APPENDIX B-1

Environmental Site Assessment update letter dated January 18, 2017

MALAMA Environmental

January 18, 2017

Mr. Robert Poynor, Vice President
Sarofim Realty Advisors
8115 Preston Road, Suite 400
Dallas, Texas 75225

RE: Update Letter for Environmental Site Assessment: Phase I Investigation – Piilani Promenade LLC, MEV Project Number 1307-0292, dated December 17, 2013 (the "Report"), prepared by Malama Environmental (MEV, the "Consultant")
MEV Project No. T17-006

Dear Mr. Poynor:

The Consultant prepared the Report as of the date noted above. The Report was prepared in accordance with the applicable ASTM standards that were required at the time the Report was written.

Under ASTM standards, a Phase I Environmental Site Assessment may be considered out of date if not conducted within the prior 180 days. As a result, the Owner requested that we update the Report. To complete the update, on January 13, 2017, professional staff members of Consultant conducted a follow-up site visit at the sites covered by the Report, located on the island of Maui, Hawaii (the "Project Site"). The site visit entailed a reconnaissance of the Project Site in order to ascertain any visible changes that may have occurred specific to the Report. Also, current State of Hawaii Department of Health database information was obtained and reviewed by the Consultant to determine if listed nearby risk sites pose an environmental concern to the Project Site. Results of the site visit and database review showed no visible evidence of changes in conditions specific to existing recognized environmental conditions. Consultant did not identify, and concludes that there have been no new recognized environmental conditions, and does not have any changes to the conclusions or recommendations set forth in the Report, based on the work performed.

Consultant states that: (1) the Report represents Consultant's professional opinion with respect to the Project as of the date hereof; and (2) since the date of the Report and the date of the subsequent site visit referenced in this letter, nothing has come to Consultant's attention which would cause it to change any matter or opinion set forth in the Report, based on the work performed.

The undersigned states that, to the best of our knowledge, neither our firm nor its principals have any interest in the subject property and are not affiliated with the property Owner, buyer(s), or lender(s) of the subject property.

Sincerely,

Malama Environmental

Jeffrey R. King, CPG
Manager - Technical Services

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APPENDIX C

Botanical Flora and Fauna Report dated July 2013

BOTANICAL AND FAUNA SURVEYS

PI'ILANI PROMENADE PROJECT

KIHEI, MAUI, HAWAII

ROBERT W. HOBDY
ENVIRONMENTAL CONSULTANT
Kokomo, Maui
July 2013

Prepared for: Sarofim Realty Advisors

BOTANICAL AND FAUNA SURVEY
THE PI'ILANI PROMENADE - KIHEI, MAUI

INTRODUCTION

The Pi'ilani Promenade Project lies on approximately 80 acres of undeveloped land in upper Kihei, Maui. On its lower edge is Pi'ilani Highway. On its northern edge are commercially zoned properties. Its east and south edges border pasture lands of Ka'ono'ulu Ranch. This survey was initiated by the owners in fulfillment of environmental requirements of the planning process.

SITE DESCRIPTION

The project area was formerly a dry, seasonal pasture situated on gently sloping lands above the coastal plain in north Kihei. Elevations range from 15 feet along Pi'ilani Highway up to 220 feet on the top of the project. One large, rocky gulch, Kūlanihako'i, runs just south of the project area, and one small, unnamed gully runs through the project. Soils are all classified as Waiakoa Extremely Stony Silty Clay Loam, eroded (WID2) which is a light brown, well-drained soil with extensive surface rock (Foote et al, 1972). Rainfall averages a scant 8 – 10 inches per year, in this driest part of Maui (Armstrong, 1983). The vegetation consists of dry Savannah with scattered kiawe trees (*Prosopis pallida*) and an extensive, sparse grassland of buffelgrass (*Cenchrus ciliaris*).

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Pi'ilani Promenade Project which was conducted in July 2013. The objectives of the survey were to:

1. Document what plant, bird and mammal species occur on the property or may likely occur in the existing habitat.

2. Document the status and abundance of each species.

3. Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. If such occur, identify what features of the habitat may be essential for these species.

4. Determine if the project area contains any special habitats which if lost or altered might result in a significant negative impact on the flora and fauna in this part of the island.

BIOLOGICAL HISTORY

Originally this area would have been a dry native forest/shrubland with such trees as wiliwili (*Erythrina sandwicensis*), ‘ohe makai (*Reynoldsia sandwicensis*) and hao (*Rauvolfia sandwicensis*), shrubs such as ‘a’ali’i (*Dodonaea viscosa*), ma’o (*Gossypium tomentosum*), ‘ilima (*Sida fallax*) and grasses and vines such as pili (*Heteropogon contortus*), kalamalō (*Eragrostis deflexa*), huehue (*Cocculus orbiculatus*) and ‘āwikiwiki (*Canavalia pubescens*).

For the past 150 years this area has been grazed by livestock, usually seasonally, following winter rains when the vegetation responds with a flush of growth. This land use has resulted in the gradual loss of native plants species and their replacement with hardy pasture grasses and weeds. During the past 40 years two other environmental disturbances have influenced conditions on the property. Introduced axis deer (*Axis axis*) have built up sizeable herds within this part of Maui. These animals are able to access steeper sites than cattle and have eliminated additional species of native plants. Also fires have swept through this area a number of times over the years. Charred stumps were encountered throughout the property. Fires, over time, eliminate species not adapted to this type of catastrophic environmental disturbance.

Today few plants species occur on the property and those that do tend to dominate. Few of these are native.

BOTANICAL SURVEY REPORT

SURVEY METHODS

A walk-through botanical survey method was used following routes to ensure maximum coverage of the many areas of this large property. Areas most likely to harbor native or rare plants such as gulches or rocky outcroppings were more intensively examined. Notes were made on plant species, distribution and abundance as well as terrain and substrate.

DESCRIPTION OF THE VEGETATION

The vegetation on this large property was dominated by just two species: kiawe (*Prosopis pallida*) and buffelgrass (*Cenchrus ciliaris*). These two species make up more than 95% of the plant cover. The kiawe trees create an open woodland across the entire property with denser growth along the rocky gully. The buffelgrass forms an almost uniform grassland under and between the trees. All other plant species were uncommon to rare on the property. Small parts of the property had no vegetation only bare patches of soil and surface stones.

A total of 10 species of plants were recorded during the survey. Of these 2 were native Hawaiian species, ‘ilima (*Sida fallax*) and ‘uhaloa (*Waltheria indica*). Both are indigenous to Hawaii as well as other countries and both are widespread and of common occurrence in Hawaii.

DISCUSSION AND RECOMMENDATIONS

The vegetation throughout the project is dominated by just two non-native plant species, kiawe and buffelgrass. The two native Hawaiian plant species recorded, ‘ilima and ‘uhaloa, although of uncommon or rare occurrence on the property, are widespread and common in Hawaii in general.

No Federally listed Endangered or Threatened native plants (USFWS, 2013) were encountered during the course of the survey nor were any species that are candidate for such status seen. No special habitats or rare plant communities were seen on the property, although there is a large protected reserve three to four miles up-slope near Pu’u o Kali containing some Endangered dryland plant species.

Because the vegetation is dominated by non-native plants, and no rare or protected species occur on or adjacent to the property, there is little of botanical concern and the proposed land uses are not expected to have a significant negative impact on the botanical resources in this part of Maui.

Because much of Kihei is a flood plain and because the soils on the property are subject to erosion, it is recommended that during any land clearing work special care be taken to use accepted contouring and terracing techniques to avoid significant soil runoff.

It is also recommended that native dryland plants known to occur in this area be incorporated into the landscape design of the completed project. The Maui County Planting Plan can be consulted for ideas.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of two groups: Monocots and Dicots. Taxonomy and nomenclature of the flowering plants (Monocots and Dicots) are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

1. Scientific name with author citation

2. Common English or Hawaiian name.

3. Bio-geographical status. The following symbols are used:

   endemic = native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.
   indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
   non-native = all those plants brought to the islands intentionally or accidentally after western contact.
   Polynesian = all those plants brought to the islands by the Hawaiians during the course of their migrations.

4. Abundance of each species within the project area:

   abundant = forming a major part of the vegetation within the project area.
   common = widely scattered throughout the area or locally abundant within a portion of it.
   uncommon = scattered sparsely throughout the area or occurring in a few small patches.
   rare = only a few isolated individuals within the project area.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
MONOCOTS			
POACEAE (Grass Family)			
Cenchrus ciliaris L.	buffelgrass	non-native	abundant
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	non-native	rare
DICOTS			
AMARANTHACEAE (Amaranth Family)			
Amaranthus spinosus L.	spiny amaranth	non-native	rare
EUPHORBIACEAE (Spurge Family)			
Ricinus communis L.	Castor bean	non-native	rare
FABACEAE (Pea Family)			
Acacia farnesiana (L.) Millsp.	klu	non-native	uncommon
Desmanthus pernambucanus (L.) Thellung	slender mimosa	non-native	rare
Leucaena leucocephala (Lamarck) de Wit	koa haole	non-native	uncommon
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	kiawe	non-native	common
MALVACEAE (Mallow Family)			
Sida Fallax Walp.	'ilima	indigenous	rare
Waltheria indica L.	'uhaloa	indigenous	uncommon

FAUNA SURVEY REPORT

SURVEY METHODS

A walk-through survey method was conducted in conjunction with the botanical survey. All parts of the project area were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species abundance, activities and location as well as observations of trails, tracks scat and signs of feeding. In addition an evening visit was made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the Endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

RESULTS

MAMMALS

Four non-native mammal species were observed in the project area during two site visits. Taxonomy and nomenclature follow Tomich (1986).

The axis deer (axis axis) was abundant throughout the area. These herbivores spend the day bedded down in secluded areas, then come out during the evening to feed under cover of darkness. While not seen, their tracks, droppings and antler rubbings were everywhere.

Signs of domestic cats (*Felis catus*) and dogs (*Canis familiaris*) were seen sporadically. Old cattle (*Bos Taurus*) droppings were seen from former grazing in this area.

Other mammals that likely occur on the property, but which were not seen, include rats (*Rattus* spp.), mice (*Mus domesticus*) and mongoose (*Herpestes auropunctatus*). Rats and mice feed on seeds and herbaceous vegetation and mongoose hunt for the rodents as well as birds.

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey on two areas of the property. These bats are known to occur sporadically across much of Maui.. When present in an area they can be easily identified as they forage for insects, their distinctive flight patterns clearly visible in the glow of twilight. In addition an electronic bat detector (Batbox IIID) was employed, set to the frequency of 27,000 Hertz that these bats are known to emit when echolocating for nocturnal flying insect prey. No bats were detected at either location using this device.

BIRDS

Birdlife was rather sparse in this dry habitat with few food resources. Seven species of birds were seen during two site visits. Taxonomy and nomenclature follow American Ornithologists' Union (2011). Two non-native bird species were of common occurrence: the zebra dove (*Geopelia striata*) and the gray francolin (*Francolinus pondicerianus*). The other five species were of uncommon to rare occurrence.

One flock of six nēnē or Hawaiian geese (*Branta sandvicensis*) were seen flying south above the project area. These endemic and Endangered geese are powerful and wide-ranging fliers that are capable of reaching anywhere on the island within an hour in their search for water and succulent herbaceous vegetation resources. They did not come from or land on the project area as there are no habitats or resources here to attract them. They were observed for about three minutes at which point they had covered about two miles and disappeared from sight.

A few other non-native birds could occasionally visit this project area such as the house finch (*Carpodacus mexicanus*), African silverbill (*Lonchura cantans*), nutmeg mannikin (*Lonchura punctulata*), northern cardinal (*Cardinalis cardinalis*), Japanese white-eye (*Zosterops japonicus*) and the northern mocking bird (*Mimus polyglottos*) although none of these were seen.

The habitat is also unsuitable for Hawaii's native forest birds which are presently restricted to higher elevation native forests beyond the range of mosquitoes and the deadly avian diseases they carry and transmit.

INSECTS

Insect life was sparse throughout the project area. Just six insect species were observed in five Orders. Taxonomy and nomenclature follow Nishida et al (1992). Two species were found to be common, the blowfly (*Lucilia sericata*) and the globe skimmer dragonfly (*Pantala flavescens*). The other four species were all rare. The two dragonfly species, the globe skimmer and the green darner (*Anax junius*) are native species. Both are indigenous and common throughout Hawaii and are also found in other parts of the world.

One native sphingid moth, Blackburn's sphinx moth (*Manduca blackburni*) has been put on the Federal Endangered species list and this designation requires special focus (USFWS 2000). Blackburn's sphinx moth is known to occur in parts of East Maui and Central Maui. Its native host plants are species of ʻaiea (*Nothocestrum* spp.) and non-native alternative host plants are tobacco (*Nicotiana tabacum*) and tree tobacco (*Nicotiana glauca*). None of these plants were found on the property, and no Blackburn's sphinx moth or their larvae were seen.

CONCLUSIONS AND RECOMMENDATIONS

Diversity of species in this project area was generally low with just a few species dominating the landscape. Axis deer were abundant and zebra doves, gray francolins, blow flies and the globe skimmer dragonfly were common. This pattern mirrors the situation in the plant life with low diversity and just two hardy species dominating. This lack of species has resulted from the inordinate grazing pressure of deer and cattle, the effects of periodic wildfires and several years of severe drought that has plagued leeward Maui. Only the hardiest species are able to survive.

The two native dragonfly species are both widespread and common in Hawaii as well as in other parts of the world and are of no special conservation concern.

The sighting of six Endangered nēnē geese flying over the project area was recorded in the inventory, but has to be considered tangential in nature and not an indication of use of this habitat by these birds. There are no food or water resources that would lure these birds to feed or rest here.

No Hawaiian bats were recorded on the project area. These bats are wide ranging and opportunistic to spikes in insect activity. The general lack of insect food resources here does not promote the use of this habitat by these bats.

No Blackburn's sphinx moths or their larvae were found. The total lack of their required host plant species on the project area effectively prohibits their use of this habitat.

No native bird species were found on the property during two site visits and none are to be expected in this habitat. Nonetheless, there are native seabirds, the Endangered Hawaiian petrel (*Pterodroma sandwichensis*) and the Threatened Newell's shearwater (*Puffinus newelli*) that fly over these lowlands on the way to their burrows high in the mountains. These seabirds, and especially the fledglings, are attracted to bright lights in the evenings and early dawn hours and can become disoriented and crash. They are then vulnerable to injury, vehicle strikes and predators. It is recommended that any significant outdoor lighting in any proposed development on this property be shielded to direct the light downward to minimize disorientation of these protected seabirds.

No other issues are anticipated with wildlife species.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within three groups: Mammals, Birds and Insects. For each species the following information is provided:

1. Common name

2. Scientific name

3. Bio-geographical status. The following symbols are used:

   endemic = native only to Hawaii; not naturally occurring anywhere else in the world.
   indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
   migratory = all species that spend part of their annual life cycle in Hawaii and part of it elsewhere. Migrant birds typically spend their spring and summer months breeding in the arctic and their fall and winter months in Hawaii.

   non-native = all those animals brought to Hawaii intentionally or accidentally after western contact.

4. Abundance of each species within the project area:

   abundant = many flocks or individuals seen throughout the area.

   common = a few flocks or well scattered individuals throughout the area.

   uncommon = only one flock or several individuals seen within the project area.
   rare = only one or two seen within the project area.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
MAMMALS			
Axis axis Erxleben	axis deer	non-native	abundant
Felis catus L.	domestic cat	non-native	rare
Canis familiaris L.	domestic dog	non-native	rare
Bos taurus L.	domestic cattle	non-native	rare
BIRDS			
Geopelia striata	zebra dove	non-native	common
Francolinus pondicerianus Gmelin	gray francolin	non-native	common
Streptopelia chinensis Scopoli	spotted dove	non-native	uncommon
Acridotheres tristis L.	common myna	non-native	uncommon
Branta sanvicensis Vigors	nēnē, Hawaiian goose	endemic	rare
Zenaida macroura L.	mourning dove	non-native	rare
Francolinus francolinus L.	black francolin	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
INSECTS			
Order DIPTERA - flies			
CALLIPHORIDAE (Blow Fly Family)			
Lucilia sericata Meigen	blow fly	non-native	common
Order HETEROPTERA - true bugs			
APHIDIDAE (Aphid Family)			
Aphis craccivora Koch	cowpea aphid	non-native	rare
Order LEPIDOPTERA - butterflies & moths			
PAPILIONIDAE (Swallowtail Butterfly Family)			
Papilio xuthus L.	Asian swallowtail	non-native	rare
Order ODONATA)dragonflies & damselflies			
AESHNIDAE (Darner Dragonfly Family)			
Anax junius Drury	green darner	indigenous	rare
LIBELLULIDAE (Skimmer Dragonfly Family)			
Pantala favescens Fabricius	globe skimmer	indigenous	common
Order ORTHOPTERA - grasshoppers & crickets			
ACRIDIDAE (Grasshopper Family)			
Oedaleus abrubtus Thunberg	short-horned grasshopper	non-native	rare

Figure 1. Project Area – view south from northeast corner.

Figure 2. Project Area – view west from the northeast corner.

Figure 3. Waterline Corridor –
view west showing area denuded of grass.

Figure 4. Waterline Corridor –
view east showing denuded rocky landscape.

<u>Literature Cited</u>

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APPENDIX D

Air Quality Study dated February 2014

Draft

AIR QUALITY STUDY

FOR THE PROPOSED

PIILANI PROMENADE PROJECT

KIHEI, MAUI, HAWAII

Prepared for:

Sarofim Realty Advisors

August 1, 2014

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CONTENTS

FIGURES

TABLES

TABLES(cont.)

Table

1.0 SUMMARY

Sarofim Realty Advisors is proposing the Piilani Promenade Project in Kihei on the island of Maui. The proposed project will consist of 103,201 square feet of commercial/retail space, 5 acres of light industrial uses, 226 affordable residential apartments and other related improvements. This study examines the potential short- and long-term air quality impacts that could occur as a result of construction and use of the proposed facilities and suggests mitigative measures to reduce any potential air quality impacts where possible and appropriate.

Both federal and state standards have been established to maintain ambient air quality. At the present time, seven parameters are regulated including: particulate matter, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, carbon monoxide, ozone and lead. Hawaii air quality standards are comparable to the national standards except those for nitrogen dioxide and carbon monoxide which are more stringent than the national standards.

Regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of the project area is very much affected by its elevation near sea level and by nearby mountains. Haleakala partially shelters the area from the northeast trade winds, and local winds (such as land/sea breezes and upslope/downslope winds) may affect the wind flow in the area some of the time. Temperatures in the project area are generally very consistent and warm with average daily temperatures ranging from about 63°F to 86°F. Rainfall in the project area is minimal with an average of only about 12 inches per year.

Except for periodic impacts from volcanic emissions (vog) and possibly occasional localized impacts from traffic congestion and local agricultural sources, the present air quality of the project area is believed to be relatively good. There is very little air quality monitoring data from the Department of Health for the project area, but the limited data that are available suggest that concentrations are well within state and national air quality standards.

If the proposed project is given the necessary approvals to proceed, there may be some short- and/or long-term impacts on air quality that may occur either directly or indirectly as a consequence of project construction and use. Short-term impacts from fugitive dust could occur during the project construction phase. To a lesser extent, exhaust emissions from stationary and mobile construction equipment, from the minor disruption of traffic, and from workers' vehicles may also affect air quality during the period of construction. State air pollution control regulations require that there be no visible fugitive dust emissions at the property line. Hence, an effective dust control plan must be implemented to ensure compliance with state regulations. Fugitive dust emissions can be controlled to a large extent by watering of active work areas, using wind screens, keeping adjacent paved roads clean, and by covering of open-bodied trucks. Other dust control measures to consider include limiting the area that is disturbed at any given time and/or mulching or chemically stabilizing inactive areas that have been worked. Paving and landscaping of project areas early in the construction schedule will also reduce dust emissions. Exhaust emissions can be mitigated by moving construction equipment and workers to and from the project site during off-peak traffic hours.

To assess the potential long-term impact of emissions from project-related motor vehicle traffic operating on roadways in the project area after construction is completed, a computerized air quality modeling study was undertaken. The air quality modeling study estimated current worst-case concentrations of carbon monoxide at selected intersections in the project vicinity and predicted future levels both with and without the proposed project. During worst-case conditions, model results indicated that present 1-hour and 8-hour worst-case carbon monoxide concentrations are well within both the state and the national ambient air quality standards. In the year 2018 without the project, worst-case carbon monoxide concentrations were predicted to remain nearly unchanged or decrease slightly, and concentrations would remain well within standards. With the project in the year 2018, estimated worst-case carbon monoxide concentrations indicated only minimal or no impact compared to the without project case. Concentrations would remain well within standards. Due to the negligible impact the project is expected to have, implementing mitigation measures for long-term traffic-related air quality impacts is unnecessary and unwarranted.

At this time, the specific tenants of the light industrial area associated with the project have not been identified, and the detailed information needed to assess any air quality impacts is not available. However, the types of facilities that are expected to locate within the project are not significant sources of air pollution. Before any air pollution sources can be built anywhere in the state, an application must be submitted to the Department of Health for a permit to construct the facility, and detailed information concerning any air pollution emissions will need to be provided in the application. The Department of Health may at that time may request a detailed air quality impact assessment.

2.0 INTRODUCTION

Sarofim Realty Advisors is proposing the Piilani Promenade Project in Kihei on the island of Maui (see Figure 1 for project location). The project site is located along the mauka (east) side of Piilani Highway opposite Kaonoulu Street in the Kihei area of Maui. Primary access to and egress from the project will be provided by the extension of Kaonoulu Street mauka of Piilani Highway. The extension of Kaonoulu Street will divide the project into two parcels. The north parcel will consist of 103,201 square feet of commercial uses, 226 affordable residential apartments and 5 acres of light industrial uses. The south parcel will consist of 430,500 leasable square feet of commercial floor area. The project is expected to be completed and occupied in 2018.

The purpose of this study is to describe existing air quality in the project area and to assess the potential short- and long-term direct and indirect air quality impacts that could result from construction and use of the proposed facilities as planned. Measures to mitigate project impacts are suggested where possible and appropriate.

3.0 AMBIENT AIR QUALITY STANDARDS

Ambient concentrations of air pollution are regulated by both national and state ambient air quality standards (AAQS). National AAQS are specified in Section 40, Part 50 of the Code of Federal Regulations (CFR), while State of Hawaii AAQS are defined in Chapter 11-59 of the Hawaii Administrative Rules. Table 1 summarizes both the national and the state AAQS that are specified in the cited documents. As indicated in the table, national and state AAQS have been established for particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone and lead. The state has also set a standard for hydrogen sulfide. National AAQS are stated in terms of both primary and secondary standards for most of the regulated air pollutants. National primary standards are designed to protect the public health with an "adequate margin of safety". National secondary standards, on the other hand, define levels of air quality necessary to protect the public welfare from "any known or anticipated adverse effects of a pollutant". Secondary public welfare impacts may include such effects as decreased visibility, diminished comfort levels, or other potential injury to the natural or man-made environment, e.g., soiling of materials, damage to vegetation or other economic damage. In contrast to the national AAQS, Hawaii State AAQS are given in terms of a single standard that is designed "to protect public health and welfare and to prevent the significant deterioration of air quality".

Each of the regulated air pollutants has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration for prolonged periods of time. The AAQS specify a maximum allowable concentration for a given air pollutant for one or more averaging times to prevent harmful effects. Averaging times vary from one hour to one year depending on the pollutant and type of exposure necessary to cause adverse effects. In the case of the short-term (i.e., 1- to 24-hour) AAQS, both national and state standards allow a specified number of exceedances each year.

The Hawaii AAQS are in some cases considerably more stringent than the comparable national AAQS. In particular, the Hawaii 1-hour AAQS for carbon monoxide is four times more stringent than the comparable national limit.

The national AAQS are reviewed periodically, and multiple revisions have occurred over the past 30 years. In general, the national AAQS have become more stringent with the passage of time and as more information and evidence become available concerning the detrimental effects of air pollution. Changes to the Hawaii AAQS over the past several years have tended to follow revisions to the national AAQS, making several of the Hawaii AAQS the same as the national AAQS.

4.0 REGIONAL AND LOCAL CLIMATOLOGY

Regional and local climatology significantly affect the air quality of a given location. Wind, temperature, atmospheric turbulence, mixing height and rainfall all influence air quality. Although the climate of Hawaii is relatively moderate throughout most of the state, significant differences in these parameters may occur from one location to another. Most differences in regional and local climates within the state are caused by the mountainous topography.

The topography of Maui is dominated by the great volcanic masses of Haleakala (10,023 feet) and the West Maui Mountains (5,788 feet). The island consists entirely of the slopes of these mountains and of a connecting isthmus. Haleakala is still considered to be an active volcano and last erupted about 1790. The project site is located on the lower western slope of Haleakala at an elevation of about 100 feet.

Maui lies well within the belt of northeasterly trade winds generated by the semi-permanent Pacific high pressure cell to the north and east. Because the project area is located on the western side of Haleakala, it is partially sheltered from the northeast trade winds. When the trade winds are more northerly, the winds will sweep through the valley between the mountains and into the Kihei area. Local winds such as land/sea breezes and/or upslope/downslope winds also influence the wind pattern for the area. During winter, occasional strong winds from the south or southwest occur in association with the passage of winter storm systems.

Air pollution emissions from motor vehicles, the formation of photochemical smog and smoke plume rise all depend in part on air temperature. Colder temperatures tend to result in higher emissions of contaminants from automobiles but lower concentrations of photochemical smog and ground-level concentrations of air pollution from elevated plumes. In Hawaii, the annual and daily variation of temperature depends to a large degree on elevation above sea level, distance inland and exposure to the trade winds. Average temperatures at locations near sea level generally are warmer than those at higher elevations. Areas exposed to the trade winds tend to have the least temperature variation, while inland and leeward areas often have the most. The project site's lower elevation and leeward location results in warmer temperatures compared with many other parts of the island. At Puunene, which is a few miles to the north of the project area and at an elevation of about 130 feet, average daily minimum and maximum temperatures are 63°F and 86°F, respectively [1]. Temperatures at the project site can be expected to be similar to this.

Small scale, random motions in the atmosphere (turbulence) cause air pollutants to be dispersed as a function of distance or time from the point of emission. Turbulence is caused by both mechanical and thermal forces in the atmosphere. It is often measured and described in terms of Pasquill-Gifford stability class. Stability class 1 is the most turbulent and class 6 is the least. Thus, air pollution dissipates the best during stability class 1 conditions and the worst when stability class 6 prevails. In the Kihei area, stability classes 5 or 6 typically occur during the nighttime or early morning hours when temperature inversions form due to radiational cooling or to drainage flow from the nearby mountains. Stability classes 1 through 4 occur during the daytime, depending mainly on the amount of cloud cover and incoming solar radiation and the onset and extent of the sea breeze.

Mixing height is defined as the height above the surface through which relatively vigorous vertical mixing occurs. Low mixing heights can result in high ground-level air pollution concentrations because contaminants emitted from or near the surface can become trapped within the mixing layer. In Hawaii, minimum mixing heights tend to be high because of mechanical mixing caused by the trade winds and because of the temperature moderating effect of the surrounding ocean. Low mixing heights may sometimes occur, however, at inland locations and even at times along coastal areas early in the morning following a clear, cool, windless night. Coastal areas also may experience low mixing levels during sea breeze conditions when cooler ocean air rushes in over warmer land. Mixing heights in Hawaii typically are above 3,000 feet (1,000 meters).

Rainfall can have a beneficial effect on the air quality of an area in that it helps to suppress fugitive dust emissions, and it also may "washout" gaseous contaminants that are water soluble. Rainfall in Hawaii is highly variable depending on elevation and on location with respect to the trade wind. The climate of the project area is relatively dry due to the leeward location. Historical records from Kihei show that this area of Maui averages about only 12 inches of precipitation per year with the summer months being the driest [1].

5.0 PRESENT AIR QUALITY

Present air quality in the project area is mostly affected by air pollutants from vehicular, industrial, natural and/or agricultural sources. Table 2 presents an air pollutant emission summary for the island of Maui for calendar year 1993. This is the most recent year for which an island-wide emission inventory is available. The emission rates shown in the table pertain to manmade emissions only, i.e., emissions from natural sources are not included. As suggested in the table, most of the manmade particulate and sulfur oxides emissions on Maui originate from point sources, such as power plants and other fuel-burning industries. Nitrogen oxides emissions are roughly equally divided between point sources and area sources (mostly motor vehicle traffic). The majority of carbon monoxide emissions occur from area sources (motor vehicle traffic and sugar cane burning), while hydrocarbons are emitted mainly from point sources. Emissions today are probably higher than those shown in the table, but the proportional relationships are likely about the same.

The largest sources of air pollution in the immediate project area are most likely agricultural operations and automobile traffic using local roadways. Emissions from these sources consist primarily of particulate, carbon monoxide and nitrogen oxides. Power plants burning diesel fuel are located several miles away. These sources mostly emit sulfur dioxide, nitrogen oxides and particulate. Volcanic emissions from distant natural sources on the Big Island also affect the air quality at times during kona wind conditions. By the time the volcanic emissions reach the project area, they consist mostly of fine particulate sulfate.

The State Department of Health operates a network of air quality monitoring stations at various locations around the state, but only very limited data are available for Maui Island. The only air quality data for the project area consists of particulate measurements collected at Kihei. Table 3 summarizes the data from the Kihei monitoring station. The annual second-highest 24-hour PM-10 particulate concentration (which is most relevant to the air quality standard) was 60 $\mu g/m^3$ in 2008. The average annual concentration was 20 $\mu g/m^3$. Prior to 2008, occasional exceedances of the state PM-10 standard have been recorded. These were generally due to either agricultural tilling operations or brush fires in the area. Monitoring of PM-10 at the Kihei monitoring station was discontinued in 2009.

As indicated in Table 3, PM-2.5 particulate is also monitored at the Kihei monitoring station. Annual 24-hour 98th percentile PM-2.5 particulate concentrations (which are most relevant to the air quality standards) ranged from 13 to 16 $\mu g/m^3$ between 2008 and 2012. Average annual concentrations ranged from 4 to 6 $\mu g/m^3$. No values above 35 $\mu g/m^3$ (which relates to the national standard) were recorded during this period.

Given the limited air pollution sources in the area, it is likely that air pollution concentrations are near natural background levels most of the time, except possibly for locations adjacent to agricultural operations or near traffic-congested intersections. Present concentrations of carbon monoxide in the project area are estimated later in this study based on computer modeling of motor vehicle emissions.

6.0 SHORT-TERM IMPACTS OF PROJECT

Short-term direct and indirect impacts on air quality could potentially occur due to project construction. For a project of this nature, there are two potential types of air pollution emissions that could directly result in short-term air quality impacts during project construction: (1) fugitive dust from vehicle movement and soil excavation activities; and (2) exhaust emissions from on-site construction equipment. Indirectly, there also could be short-term impacts from slow-moving construction equipment traveling to and from the project site, from a temporary increase in local traffic caused by commuting construction workers, and from the disruption of normal traffic flow caused by roadway lane closures.

Fugitive dust emissions may arise from the grading and dirt-moving activities associated with site clearing and preparation work. The emission rate for fugitive dust emissions from construction activities is difficult to estimate accurately. This is because of its elusive nature of emission and because the potential for its generation varies greatly depending upon the type of soil at the construction site, the amount and type of dirt-disturbing activity taking place, the moisture content of exposed soil in work areas, and the wind speed. The EPA [2] has provided a rough estimate for uncontrolled fugitive dust emissions from construction activity of 1.2 tons per acre per month under conditions of "medium" activity, moderate soil silt content (30%), and precipitation/evaporation (P/E) index of 50. Uncontrolled fugitive dust emissions at the project site could be somewhere near that level, depending on the amount of rainfall that occurs. In any case, State of Hawaii Air Pollution Control Regulations [3] prohibit visible emissions of fugitive dust from construction activities at the property line. Thus, an effective dust control plan for the project construction phase is essential.

Adequate fugitive dust control can usually be accomplished by the establishment of a frequent watering program to keep bare-dirt surfaces in construction areas from becoming significant sources of dust. In dust-prone or dust-sensitive areas, other control measures such as limiting the area that can be disturbed at any given time, applying chemical soil stabilizers, mulching and/or using wind screens may be necessary. Control regulations further stipulate that open-bodied trucks be covered at all times when in motion if they are transporting materials that could become airborne. Haul trucks tracking dirt onto paved streets from unpaved areas is often a significant source of dust in construction areas. Some means to alleviate this problem, such as road cleaning or tire washing, may be appropriate. Paving of parking areas and/or establishment of landscaping as early in the construction schedule as possible can also lower the potential for fugitive dust emissions.

On-site mobile and stationary construction equipment also will emit air pollutants from engine exhausts. The largest of this equipment is usually diesel-powered. Nitrogen oxides emissions from diesel engines can be relatively high compared to gasoline-powered equipment, but the annual standard for nitrogen dioxide is not likely to be violated by short-term construction equipment emissions. Also, the new short-term (1-hour) standard for nitrogen dioxide is based on a three-year average; thus it is unlikely that relatively short-term construction emissions would exceed the standard. Carbon monoxide emissions from diesel engines are low and should be relatively insignificant compared to vehicular emissions on nearby roadways.

Project construction activities could obstruct the normal flow of traffic for short periods of times such that overall vehicular emissions in the project area could temporarily increase. The only means to alleviate this problem will be to attempt to keep roadways open during peak traffic hours and to move heavy construction equipment and workers to and from construction areas during periods of low traffic volume. Thus, most potential short-term air quality impacts from project construction can be mitigated.

7.0 LONG-TERM IMPACTS OF PROJECT

7.1 Roadway Traffic

After construction is completed, use of the proposed facilities may result in increased motor vehicle traffic in the project area, potentially causing long-term impacts on ambient air quality. Motor vehicles with gasoline-powered engines are significant sources of carbon monoxide. They also emit nitrogen oxides and other contaminates.

Federal air pollution control regulations require that new motor vehicles be equipped with emission control devices that reduce emissions significantly compared to a few years ago. In 1990, the President signed into law the Clean Air Act Amendments. This legislation required further emission reductions, which have been phased in since 1994. More recently, additional restrictions were signed into law during the Clinton administration, and these began to take effect during the next decade. The added restrictions on emissions from new motor vehicles will lower average emissions each year as more and more older vehicles leave the state's roadways. It is estimated that carbon monoxide emissions, for example, will go down by an average of about 20 percent per vehicle during the next 10 years due to the replacement of older vehicles with newer models.

To evaluate the potential long-term ambient air quality impact of motor vehicle traffic using the proposed new roadway facilities, computerized emission and atmospheric dispersion models can be used to estimate ambient carbon monoxide concentrations along roadways within the project area. Carbon monoxide is selected for modeling because it is both the most stable and the most abundant of the pollutants generated by motor vehicles. Furthermore, carbon monoxide air pollution is generally considered to be a microscale problem that can be addressed locally to some extent, whereas nitrogen oxides air pollution most often is a regional issue that cannot be addressed by a single project.

For this project, three scenarios were selected for the carbon monoxide modeling study: (1) year 2013 with present conditions, (2) year 2018 without the project, and (3) year 2018 with the project (and including the Honuaula Project). To begin the modeling study of the three scenarios, critical receptor areas in the vicinity of the project were identified for analysis. Generally speaking, roadway intersections are the primary concern because of traffic congestion and because of the increase in vehicular emissions associated with traffic queuing. For this study, five of the key intersections identified in the traffic study [4] were selected for air quality analysis. These included the following intersections:

- Piilani Highway at Kulanihakoi Road
- Piilani Highway at Kaonoulu Street
- South Kihei Road at Kaonoulu Street
- Piilani Highway at Ohukai Street

- Piilani Highway at North Kihei Road.

The traffic impact report for the project [4] describes the existing and projected future traffic conditions and laneage configurations of the study intersections in detail. In performing the air quality impact analysis, it was assumed that all recommended traffic mitigation measures would be implemented.

The main objective of the modeling study was to estimate maximum 1-hour average carbon monoxide concentrations for each of the three scenarios studied. To evaluate the significance of the estimated concentrations, a comparison of the predicted values for each scenario can be made. Comparison of the estimated values to the national and state AAQS was also used to provide another measure of significance.

Maximum carbon monoxide concentrations typically coincide with peak traffic periods. The traffic impact assessment report evaluated morning and afternoon weekday peak traffic periods and the Saturday (midday) peak hour. The traffic analysis indicates that at the five intersections selected for air quality analysis that the weekday afternoon traffic conditions are generally more congested than during the Saturday midday peak hour.

Vehicular carbon monoxide emissions for each year studied were calculated using EPA’s Motor Vehicle Emission Simulator (MOVES) computer model [5]. MOVES was configured for a project-level analysis specifically for Hawaii. Assumptions included an urban, unrestricted road type, default fuel supply and fuel formulation, default vehicle age distribution and ambient temperature of 68 F.

MOVES emission factors were generated both for idling and for moving traffic. It should be noted that emission estimates provided by MOVES are generally lower than emission estimates obtained from previous EPA emission models for motor vehicles.

After computing vehicular carbon monoxide emissions through the use of MOVES, these data were then input to an atmospheric dispersion model. EPA air quality modeling guidelines [6] currently recommend that the computer model CAL3QHC [7] be used to assess carbon monoxide concentrations at roadway intersections, or in areas where its use has previously been established, CALINE4 [8] may be used. Several years ago, CALINE4 was used extensively in Hawaii to assess air quality impacts at roadway intersections. In December 1997, the California Department of Transportation recommended that the intersection mode of CALINE4 no longer be used because it was thought the model had become outdated. Studies have shown that CALINE4 may tend to over-predict maximum concentrations in some situations. Therefore, CAL3QHC was used for the subject analysis.

CAL3QHC was developed for the U.S. EPA to simulate vehicular movement, vehicle queuing and atmospheric dispersion of vehicular emissions near roadway intersections. It is designed to predict 1-hour average pollutant concentrations near roadway intersections based on input traffic and emission data, roadway/receptor geometry and meteorological conditions.

Although CAL3QHC is intended primarily for use in assessing atmospheric dispersion near signalized roadway intersections, it can also be used to evaluate unsignalized intersections. This is accomplished by manually estimating queue lengths and then applying the same techniques used by the model for signalized intersections. Currently, three of the existing study intersections (Piilani Highway at Kaonoulu Street, Kaonoulu Street at South Kihei Road and Piilani Highway at Kulanihakoi Street) are unsignalized. For the future scenarios studied, with or without project, in accordance with the traffic report, these intersections were assumed to become signalized.

Input peak-hour traffic data were obtained from the traffic study cited previously. This included vehicle approach volumes, saturation capacity estimates, intersection laneage and signal timings. All emission factors that were input to CAL3QHC for free-flow traffic on roadways were obtained from MOVES based on assumed free-flow vehicle speeds corresponding to the posted or design speed limits.

Model roadways were set up to reflect roadway geometry, physical dimensions and operating characteristics. Concentrations predicted by air quality models generally are not considered valid within the roadway-mixing zone. The roadway-mixing zone is usually taken to include 3 meters on either side of the traveled portion of the roadway and the turbulent area within 10 meters of a cross street. Model receptor sites were thus located at the edges of the mixing zones near all intersections that were studied for all three scenarios. All receptor heights were placed at 1.8 meters above ground to simulate levels within the normal human breathing zone.

Input meteorological conditions for this study were defined to provide "worst-case" results. One of the key meteorological inputs is atmospheric stability category. For these analyses, atmospheric stability category 6 was assumed for the morning cases, while atmospheric stability category 4 was assumed for the afternoon cases. These are the most conservative stability categories that are generally used for estimating worst-case pollutant dispersion within suburban areas for these periods. A surface roughness length of 100 cm and a mixing height of 1000 meters were used in all cases. Worst-case wind conditions were defined as a wind speed of 1 meter per second with a wind direction resulting in the highest predicted concentration. Concentration estimates were calculated at wind directions of every 5 degrees.

Existing background concentrations of carbon monoxide in the project vicinity are believed to be at low levels. Thus, background contributions of carbon monoxide from sources or roadways not directly considered in the analysis were accounted for by adding a background concentration of 0.5 ppm to all predicted concentrations for 2013. Although increased traffic is expected to occur within the project area within the next few years with or without the project, background carbon monoxide concentrations may not change significantly since individual emissions from motor vehicles are forecast to decrease with time. Hence, a background value of 0.5 ppm was assumed to persist for the future scenarios studied.

Predicted Worst-Case 1-Hour Concentrations

Table 4 summarizes the final results of the modeling study in the form of the estimated worst-case 1-hour weekday morning and afternoon and Saturday midday ambient carbon monoxide concentrations. These results can be compared directly to the state and the national AAQS. Estimated worst-case carbon monoxide concentrations are presented in the table for three scenarios: year 2013 with existing traffic, year 2018 without the project and year 2018 with the project. The locations of these estimated worst-case 1-hour concentrations all occurred at or very near the indicated intersections.

As indicated in the table, the highest estimated 1-hour concentration within the project vicinity for the present (2013) case was 2.2 ppm. This was projected to occur during the weekday morning peak traffic hour near the intersection of Piilani Highway and Ohukai Street. Concentrations at other locations and times studied were 1.9 ppm or lower. All predicted worst-case 1-hour concentrations for the 2013 scenario were within both the national AAQS of 35 ppm and the state standard of 9 ppm.

In the year 2018 without the proposed project, the highest worst-case 1-hour concentration was predicted to occur during the weekday morning peak traffic hour at the intersection of Piilani Highway and Kulanihakoi Road. A value of 1.8 ppm was predicted to occur at this location and time. Peak-hour worst-case values at the other locations and times studied for the 2018 without project scenario ranged between 0.8 and 1.7 ppm. Compared to the existing case, concentrations mostly remained about the same or decreased slightly, and all projected worst-case concentrations for this scenario remained well within the state and national standards.

In the year 2018 with the project (and with Honuaula), the highest worst-case 1-hour concentration was predicted to occur during the weekday morning both at the intersections of Piilani Highway at Kulanihakoi Road and Piilani Highway at Ohukai Street with a value of 1.8 ppm. Other concentrations for this alternative ranged between 0.9 and 1.7 ppm. The with-project alternative generally resulted in slightly higher concentrations compared to without the project, but the values remained well within the state and federal standards.

Predicted Worst-Case 8-Hour Concentrations

Worst-case 8-hour carbon monoxide concentrations were estimated by multiplying the worst-case 1-hour values by a persistence factor of 0.5. This accounts for two factors: (1) traffic volumes averaged over eight hours are lower than peak 1-hour values, and (2) meteorological conditions are more variable (and hence more favorable for dispersion) over an 8-hour period than they are for a single hour. Based on monitoring data, 1-hour to 8-hour persistence factors for most locations generally vary from 0.4 to 0.8 with 0.6 being the most typical. One study based on modeling [9] concluded that 1-hour to 8-hour persistence factors could typically be expected to range from 0.4 to 0.5. EPA guidelines [10] recommend using a value of 0.7 unless a locally derived persistence factor is available. Recent monitoring data for locations on Oahu reported by the Department of Health [11] suggest that this factor may range between about 0.2 and 0.6 depending on location and traffic variability. Considering the location of the project and the traffic pattern for the area, a 1-hour to 8-hour persistence factor of 0.5 will likely yield reasonable estimates of worst-case 8-hour concentrations.

The resulting estimated worst-case 8-hour concentrations are indicated in Table 5. For the 2013 scenario, the estimated worst-case 8-hour carbon monoxide concentrations for the five locations studied ranged from 0.8 to 1.1 ppm with the highest occurring during the weekday morning at the intersection of Piilani Highway and Ohukai Street. The estimated worst-case concentrations for the existing case were well within both the state standard of 4.4 ppm and the national limit of 9 ppm.

For the year 2018 without project scenario, worst-case concentrations generally remained about the same or decreased slightly. All predicted concentrations remained within the standards.

For the year 2018 with the project, worst-case concentrations were predicted to remain about the same or increase slightly compared to the without project case. All predicted 8-hour concentrations for the with-project alternative were within both the national and the state AAQS.

Conservativeness of Estimates

The results of this study reflect several assumptions that were made concerning both traffic movement and worst-case meteorological conditions. One such assumption concerning worst-case meteorological conditions is that a wind speed of 1 meter per second with a steady direction for 1 hour will occur. A steady wind of 1 meter per second blowing from a single direction for an hour is extremely unlikely and may occur only once a year or less.

With wind speeds of 2 meters per second, for example, computed carbon monoxide concentrations would be only about half the values given above. The 8-hour estimates are also conservative in that it is unlikely that anyone would occupy the assumed receptor sites (within 3 m of the roadways) for a period of 8 hours.

7.2 Light Industrial Facilities

Air pollution emissions from light industrial sources locating within the proposed project could potentially result in direct impacts on air quality. While the specific industrial residents of the proposed project have not yet been identified, it is expected these will not have the potential to emit significant amounts of air pollution. It is assumed that the industrial land uses within the proposed project will be consistent with the M-1 Light Industrial District (Chapter 19.24 of the Maui County Code) and may include warehousing and distribution businesses as well as retailing, light manufacturing, research facilities, offices and other uses.

Without specific information concerning stack heights and stack gas temperatures, exit velocities and emission rates, air quality impacts from the potential light industrial facilities locating within the proposed project cannot be quantitatively estimated. At the present time, such detailed information is not available. However, Hawaii air pollution control rules [3] require that any activity that causes air pollution must obtain written approval from the director of the Hawaii Department of Health. This written approval generally involves applying for both a permit to construct and a permit to operate. At the time of application, detailed information must be provided by the applicant concerning the type and nature of any air pollution emissions and the emission control technology that would be utilized. Depending on the magnitudes of the project emissions and other factors, air quality impact analyses and/or air quality monitoring may be required before the application to construct/operate is approved. Thus, even though an assessment of potential direct impacts from project air pollution emissions cannot be done at this time, state rules may require that such analyses be performed at a later date when specific businesses that emit air pollution apply to locate at the proposed project.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Although very little ambient air quality data are available to characterize existing conditions, it is likely that state and federal ambient air quality standards are currently being met in the project area, except perhaps for occasional exceedances of the particulate standards due to dust or smoke from nearby agricultural sources. Volcanic emissions from distant sources on the island of Hawaii may sometimes affect air quality, reducing visibility and causing discomfort for sensitive individuals.

Potential short-term impacts on air quality could occur from the emission of fugitive dust during project construction. Uncontrolled fugitive dust emissions from construction activities could amount to about 1.2 tons per acre per month, depending on rainfall. To control dust, active work areas and any temporary unpaved work roads should be watered at least twice daily on days without rainfall. Use of wind screens and/or limiting the area that is disturbed at any given time will also help to contain fugitive dust emissions. Wind erosion of inactive areas of the site that have been disturbed could be controlled by mulching or by the use of chemical soil stabilizers. Dirt-hauling trucks should be covered when traveling on roadways to prevent windage. A routine road cleaning and/or tire washing program will also help to reduce fugitive dust emissions that may occur as a result of trucks tracking dirt onto paved roadways in the project area. Establishment of landscaping early in the construction schedule will also help to control dust.

During construction phases, emissions from engine exhausts (primarily consisting of carbon monoxide and nitrogen oxides) will also occur both from on-site construction equipment and from vehicles used by construction workers and from trucks traveling to and from the project. Increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction workers could occur and can be alleviated by moving equipment and personnel to the site during off-peak traffic hours.

After the proposed project is completed, any long-term impacts on air quality in the project area due to emissions from project-related motor vehicle traffic should be negligible. Worst-case concentrations of carbon monoxide should remain well within both the state and the national ambient air quality standards. Implementing any air quality mitigation measures for long-term traffic-related impacts is unnecessary and unwarranted.

At this time, sufficient detail is not available describing the facilities that may be located within the light industrial area included in the project to perform any quantitative impact assessments. However, the types of facilities currently being considered do not emit significant amounts of air pollution. In any case, before any air pollution sources can be built anywhere in the state, an application must be submitted to the Department of Health for a permit to construct the facility, and detailed information concerning any air pollution emissions will need to be provided in the application. If deemed necessary, the Department of Health may require the applicant to assess the air quality impact of the proposed emissions.

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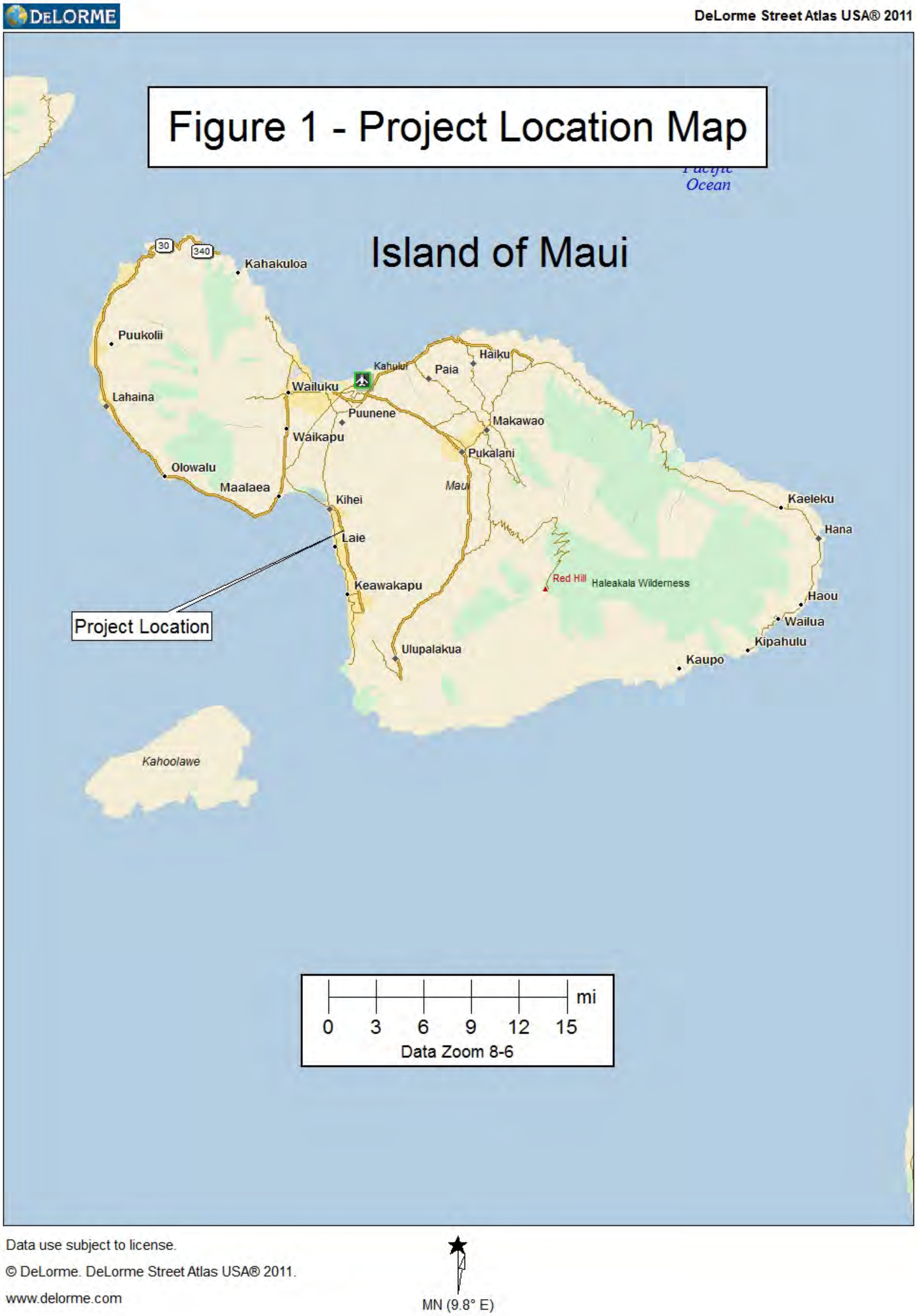
DeLORME
DeLorme Street Atlas USA® 2011
Figure 1 - Project Location Map
Pacific Ocean
Island of Maui
30
340
Kahakuloa
Puukolii
Lahaina
Wailuku
Kahului
Paia
Haiku
Puunene
Waikapu
Makawao
Pukalani
Olowalu
Maalaea
Kihei
Maui
Laie
Kaeleku
Hana
Red Hill
Haleakala Wilderness
Keawakapu
Project Location
Haou
Wailua
Kipahulu
Ulupalakua
Kaupo
Kahoolawe
mi
0 3 6 9 12 15
Data Zoom 8-6
MN (9.8° E)

Table 1

SUMMARY OF STATE OF HAWAII AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Units	Averaging Time	Maximum Allowable Concentration		
			National Primary	National Secondary	State of Hawaii
Particulate Matter (<10 microns)	$\mu g/m^3$	Annual	-	-	50
		24 Hours	150[a]	150[a]	150[b]
Particulate Matter (<2.5 microns)	$\mu g/m^3$	Annual	15[c]	15[c]	-
		24 Hours	35[d]	35[d]	-
Sulfur Dioxide	ppm	Annual	-	-	0.03
		24 Hours	-	-	0.14[b]
		3 Hours	-	0.5[b]	0.5[b]
		1 Hour	0.075[e]	-	-
Nitrogen Dioxide	ppm	Annual	0.053	0.053	0.04
		1 Hour	0.100[f]	-	-
Carbon Monoxide	ppm	8 Hours	9[b]	-	4.4[b]
		1 Hour	35[b]	-	9[b]
Ozone	ppm	8 Hours	0.075[g]	0.075[g]	0.08[g]
Lead	$\mu g/m^3$	3 Months	0.15[h]	0.15[h]	-
		Quarter	1.5[i]	1.5[i]	1.5[i]
Hydrogen Sulfide	ppm	1 Hour	-	-	0.035[b]

[a] Not to be exceeded more than once per year on average over three years.
[b] Not to be exceeded more than once per year.
[c] Three-year average of the weighted annual arithmetic mean.
[d] 98th percentile value of the 24-hour concentrations averaged over three years.
[e] Three-year average of annual fourth-highest daily 1-hour maximum.
[f] 98th percentile value of the daily 1-hour maximum averaged over three years.
[g] Three-year average of annual fourth-highest daily 8-hour maximum.
[h] Rolling 3-month average.
[i] Quarterly average.

Table 2

AIR POLLUTION EMISSIONS INVENTORY FOR ISLAND OF MAUI, 1993

Air Pollutant	Point Sources (tons/year)	Area Sources (tons/year)	Total (tons/year)
Particulate	63,275	7,030	70,305
Sulfur Oxides	6,419	nil	6,419
Nitrogen Oxides	7,312	8,618	15,930
Carbon Monoxide	4,612	20,050	24,662
Hydrocarbons	1,991	234	2,225

Source: Final Report, “Review, Revise and Update of the Hawaii Emissions Inventory Systems for the State of Hawaii”, prepared for Hawaii Department of Health by J.L. Shoemaker & Associates, Inc., 1996

Table 3

ANNUAL SUMMARIES OF AIR QUALITY MEASUREMENTS FOR MONITORING STATIONS NEAREST PIILANI PROMENADE PROJECT

Parameter / Location	2008	2009	2010	2011	2012
Particulate (PM-10) / Kihei					
24-Hour Averaging Period:					
No. of Samples	331	-	-	-	-
Highest Concentration ($\mu g/m^3$)	78	-	-	-	-
2^{nd} Highest Concentration ($\mu g/m^3$)	60	-	-	-	-
No. of State AAQS Exceedances	0	-	-	-	-
Annual Average Concentration ($\mu g/m^3$)	20	-	-	-	-
Particulate (PM-2.5) / Kihei					
24-Hour Averaging Period:					
No. of Samples	58	358	332	301	337
Highest Concentration ($\mu g/m^3$)	16	26	24	15	18
98^{th} Percentile Concentration ($\mu g/m^3$)	15	16	14	13	14
No. of values greater than 35 $\mu g/m^3$	0	0	0	0	0
Annual Average Concentration ($\mu g/m^3$)	6	4	5	6	6

Source: State of Hawaii Department of Health, “Annual Summaries, Hawaii Air Quality Data, 2008 - 2012”

Table 4

ESTIMATED WORST-CASE 1-HOUR CARBON MONOXIDE CONCENTRATIONS ALONG ROADWAYS NEAR PIILANI PROMENADE PROJECT (parts per million)

Roadway Intersection	Year/Scenario								
	2013/Present			2018/Without Project			2018/With Project[#]		
	AM	PM	Sat.	AM	PM	Sat.	AM	PM	Sat.
Piilani Highway at Kulanihakoi Road	1.5	1.1	0.9	1.8	1.1	0.9	1.8	1.2	1.1
Piilani Highway at Kaonoulu Street	1.5	1.1	0.9	1.4	1.1	0.9	1.5	1.4	1.4
South Kihei Road at Kaonoulu Street	1.2	0.9	0.9	1.1	0.8	0.8	1.1	1.0	0.9
Piilani Highway at Ohukai Street[*]	2.2	1.3	1.0	1.7	1.2	0.9	1.8	1.3	1.1
Piilani Highway at North Kihei Road	1.9	1.6	1.1	1.6	1.2	1.0	1.7	1.3	1.2

Hawaii State AAQS: 9
National AAQS: 35

[#]Includes Honuaula Project

[*]2018 without-project scenario includes mitigation specified in traffic report

Table 5

ESTIMATED WORST-CASE 8-HOUR CARBON MONOXIDE CONCENTRATIONS ALONG ROADWAYS NEAR PIILANI PROMENADE PROJECT (parts per million)

Roadway Intersection	Year/Scenario		
	2013/Present	2018/Without Project	2018/With Project#
Piilani Highway at Kulanihakoi Road	0.8	0.9	0.9
Piilani Highway at Kaonoulu Street	0.8	0.7	0.8
South Kihei Road at Kaonoulu Street	0.6	0.6	0.6
Piilani Highway at Ohukai Street*	1.1	0.8	0.9
Piilani Highway at North Kihei Road	1.0	0.8	0.8

Hawaii State AAQS: 4.4
National AAQS: 9

#Includes Honuaula Project

*2018 without-project scenario includes mitigation specified in traffic report

APPENDIX D-1

Air Quality Study Update dated March 11, 2016

B.D. NEAL & ASSOCIATES

Applied Meteorology • Air Quality • Computer Science

P.O. BOX 1808 • KAILUA-KONA, HAWAII 96745 • TELPHONE (808) 329-1627 • FAX (808) 325-6739

EMAIL: bdneal@bdneal.com

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PACIFIC RIM LAND, INC.
MAUI MAIN

March 11, 2016

Piilani Promenade North LLC & Piilani Promenade South LLC
c/o Sarofim Realty Advisors
Attn: Mr. Robert Poynor, Vice President
8115 Preston Road, Ste. 400
Dallas, Texas, 75225

Subject: Piilani Promenade Project
Update of Air Quality Study

Dear Mr. Poynor:

In accordance with your request, we have reviewed the revised traffic impact analysis report (TIAR) for the subject project dated March 4, 2016 as it relates to the air quality study we prepared for this project in August 2014. Although the revised TIAR has many substantial differences compared to the original TIAR, in our judgment, re-analysis of the project air quality impacts due to project traffic would not yield significantly different results. Our air quality study from August 2014 indicated that "With the project in the year 2018, estimated worst-case carbon monoxide concentrations indicated only minimal or no impact compared to the without project case. Concentrations would remain well within standards." The revised TIAR evaluates the years 2025 and 2032 instead, but in our opinion, the conclusions stated in the air quality study of August 2014 remain valid.

Please call me if you have any questions concerning the information presented herein or if you wish to discuss this matter further.

Very truly yours,

Barry D. Neal

Barry D. Neal
Certified Consulting
Meteorologist

APPENDIX D-2

Air Quality Study Update
Dated February 2, 2017

B.D. NEAL & ASSOCIATES
Applied Meteorology • Air Quality • Computer Science
P.O. BOX 1808 • KAILUA-KONA, HAWAII 96745 • TELPHONE (808) 329-1627 • FAX (808) 325-6739
EMAIL: bdneal@bdneal.com

February 2, 2017

Piilani Promenade North LLC & Piilani Promenade South LLC
c/o Sarofim Realty Advisors
Attn: Mr. Robert Poynor, Vice President
8115 Preston Road, Ste. 400
Dallas, Texas, 75225

Subject: Piilani Promenade Project
Update of Air Quality Study

Dear Mr. Poynor:

In accordance with your request, we have reviewed the revised traffic impact analysis report (TIAR) for the subject project dated December 20, 2016 as it relates to the air quality study we prepared for this project in August 2014. Although the revised TIAR has many substantial differences compared to the original TIAR, in our judgment, re-analysis of the project air quality impacts due to project traffic would not yield significantly different results. Our air quality study from August 2014 indicated that "With the project in the year 2018, estimated worst-case carbon monoxide concentrations indicated only minimal or no impact compared to the without project case. Concentrations would remain well within standards." The revised TIAR evaluates the years 2025 and 2032 instead, but in our opinion, the conclusions stated in the air quality study of August 2014 remain valid.

Please call me if you have any questions concerning the information presented herein or if you wish to discuss this matter further.

Very truly yours,

Barry D. Neal

Barry D. Neal
Certified Consulting
Meteorologist