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MEMORANDUM

To: Laura Shinn, San Diego State University
From: Sarah Lozano, Katie Laybourn, Nicholas Lorenzen, Dudek
Subject: SDSU Tula Pavilion and Tenochca Hall Renewal/Refresh - Energy Consumption Technical Memorandum
Date: January 5, 2017
Attachment(s): Figures 1–2

Dudek evaluated potential impacts to energy consumption associated with the proposed San Diego State University (SDSU) Tula Pavilion and Tenochca Hall Renewal/Refresh (proposed project), located in San Diego, California. This technical memorandum provides the results of the Energy Consumption technical evaluation.

1 PROJECT LOCATION AND SETTING

SDSU is located adjacent to Interstate 8 (I-8), approximately 8 miles east of downtown San Diego (see Figure 1, Project Location and Vicinity Map). The SDSU campus is located in the "College Area," within the City of San Diego (City) and County of San Diego, and is surrounded by urban uses, including commercial, institutional, and medical facilities. The proposed project would be located in the southeastern portion of the SDSU campus (see Figure 2, Project Site). As described below, the proposed Tenochca Community Space (TCS) and Tula Pavilion would replace the existing Tula/Tenochca Community Center; the TCS would be constructed on the site of the demolished Tula/Tenochca Community Center, and the proposed Tula Pavilion would be constructed to the northwest on the site of a paved walking path at the north end of a service vehicle parking lot.

2 PROJECT DESCRIPTION

The proposed project, referred to as the "Tula Pavilion and Tenochca Hall Renewal/Refresh," involves demolition of the existing Tula/Tenochca Community Center. To replace the demolished building, the Tula Pavilion and the TCS would be constructed. The proposed TCS would be two-stories in height and approximately 13,000 gross square feet (gsf) in size. The proposed TCS building would provide a variety of student gathering spaces, including student lounges, a kitchen for student use, and areas visible to televisions that front the outdoor grounds. The proposed Tula

Pavilion would be a one-story building and approximately 12,000 gsf. The Tula interior space would include one large assembly space, and an adjoining large classroom/seminar room that can be divided into three smaller rooms and a banquet room. On the exterior, a courtyard would provide an outdoor venue for private events, and otherwise would be open to public use and circulation.

In addition, the proposed TCS would be constructed at the site of the existing Tula/Tenochca Community Center and would replace the student common spaces at the existing Tula/Tenochca Community Center, such as the security check-in point, student lounge space, laundry and Star Center, and faculty residences. Exterior landscape improvements would include the expansion of the landscape at the commons side of the building. A new "Tenochca Backyard" would be created with outdoor room and lawn areas. The existing pool between the proposed TCS and existing Maya Hall would be enclosed with new fencing, surrounded by new palm trees, and furnished with new furniture and tables to create a sense of place at the pool deck. No further renovations to the pool area would be proposed as part of the project. Construction of the proposed TCS would require approximately 8,700 square feet of concrete and approximately 850 cubic yards (cy) of structural fill.

Further, the proposed Tula Pavilion would replace those spaces that serve public gathering and large assembly functions at the existing Tula/Tenochca Community Center and would be constructed north of the existing Tula/Tenochca Community Center on a site presently designated as Lot 4A. The proposed building also would incorporate exterior elements, including a courtyard on the north end and an open arcade that wraps around the west side of the building, for a total exterior space of approximately 6,000 square feet. The proposed Tula Pavilion would be constructed as a steel-framed building with wood roofs, a reinforced concrete foundation system, and stucco exterior. Construction would require approximately 10,000 square feet of concrete and approximately 2,000 cy of backfill.

The anticipated start date for demolition of the Tula/Tenochca Community Center and construction of the proposed Tula Pavilion and TCS is June 2017, with an anticipated duration for construction of 15 months. The total gross square footage to be demolished is approximately 20,000 gsf. The total gross square footage to be constructed is approximately 25,000 gsf of interior space. See Table 1 for additional project demolition and construction details.

Table 1
Tula Pavilion and Tenochca Hall Renewal/Refresh Project Details

	Tula Community Center	Tenochca Community Space	Tula Pavilion
Project Phase	Demolition	Construction	Construction
Gross square footage (GSF)	19,872	12,638	12,181 + 5,988 (exterior) = 18,169
Stories	Two stories	Two stories	One story
Project Phase	Operation	Operation	Operation
Uses	• Lobby • Meeting rooms • Restrooms • Kitchen • Storage • Custodial • "Star Center" • Offices • TV Lounge • Recreation • Laundry • Faculty Apartments	• Lobby • Restrooms • Storage • "Star Center" • Offices • TV Lounge • Recreation • Laundry • Faculty Apartments • "Backyard" Outdoor room	• Assembly space • Classroom space (3 rooms) • Banquet room • Storage • Custodial • Offices • Mechanical • Restrooms • Kitchen • Courtyard • Arcade

3 EXISTING CONDITIONS

The proposed project site consists entirely of developed land. Additionally, the general vicinity of the project site is primarily developed, with parking structures and associated roadways immediately to the east, existing campus buildings to the north and west of the site, and residential neighborhoods to the south.

4 METHODOLOGY

CEQA provides that an environmental impacts analysis shall include a detailed statement identifying all significant effects on the environment of a proposed project, and measures proposed to minimize significant effects on the environment, including, but not limited to, "measures to reduce the wasteful, inefficient, and unnecessary consumption of energy" (California Public Resources Code, Section 21100(b)(1),(3)).

Appendix F of the CEQA Guidelines, Energy Conservation, includes recommendations for information that should be included in an environmental impacts analysis to "assure that energy implications are considered in project decisions" (14 CCR 15000 et seq.). Appendix F directs

that the environmental impacts analysis conducted for proposed projects should include "discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy (see Public Resources Code section 21100(b)(3))" (14 CCR 15000 et seq.).

Appendix F of the CEQA Guidelines lists potential energy impacts that may be relevant to the Energy Conservation analysis in a proposed project's environmental impacts analysis. Where a listed item is applicable or relevant to a proposed project, the environmental impacts analysis should consider it. This analysis applied the following relevant listed items from Appendix F, subdivision (II)(F)(C), to the discussion of impacts: energy requirements and energy use efficiencies of the project by fuel type and amount for each stage of the project, the effects of the project on local and regional energy supplies and on requirements for additional capacity, the effects of the project on peak and base period demands for electricity and other forms of energy, compliance with existing energy standards, the effects of the project on energy resources, and the project's projected transportation energy use requirements and overall use of efficient transportation alternatives.

In accordance with Appendix F, this memorandum includes relevant information and analyses that address the energy implications of the proposed project. This section presents a summary of the proposed project's anticipated energy needs, impacts, and conservation measures. The proposed project's energy needs have been estimated using the California Emissions Estimator Model (CalEEMod) outputs presented in Appendix C to this memorandum. This emissions model contains typical electricity use and natural gas use for a range of land uses, as well as estimates for the number of vehicle trips that may be associated with construction and operation of the proposed project. The CalEEMod outputs also contain estimates for the energy consumption and vehicle trips associated with the existing commercial uses on the project site. This section summarizes the energy use estimates of the proposed project and compares them to those of the existing on-site land uses, to regional and local supply and demand under existing conditions, and to regional and local supply and demand that has been forecasted for the future.

A brief overview of the methodology applied to assess the project's potential impacts is provided below:

- **Electricity**: Proposed project and existing on-site electricity usage data were determined using CalEEMod Version 2016.3.1 assuming an operational year of 2019 for the proposed project and 2000 for existing conditions. The earliest operational year provided by CalEEMod is 2000. Therefore this analysis provides a conservative estimate of existing on-site electricity as the existing structures were built during the 1980s.

Electricity demand within San Diego Gas and Electric's (SDG&E's) service area was obtained from CPUC reports (specifically, the RPS Program Updates). Electricity demand within the City was obtained from the City's General Plan EIR (2008).

- **Natural Gas**: Proposed project and existing on-site natural gas usage data were provided using CalEEMod. Regional natural gas demand data was obtained from CEC reports (specifically, the California Energy Demand Forecast). Natural gas demand within the City was obtained from the City's General Plan EIR (2008). Information on natural gas supply was obtained from the 2016 California Gas Report.
- **Petroleum**: Potential impacts were assessed through projected traffic trip generation during construction and operation, as provided by the CalEEMod outputs and the Linscott, Law & Greenspan (LLG) Transportation Impact Analysis that was prepared for the proposed project. Fuel consumption factors were obtained using California's Emission Factors model (EMFAC), which CARB developed to calculate emission rates from all vehicles operating on roadways in the state. Fuel consumption factors were calculated for worker vehicles, vendor trucks, and haul trucks using EMFAC2014 for years 2015 (existing conditions) and 2020 (operational conditions). EMFAC2014 provides fuel consumption for each vehicle class type. Based on vehicles used during construction of prior projects, worker vehicles would consist of passenger cars and light duty trucks; vendor trucks would consist of light heavy duty trucks, medium duty vehicles, and medium heavy duty trucks; and haul trucks would consist of heavy duty trucks. A weighted average fuel consumption factor was determined for worker vehicles and vendor trucks using the total fuel consumption per vehicle class type and vehicle miles traveled per vehicle class type. Haul trucks are expected to be diesel engines only, while vendor trucks and worker vehicles are expected to be diesel or gasoline engine vehicles. To provide conservative calculations, construction petroleum use was calculated using 2015 fuel consumption factors. Because students, staff, and visitors already on campus would use the proposed project, operational vehicular trips are expected to consist of passenger cars and light duty trucks. The weighted average fuel consumption factor was calculated using the total fuel consumption per vehicle class type and vehicle miles traveled per vehicle class type. Operational petroleum use was calculated using 2020 fuel consumption factors.

5 IMPACT ANALYSIS AND CONCLUSIONS

5.1 Thresholds of Significance

The CEQA Guidelines provide no specific thresholds for impacts associated with energy consumption. However, Appendix F of the CEQA Guidelines (14 CCR 15000 et seq.) provides guidance for evaluating whether a development project may result in significant impacts with regard to energy. Based on Appendix F of the CEQA Guidelines, a project could have a significant impact on energy conservation if the project would:

a. Result in wasteful, inefficient, or unnecessary consumption of energy.

b. Conflict with existing energy standards and regulations.

c. Place a significant demand on local and regional energy supplies or require a substantial amount of additional capacity.

Would the project result in wasteful, inefficient, or unnecessary consumption of energy?

Electricity

Construction Use

SDG&E would provide temporary electric power for lighting and electronic equipment such as computers inside temporary construction trailers. The electricity used for such activities would be temporary and would be substantially less than that required for project operation and would have a negligible contribution to the project's overall energy consumption.

Operational Use

The operational phase would require electricity for multiple purposes including, but not limited to, building heating and cooling, lighting, appliances, and electronics. Additionally, the supply, conveyance, treatment, and distribution of water would indirectly result in electricity usage. CalEEMod was used to estimate project emissions from electricity uses (see Appendix A of the Air Quality and Greenhouse Gas Technical Memorandum for calculations). Default electricity generation rates in CalEEMod were used (based on the proposed land use and climate zone) and adjusted based on compliance with Title 24 standards for 2013. According to these estimations, the project would consume approximately 226,101 kWh per year. As discussed previously, the electricity consumption at the project site under existing conditions was also calculated using CalEEMod assuming an operational start of 2000 which is earliest operational year available and

provides a conservative estimate of electricity consumption. Existing condition at the project siteis estimated to be 214,028 kWh per year. As such, upon project implementation, electricity demand at the project site would increase by 12,073 kWh per year (Appendix A of the Air Quality and Greenhouse Gas Technical Memorandum).

Although the proposed project would result in a net increase in total square footage and in total electricity consumption on the project site, the amount of electricity used per square foot is anticipated to decrease upon project implementation. According to the calculations presented above, the existing on-site uses have an annual electricity demand of approximately 10.77 kWh per square foot, whereas the proposed project's annual electricity demand would be approximately 9.11 kWh per square foot. As measured against the existing environmental condition, the proposed project would result in a 15% net decrease in annnual electricity demand per square foot. This anticipated decrease is attributable to the newer, energy-efficient building design and the increasing stringency of modern energy standards.

As described above, the electricity demand calculation for the proposed project expects compliance with Title 24 standards for 2013. This estimate is conservative, as the proposed project will likely be subject to the more stringent 2016 standards that will go into effect on January 1, 2017. Additionally, the demand calculations do not take into account the project's energy-saving design features that would result in exceedances of the code requirements. As such, the replacement buildings' electricity use would be more efficient than what is required and would likely be even lower than the calculations presented above. The relationship between operative efficiency requirements and the proposed project's specific design features that would minimize electricity use are summarized below.

The project would be required to meet the California Building Energy Efficiency Standards (24 CCR, Part 6) which improve the energy efficiency of non-residential buildings. The Title 24, Part 6, standards are updated every three years. The currently applicable amendments are the 2013 standards. Buildings constructed in accordance with the 2013 standards will use 25% less energy for lighting, heating, cooling, ventilation, and water heating than buildings constructed in accordance with the 2008 standards. The most recent amendments to Title 24, Part 6, referred to as the 2016 standards, will become effective on January 1, 2017. In general, buildings built to the 2016 standards will use an estimated 5% less energy than those built to the 2013 standards (CEC 2015). Although the project would be required to comply with 2016 Title 24 standards because it would be constructed after January 1, 2017, this energy analysis does not quantify the increased energy efficiency associated with the more stringent 2016 Title 24 standards and relies instead on the 2013 standards to remain conservative.

The proposed university buildings would be designed to meet a minimum of LEED Silver certification or equivalent. LEED requires at least 10% improvement in energy efficiency over Title 24 requirements (USGBC 2011; VCA Green 2015). As such, the proposed project would exceed California code requirements for energy efficiency. To meet the prerequisite energy performance design standards for LEED certification, the proposed project would be required to meet minimum energy performance standards, energy commissioning requirements, energy metering, and refrigerant management (including the elimination of chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration systems (USGBC 2016)). No reductions for these energy-efficiency measures were accounted for in the electricity usage calculations, to ensure a conservative analysis. It should be noted that these energy-efficiency measures are required prerequisites under the LEED certification system; however, the proposed project could potentially exceed these standards to achieve additional credits under the LEED certification program, which would result in additional on-site electricity use reductions.

The proposed project would require installation of Energy Star–labeled products and appliances where appropriate, compact fluorescent light bulbs, energy saving lighting schemes such as occupancy-sensing controls (where applicable), use of light emitting diode (LED) lighting or other energy-efficient lighting technologies where appropriate, and energy-efficient heating and cooling equipment. Exterior lighting elements would be controlled by light sensors and/or time clocks to avoid over lighting as appropriate. These aspects of the project design would reduce energy associated with indoor and outdoor lighting, as well as the building's appliances and climate control equipment.

Peak electricity use for a typical university building occurs in the winter and summer seasons. In Southern California specifically, peak use is expected to occur during the summer months when HVAC systems are most heavily used. On a daily basis, peak electricity use typically occurs in the evenings (ACEEE 2010). Within SDG&E's service area, peak electricity use occurs in the summer (June 1 through October 1). During the day, peak use occurs between noon and 6 p.m. during the summer, and between 8 a.m. and 9 p.m. during the winter (SDG&E 2016). As such, the proposed project's peak electricity use is expected to align generally with typical peak use patterns in the region. The regulations and design features described above would reduce the proposed project's effect on peak and base periods of electricity demand.

In summary, the proposed project's electricity consumption upon implementation would decrease on a per square foot basis; the proposed project would be expected to result in a 33% decrease in annnual electricity demand per square foot when compared to the existing site conditions. Additionally, the proposed project's energy efficiency would go beyond code

compliance and would be increased through the LEED certification program or equivalent standards. Construction electricity usage would be minimal relative to the project's overall energy consumption.

For these reasons, the electricity consumption of the proposed project would not be considered inefficient or wasteful, and impacts would be **less than significant**.

Natural Gas

Construction Use

Natural gas is not anticipated to be required during construction of the proposed project. Fuels used for construction equipment would primarily consist of diesel and gasoline, which are discussed below under the "petroleum" subsection. Any minor amounts of natural gas that may be consumed as a result of project construction would be temporary and substantially less than that required for project operation and would have a negligible contribution to the project's overall energy consumption.

Operational Use

The operation of the proposed project would require natural gas for various purposes, including building heating and cooling and service water heating (ACEEE 2010). Default natural gas usage rates in CalEEMod for the proposed land use and climate zone were used and adjusted based on compliance with 2013 Title 24 standards (see Appendix A in the Air Quality/Greenhouse Gas Technical Memorandum for calculations). According to these estimations, the project would consume approximately 905,646 kBTU per year. The natural gas consumption at the project site under existing conditions was also calculated using CalEEMod assuming an operational starting year of 2000 as this is the earliest available operational provided in CalEEMod. As the existing structures at the project site began operation in the 1980s, this analysis provides a conservative estimate of existing natural gas usage rates for the purposes of a comparative analysis with the proposed project. Under existing conditions, it is estimated that existing commercial uses at the project site consume 819,745 kBTU per year. As such, upon project implementation, natural gas demand at the project site would increase by 85,901 kBTU per year (Appendix A of the Air Quality/Greenhouse Gas Technical Memorandum).

Although the proposed project would result in a net increase in total square footage and in total natural gas consumption on the project site, the amount of natural gas used per square foot is anticipated to decrease upon project implementation. According to the calculations presented

above, the existing on-site uses have an annual natural gas demand of 41.25 kBTU per square foot, whereas the proposed project's annual natural gas demand would be approximately 36.49 kBTU per square foot. Therefore, as measured against the existing environmental condition, the proposed project would result in a 12% net decrease in annnual natural gas usage per square foot. This anticipated decrese is attributable to the newer, energy-efficient building design and the increasing stringency of modern energy standards.

As with electricity demand, the anticipated reduction in natural gas usage per square foot is attributatble, in part, to compliance with the 2013 Title 24 standards, which was included in the CalEEMod calculations described above. However, because the proposed project would be constructed after January 1, 2017 and, therefore, would likely be subject to the more stringent 2016 Title 24 standards, and would also exceed energy efficiency code requirements through project design, the project's natural gas demand could potentially be lower than the calculations presented above. The 2016 Title 24 standards are expected to result in a 5% decrease in energy usage relative to the 2013 standards. Additionally, the proposed project would be designed to meet a minimum of LEED Silver certification or equivalent, which would require at least a 10% improvement in energy efficiency over Title 24 requirements (VCA-Green 2015; USGBC 2011). Project-specific sustainable design features include energy-efficient heating and cooling equipment, which would reduce the project's natural gas use.

Peak natural gas use for university buildings typically occurs in winter, although the variation in natural gas use throughout the year is not substantial (ACEEE 2010). In Southern California, peak demand occurs in winter (California Gas and Electric Utilities 2016). As such, the proposed project's peak natural gas use would be expected to align generally with typical peak use patterns in the region. The regulations and design features described above would reduce the project's effect on peak and base periods of natural gas demand.

In summary, the project's energy efficiency would go beyond code compliance and would be increased through the LEED certification program or equivalent standards. Additionally, the proposed project would be expected to result in a 12% decrease in annnual natural gas usage per square foot when compared to the existing site conditions. For these reasons, the natural gas consumption of the proposed project would not be considered inefficient or wasteful, and impacts would be **less than significant.**

Petroleum

Construction Use

Heavy-duty construction equipment associated with construction activities for the proposed project would rely on diesel fuel, as would haul trucks involved in removing the materials from excavation. Construction workers would travel to and from the project site throughout the duration of construction. Based on past experience with construction of projects, it is expected that construction workers would travel to and from the site in gasoline-powered passenger vehicles.

Heavy-duty construction equipment of various types would be used during each phase of project construction. The CalEEMod analysis discussed in the Air Quality and Greenhouse Gas Technical Memorandum, lists the expected equipment usage for each phase of construction. Based on that analysis, over all phases of construction, diesel-fueled construction equipment would run for an estimated 46,586 hours.

Estimating construction equipment for the proposed project would have an average horsepower of 100 to 175, the average diesel fuel efficiency for off-road construction equipment used during construction of the proposed project would be approximately 1.74 gallons per hour (EPA 2010). As such, given the total operating time of 1,056 hours, construction equipment would consume approximately 1,837 gallons of diesel fuel during the proposed project's construction period.

Based on Transportation Impact Analysis approximately 337 one-way haul trips would be required over the course of the construction period. The vehicle miles traveled (VMT) per trip is assumed to be approximately 20 miles, equating to 6,740 VMT. Estimating an average diesel fuel efficiency of 5.4 miles per gallon for heavy duty trucks, hauling would consume 1,248 gallons of petroleum (EMFAC 2014).

In addition to haul trucks, other construction-related vehicles would travel to and from the site to deliver materials. Based on CalEEMod estimates, approximately 500 one-way vendor truck trips would occur over the course of the construction period. The VMT per trip is estimated to be approximately 7.3 miles, equating to 3,650 VMT Using an average of 21.7 miles per gallon for light duty vehicles (EMFAC 2014), construction activities on sight would use approximately 168 gallons of petroleum for vendor trips (EMFAC 2014).

Construction workers traveling to and from the project site throughout the construction period also would consume fuel. The number of construction workers required would vary based on the construction phase and activity. Using CalEEMod estimates, construction would result in a

total of 1,530 one-way worker trips and each trip would be 10.8 miles in length. As such, construction worker commute trips would result in 16,524 VMT. Using an average fuel consumption of 21.7 miles per gallon for light duty vehicles (EMFAC 2014), construction activities on site would use approximately 762 gallons of petroleum for construction worker trips. This estimate is conservative given that it does not account for carpooling or use of public transit by construction workers.

In summary, the proposed project is conservatively anticipated to consume 4,015 (1,837 gallons + 1,248 gallons +168 gallons + 762 gallons) gallons of petroleum during the construction phase, which would last approximately 15 months (extending approximately from Summer 2017 to late Fall 2018). By comparison, California's consumption of petroleum is approximately 72 million gallons per day. Based on these assumptions, approximately 32billion gallons of petroleum would be consumed in California over the course of the 15 month construction period (EIA 2016b). (72 million gallons per day* (15 months *30 days per month) Construction of the proposed project would, therefore, equate to 0.00005% of the total amount of petroleum that would be used statewide during the course of the construction period. While construction activities would consume petroleum-based fuels, consumption of such resources would be temporary and would cease upon the completion of construction. Further, the petroleum consumed related to project construction would be typical of construction projects of similar types and sizes and would not necessitate new petroleum resources beyond what are typically consumed in California.

Further, due to the fact that the proposed project would be built on an urban infill site, construction worker trip and haul truck trip distances are anticipated to be reduced as compared to sites that are not located in urban centers. As a result, impacts during construction would be less than significant.

Operational Use

As discussed in the Transportation Impact Analysis, because operation of the proposed project would not generate new vehicle trips, there would be no increased petroleum-related impacts upon operational use.

Would the project conflict with existing energy standards and regulations?

The proposed project would be subject to and would comply with, at a minimum, the California Building Energy Efficiency Standards (24 CCR, Part 6). Part 6 of Title 24 establishes energy efficiency standards for residential and non-residential buildings constructed in California in order to reduce energy demand and consumption. Additionally, the proposed project would go

beyond the requirements of the California Building Energy Efficiency Standards because the university buildings would be designed to meet LEED Silver certification or equivalent. LEED requires at least 10% improvement in energy efficiency over Title 24 requirements (USGBC 2011; VCA Green 2015). As such, the proposed project would exceed California code requirements for energy efficiency.

Part 11 of Title 24 sets forth voluntary and mandatory energy measures that are applicable to the project under the California Green Building Standards Code. As discussed under the previous thresholds, the project would result in an increased demand for electricity, natural gas, and petroleum. In accordance with Title 24 Part 11 mandatory compliance, the proposed project would have (a) at least 50% of its construction and demolition waste diverted from landfills; (b) mandatory inspections of energy systems to ensure optimal working efficiency; (c) low-pollutant emitting exterior and interior finish materials, such as paints, carpets, vinyl flooring and particle boards; and, (d) a 20% reduction in indoor water use. Because the project would comply with and exceed the existing energy standards and regulations, **no impact** would result due to conflicts with energy standards and regulations.

Would the project place a significant demand on local and regional energy supplies or require a substantial amount of additional capacity?

Electricity

As previously described, SDG&E supplies electricity to the project site. As of 2016, approximately 13 billion kWh of electricity were used in the County. Upon implementation of the proposed project, the amount of electricity used at the project site would be anticipated to increase by 226,101 kWh per year. This increase represents 0.0004% of SDG&E's existing demand within the City of San Diego.

As such, under both existing and future conditions, the electricity demand at the project site would be negligible relative to the electricity demand in SDG&E's service area. At the local scale, the County's 2012 Regional GHG Inventory Methodology provided electricity projections out to 2050. Between 2012 and 2050, the County's electricity demand is anticipated to grow by approximately 52.6%. The increase in electricity consumption attributable to the proposed project is approximately 0.00001% of the County's 2012 electricity demand and 0.000008% of the County's anticipated 2050 demand. (In 2012, the County's annual electricity consumption was 19,737 GWh and in 2050, the County's annual electricity consumption is anticipated to be 30,116 GWh per year (SANDAG 2015).) As such, the increase in electricity usage in the City

attributable to the proposed project falls well within the total growth in demand that has been anticipated in the General Plan. As a result, impacts would be less than significant.

Natural Gas

As described previously, SDG&E supplies natural gas to the project site. The proposed project would not use natural gas during construction. The operation of the proposed project would require natural gas for various purposes, including building heating and cooling and service water heating. Although the proposed project would result in a net increase in total square footage and in total natural gas consumption on the project site, the amount of natural gas used per square foot is anticipated to have a net decrease of 12% upon project implementation. This is attributed to the newer, energy-efficient building design and the increasing stringency of modern energy standards. Therefore, natural gas consumption of the proposed project would not place significant demand on local or regional energy supplies, and would be less than significant.

Petroleum

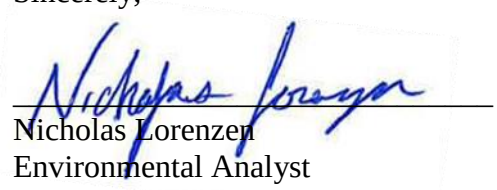
The proposed project would increase the use of petroleum relative to existing conditions at the project site. During the construction phase, it is anticipated that approximately 1,318.51 gallons of petroleum would be used. This amount is approximately 0.00005% of the total amount of petroleum that would be used statewide during the course of the construction period. As previously discussed, operation of the proposed project would not generate new vehicle trips and consequently there would be no petroleum-related operational uses. Furthermore, the United States produces approximately 523 million gallons of petroleum per day, amounting to 190 billion gallons per year. Therefore the increase in petroleum attributable to the proposed project would be negligible relative to petroleum production in the United States alone.

For the reasons described previously, the proposed project's energy use falls well within local and regional energy supplies. The proposed project's anticipated energy consumption is minimal relative to both existing energy consumption and future consumption at both the local and regional scale. Further, as substantiated in the calculations above, the increase in electricity and natural gas usage attributable to the proposed project falls within anticipated increases in the City's electricity and natural gas demands. Regarding petroleum, fuel economy and use of alternative modes of transportation are expected to increase over time, and even without such reductions in future petroleum use, the petroleum use associated with the proposed project would be negligible relative to current use and production. As a result, impacts would be less than significant.

5.1.1 Cumulative Analysis

The study area for the energy conservation cumulative effects analysis is defined as the San Diego region, as the proposed project's components would rely on a regional distribution network for electricity and natural gas service. Energy consumption can occur in a variety of forms, primarily resulting from electricity, natural gas, and petroleum (diesel and gasoline) consumption. The proposed project and cumulative projects would be required to comply with all applicable federal, state, and local regulations pertaining to energy efficiency. These provisions include the mandatory energy requirements set forth by Title 24, Part 6, of the California Code of Regulations. Section 5.9, Energy, is a cumulative analysis by nature, as energy consumption is a cumulative impact resulting from past, present, and future projects, including but not limited to the proposed project and the cumulative projects listed in Table 6-1. SDG&E supplies electricity and natural gas to the proposed project site. SDG&E uses a wide range of data sources when developing buying and selling decisions, which ensures that their service area will have energy for the foreseeable future. As of 2016, approximately 13 billion kilowatt-hours of electricity were used in the County. It was found that under existing and future conditions the electricity demand at the proposed project site would be negligible (less than 0.1%) relative to the electricity demand in SDG&E's service area. Additionally, the proposed project does not include features that would result in an increased use of natural gas during operation. The proposed project would increase the use of petroleum relative to existing conditions at the proposed project site. During the construction phase, it is anticipated that approximately 3,918 gallons of petroleum would be used, which is approximately 0.00005% of the total amount of petroleum that would be used statewide during the course of the construction period. During operation, new vehicle trips would not be generated, and therefore there would be no petroleum-related operational use. As such, the proposed project's energy use falls well within local and regional energy supplies and cumulative impacts would be less than significant.

Sincerely,



Nicholas Lorenzen
Environmental Analyst

6 REFERENCES

ACEEE (American Council for an Energy-Efficient Economy). 2010. *Energy End-Use Patterns in Full-Service Hotels: A Case Study*. 2010. Accessed November 17, 2016. http://aceee.org/files/proceedings/2010/data/papers/1984.pdf.

California Gas and Electric Utilities (Southern California Gas Company, Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southwest Gas Corporation, City of Long Beach Gas & Oil Department, and Southern California Edison Company). 2016. California Gas Report. 2016. Accessed November 17, 2016. https://www.socalgas.com/regulatory/cgr.shtml.

CEC. 2015. "2016 Building Efficiency Standards Adoption Hearing Presentation." June 2015. Accessed November 17, 2016. http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2015-06-10_hearing/2015-06-10_Adoption_Hearing_Presentation.pdf#page=8.

EMFAC. 2014 (California Emissions Factor Model). 2014. "California Air Resources Board EMFAC Web Database." Accessed November 17, 2016. https://www.arb.ca.gov/emfac/2014/.

EIA. 2016b. "California State Profile and Energy Estimates – Table F15: Total Petroleum Consumption Estimates, 2014." Accessed November 17, 2016. http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_use_pa.html&sid=US&sid=CA.

EPA (U.S. Environmental Protection Agency). 2010. *Construction Fleet Inventory Guide*. EPA-420-B-10-025. Prepared by Eastern Research Group, Inc. July 2010.

SANDAG (San Diego Association of Governments). 2015. *San Diego Forward: The Regional Plan*. October 2015. Accessed November 2016. http://www.sdforward.com/pdfs/RP_final/The%20Plan%20-%20combined.pdf.

SDG&E (San Diego Gas & Electric). 2016. "Company Facts." Accessed December 2016. http://www.sdge.com/aboutus.

USGBC. 2016. "LEED Credit Library: Energy and Atmosphere." Accessed November 17, 2016. http://www.usgbc.org/credits/new-construction/v4/energy-%26-atmosphere.

VCA Green. 2015. "Title 24 and LEED for Multi-Family: A Practical Approach to Compliance" in *California Green Building Trends.* By Moe Fakih. 2015. Accessed November 17, 2016. http://www.vca-green.com/LEED-and-Title-24-a-Practical-Guide.pdf.

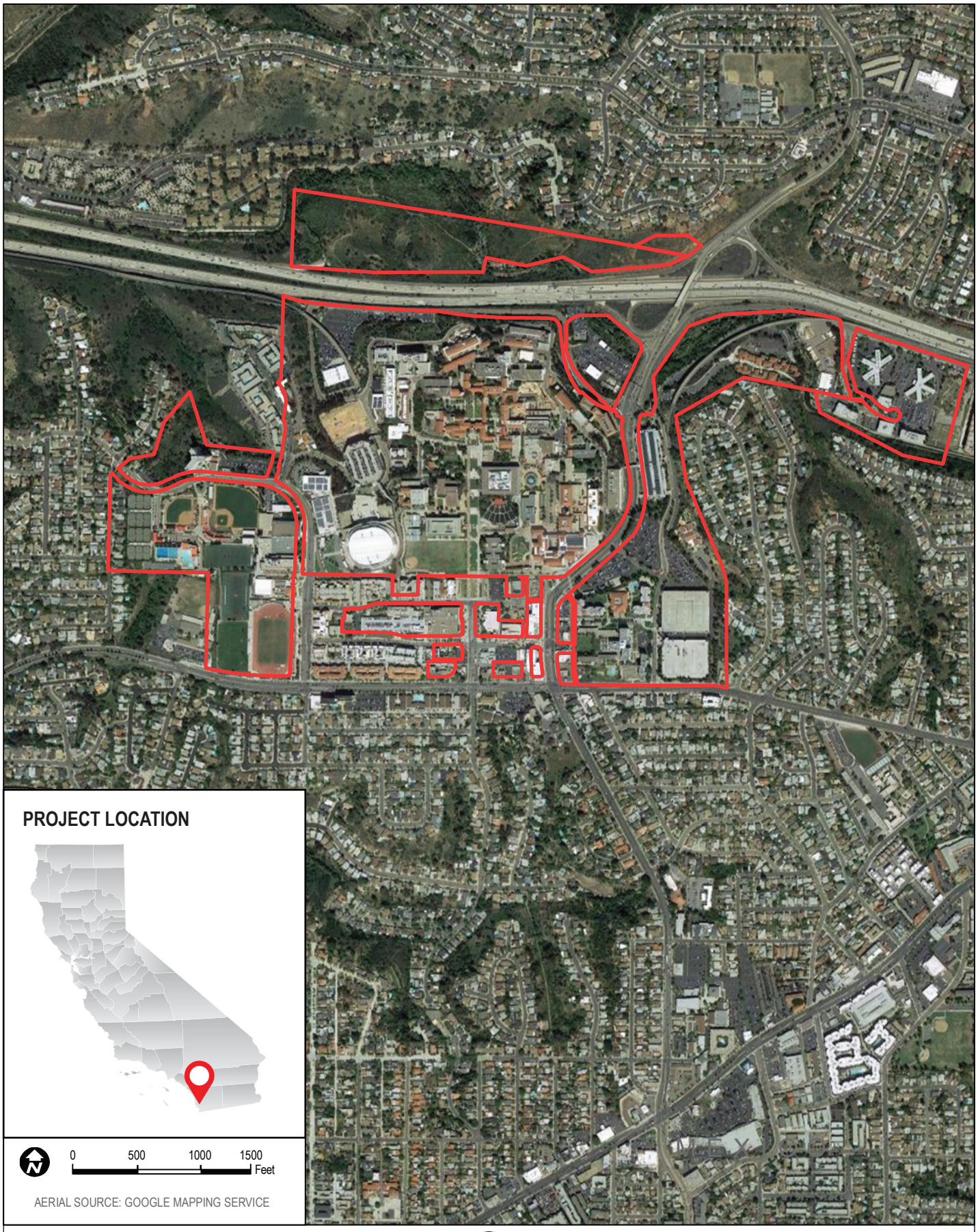


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FIGURE 1
PROJECT LOCATION AND VICINITY MAP

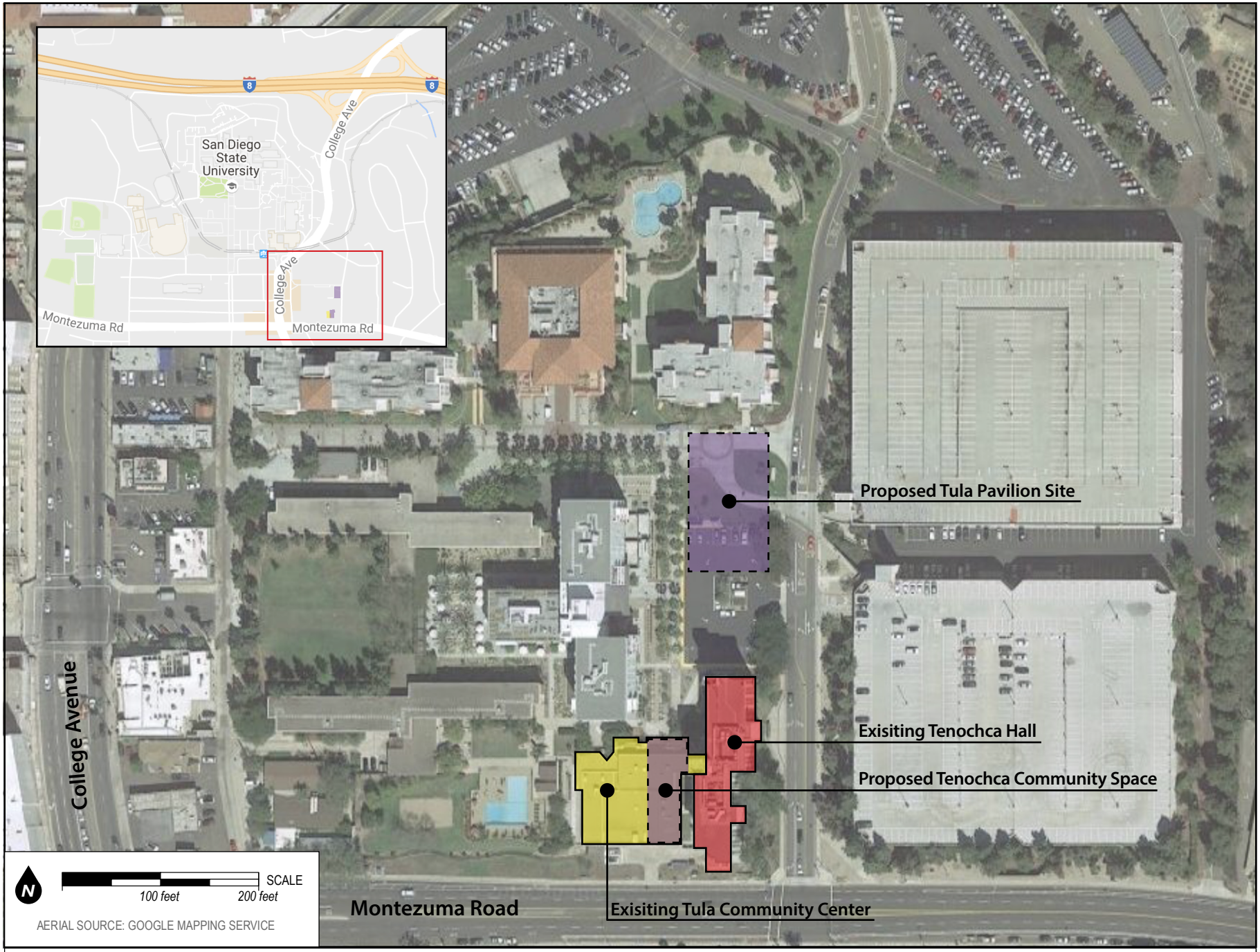

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FIGURE 2
PROJECT SITE