin D. Rolph

Martin Rolph
Air Quality Specialist

Victor Ortiz
Senior Air Quality Specialist

Attachments:

Figure 1: Regional Location
Figure 2: Detailed Site Plan
Figure 3: Receptor Locations
Figure 4: Cancer Risk
Attachment A: Emissions Calculation Sheets
Attachment B: HRA Model Output
Attachment C: Addendum to the Folsom Lakeside Crematorium Project Air Quality and Greenhouse Gas Emissions Assessment

REFERENCES

California Air Resources Board (CARB). 2017. The 2017 Climate Change Scoping Plan Update. January. Available at: https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf.

2015. Risk Management Guidance for Stationary Sources of Air Toxics. Available at: https://www.arb.ca.gov/toxics/rma/rmgssat.pdf.

2008. Climate Change Scoping Plan – A Framework for Change. December. Available at: https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2008-scoping-plan-documents.

2005. Air Quality and Land Use Handbook: A Community Health Perspective. Available at: https://www.arb.ca.gov/ch/handbook.pdf.

Folsom, City of. 2018a. 2035 General Plan. Adopted August 28. Available at: https://www.folsom.ca.us/community/planning/general_plan/2035_general_plan.asp.

2018b. 2035 General Plan Appendix A – Greenhouse Gas Emissions Reduction Strategy. Available at: https://www.folsom.ca.us/civicax/filebank/blobdload.aspx?blobid=34205.

2018c. Greenhouse Gas Reduction Strategy Consistency Checklist. Available at: https://www.folsom.ca.us/documents/Planning/Folsom_GHG_Reduction_Checklist_FINAL.pdf

Iowa Environmental Mesonet. 2019. Sacramento Executive Airport Wind Rose Plot. Available at: https://mesonet.agron.iastate.edu/sites/windrose.phtml?station=SAC&network=CA_ASOS.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Science Basis. Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. February. Available at: https://www.ipcc.ch/report/ar4/wg1/.

Occupational Safety and Health Administration (OSHA). 2006. OSHA Fact Sheet - Health Effects of Hexavalent Chromium. Available at: https://www.osha.gov/OshDoc/data_General_Facts/hexavalent_chromium.pdf.

Office of Environmental Health Hazard Assessment (OEHHA). 2015. Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Available at: https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0.

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2020a. Guide to Air Quality Assessment in Sacramento County. Revised April. Available at: http://www.airquality.org/Residents/CEQA-Land-Use-Planning/CEQA-Guidance-Tools.

2020b. Electronic communications between HELIX Environmental Planning (Victor Ortiz) and the Sacramento Metropolitan Air Quality Management District (Venk Reddy); attachments to communications containing crematory emissions calculations. August and November.

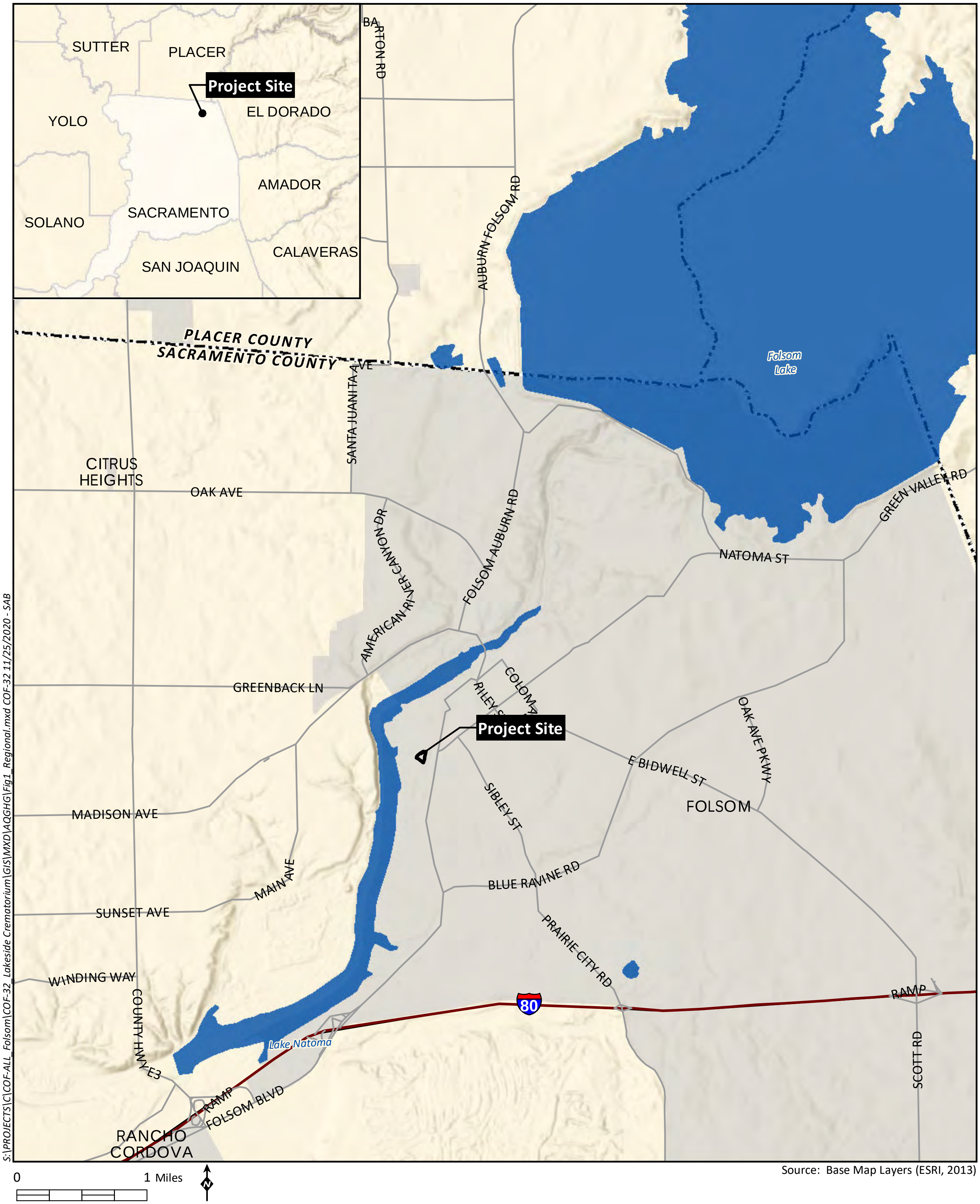
2020c. SMAQMD Thresholds of Significance Table. April. Available at: http://www.airquality.org/LandUseTransportation/Documents/CH2ThresholdsTable4-2020.pdf.

2017. Sacramento Regional 2008 NAAQS 8-Hour Ozone Attainment and Reasonable Further Progress Plan. July. Available at: http://www.airquality.org/ProgramCoordination/Documents/Sac%20Regional%202008%20NAAQS%20Attainment%20and%20RFP%20Plan.pdf.

2014. AERMOD meteorological data files. Available at: http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools.

U.S. Environmental Protection Agency (USEPA). 2020. Health Effects of Exposures to Mercury. Available at: https://www.epa.gov/mercury/health-effects-exposures-mercury. Accessed November 2020.

2008. AP 42, Fifth Edition, Volume I Chapter 1: External Combustion Sources, 1.5 Liquified Petroleum Gas Combustion. Available at: https://www.epa.gov/sites/production/files/2020-09/documents/1.5_liquefied_petroleum_gas_combustion.pdf.



Source: Base Map Layers (ESRI, 2013)

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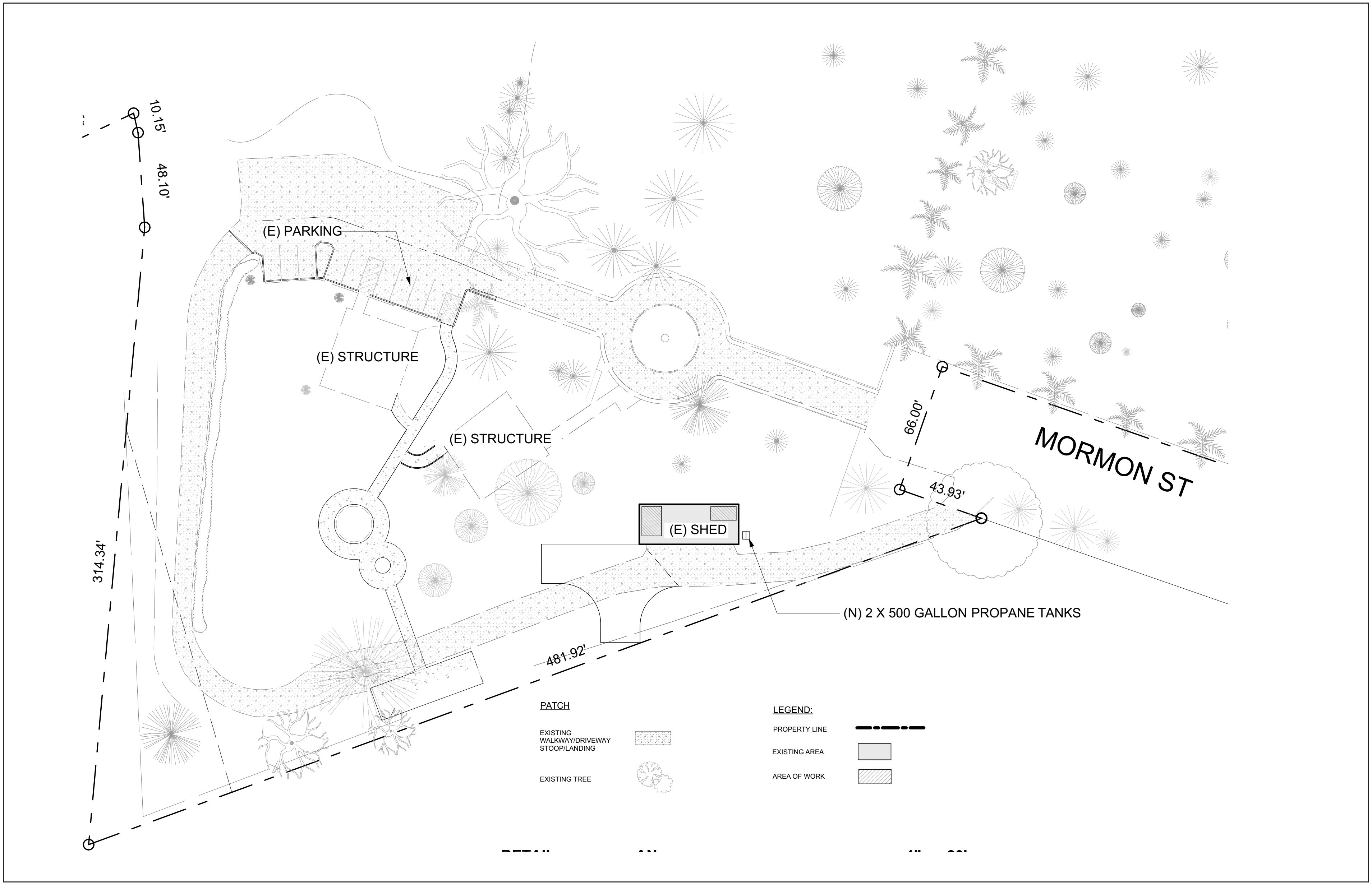
HELIX Environmental Planning

Regional Location

Figure 1



Source: LEV Designs 2020

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HELIX Environmental Planning

Detailed Site Plan

Figure 2

Source: Aerial (Maxar, 2019)

0 300 Feet

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HELIX Environmental Planning

Receptor Locations

Figure 3

Source: Aerial (Maxar, 2019)

HELIX Environmental Planning

Cancer Risks

Figure 4

Attachment A

Emissions Calculation Sheets

Crematory Criteria Pollutant Emissions

Emissions from Propane Combustion

KBTU/Cycle	1,800
KBTU/Gallon	91.502
Gallons/Cycle	19.672
Cycles/Day	2
Cycles/Year	500

Pollutant	Emission Factor (lbs/1000 gal)[1]	Emissions (lbs/day)	Emissions (tons/year)
ROG[3]	1	0.04	0.005
NOx	13	0.51	0.064
SOx	0.054	0.00	0.000
PM10	0.7	0.03	0.003
PM2.5[4]	0.7	0.03	0.003
CO	7.5	0.30	0.037

Emissions from Combustion of Human Remains

	lbs/day	lbs/yr
Maximum Throughput	400	100,000

Pollutant	Emission Factor (lbs/ton)[2]	Emissions (lbs/day)	Emissions (tons/year)
ROG	0.299	0.06	0.007
NOx	3.560	0.71	0.089
SOx	2.170	0.43	0.054
PM10	1.130	0.23	0.028
PM2.5[4]	1.130	0.23	0.028
CO	2.950	0.59	0.074

Total Emissions

Pollutant	Emissions (lbs/day)	Emissions (tons/year)
ROG	0.1	0.01
NOx	1.2	0.15
SOx	0.4	0.05
PM10	0.3	0.03
PM2.5	0.3	0.03
CO	0.9	0.11

Notes:
1. Emissions factors for propane from USEPA AP-42 Chapter 1, External Combustion Sources, Section 1.5 Liquefied Petroleum Gas Combustion, Table 1.5-1.
2. Emissions from combustion of human remains provided by SMAQMD and are from USEPA Factor Information REtrieval (FIRE) Program Data System (3/08).
3. ROG fraction of TOC for propane combustion unavailable, ROG assumed to be equal to TOC.

CREMATORY TAC EMISSIONS

Max hourly throughput (lbs)	200
Max annual throughput (lbs)	100,000

Substance	Test Results (in lbs/lbs charge)[1]	lbs/hr	lbs/year
Acetaldehyde	3.64E-07	7.27E-05	3.64E-02
Arsenic	2.52E-07	5.04E-05	2.52E-02
Benzene	1.77E-07	3.54E-05	1.77E-02
Beryllium	1.14E-08	2.28E-06	1.14E-03
Cadmium	8.59E-08	1.72E-05	8.59E-03
Chromium (Hex)	9.57E-08	1.91E-05	9.57E-03
Copper	2.17E-07	4.34E-05	2.17E-02
Formaldehyde	9.50E-08	1.90E-05	9.50E-03
Hydrogen Fluoride	4.01E-06	8.02E-04	4.01E-01
Lead	5.17E-07	1.03E-04	5.17E-02
Mercury[2]	2.77E-05	4.16E-03	2.77E+00
Nickel	2.99E-07	5.98E-05	2.99E-02
Selenium	1.72E-07	3.44E-05	1.72E-02
Toluene	5.73E-06	1.15E-03	5.73E-01
Vinyl Chloride	1.85E-08	3.70E-06	1.85E-03
Xylenes	9.63E-08	1.93E-05	9.63E-03
Zinc	2.76E-06	5.51E-04	2.76E-01
Total PAHs	2.64E-08	5.28E-06	2.64E-03
Benzo[a]anthracene	6.67E-11	1.33E-08	6.67E-06
Benzo[a]pyrene	2.45E-10	4.90E-08	2.45E-05
Benzo[b]fluoranthene	5.61E-11	1.12E-08	5.61E-06
Benzo[k]fluoranthene	5.06E-11	1.01E-08	5.06E-06
Chrysene	3.49E-10	6.98E-08	3.49E-05
Dibenzo[a,h]anthracene	4.52E-11	9.04E-09	4.52E-06
Ideno[1,2,3,-cd]pyrene	5.39E-11	1.08E-08	5.39E-06
Total PCDDs	1.50E-10	3.00E-08	1.50E-05
2,3,7,8-TCDD	5.11E-13	1.02E-10	5.11E-08
1,2,3,7,8-PeCDD	1.49E-12	2.98E-10	1.49E-07
1,2,3,4,7,8-HxCDD	1.77E-12	3.54E-10	1.77E-07
1,2,3,6,7,8-HxCDD	2.55E-12	5.10E-10	2.55E-07
1,2,3,7,8,9-HxCDD	3.16E-12	6.32E-10	3.16E-07
1,2,3,4,6,7,8-HpCDD	2.42E-11	4.84E-09	2.42E-06
Total PCDFs	2.31E-10	4.61E-08	2.31E-05
2,3,7,8-TCDF	3.43E-12	6.86E-10	3.43E-07
1,2,3,7,8-PeCDF	1.91E-12	3.81E-10	1.91E-07
2,3,4,7,8-PeCDF	5.82E-12	1.16E-09	5.82E-07
1,2,3,4,7,8-HxCDF	6.18E-12	1.24E-09	6.18E-07
1,2,3,6,7,8-HxCDF	5.49E-12	1.10E-09	5.49E-07
1,2,3,7,8,9-HxCDF	1.07E-11	2.15E-09	1.07E-06
2,3,4,6,7,8-HxCDF	2.23E-12	4.45E-10	2.23E-07
1,2,3,4,6,7,8-HpCDF	2.94E-11	5.89E-09	2.94E-06
1,2,3,4,7,8,9-HpCDF	1.79E-12	3.58E-10	1.79E-07

Notes:
1. Emissions factors provided by SMAQMD and are from CARB Test Report No. C-90-004, Evaluation Test on Two Propane-Fired Crematories at Camellia Memorial Lawn Cemetery (Oct. 29, 1992).

Attachment B

HRA Model Output

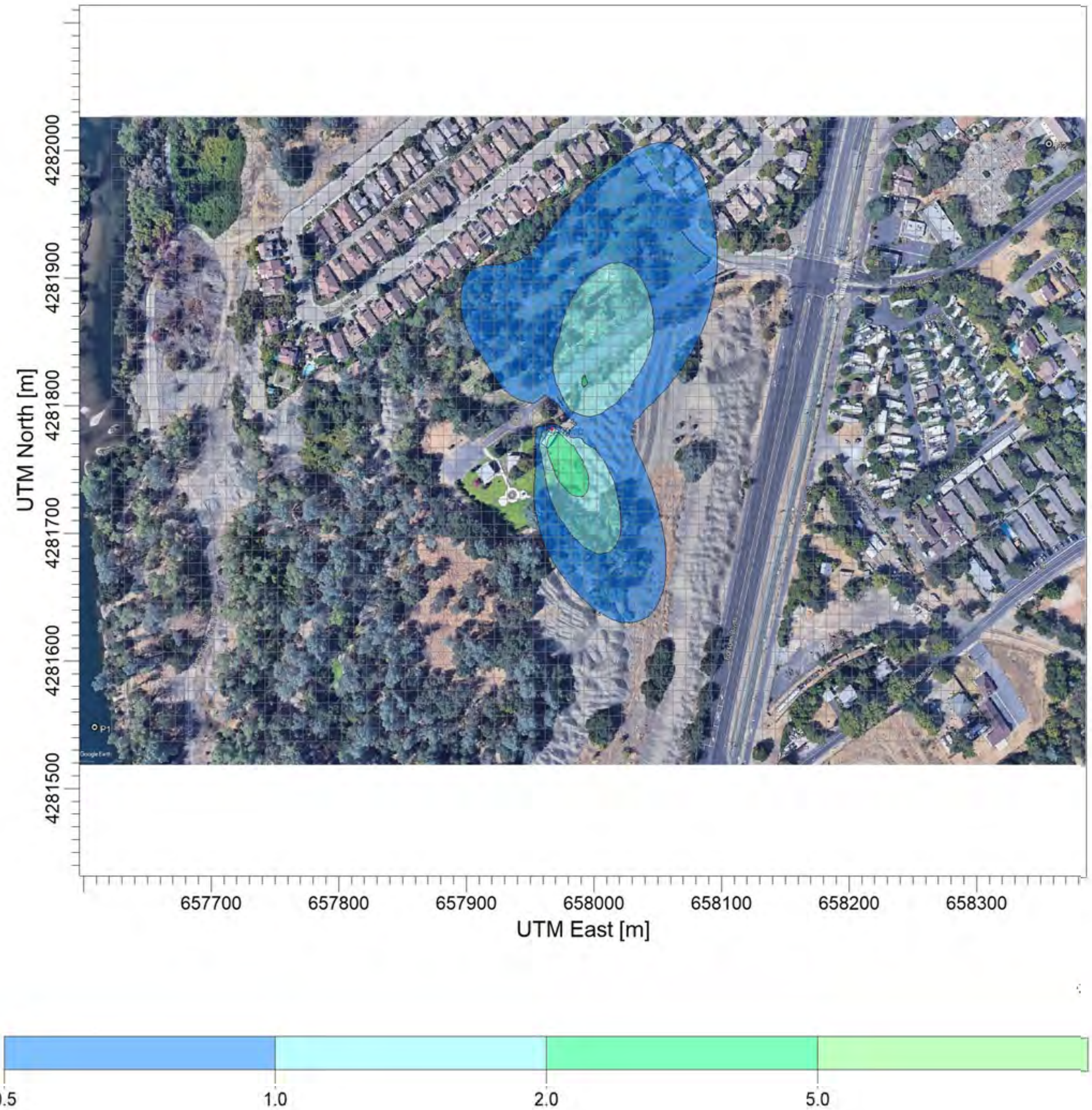
Residential Cancer Risk

*HARP - HRACalc v19044 11/20/2020 9:17:07 AM - Cancer Risk

REC	GRP	NETID	X	Y	RISK_SUM	SCENARIO
R1	ALL		658172	4281577	1.30E-07	30YrCancerDerived_Inh_FAH3to70
R2	ALL		658204.3	4281599	9.77E-08	30YrCancerDerived_Inh_FAH3to70
R3	ALL		658177.6	4281681	1.02E-07	30YrCancerDerived_Inh_FAH3to70
R4	ALL		658221	4281731	6.16E-08	30YrCancerDerived_Inh_FAH3to70
R5	ALL		658216.2	4281738	6.25E-08	30YrCancerDerived_Inh_FAH3to70
R6	ALL		658211.2	4281758	6.15E-08	30YrCancerDerived_Inh_FAH3to70
R7	ALL		658184.6	4281790	7.50E-08	30YrCancerDerived_Inh_FAH3to70
R8	ALL		658186.7	4281798	7.55E-08	30YrCancerDerived_Inh_FAH3to70
R9	ALL		658189.5	4281816	7.98E-08	30YrCancerDerived_Inh_FAH3to70
R10	ALL		658194.3	4281838	8.82E-08	30YrCancerDerived_Inh_FAH3to70
R11	ALL		658196.8	4281851	9.45E-08	30YrCancerDerived_Inh_FAH3to70
R12	ALL		658103.2	4281928	4.65E-07	30YrCancerDerived_Inh_FAH3to70
R13	ALL		658071.8	4281960	5.80E-07	30YrCancerDerived_Inh_FAH3to70
R14	ALL		658060.4	4281973	5.87E-07	30YrCancerDerived_Inh_FAH3to70
R15	ALL		658051.7	4281986	5.62E-07	30YrCancerDerived_Inh_FAH3to70
R16	ALL		658043.1	4281998	5.21E-07	30YrCancerDerived_Inh_FAH3to70
R17	ALL		658012.3	4281990	4.88E-07	30YrCancerDerived_Inh_FAH3to70
R17	ALL		658000.9	4281983	4.77E-07	30YrCancerDerived_Inh_FAH3to70
R19	ALL		657988.3	4281975	4.58E-07	30YrCancerDerived_Inh_FAH3to70
R20	ALL		657977	4281966	4.42E-07	30YrCancerDerived_Inh_FAH3to70
R21	ALL		657966.5	4281958	4.25E-07	30YrCancerDerived_Inh_FAH3to70
R22	ALL		657954.9	4281949	4.10E-07	30YrCancerDerived_Inh_FAH3to70
R23	ALL		657944.2	4281940	4.07E-07	30YrCancerDerived_Inh_FAH3to70
R24	ALL		657933.3	4281932	4.17E-07	30YrCancerDerived_Inh_FAH3to70
R25	ALL		657921.4	4281923	4.44E-07	30YrCancerDerived_Inh_FAH3to70
R26	ALL		657910.8	4281914	4.80E-07	30YrCancerDerived_Inh_FAH3to70
R27	ALL		657900.6	4281906	4.93E-07	30YrCancerDerived_Inh_FAH3to70
R28	ALL		657888.2	4281897	4.44E-07	30YrCancerDerived_Inh_FAH3to70
R29	ALL		657877.8	4281889	3.79E-07	30YrCancerDerived_Inh_FAH3to70
R30	ALL		657866.5	4281880	2.97E-07	30YrCancerDerived_Inh_FAH3to70
R31	ALL		657855.3	4281872	2.28E-07	30YrCancerDerived_Inh_FAH3to70
R32	ALL		657844.1	4281863	1.73E-07	30YrCancerDerived_Inh_FAH3to70
R33	ALL		657832.5	4281854	1.34E-07	30YrCancerDerived_Inh_FAH3to70
R34	ALL		657820.3	4281845	1.06E-07	30YrCancerDerived_Inh_FAH3to70
R35	ALL		657808	4281834	8.38E-08	30YrCancerDerived_Inh_FAH3to70
R36	ALL		657791.5	4281834	6.80E-08	30YrCancerDerived_Inh_FAH3to70
R37	ALL		657764	4281814	4.64E-08	30YrCancerDerived_Inh_FAH3to70

PROJECT TITLE:

Residential Incremental Cancer Risk



COMMENTS: Risk in chances per million	SOURCES: **1**	COMPANY NAME: **HELIX Environmental Planning**	
	RECEPTORS: **3541**		
	OUTPUT TYPE: **Risk**	SCALE: 1:4,963 0 ▬ 0.1 km	
	MAX:	DATE: **11/21/2020**	PROJECT NO.: **COF-32**

AERMOD View - Lakes Environmental Software

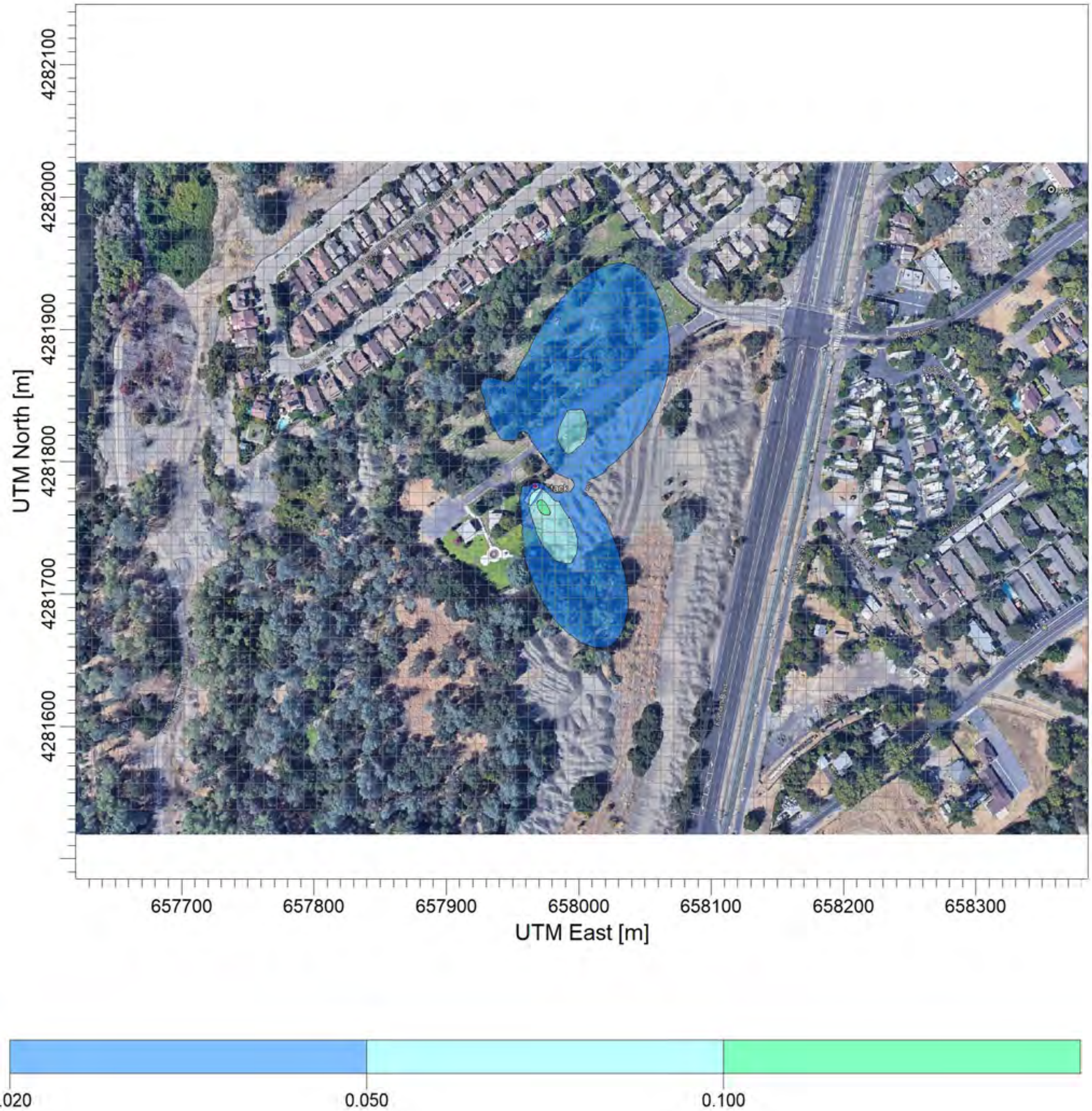
Residential Chronic Risk

*HARP - HRACalc v19044 11/20/2020 9:18:14 AM - Chronic Risk

REC	GRP	NETID	X	Y	SCENARIO	MAXHI
R1	ALL		658172	4281577	NonCancerChronicDerived_Inh	3.62E-03
R2	ALL		658204.3	4281599	NonCancerChronicDerived_Inh	2.72E-03
R3	ALL		658177.6	4281681	NonCancerChronicDerived_Inh	2.85E-03
R4	ALL		658221	4281731	NonCancerChronicDerived_Inh	1.71E-03
R5	ALL		658216.2	4281738	NonCancerChronicDerived_Inh	1.74E-03
R6	ALL		658211.2	4281758	NonCancerChronicDerived_Inh	1.71E-03
R7	ALL		658184.6	4281790	NonCancerChronicDerived_Inh	2.08E-03
R8	ALL		658186.7	4281798	NonCancerChronicDerived_Inh	2.10E-03
R9	ALL		658189.5	4281816	NonCancerChronicDerived_Inh	2.22E-03
R10	ALL		658194.3	4281838	NonCancerChronicDerived_Inh	2.45E-03
R11	ALL		658196.8	4281851	NonCancerChronicDerived_Inh	2.63E-03
R12	ALL		658103.2	4281928	NonCancerChronicDerived_Inh	1.29E-02
R13	ALL		658071.8	4281960	NonCancerChronicDerived_Inh	1.61E-02
R14	ALL		658060.4	4281973	NonCancerChronicDerived_Inh	1.63E-02
R15	ALL		658051.7	4281986	NonCancerChronicDerived_Inh	1.56E-02
R16	ALL		658043.1	4281998	NonCancerChronicDerived_Inh	1.45E-02
R17	ALL		658012.3	4281990	NonCancerChronicDerived_Inh	1.36E-02
R17	ALL		658000.9	4281983	NonCancerChronicDerived_Inh	1.33E-02
R19	ALL		657988.3	4281975	NonCancerChronicDerived_Inh	1.27E-02
R20	ALL		657977	4281966	NonCancerChronicDerived_Inh	1.23E-02
R21	ALL		657966.5	4281958	NonCancerChronicDerived_Inh	1.18E-02
R22	ALL		657954.9	4281949	NonCancerChronicDerived_Inh	1.14E-02
R23	ALL		657944.2	4281940	NonCancerChronicDerived_Inh	1.13E-02
R24	ALL		657933.3	4281932	NonCancerChronicDerived_Inh	1.16E-02
R25	ALL		657921.4	4281923	NonCancerChronicDerived_Inh	1.23E-02
R26	ALL		657910.8	4281914	NonCancerChronicDerived_Inh	1.34E-02
R27	ALL		657900.6	4281906	NonCancerChronicDerived_Inh	1.37E-02
R28	ALL		657888.2	4281897	NonCancerChronicDerived_Inh	1.23E-02
R29	ALL		657877.8	4281889	NonCancerChronicDerived_Inh	1.05E-02
R30	ALL		657866.5	4281880	NonCancerChronicDerived_Inh	8.27E-03
R31	ALL		657855.3	4281872	NonCancerChronicDerived_Inh	6.34E-03
R32	ALL		657844.1	4281863	NonCancerChronicDerived_Inh	4.81E-03
R33	ALL		657832.5	4281854	NonCancerChronicDerived_Inh	3.72E-03
R34	ALL		657820.3	4281845	NonCancerChronicDerived_Inh	2.95E-03
R35	ALL		657808	4281834	NonCancerChronicDerived_Inh	2.33E-03
R36	ALL		657791.5	4281834	NonCancerChronicDerived_Inh	1.89E-03
R37	ALL		657764	4281814	NonCancerChronicDerived_Inh	1.29E-03

PROJECT TITLE:

Residential Maximum Non-Cancer Chronic Hazard Index



COMMENTS:	SOURCES:	COMPANY NAME:	
Risk in maximum hazard index	**1**	**HELIX Environmental Planning**	
	RECEPTORS: **3541**		
	OUTPUT TYPE: **Hazard Index**	SCALE: 1:4,808 (0 — 0.1 km)	
	MAX:	DATE: **11/21/2020**	PROJECT NO.: **COF-32**

AERMOD View - Lakes Environmental Software

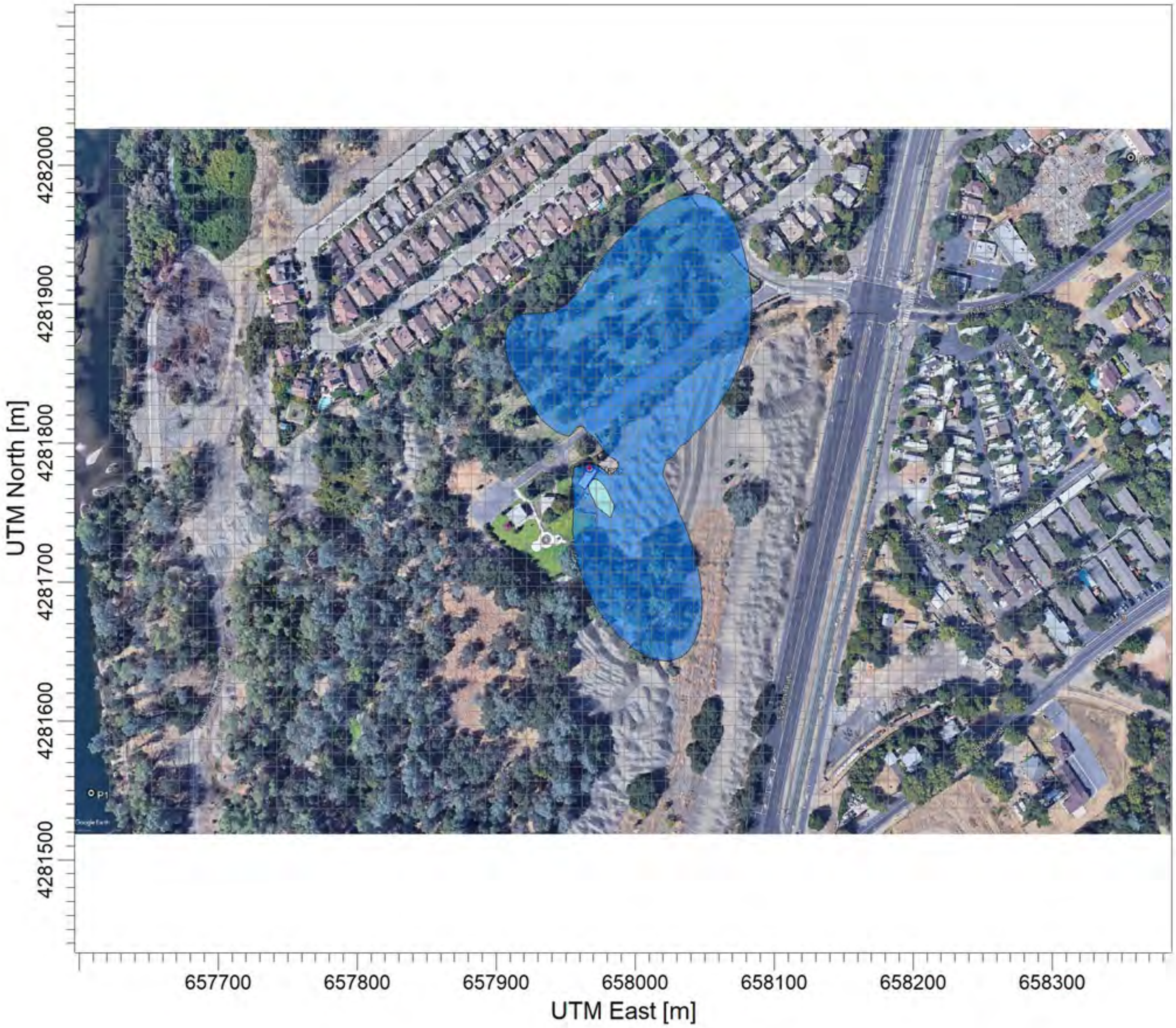
Worker Cancer Risk

*HARP - HRACalc v19044 11/20/2020 8:51:22 AM - Cancer Risk

REC	GRP	NETID	X	Y	RISK_SUM	SCENARIO
C1	ALL		658281.4	4281574	1.04E-08	25YrCancerDerived_InhSoilDerm
C2	ALL		658296.2	4281585	9.41E-09	25YrCancerDerived_InhSoilDerm
C2	ALL		658208.6	4281691	1.30E-08	25YrCancerDerived_InhSoilDerm
C4	ALL		658217.1	4281910	2.02E-08	25YrCancerDerived_InhSoilDerm

PROJECT TITLE:

Worker Incremental Cancer Risk



0.100 0.500

COMMENTS:	SOURCES:	COMPANY NAME:	
Risk in chances per million	**1**	**HELIX Environmental Planning**	
	RECEPTORS: **3541**		
	OUTPUT TYPE: **Risk**	SCALE: 1:4,963 (0 — 0.1 km)	
	MAX:	DATE: **11/21/2020**	PROJECT NO.: **COF-32**

AERMOD View - Lakes Environmental Software

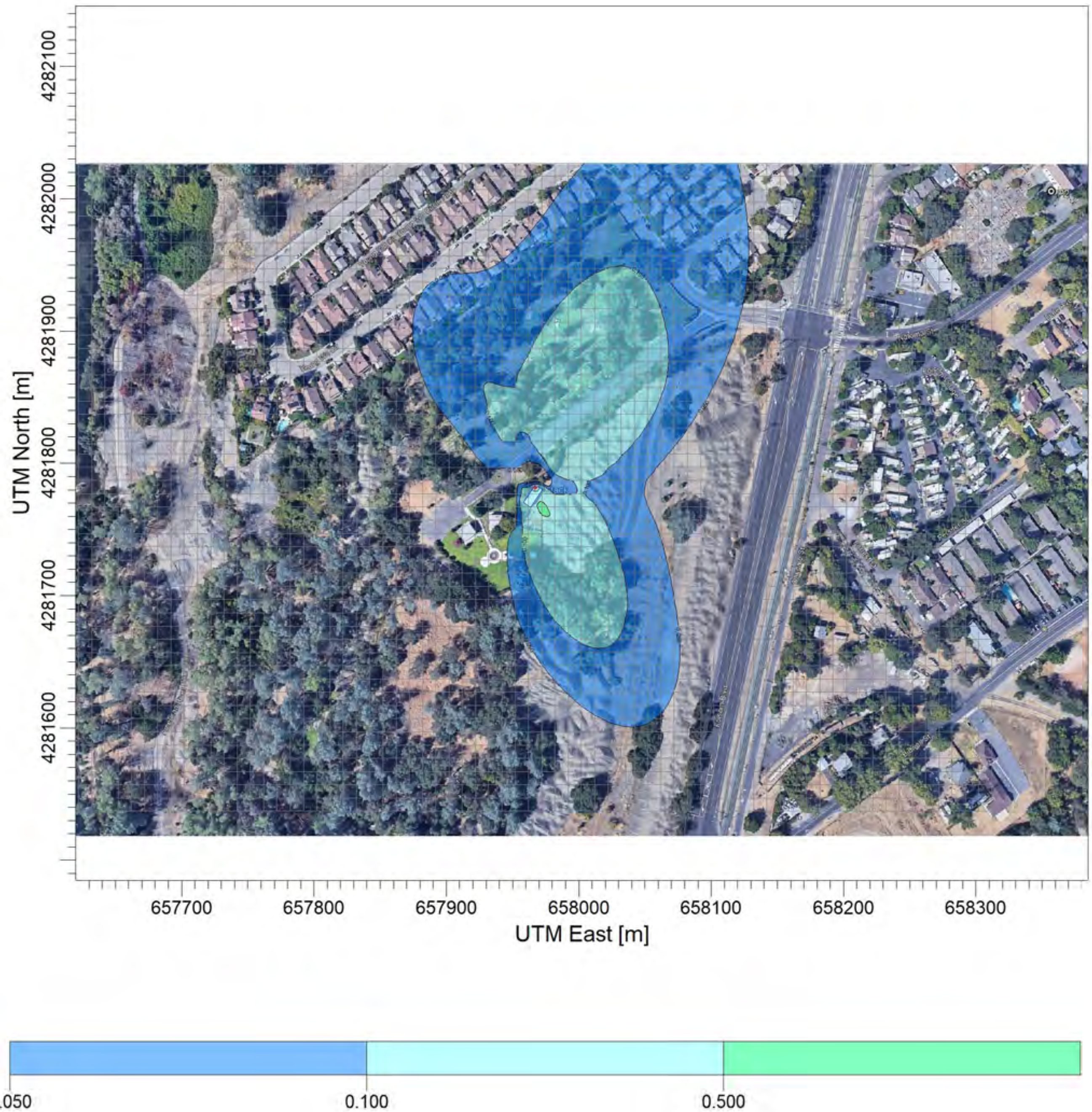
Worker Chronic Risk

*HARP - HRACalc v19044 11/20/2020 8:52:49 AM - Chronic Risk

REC	GRP	NETID	X	Y	SCENARIO	MAXHI
C1	ALL		658281.4	4281574	NonCancerChronicDerived_InhSoilDerm	8.37E-03
C2	ALL		658296.2	4281585	NonCancerChronicDerived_InhSoilDerm	7.57E-03
C2	ALL		658208.6	4281691	NonCancerChronicDerived_InhSoilDerm	1.05E-02
C4	ALL		658217.1	4281910	NonCancerChronicDerived_InhSoilDerm	1.62E-02

PROJECT TITLE:

Worker Maximum Non-Cancer Chronic Hazard Index



COMMENTS: Risk in maximum hazard index	SOURCES: **1**	COMPANY NAME: **HELIX Environmental Planning**	
	RECEPTORS: **3541**		
	OUTPUT TYPE: **Hazard Index**	SCALE: 1:4,808 0 0.1 km	
	MAX:	DATE: **11/21/2020**	PROJECT NO.: **COF-32**

AERMOD View - Lakes Environmental Software

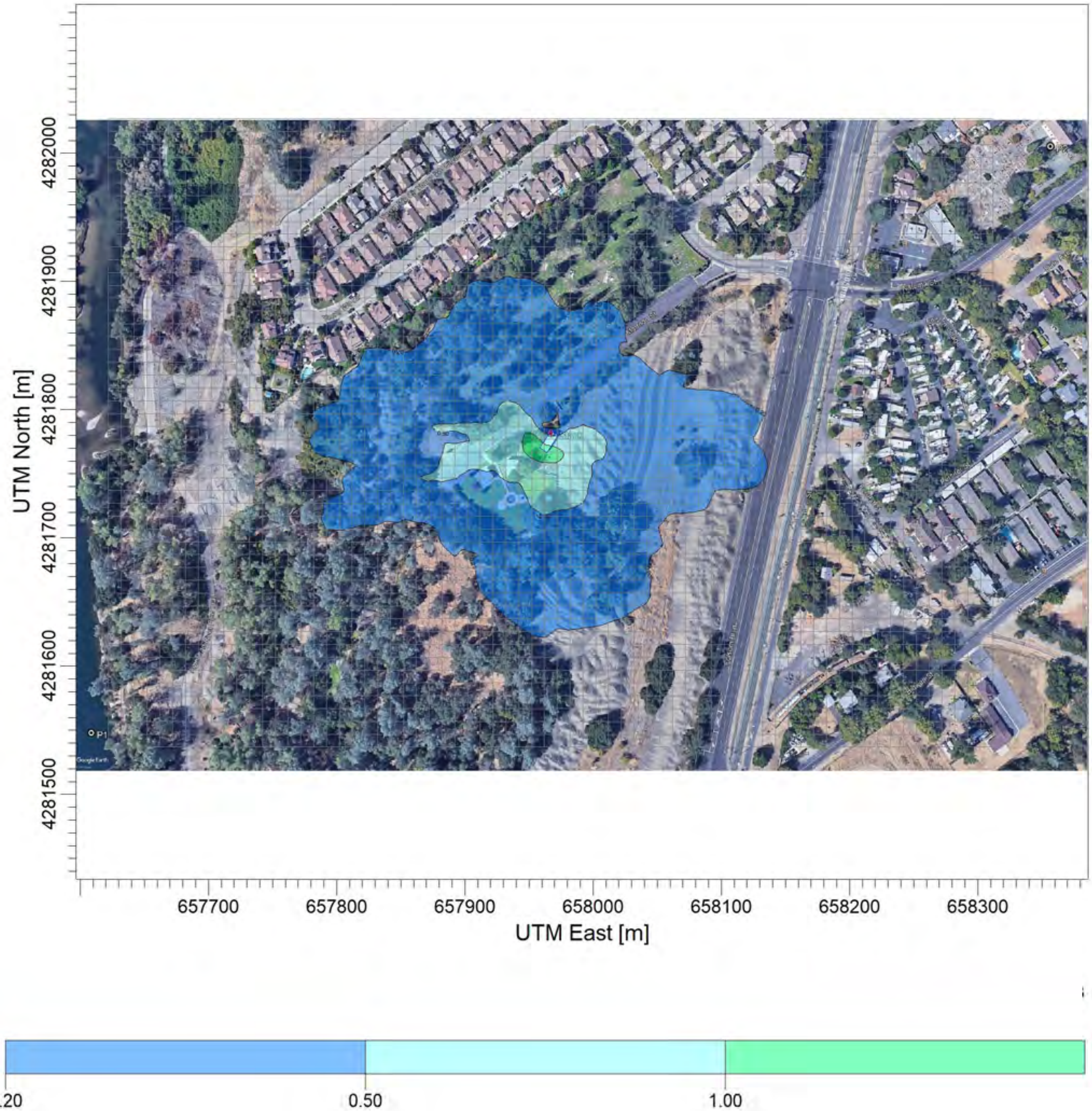
Acute Risk

*HARP - HRACalc v19044 11/20/2020 8:38:30 AM - Acute Risk

REC	GRP	NETID	X	Y	SCENARIO	MAXHI
R1	ALL		658172	4281577	NonCancerAcute	7.21E-02
R2	ALL		658204.3	4281599	NonCancerAcute	6.97E-02
R3	ALL		658177.6	4281681	NonCancerAcute	9.60E-02
R4	ALL		658221	4281731	NonCancerAcute	8.54E-02
R5	ALL		658216.2	4281738	NonCancerAcute	8.64E-02
R6	ALL		658211.2	4281758	NonCancerAcute	8.93E-02
R7	ALL		658184.6	4281790	NonCancerAcute	1.03E-01
R8	ALL		658186.7	4281798	NonCancerAcute	1.06E-01
R9	ALL		658189.5	4281816	NonCancerAcute	9.65E-02
R10	ALL		658194.3	4281838	NonCancerAcute	9.39E-02
R11	ALL		658196.8	4281851	NonCancerAcute	9.03E-02
R12	ALL		658103.2	4281928	NonCancerAcute	1.08E-01
R13	ALL		658071.8	4281960	NonCancerAcute	1.16E-01
R14	ALL		658060.4	4281973	NonCancerAcute	1.14E-01
R15	ALL		658051.7	4281986	NonCancerAcute	1.11E-01
R16	ALL		658043.1	4281998	NonCancerAcute	1.07E-01
R17	ALL		658012.3	4281990	NonCancerAcute	1.15E-01
R17	ALL		658000.9	4281983	NonCancerAcute	1.21E-01
R19	ALL		657988.3	4281975	NonCancerAcute	1.25E-01
R20	ALL		657977	4281966	NonCancerAcute	1.33E-01
R21	ALL		657966.5	4281958	NonCancerAcute	1.44E-01
R22	ALL		657954.9	4281949	NonCancerAcute	1.53E-01
R23	ALL		657944.2	4281940	NonCancerAcute	1.59E-01
R24	ALL		657933.3	4281932	NonCancerAcute	1.72E-01
R25	ALL		657921.4	4281923	NonCancerAcute	1.74E-01
R26	ALL		657910.8	4281914	NonCancerAcute	1.82E-01
R27	ALL		657900.6	4281906	NonCancerAcute	1.92E-01
R28	ALL		657888.2	4281897	NonCancerAcute	1.79E-01
R29	ALL		657877.8	4281889	NonCancerAcute	1.79E-01
R30	ALL		657866.5	4281880	NonCancerAcute	1.79E-01
R31	ALL		657855.3	4281872	NonCancerAcute	1.67E-01
R32	ALL		657844.1	4281863	NonCancerAcute	1.66E-01
R33	ALL		657832.5	4281854	NonCancerAcute	1.62E-01
R34	ALL		657820.3	4281845	NonCancerAcute	1.98E-01
R35	ALL		657808	4281834	NonCancerAcute	1.78E-01
R36	ALL		657791.5	4281834	NonCancerAcute	1.57E-01
R37	ALL		657764	4281814	NonCancerAcute	1.17E-01
C1	ALL		658281.4	4281574	NonCancerAcute	5.58E-02
C2	ALL		658296.2	4281585	NonCancerAcute	5.51E-02
C2	ALL		658208.6	4281691	NonCancerAcute	8.41E-02
C4	ALL		658217.1	4281910	NonCancerAcute	7.37E-02

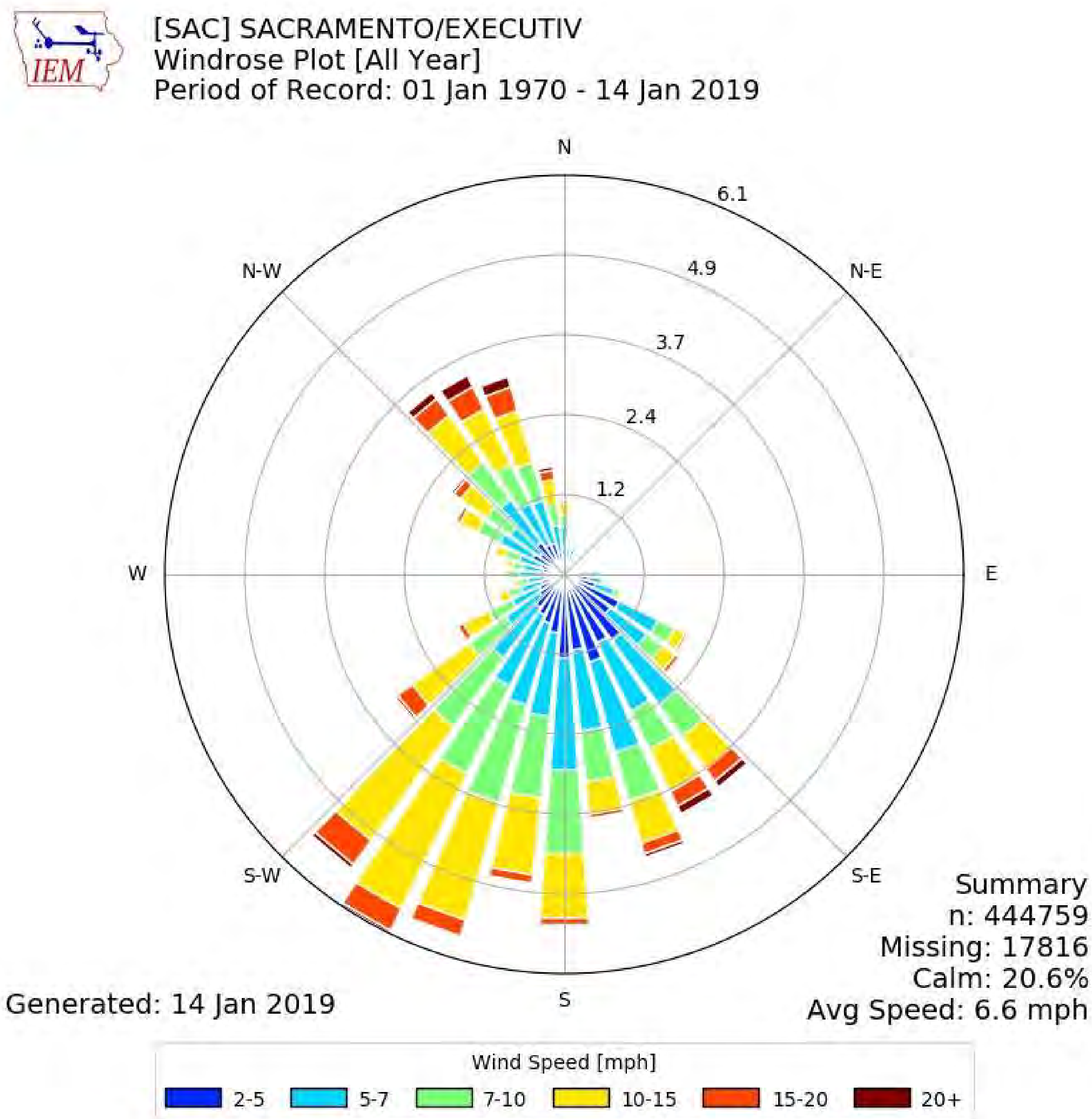
PROJECT TITLE:

Non-Cancer Acute Maximum Hazard Index



COMMENTS:	SOURCES:	COMPANY NAME:	
Risk in maximum hazard index	**1**	**HELIX Environmental Planning**	
	RECEPTORS: **3541**		
	OUTPUT TYPE: **Hazard Index**	SCALE: 1:4,963 (0 — 0.1 km)	
	MAX:	DATE: **11/21/2020**	PROJECT NO.: **COF-32**

AERMOD View - Lakes Environmental Software


[SAC] SACRAMENTO/EXECUTIV
Windrose Plot [All Year]
Period of Record: 01 Jan 1970 - 14 Jan 2019
N
N-E
E
S-E
S
S-W
W
N-W
1.2
2.4
3.7
4.9
6.1
Summary
n: 444759
Missing: 17816
Calm: 20.6%
Avg Speed: 6.6 mph
Generated: 14 Jan 2019
Wind Speed [mph]
2-5
5-7
7-10
10-15
15-20
20+

Control Pathway

AERMOD

Dispersion Options

Titles
C:\Users\mdrol\Desktop\COF-32 HRA\COF-32 Lakeside Crematorium Lakes\

Dispersion Options
- [x] Regulatory Default
- [ ] Non-Default Options

Dispersion Coefficient
Rural

Output Type
- [x] Concentration
- [ ] Total Deposition (Dry & Wet)
- [ ] Dry Deposition
- [ ] Wet Deposition

Plume Depletion
- [ ] Dry Removal
- [ ] Wet Removal

Output Warnings
- [ ] No Output Warnings
- [ ] Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type
OTHER - MULTIPLE

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	[x]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

- [ ] Month
- [x] Period
- [ ] Annual

Exponential Decay
Option not available

Terrain Height Options
- [ ] Flat
- [x] Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors
- [x] Yes
- [ ] No

Default Height = 1.20 m

Optional Files

☐ Re-Start File	☐ Init File	☐ Multi-Year Analyses	☐ Event Input File	☒ Error Listing File

Detailed Error Listing File

Filename: COF-32 Lakeside Crematorium Lakes.err

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	STACK1	657967.00 Stack	4281782.00	50.33	5.97	1.00000	855.37	4.47	0.51

Source Pathway

AERMOD

Building Downwash Information

Source ID: **STACK1**

Heights [m] (10 to 360 deg)

10-60 deg	3.44	3.44	3.44	3.44	3.44	3.44
70-120 deg	3.44	3.44	3.44	3.44	3.44	3.44
130-180 deg	3.44	3.44	3.44	3.44	3.44	3.44
190-240 deg	3.44	3.44	3.44	3.44	3.44	3.44
250-300 deg	3.44	3.44	3.44	3.44	3.44	3.44
310-360 deg	3.44	3.44	3.44	3.44	3.44	3.44

Widths [m] (10 to 360 deg)

10-60 deg	12.51	10.24	7.65	8.26	10.81	13.03
70-120 deg	14.85	16.22	17.10	17.46	17.29	16.59
130-180 deg	16.66	17.25	17.31	16.84	15.87	14.41
190-240 deg	12.51	10.24	7.65	8.26	10.81	13.03
250-300 deg	14.85	16.22	17.10	17.46	17.29	16.59
310-360 deg	16.66	17.25	17.31	16.84	15.87	14.41

Lengths [m] (10 to 360 deg)

10-60 deg	17.46	17.29	16.59	16.66	17.25	17.31
70-120 deg	16.84	15.87	14.41	12.51	10.24	7.65
130-180 deg	8.26	10.81	13.03	14.85	16.22	17.10
190-240 deg	17.46	17.29	16.59	16.66	17.25	17.31
250-300 deg	16.84	15.87	14.41	12.51	10.24	7.65
310-360 deg	8.26	10.81	13.03	14.85	16.22	17.10

Along Flow [m] (10 to 360 deg)

10-60 deg	-15.63	-15.49	-14.88	-14.41	-14.07	-13.30
70-120 deg	-12.12	-10.58	-8.72	-6.59	-4.26	-1.81
130-180 deg	-0.93	-1.19	-1.41	-1.59	-1.72	-1.80
190-240 deg	-1.82	-1.79	-1.71	-2.26	-3.18	-4.01
250-300 deg	-4.72	-5.29	-5.69	-5.92	-5.97	-5.84
310-360 deg	-7.34	-9.63	-11.62	-13.26	-14.50	-15.30

Across Flow [m] (10 to 360 deg)

10-60 deg	0.34	-0.85	-2.02	-3.21	-4.22	-5.11
70-120 deg	-5.84	-6.39	-6.75	-6.90	-6.85	-6.59
130-180 deg	-6.08	-5.44	-4.64	-3.70	-2.65	-1.51
190-240 deg	-0.34	0.85	2.02	3.21	4.22	5.11
250-300 deg	5.84	6.39	6.75	6.90	6.85	6.59
310-360 deg	6.08	5.44	4.64	3.70	2.65	1.51

Emission Rate Units for Output

For Concentration

Unit Factor:	1E6
Emission Unit Label:	GRAMS/SEC
Concentration Unit Label:	MICROGRAMS/M**3

Receptor Networks

Note: Terrain Elavations and Flagpole Heights for Network Grids are in Page RE2 - 1 (If applicable)
Generated Discrete Receptors for Multi-Tier (Risk) Grid and Receptor Locations for Fenceline Grid are in Page RE3 - 1 (If applicable)

Uniform Cartesian Grid

Receptor Network ID	Grid Origin X Coordinate [m]	Grid Origin Y Coordinate [m]	No. of X-Axis Receptors	No. of Y-Axis Receptors	Spacing for X-Axis [m]	Spacing for Y-Axis [m]
UCART1	657622.00	4281537.00	70	50	10.00	10.00

Discrete Receptors

Discrete Cartesian Receptors

Record Number	X-Coordinate [m]	Y-Coordinate [m]	Group Name (Optional)	Terrain Elevations	Flagpole Heights [m] (Optional)
1	658171.99	4281576.80		56.25	
2	658204.25	4281599.32		56.72	
3	658177.63	4281680.58		56.34	
4	658220.99	4281730.59		57.89	
5	658216.22	4281737.74		58.30	
6	658211.15	4281758.13		58.69	
7	658184.55	4281789.89		58.01	
8	658186.65	4281798.48		58.07	
9	658189.46	4281816.10		58.09	
10	658194.31	4281838.45		58.23	
11	658196.77	4281850.98		58.27	
12	658103.22	4281927.78		55.35	
13	658071.77	4281959.88		54.86	
14	658060.39	4281973.04		54.92	
15	658051.68	4281985.75		55.07	
16	658043.07	4281998.03		55.31	
17	658012.30	4281989.53		53.82	
18	658000.94	4281982.74		53.45	
19	657988.34	4281974.95		53.12	
20	657977.03	4281966.32		52.45	
21	657966.52	4281958.41		51.82	
22	657954.91	4281949.27		51.24	
23	657944.16	4281940.37		50.78	
24	657933.29	4281931.72		50.35	
25	657921.43	4281922.83		49.89	
26	657910.81	4281913.81		49.47	

27	657900.56	4281905.53		49.05
28	657888.20	4281897.13		48.45
29	657877.82	4281889.10		47.97
30	657866.46	4281879.84		47.51
31	657855.34	4281872.06		47.00
32	657844.10	4281863.28		46.48
33	657832.49	4281853.90		46.03
34	657820.26	4281845.37		45.60
35	657807.97	4281834.37		45.10
36	657791.51	4281834.17		44.60
37	657763.95	4281813.59		43.54
38	658281.43	4281574.43		57.67
39	658296.17	4281585.05		58.20
40	658208.56	4281690.93		56.99
41	658217.08	4281910.37		58.57

Plant Boundary Receptors

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: ..\Exec 10-14 N1MD.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: ..\Exec 10-14 N1MD.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 10.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2010			SACRAMENTO/EXECUTIVE ARPT
Upper Air		2010			OAKLAND/WSO AP

Data Period

Data Period to Process

Start Date: 1/1/2010 Start Hour: 1 End Date: 12/31/2014 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Output Pathway

AERMOD

Tabular Printed Outputs

Short Term Averaging Period	RECTABLE Highest Values Table										MAXTABLE Maximum Values Table	DAYTABLE Daily Values Table
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th		
1	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐		No

Contour Plot Files (PLOTFILE)

Path for PLOTFILES: COF-32 Lakeside Crematorium Lakes.AD

Averaging Period	Source Group ID	High Value	File Name
1	ALL	1st	01H1GALL.PLT
Period	ALL	N/A	PE00GALL.PLT

HARP Project Summary Report 11/21/2020 10:12:35 AM

PROJECT INFORMATION
HARP Version: 19121
Project Name: COF-32 LAKESIDE CREMATORIUM HARP
HARP Database: NA

EMISSION INVENTORY
No. of Pollutants:39
No. of Background Pollutants:0

Emissions

ScrID	StkID	ProID	PolID	PolAbbrev	Multi	Annual Ems (lbs/yr)	MaxHr Ems (lbs/hr)	MWAF
STACK1	0	0	75070	Acetaldehyde	1	0.0364	7.27E-05	1
STACK1	0	0	71432	Benzene	1	0.0177	3.54E-05	1
STACK1	0	0	7440417	Beryllium	1	0.00114	2.28E-06	1
STACK1	0	0	7440439	Cadmium	1	0.00859	1.72E-05	1
STACK1	0	0	18540299	Cr(VI)	1	0.00957	1.91E-05	1
STACK1	0	0	7440508	Copper	1	0.0217	4.34E-05	1
STACK1	0	0	50000	Formaldehyde	1	0.0095	1.90E-05	1
STACK1	0	0	7664393	HF	1	0.401	0.000802	1
STACK1	0	0	7439921	Lead	1	0.0517	0.000103	1
STACK1	0	0	7439976	Mercury	1	2.77	0.00416	1
STACK1	0	0	7440020	Nickel	1	0.0299	5.98E-05	1
STACK1	0	0	7782492	Selenium	1	0.0172	3.44E-05	1
STACK1	0	0	108883	Toluene	1	0.573	0.00115	1
STACK1	0	0	75014	Vinyl Chloride	1	0.00185	3.70E-06	1
STACK1	0	0	1330207	Xylenes	1	0.00963	1.93E-05	1
STACK1	0	0	7440666	Zinc	1	0.276	0.000551	1
STACK1	0	0	56553	B[a]anthracene	1	6.67E-06	1.33E-08	1
STACK1	0	0	50328	B[a]P	1	2.45E-05	4.90E-08	1
STACK1	0	0	205992	B[b]fluoranthen	1	5.61E-06	1.12E-08	1
STACK1	0	0	207089	B[k]fluoranthen	1	5.06E-06	1.01E-08	1
STACK1	0	0	218019	Chrysene	1	3.49E-05	6.98E-08	1
STACK1	0	0	53703	D[a,h]anthracen	1	4.52E-06	9.04E-09	1
STACK1	0	0	193395	In[1,2,3-cd]pyr	1	5.39E-06	1.08E-08	1
STACK1	0	0	1746016	2,3,7,8-TCDD	1	5.11E-08	1.02E-10	1
STACK1	0	0	40321764	1-3,7,8PeCDD	1	1.49E-07	2.98E-10	1
STACK1	0	0	39227286	1-4,7,8HxCDD	1	1.77E-07	3.54E-10	1
STACK1	0	0	57653857	1-3,6-8HxCDD	1	2.55E-07	5.10E-10	1
STACK1	0	0	19408743	1-3,7-9HxCDD	1	3.16E-07	6.32E-10	1
STACK1	0	0	35822469	1-4,6-8HpCDD	1	2.42E-06	4.84E-09	1
STACK1	0	0	51207319	2,3,7,8-TCDF	1	3.43E-07	6.86E-10	1
STACK1	0	0	57117416	1-3,7,8PeCDF	1	1.91E-07	3.81E-10	1
STACK1	0	0	57117314	2-4,7,8PeCDF	1	5.82E-07	1.16E-09	1
STACK1	0	0	70648269	1-4,7,8HxCDF	1	6.18E-07	1.24E-09	1
STACK1	0	0	57117449	1-3,6-8HxCDF	1	5.49E-07	1.10E-09	1
STACK1	0	0	72918219	1-3,7-9HxCDF	1	1.07E-06	2.15E-09	1
STACK1	0	0	60851345	2-4,6-8HxCDF	1	2.23E-07	4.45E-10	1
STACK1	0	0	67562394	1-4,6-8HpCDF	1	2.94E-06	5.89E-09	1
STACK1	0	0	55673897	1-4,7-9HpCDF	1	1.79E-07	3.58E-10	1
STACK1	0	0	7440382	Arsenic	1	0.0252	5.04E-05	1

POLLUTANT HEALTH INFORMATION
Health Database: C:\HARP2\Tables\HEALTH17320.mdb
Health Table Version: HEALTH19252
Official: True

PolID	PolAbbrev	InhCancer	OralCancer	AcuteREL	InhChronicREL	OralChronicREL	InhChronic8HRREL
75070	Acetaldehyde	0.01		470	140		300
71432	Benzene	0.1		27	3		3
7440417	Beryllium	8.4			0.007	0.002	
7440439	Cadmium	15			0.02	0.0005	
18540299	Cr(VI)	510	0.5		0.2	0.02	
7440508	Copper			100			
50000	Formaldehyde	0.021		55	9		9
7664393	HF			240	14	0.04	
7439921	Lead	0.042	0.0085				
7439976	Mercury			0.6	0.03	0.00016	0.06
7440020	Nickel	0.91		0.2	0.014	0.011	0.06
7782492	Selenium				20	0.005	
108883	Toluene			37000	300		
75014	Vinyl Chloride	0.27		180000			
1330207	Xylenes			22000	700		
7440666	Zinc						
56553	B[a]anthracene	0.39	1.2				
50328	B[a]P	3.9	12				
205992	B[b]fluoranthen	0.39	1.2				
207089	B[k]fluoranthen	0.39	1.2				
218019	Chrysene	0.039	0.12				
53703	D[a,h]anthracen	4.1	4.1				
193395	In[1,2,3-cd]pyr	0.39	1.2				
1746016	2,3,7,8-TCDD	130000	130000		4.00E-05	1.00E-08	
40321764	1-3,7,8PeCDD	130000	130000		4.00E-05	1.00E-08	
39227286	1-4,7,8HxCDD	13000	13000		0.0004	1.00E-07	
57653857	1-3,6-8HxCDD	13000	13000		0.0004	1.00E-07	
19408743	1-3,7-9HxCDD	13000	13000		0.0004	1.00E-07	
35822469	1-4,6-8HpCDD	1300	1300		0.004	1.00E-06	
51207319	2,3,7,8-TCDF	13000	13000		0.0004	1.00E-07	
57117416	1-3,7,8PeCDF	3900	3900		0.0013	3.30E-07	
57117314	2-4,7,8PeCDF	39000	39000		0.00013	3.30E-08	
70648269	1-4,7,8HxCDF	13000	13000		0.0004	1.00E-07	
57117449	1-3,6-8HxCDF	13000	13000		0.0004	1.00E-07	
72918219	1-3,7-9HxCDF	13000	13000		0.0004	1.00E-07	
60851345	2-4,6-8HxCDF	13000	13000		0.0004	1.00E-07	
67562394	1-4,6-8HpCDF	1300	1300		0.004	1.00E-06	
55673897	1-4,7-9HpCDF	1300	1300		0.004	1.00E-06	
7440382	Arsenic	12	1.5	0.2	0.015	3.50E-06	0.015

LIST OF AIR DISPERSION FILES
AERMOD Input File:
AERMOD Output File:
AERMOD Error File:
Plotfile list
____

LIST OF RISK ASSESSMENT FILES
Health risk analysis files (\hra\)

____
AcuteGLCList.csv
AcuteHRAInput.hra
AcuteNCAcuteRisk.csv
AcuteNCAcuteRiskSumByRec.csv
AcuteOutput.txt
AcutePathwayRec.csv
AcutePolDB.csv
ResCancerCancerRisk.csv
ResCancerCancerRiskSumByRec.csv
ResCancerGLCList.csv
ResCancerHRAInput.hra
ResCancerOutput.txt
ResCancerPathwayRec.csv
ResCancerPolDB.csv
ResChronicGLCList.csv
ResChronicHRAInput.hra
ResChronicNCChronicRisk.csv
ResChronicNCChronicRiskSumByRec.csv
ResChronicOutput.txt
ResChronicPathwayRec.csv
ResChronicPolDB.csv
WorkCancerCancerRisk.csv
WorkCancerCancerRiskSumByRec.csv
WorkCancerGLCList.csv
WorkCancerHRAInput.hra
WorkCancerOutput.txt
WorkCancerPathwayRec.csv
WorkCancerPolDB.csv
WorkChronicGLCList.csv
WorkChronicHRAInput.hra
WorkChronicNCChronicRisk.csv
WorkChronicNCChronicRiskSumByRec.csv
WorkChronicOutput.txt
WorkChronicPathwayRec.csv
WorkChronicPolDB.csv

Attachment C

Addendum to the Folsom Lakeside Crematorium Project Air Quality and Greenhouse Gas Emissions Assessment

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 150
Folsom, CA 95630
916.365.8700
www.helixepi.com

November 5, 2021 Project 02576.00032.001

Mr. Scott Johnson, AICP
Planning Manager
City of Folsom, Community Development Department
50 Natoma Street
Folsom, CA 95630

Subject: Addendum to the Folsom Lakeside Crematorium Project Air Quality and Greenhouse Gas Emissions Assessment

Dear Mr. Johnson:

HELIX Environmental Planning, Inc. (HELIX) completed the *Folsom Lakeside Crematorium Project Air Quality and Greenhouse Gas Emissions Assessment* in July 2021 (HELIX 2021). Following the completion of the July 2021 analysis, Caring Services Group (Applicant) has requested alterations to the operating hours and number of daily cremations to occur on site. This Addendum provides an updated analysis based on these alterations.

PREVIOUS ANALYSIS

The July 2021 letter report assessed the air quality and greenhouse gas (GHG) emissions associated with the construction and operation of the proposed Folsom Lakeside Crematorium Project (project), including a health risk assessment (HRA) to evaluate potential community health risks from the project's emissions. The analysis was prepared to support environmental review under the California Environmental Quality Act (CEQA).

The analysis assumed a maximum cremation process rate of 200 pounds per hour, 400 pounds per day, and 100,000 pounds per year based on information provided by Applicant. The project's emissions of criteria pollutants and precursors were found to be below Sacramento Metropolitan Air Quality Management District (SMAQMD) thresholds and result in a less than significant impact. Community health risks resulting from emissions of toxic air contaminants (TACs) from the project's operation of a crematory were evaluated in an HRA following the Office of Environmental Health Hazard Assessment (OEHHA) guidelines. Project TAC emissions were found to result in less than significant impacts. The project was not found to be a substantial source of objectional odors and odor impacts were disclosed as less than significant. The project was found to be consistent with the City's integrated General Plan and GHG Strategy and GHG emissions impacts were disclosed as being less than significant. The project was found to not conflict with an applicable plan adopted for the purposes of reducing GHG emissions and the impact was disclosed as less than significant.

REVISED ANALYSIS

As discussed previously, the Applicant has requested alterations to the operating hours and number of daily cremations to occur on the site. The Applicant has requested an increase in the daily process rate from the previously analyzed 400 pounds per day to a new value of 800 pounds per day. There are no changes to the project that would affect the construction analysis previously conducted. The analysis that follows focuses on daily operational emissions.

The HRA previously conducted to evaluate potential community health risks from the project's TAC emissions relies on the maximum hourly emissions rate and the average annual emissions generated by project operations. The hourly cremation process rate was previously set based on the maximum hourly capacity of the crematory; therefore, there is no change to the hourly process rate or maximum hourly emissions. The Applicant has not requested alteration to the total number of cremations to occur per year; therefore, there is no change to the annual cremation process rate or average annual emissions profile. Therefore, the potential health risks from the project would remain the same as previously disclosed.

Methods

Criteria pollutant and precursor emissions for long-term operation of the proposed crematory were calculated using propane combustion emissions factors from the USEPA AP-42 Compilation of Emissions Factors Chapter 1.5 (USEPA 2008), and crematory emissions factors provided by the SMAQMD, which combined USEPA AP-42 data and the USEPA Factor Information Retrieval Program (SMAQMD 2020a).

Air Quality Impact Analysis

Operation of a propane-fired crematory would be considered a new stationary source of emissions. The project may be subject to SMAQMD's Rule 201, *General Permit Requirements*, and Rule 202, *New Source Review*. The project would be required to implement best available control technology (BACT) for the minimization of emissions. BACT for crematories is incorporated into the product design in the form of controls which ensure maintenance of the correct temperatures and cycle times, and a secondary combustion chamber which ensures oxygenation and complete combustions of all fuels. As described in the Methods sections, above, criteria pollutant and precursor emissions for long-term operation of the proposed crematory were calculated using propane combustion emissions factors from AP-42 and crematory emission factors provided by SMAQMD. The project's calculated criteria and precursors operational emissions are compared to the SMAQMD thresholds in Table 1, *Operational Criteria Pollutant and Precursor Emissions*, and the calculation output sheets are included in Attachment A to this letter.

Table 1
OPERATIONAL CRITERIA POLLUTANT AND PRECURSOR EMISSIONS

Pollutant	Project Emissions	SMAQMD Threshold	Exceed Threshold?
Daily Emissions (pounds per day)			
ROG	0.2	**65**	*No*
NO_X	2.4	**65**	*No*
CO	1.8	**None**	*No*
SO_X	0.9	**None**	*No*
PM_{10}	0.5	**80**	*No*
$PM_{2.5}$	0.5	**82**	*No*

Source: SMAQMD 2020a; SMAQMD 2020b

As shown in Table 1, the project's operational emissions of criteria pollutants and precursors would not exceed the SMAQMD daily thresholds. Therefore, the project's operational emissions would not result in a cumulatively considerable net increase of any criteria pollutant and impacts would be less than significant.

SUMMARY

The project's daily emissions of criteria pollutants and precursors would remain below SMAQMD thresholds and would result in a less than significant impact. All other quantified emissions and significance determinations remain unchanged from what was presented in the July 2021 *Folsom Lakeside Crematorium Project Air Quality and Greenhouse Gas Emissions Assessment*.

Sincerely,

Victor Ortiz
Senior Air Quality Specialist

Attachments:

Attachment A: Emissions Calculation Sheets

REFERENCES

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2020a. Electronic communications between HELIX Environmental Planning (Victor Ortiz) and the Sacramento Metropolitan Air Quality Management District (Venk Reddy); attachments to communications containing crematory emissions calculations. August and November.

2020b. SMAQMD Thresholds of Significance Table. April. Available at: http://www.airquality.org/LandUseTransportation/Documents/CH2ThresholdsTable4-2020.pdf.

U.S. Environmental Protection Agency (USEPA). 2008. AP 42, Fifth Edition, Volume I Chapter 1: External Combustion Sources, 1.5 Liquified Petroleum Gas Combustion. Available at: https://www.epa.gov/sites/production/files/2020-09/documents/1.5_liquefied_petroleum_gas_combustion.pdf.

Crematory Criteria Pollutant Emissions

Emissions from Propane Combustion

KBTU/Cycle	1,800
KBTU/Gallon	91.502
Gallons/Cycle	19.672
Cycles/Day	4
Cycles/Year	500

Pollutant	Emission Factor (lbs/1000 gal)[1]	Emissions (lbs/day)
ROG[3]	1	0.08
NOx	13	1.02
SOx	0.054	0.00
PM10	0.7	0.06
PM2.5[4]	0.7	0.06
CO	7.5	0.59

Emissions from Combustion of Human Remains

	lbs/day
Maximum Throughput	800

Pollutant	Emission Factor (lbs/ton)[2]	Emissions (lbs/day)
ROG	0.299	0.12
NOx	3.560	1.42
SOx	2.170	0.87
PM10	1.130	0.45
PM2.5[4]	1.130	0.45
CO	2.950	1.18

Total Emissions

Pollutant	Emissions (lbs/day)
ROG	0.2
NOx	2.4
SOx	0.9
PM10	0.5
PM2.5	0.5
CO	1.8

Notes:
1. Emissions factors for propane from USEPA AP-42 Chapter 1, External Combustion Sources, Section 1.5 Liquefied Petroleum Gas Combustion, Table 1.5-1.
2. Emissions from combustion of human remains provided by SMAQMD and are from USEPA Factor Information REtrieval (FIRE) Program Data System (3/08).
3. ROG fraction of TOC for propane combustion unavailable, ROG assumed to be equal to