SUMMIT PUBLIC SCHOOL: SUMMIT DENALI ENVIRONMENTAL AIR QUALITY ASSESSMENT 539 E. WEDDELL DRIVE SUNNYVALE, CALIFORNIA

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Prepared for:

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INTRODUCTION

Summit Public Schools (SPS) plans to lease an existing 19,402 square foot building (previously used as a Church) and temporarily locate two (2) 960 square foot classroom portables to operate a charter school (grades 6–9). The long term plan is to solely serve the middle school population (Grades 6-8) of 300 students. The school will operate its first academic calendar year (2016-2017) with 400 students. After the first academic calendar year the portables will be removed from the site and the paved area may at times be used for outdoor recreation (e.g., basketball during the lunchtime period or after school). The existing building will require interior tenant improvements to accommodate the school program. No expansion of the existing building footprint is needed.

This report summarizes the assessment of potential air quality and greenhouse gas (GHG) impacts resulting from the proposed Summit Denali Charter School Project proposed at 539 E. Weddell Drive in Sunnyvale, California. The Bay Area Air Quality Management District (BAAQMD) prepared CEQA Air Quality Guidelines in 2011 that the City uses to evaluate air quality impacts. These guidelines were used to evaluate the air quality impacts associated with this project.

Setting

The project is located in northern Santa Clara County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$).

Air Pollutants of Concern

High ozone levels are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NOx). These precursor pollutants react under certain meteorological conditions to form high ozone levels. Controlling the emissions of these precursor pollutants is the focus of the Bay Area's attempts to reduce ozone levels. The highest ozone levels in the Bay Area occur in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone levels aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

Particulate matter is another problematic air pollutant of the Bay Area. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less (PM_{10}) and fine particulate matter where particles have a diameter of 2.5 micrometers or less ($PM_{2.5}$). Elevated concentrations of PM_{10} and $PM_{2.5}$ are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

Toxic Air Contaminants

Toxic air contaminants (TAC) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter [DPM] near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the State's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

CARB has adopted and implemented a number of regulations for stationary and mobile sources to reduce emissions of DPM. Several of these regulatory programs affect medium and heavy duty diesel trucks that represent the bulk of DPM emissions from California highways. These regulations include the solid waste collection vehicle (SWCV) rule, in-use public and utility fleets, and the heavy-duty diesel truck and bus regulations. In 2008, CARB approved a new regulation to reduce emissions of DPM and nitrogen oxides from existing on-road heavy-duty diesel fueled vehicles.[1] The regulation requires affected vehicles to meet specific performance requirements between 2014 and 2023, with all affected diesel vehicles required to have 2010 model-year engines or equivalent by 2023. These requirements are phased in over the compliance period and depend on the model year of the vehicle.

The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the CARB (a part of the California Environmental Protection Agency [EPA]) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has recently published California Environmental Quality Act (CEQA) Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.[2]

Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. The closest off-site sensitive receptors are residences

1 Available online: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed: November 21, 2014.

2 Bay Area Air Quality Management District. 2011. BAAQMD CEQA Air Quality Guidelines. May.

located north of the project site across U.S. Highway 101. Additional residences are located at farther distances north of the construction area.

Greenhouse Gases

Gases that trap heat in the atmosphere, GHGs, regulate the earth's temperature. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate. The most common GHGs are carbon dioxide (CO_2) and water vapor but there are also several others, most importantly methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These are released into the earth's atmosphere through a variety of natural processes and human activities. Sources of GHGs are generally as follows:

- CO_2 and N_2O are byproducts of fossil fuel combustion.
- N_2O is associated with agricultural operations such as fertilization of crops.
- CH_4 is commonly created by off-gassing from agricultural practices (e.g., keeping livestock) and landfill operations.
- Chlorofluorocarbons (CFCs) were widely used as refrigerants, propellants, and cleaning solvents but their production has been stopped by international treaty.
- HFCs are now used as a substitute for CFCs in refrigeration and cooling.
- PFCs and sulfur hexafluoride emissions are commonly created by industries such as aluminum production and semi-conductor manufacturing.

Each GHG has its own potency and effect upon the earth's energy balance. This is expressed in terms of a global warming potential (GWP), with CO_2 being assigned a value of 1 and sulfur hexafluoride being several orders of magnitude stronger with a GWP of 23,900. In GHG emission inventories, the weight of each gas is multiplied by its GWP and is measured in units of CO_2 equivalents (CO_2e).

An expanding body of scientific research supports the theory that global warming is currently affecting changes in weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, and that it will increasingly do so in the future. The climate and several naturally occurring resources within California could be adversely affected by the global warming trend. Increased precipitation and sea level rise could increase coastal flooding, saltwater intrusion, and degradation of wetlands. Mass migration and/or loss of plant and animal species could also occur. Potential effects of global climate change that could adversely affect human health include more extreme heat waves and heat-related stress; an increase in climate-sensitive diseases; more frequent and intense natural disasters such as flooding, hurricanes and drought; and increased levels of air pollution.

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These Thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in the Air District's updated CEQA

Guidelines (updated May 2011). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 1.

Table 1. Air Quality Significance Thresholds

Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	Average Daily Emissions (lbs./day)	Annual Average Emissions (tons/year)
Criteria Air Pollutants			
ROG	54	54	10
NO_x	54	54	10
PM_{10}	82	82	15
$PM_{2.5}$	54	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards for New Sources			
Excess Cancer Risk	10 per one million		
Chronic or Acute Hazard Index	1.0		
Incremental annual average $PM_{2.5}$	0.3 $\mu g/m^3$		
Health Risks and Hazards for Sensitive Receptors (Cumulative from all sources within 1,000 foot zone of influence) and Cumulative Thresholds for New Sources			
Excess Cancer Risk	100 per one million		
Chronic Hazard Index	10.0		
Annual Average $PM_{2.5}$	0.8 $\mu g/m^3$		
Greenhouse Gas Emissions			
GHG Annual Emissions	Compliance with a Qualified GHG Reduction Strategy OR 1,100 metric tons or 4.6 metric tons per capita		

Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less; and GHG = greenhouse gas.

BAAQMD's adoption of significance thresholds contained in the 2011 CEQA Air Quality Guidelines was called into question by an order issued March 5, 2012, in California Building Industry Association (CBIA) v. BAAQMD (Alameda Superior Court Case No. RGI0548693). The order requires BAAQMD to set aside its approval of the thresholds until it has conducted environmental review under CEQA. The ruling made in the case concerned the environmental impacts of adopting the thresholds and how the thresholds would indirectly affect

land use development patterns. In August 2013, the Appellate Court struck down the lower court's order to set aside the thresholds. However, this litigation remains pending as the California Supreme Court recently accepted a portion of CBIA's petition to review the appellate court's decision to uphold BAAQMD's adoption of the thresholds. The specific portion of the argument to be considered is in regard to whether CEQA requires consideration of the effects of the environment on a project (as contrasted to the effects of a proposed project on the environment). Therefore, the significance thresholds contained in the 2011 CEQA Air Quality Guidelines are applied to this project.

Impacts and Mitigation Measures

Impact 1: Conflict with or obstruct implementation of the applicable air quality plan? ***No Impact.***

The most recent clean air plan is the *Bay Area 2010 Clean Air Plan* that was adopted by BAAQMD in September 2010. The proposed project would not conflict with the latest Clean Air planning efforts since the project would have emissions well below the BAAQMD thresholds (see Impact 2), and development would be consistent with previous uses and not causes changes in population. The project is too small to exceed any of the significance thresholds and, thus, it is not required to incorporate project-specific transportation control measures listed in the latest Clean Air Plan.

Impact 2: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable State or federal ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? ***Less than significant***

The Bay Area is considered a non-attainment area for ground-level ozone and $PM_{2.5}$ under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM_{10} under the California Clean Air Act, but not the federal act. The area has attained both State and federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM_{10}, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NOx), PM_{10}, and $PM_{2.5}$ apply to both construction period and operational period impacts.

The project would involve minimal construction and would not utilize heavy-duty construction equipment for extended periods. Due to the project size, operational period emissions would be less than significant. In their 2011 update to the CEQA Air Quality Guidelines, BAAQMD identified the size of land use projects that could result in significant air pollutant emissions. For operational impacts, the project size was identified at 285,000 square feet in size or a school that has 2,460 students. Since the project proposes reuse of a building with 19,402 square feet or 400 students, it is concluded that emissions would be below the BAAQMD significance thresholds for operational emissions.

Impact 3: Violate any air quality standard or contribute substantially to an existing or projected air quality violation? ***Less than significant.***

As discussed under Impact 2, the project would have emissions less than the BAAQMD screening size for evaluating impacts related to ozone and particulate matter. Therefore, the project would not contribute substantially to existing or projected violations of those standards. Carbon monoxide emissions from traffic generated by the project would be the pollutant of greatest concern at the local level. Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of carbon monoxide. Air pollutant monitoring data indicate that carbon monoxide levels have been at healthy levels (i.e., below State and federal standards) in the Bay Area since the early 1990s. As a result, the region has been designated as attainment for the standard. The highest measured level over any 8-hour averaging period during the last 3 years in the Bay Area is less than 3.0 parts per million (ppm), compared to the ambient air quality standard of 9.0 ppm. Intersections affected by the project would have traffic volumes less than the BAAQMD screening criteria and, thus, would not cause a violation of an ambient air quality standard or have a considerable contribution to cumulative violations of these standards.[3]

Impact 4: Expose sensitive receptors to substantial pollutant concentrations? ***Less than significant.***

Project impacts related to increased community risk can occur either by introducing a new sensitive receptor, such as a residential or school use, in proximity to an existing source of TACs or by introducing a new source of TACs with the potential to adversely affect existing sensitive receptors in the project vicinity. The project is not a source of TAC emissions, but would place new sensitive receptors near sources of TACs. This impact was analyzed.

This analysis evaluated the overall community risk impacts to the project, based on the exposure that children of junior high school age may have while attending the school. Typically, cancer risk and annual $PM_{2.5}$ assessments assume almost continuous exposure to TAC sources. However, a school or daycare is different in that the sensitive receptors, school children, do not reside at the project site. The predicted cancer risk and annual $PM_{2.5}$ concentrations accounted for the exposure duration that uses of a school/daycare facility would experience. Children attending the project are assumed to be exposed for 8 hours per day, 5 days per week, 180 days per year and 3 years during a lifetime[4]. Since school children are only present at the school for a relatively short portion of their life, lifetime and annual exposures have to be adjusted.

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3 For a land-use project type, the BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in a less than significant impact to localized carbon monoxide concentrations if the project would not increase traffic at affected intersections with more than 44,000 vehicles per hour.

4 Cancer risk computations take into account these exposure parameters, along with a higher breathing rate for children (based on weight) and an age sensitivity factor (ASF) based on 3 years at an ASF of 3, rather than a lifetime average that is 1.7. ASF accounts for the greater sensitivity of infants and children to cancer causing TACs.

For cancer risk, the screening level lifetime cancer risk was adjusted by a factor of 0.18. This is based on the following adjustments:

1. Age sensitivity. BAAQMD screening data uses a factor of 1.7 for lifetime exposure. This was adjusted to a factor of 3.

2. Daily exposure. Health risk assessments assume 24-hour per day exposure. Students would only be present for 8 hours per day.

3. Annual exposure. Health risk assessments assume 350 days of exposure per year and students would attend the school 180 days per year.

4. Lifetime exposure. Health risk assessments assume a 70-year exposure. Students would attend the school for a maximum of 3 years.

5. New OEHHA exposure guidance. New exposure parameters issued by the California Office of Environmental Health Hazards Assessment (OEHHA) include new exposure parameters that adjust for different breathing rates and exposure times were incorporated by using an adjustment factor of 1.3744 that was recommended by BAAQMD[5].

No adjustments were made to the predicted annual $PM_{2.5}$ and Hazard Index, since those screening levels are quite low and would not result in any significant health effects at the school, even if one were to assume continuous exposure.

TAC Sources Considered

Community health risk assessments typically look at all substantial sources of TACs located within 1,000 feet of project sites. These sources include highways, busy surface streets and stationary sources identified by BAAQMD. A review of the project area indicates that traffic on U.S. Highway 101 and N. Fair Oaks Drive are busy roadways that are considered sources of TACs. There are several stationary sources near the project site that are permitted by BAAQMD. Only one of these sources emits TACs that could affect the site. Figure 1 shows the project site and the sources of TACs near the site. Results of this assessment are shown in Table 2. The method to determine community risks from each source is described below. Note that no single source would pose a significant cancer risk, annual $PM_{2.5}$ concentration or non-cancer Hazard Index that exceeds the thresholds listed in Table 1. The combination of all TAC sources also would not exceed the significance thresholds. This would be a *less-than-significant* impact.

5 Phone conversation between James Reyff of Illingworth & Rodkin, Inc. and Virginia Lau of BAAQMD on November 10. 2015.

Figure 1 Project Site and 1,000-Foot Radius for Identifying TAC Sources

Highways

BAAQMD provides a Google Earth *Highway Screening Analysis Tool* that can be used to identify screening level impacts from State highways. The portion of the highway closest to the project was selected (i.e., Link 344, 6ft elevation). The lifetime cancer risk, annual $PM_{2.5}$ exposure and non-cancer hazard index corresponding to the distance between the project and the site was used. The data were interpolated since the site is 180 feet from the highway and the tool provides levels at 100 and 200 feet. Cancer risk levels were adjusted for exposure duration, age, and new exposure guidance provided by OEHHA, as described above.

Local Roadways

BAAQMD provides *Roadway Screening Analysis Calculator* that is used to assess potential excess cancer risk and annual $PM_{2.5}$ concentrations from surface streets for each Bay Area county. The calculator requires the entries of: (1) County, (2) roadway orientation (north-south or east-west), (3) side of the roadway receptors is located, (4) distance between receptor and nearest through travel lane, and (5) average daily traffic volume. N. Fair Oaks Avenue is shown by the California Environmental Health Tracking Program (CEHTP) web portal to have an annual average daily traffic of 27,417 vehicles. This north-south roadway is approximately 700 feet east of the project site. As shown in Table 2, the cancer risk, annual $PM_{2.5}$ concentration and HI associated with the roadway are below the significance threshold. Note that BAAQMD has found that non-cancer hazards from all local roadways would be well below the BAAQMD thresholds. Cancer risk levels were adjusted for exposure duration, age, and new exposure guidance provided by OEHHA, as described above.

Stationary Sources

There is one operational stationary source of TACs that was identified within 1,000 feet of the project site using the BAAQMD *Stationary Source Screening Analysis Tool.*[6] This tool provides screening levels of cancer risk, $PM_{2.5}$, and non-cancer risk for the identified sources. Plant 18976 at 444 Toyama Drive is a data center, operated by Switch and Data CA Eleven LLC, which includes four emergency back-up diesel generators. This source is permitted to operate by the BAAQMD and includes emissions standards and a maximum number of hours the source can operate (i.e., no more than 50 hours annually). Screening-level cancer risks, identified using the tool, were adjusted for the approximate 700-foot distance using BAAQMD's Diesel BUG Distance Multiplier. The community risk levels from this source are shown in Table 2. Note that Plant 8251 and 15896 that is shown within 1,000 feet of the site is actually beyond 1,000 feet from the site. Plant 5892 does not pose any cancer risk and only a very small level of $PM_{2.5}$. Cancer risk levels were adjusted for exposure duration, age, and new exposure guidance provided by OEHHA, as described above.

6 See http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools, accessed November 13, 2015.

Table 2. Community Risk Impacts from Single and Cumulative Sources

Source	Maximum Cancer Risk (per million)	Maximum Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)	Maximum Hazard Index
Highway traffic U.S. 101 at 180 feet from edge	1.5	0.24	0.07
Local Roadway traffic Fair Oaks Drive at >700 feet from edge	0.1	0.03	<0.01
Stationary Sources Plant 18976 at 444 Toyama Drive, approximately 700 feet	0.2	0.01	<0.01
Maximum Single Source	1.5	0.24	0.07
BAAQMD Threshold - Single Source	***10.0***	***0.3***	***1.0***
Significant	***No***	***No***	***No***
Cumulative Sources	1.8	0.28	<0.09
BAAQMD Threshold – Cumulative Sources	***100***	***0.8***	***10.0***
Significant	***No***	***No***	***No***

Note that Sources 8251 and 15896 that are shown to be within 1,000 feet are actually more than 1,000 feet from the project site; and therefore, are not included in this analysis. Source 5892, an auto body shop, has very low impacts.

Impact 5: Create objectionable odors affecting a substantial number of people? ***Less than significant.***

The project would not include any sources of significant odors that would cause complaints from surrounding uses. In addition, there are no known odor sources that would affect the project and cause frequent odor complaints. This would be a *less-than-significant impact*

Impact 6: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? ***Less than significant.***

The BAAQMD May 2011 CEQA Guidelines included GHG emissions-based significance thresholds. These thresholds include a "bright-line" emissions level of 1,100 metric tons (MT) per year for land-use type projects and 10,000 MT per year for stationary sources. The project would not include any stationary sources of GHGs, such as emergency back-up generators.

As described previously, the project would involve little construction activity. Due to the project size, operational period GHG emissions would be less than significant. In their 2011 update to the CEQA Air Quality Guidelines, BAAQMD identified the size of land use projects that could result in significant GHG emissions. For operational impacts, the project size was identified at 46,000 square feet in size. Since the project proposes reuse of a building with 19,402 square feet, it is concluded that emissions would be below the BAAQMD significance thresholds for operational emissions (i.e., 1,100 metric tons CO_2e per year). This would be a less than significant impact.

Impact 7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases? ***Less than significant.***

In 2014, the City finalized the Sunnyvale Climate Action Plan.[7] The Sunnyvale Climate Action Plan serves as a Qualified Greenhouse Gas Reduction Strategy or a community-wide plan to reduce greenhouse gas (GHG) emissions in accordance with AB 32 goals. The project would be subject to new requirements under rule making developed at the State and local level, including the City's Climate Action Plan, regarding greenhouse gas emissions and would be subject to local policies that may affect emissions of greenhouse gases.

7 City of Sunnyvale, 2014. *City of Sunnyvale Climate Action Plan.*, May.