**Appendix D**
**Air Quality Analysis, Technical Memorandum, AECOM, November 2014**

AECOM Water

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## Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan

# Air Quality Analysis

**Technical Memorandum-*Final***
**November 2014**

# Table of Contents

# List of Tables



# List of Figures

# List of Acronyms

| | |
|---|---|
| AS | activated sludge |
| BTU | British thermal units |
| CAA | Clean Air Act |
| CCH | City and County of Honolulu |
| cfm | cubic feet per minute |
| $CH_4$ | methane |
| CHP | combined heat and power |
| CO | carbon monoxide |
| DBEDT | Hawaii Department of Business, Economic Development, and Tourism |
| DOH | Department of Health, State of Hawaii |
| EPA | Environmental Protection Agency, United States |
| GHG | greenhouse gas |
| HAPS | hazardous air pollutants |
| $H_2S$ | hydrogen sulfide |
| HWBOCP | Honouliuli Wastewater Basin Odor Control Project |
| HWRF | Honouliuli Water Recycling Facility |
| kW | kilowatt |
| mgd | million gallons per day |
| NAAQS | National Ambient Air Quality Standards |
| $NO_2$ | nitrogen dioxide |
| $NO_x$ | nitrogen oxides |
| $N_2O$ | nitrous oxide |
| NSPS | new source performance standards |
| NSR | new source review |
| $O_3$ | ozone |
| O&M | operation and maintenance |
| Pb | lead |
| PM | particulate matter |
| ppm | parts per million |
| ppmV | parts per million by volume |
| PSD | prevention of significant deterioration |
| ROG | reactive organic gases |
| SC | solids contact |
| $SO_2$ | sulfur dioxide |
| TPY | tons per year |
| TF | Trickling Filter |
| WWTP | wastewater treatment plant |

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# Executive Summary

An air quality analysis was conducted to evaluate the potential for impact as a result of the proposed upgrade and expansion of the existing Honouliuli Wastewater Treatment Plant (WWTP) to provide secondary treatment and accommodate projected wastewater flows, as well as the potential relocation of non-process facilities that support island-wide WWTPs and wastewater pump stations that are currently located at Sand Island WWTP to the Honouliuli WWTP site. This project is part of the Honouliuli/ Waipahu/Pearl City Wastewater Facilities Plan (Honouliuli Fac Plan) that is currently being prepared by the City and County of Honolulu (CCH) Department of Environmental Services (ENV). This analysis was conducted as part of an Environmental Impact Statement in accordance with the Hawaii Environmental Quality Control Act, codified as Chapter 341, Hawaii Revised Statutes (HRS) and Chapter 343, HRS, Environmental Impact Statement Law. The EPA is the federal agency that develops and enforces the regulations that help govern air quality on a national level and provides guidance at the state level. Air quality impacts are typically evaluated against the National Ambient Air Quality Standards (NAAQS), which were established as part of the 1970 federal Clean Air Act (CAA) in 1970 to protect the public health.

Since the facility expansion as incorporated in the Honouliuli Fac Plan would involve construction and operational activities that have potential air quality impacts, this assessment includes impact evaluation of:

- Construction activities focusing on the usage of equipment during varying phases
- Operation activities focusing on the addition of new stationary and mobile sources
- Odor effects identifying the change from existing to the proposed condition.

Under the full build plan condition,

- Construction duration could last 72, 108, or 144 months depending on the selection of contracts. Since the scale of project remains the same, the usage of equipment during varying phases would be greater under short-duration schedule as compared to longer construction period, resulting in greater short-term air quality impacts. However, the equipment to be utilized remains typical for infrastructure development projects in urban areas. Given the spreading of the construction activity over the years, hot spot air quality concerns associated with concentrated equipment operations would be limited and mobile, therefore construction impacts are anticipated to be less than significant.

- Operation of the plant under future proposed condition would involve installation of new standby generators to provide expanded emergency power supply from existing 3.8 MW to 12.55 MW causing a potential short-term increase in combustion source emissions on an annual basis. However, given their emergency usage purposes, potential air quality impacts would be short in duration unlikely causing significant air quality impacts. If these generators would also provide power shaving purposes during peak loading condition, greater air quality impacts would occur. The future CAA air permitting process would further ensure compliance with the NAAQS as a result of increasing stationary source operational emissions on site. Therefore, the proposed project would unlikely result in significant air quality impacts.

- Odor releasing points at the facility would increase in the secondary treatment area in comparison to the existing condition. The affected residences would likely include those located close to Renton Road and around the Coral Creek Golf Course. However, with consideration of the on-going and future odor control measures to be implemented at the facility's major odor generating sources, adverse ambient odor impacts would likely be reduced. The future ambient odor monitoring plan to be implemented would ensure the measured hydrogen sulfide concentration levels would be below the Hawaii ambient standard.

As a result, no significant air quality impacts are anticipated as a result of the proposed project. Therefore, no construction and operational air quality mitigation measures are required.

# 1 Introduction

## 1.1 Project Description

The City and County of Honolulu (CCH) Department of Environmental Services is in the process of developing the Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan (Honouliuli Fac Plan) for the Honouliuli sewer basin. The intent of the Honouliuli Fac Plan is to define necessary improvements to the collection and treatment facilities to meet future flow demands and permit compliance.

The 2010 Consent Decree (Civil Number (No.) 94-00765 DAE-KSC) is an agreement between CCH, the State of Hawaii Department of Health (DOH), and the United States Environmental Protection Agency (EPA) that requires CCH to meet certain requirements with respect to its wastewater collection system and wastewater treatment plants (WWTPs). The 2010 Consent Decree mandates that the Honouliuli and Sand Island WWTPs be upgraded to secondary treatment facilities by 2024 and 2035, respectively.

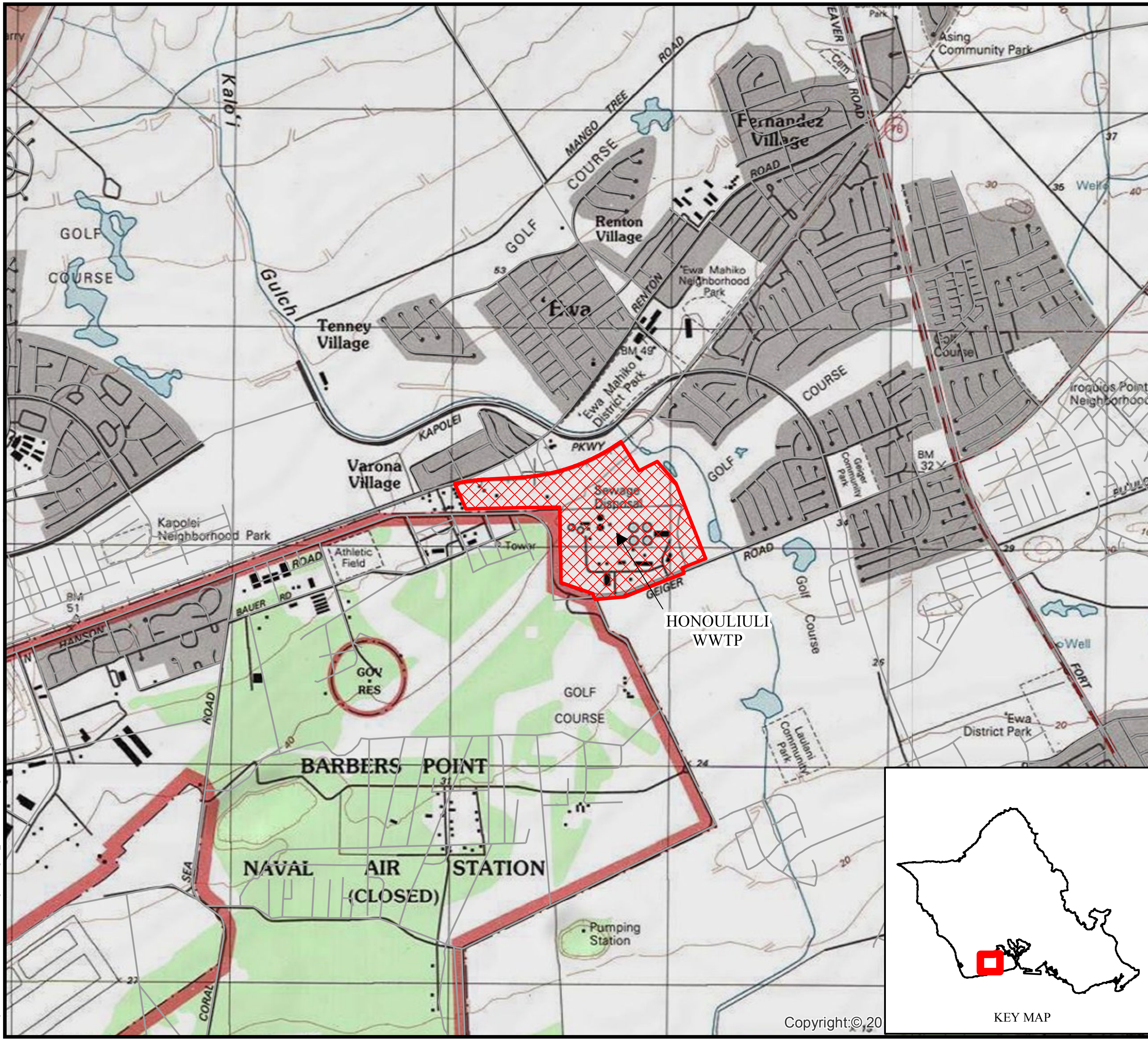
The WWTP was originally built in 1978 as a primary plant and became fully operational in 1984. The Honouliuli WWTP is the second-largest WWTP on Oahu, and has undergone numerous expansions and upgrades due to growth within the service area and additional treatment needs. The average daily flow to the WWTP was approximately 25.8 million gallons per day (mgd) in 2012. The rated design capacity is 38 mgd with one unit out of service and 51 mgd with all units in service according to the *Honouliuli WWTP Facility-Wide Operations Manual* (O&M Manual) (Fukunaga and Associates, Inc. and HDR Engineering, Inc., 2011). The WWTP provides primary treatment to all flow received. Approximately 13 mgd undergoes further secondary treatment. A portion of the secondary effluent is treated for water reuse at the CCH Board of Water Supply Honouliuli Water Recycling Facility (HWRF). The solids stream has a rated design capacity of solids generated from 42 mgd of primary treatment and 26 mgd of secondary treatment according to the *O&M Manual*.

In addition to the regulatory requirements established for secondary treatment, it is anticipated that there will be a future increased demand for reclaimed water from the HWRF. The *Ewa Non-Potable Water Master Plan* projected future non-potable maximum daily demand to be 24.6 mgd beyond 2015. Planning for the existing secondary treatment system began in 1990 as a first step toward reclamation of effluent for reuse through irrigation. The existing secondary treatment system was constructed in 1996, specifically for water reclamation purposes.

In 2011, CCH acquired 48.4 acres of land abutting the north and east boundaries of the existing Honouliuli WWTP to provide sufficient space for treatment and associated facilities to comply with the 2010 Consent Decree mandates. The Honouliuli WWTP site area is currently 100.5 acres.

The study area includes the existing Honouliuli WWTP located at 91-1000 Geiger Road and expansion property to the north and east, adjacent to the Coral Creek Golf Course. The Honouliuli WWTP project site is identified on **Figure 1-1**.

The proposed project assessed in this analysis concerns the upgrade and expansion of the Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows, as well as addresses the potential location of non-process facilities to accommodate current needs that are not adequately met, future needs that will arise from upgrading Honouliuli and Sand Island WWTFs to secondary treatment, and other treatment and collection system support facilities that may currently be decentralized. Additional improvements at the Honouliuli WWTP are proposed for the following existing facilities: Central Laboratory, Ocean Team Facilities, Administration Building, Operations Building, Leeward Region Maintenance, Central Shops, Warehouse, truck wash, process Supervisory Control and Data Acquisition, septage receiving station, odor control, grounds keeping, janitorial service and security, and Honouliuli Water Recycling Facility.




# City and County of Honolulu

## HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

**FIGURE 1-1**

**PROJECT LOCATION MAP**

**December 2014**

AECOM

1001 BISHOP ST, STE 1600
HONOLULU, HAWAII 96813

G:\Projects\MUN\60220849HON\Maps\EI\Figure_1-1 Location Map.mxd

# 2 Air Quality Regulatory Settings

Air quality is defined by ambient air concentrations of specific pollutants of concern with respect to the health and welfare of the general public. Air quality can be affected by air pollutants produced by mobile sources, such as vehicular traffic, aircraft, or non-road equipment used for construction activities; and by fixed or immobile facilities, referred to as “stationary sources.” Stationary sources can include combustion and industrial stacks and exhaust vents. Potential air quality effects in the vicinity of the WWTP would occur from both construction and operational activities associated with implementation of the proposed improvements.

## 2.1 Definition of Resource

### 2.1.1 National and Hawaiian Ambient Air Quality Standards

As required by the Clean Air Act, federal standards have been established to maintain ambient air quality. The regulatory framework includes the National Ambient Air Quality Standards (NAAQS) for six major air pollutants. These pollutants, known as criteria pollutants, are: particulate matter ($PM_{10}$ and $PM_{2.5}$), sulfur dioxide ($SO_2$), hydrogen sulfide ($H_2S$), nitrogen dioxide ($NO_2$), carbon monoxide (CO), ozone ($O_3$) and lead (Pb) as shown in Table 2-1. Hawaii air quality standards are similar to the national standards, although the Hawaii standards for carbon monoxide and nitrogen dioxide are more stringent than the national standards. In addition, Hawaii has a standard for hydrogen sulfide (Table 2-1).

The “primary” standards have been established to protect the public health. The “secondary” standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation and other aspects of the general welfare.

Hydrogen sulfide ($H_2S$) is the primary compound in wastewater collection and treatment systems that causes odor and corrosion. Problems with odor and corrosion are attributed to high wastewater sulfide levels and the resulting generation of hydrogen sulfide. As shown in Table 2-1, Hawaii has an ambient air standard for $H_2S$ of 0.025 parts per million by volume (ppmV) in any 1-hour period at the property line of a facility. This standard provides a measure of odor impacts from a wastewater treatment plant. Presently there is no federal ambient air quality standard for $H_2S$. The DOH also regulates emissions discharged from odor control systems.

Areas where concentration levels are below the NAAQS for a criteria pollutant are designated as being in “attainment.” Areas where a criteria pollutant level equals or exceeds the NAAQS are designated as being in “nonattainment.”

### 2.1.2 Stationary Sources

Stationary sources of air emissions at the various sites that could be affected by the proposed action include combustion turbines, boilers, generators, flares, and fuel tanks. The CAA set permit rules and emission standards for pollution sources of certain sizes. An air permit application is submitted by the prospective owner or operator of an emitting source in order to obtain approval of the source construction permit. A construction permit generally specifies a time period within which the source must be constructed. Permits should be reviewed for any modifications to the site or the air emissions sources to determine permit applicability. USEPA oversees the programs that grant stationary source operating permits (Title V) and new or modified major stationary source construction and operation permits. The New Source Review (NSR) program requires new major stationary sources or major modification of existing major stationary sources of pollutants to obtain permits before initiating construction. The New Source Performance Standards (NSPS) apply to sources emitting criteria pollutants, while the National Emission Standards for Hazardous Air Pollutants apply to sources emitting Hazardous Air Pollutants (HAPs).

**Table 2-1. Hawaiian and National Ambient Air Quality Standards (NAAQS)**

| Pollutant | | Primary/ Secondary(1) | Averaging Time | National Standard | Hawaii Standard | Form |
|---|---|---|---|---|---|---|
| Carbon Monoxide (CO) | | Primary | 8-hour | 9 ppm | 4.4 ppm | Not to be exceeded more than once per year |
| | | | 1-hour | 35 ppm | 9 ppm | |
| Lead (Pb) | | Primary and secondary | Rolling 3-month average | 0.15 μg/m$^3$(2) | 0.15 μg/m$^3$ (calendar quarter) | Not to be exceeded |
| Nitrogen Dioxide ($NO_2$) | | Primary | 1-hour | 100 ppb | None | 98th percentile, averaged over 3 years |
| | | Primary and secondary | Annual | 53 ppb(3) | 0.04 ppb | Annual mean |
| Ozone ($O_3$) | | Primary and secondary | 8-hour | 0.075 ppm(4) | 0.08 ppm | Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years |
| Particle Pollution | $PM_{2.5}$ | Primary | Annual | 12 μg/m$^3$ | None | Annual mean, averaged over 3 years |
| | | Secondary | Annual | 15 μg/m$^3$ | None | Annual mean, averaged over 3 years |
| | | Primary and secondary | 24-hour | 35 μg/m$^3$ | None | 98th percentile, averaged over 3 years |
| | $PM_{10}$ | Primary and secondary | 24-hour | 150 μg/m$^3$ | 150 μg/m$^3$ | Not to be exceeded more than once per year on average over 3 years |
| | | None | Annual | None | 50 μg/m$^3$ | Annual average |
| Sulfur Dioxide ($SO_2$) | | Primary | 1-hour | 0.075 ppm(5) | None | 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
| | | Secondary | 3-hour | 0.5 ppm | 0.5 ppm | Not to be exceeded more than once per year |
| | | None | 24-hour | None | 0.14 ppm | 24-hour average |
| | | None | Annual | None | 0.03 ppm | Annual average |
| Hydrogen Sulfide ($H_2S$) | | None | 1-hour | None | 0.025 ppm | 1-hour average |

Notes:
(1) Primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children and the elderly and secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.
(2) Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
(3) The official level of the annual $NO_2$ standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
(4) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard (“anti-backsliding”). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.
(5) Final rule signed June 2, 2010. The 1971 annual and 24-hour $SO_2$ standards were revoked in the same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.
Sources: http://www.epa.gov/air/criteria.html and http://health.hawaii.gov/cab/files/2013/05/naaqs_jan_2013.pdf.

HAPs, also known as toxic air pollutants, are chemicals that can cause adverse effects to human health or the environment. The CAAA directed USEPA to set standards for all major sources of air toxics. USEPA established a list of 187 HAPs that includes substances that cause cancer, neurological, respiratory, and reproductive effects. The Title V major source thresholds for pollutant emissions that are applicable to Hawaii are:

- 100 tons per year (TPY) for any criteria pollutant
- 25 TPY total HAPs
- 10 TPY for any one HAP

USEPA also established Prevention of Significant Deterioration (PSD) regulations to ensure that air quality in attainment areas does not significantly deteriorate as a result of construction and operation of major stationary sources, and to allow future industrial growth to occur. A typical major PSD source is classified as anything with the potential to emit 250 TPY of any regulated pollutant in an attainment area. However, for several types of major source operations, including fossil fuel–fired steam electric plants of more than 250 million British Thermal Units (Btu) per hour heat input, 100 TPY is the major PSD source threshold.

Since Hawaii is in an attainment area, major new sources or major modifications to existing major sources must meet the PSD requirements.

The DOH has adopted the USEPA-established stationary source regulations discussed previously and acts as the administrator to enforce stationary source air pollution control regulations in Hawaii (DOH, Title 11, Chapter 60.1, Air Pollution Control). DOH grants an air permit to applicable facilities for not only federal enforceable major sources but also non-major sources in the state.

### 2.1.3 Mobile Sources

Typical mobile sources include on-road and non-road vehicles, and construction equipment. The emissions from these mobile sources are regulated under the CAA Title II that establishes emission standards that manufacturers must achieve. Therefore, unlike stationary sources, no permitting requirements exist for operating mobile sources.

## 2.2 Criteria Pollutants and Hydrogen Sulfide Health Effects

The sources of criteria pollutants and hydrogen sulfide, their effects on human health and the nation's welfare, and their final deposition in the atmosphere vary considerably. A brief description of each criteria pollutant and hydrogen sulfide is given below.

**Ozone**. $O_3$, a colorless toxic gas, enters the blood stream and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. $O_3$ also damages vegetation by inhibiting their growth. Although $O_3$ is not directly emitted, it forms in the atmosphere through a chemical reaction between reactive organic gases (ROG) and nitrogen oxides ($NO_x$), which are emitted from industrial sources and from automobiles. Substantial $O_3$ formations generally require a stable atmosphere with strong sunlight.

**Particulate Matter**. Particulate pollution is composed of solid particles or liquid droplets that are small enough to remain suspended in the air. In general, particulate pollution can include dust, soot, and smoke; these can be irritating but usually are not poisonous.

Particulate pollution also can include bits of solid or liquid substances that can be highly toxic. Of particular concern are those particles that are smaller than, or equal to, 10 microns ($PM_{10}$) and 2.5 microns ($PM_{2.5}$) in size.

**$PM_{10}$.** $PM_{10}$ refers to particulate matter less than 10 microns in diameter, about one/seventh the thickness of a human hair. Major sources of $PM_{10}$ include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Suspended particulates produce haze and reduce visibility. Additionally, $PM_{10}$ poses a greater health risk than larger- sized particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract.

$PM_{10}$ can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections.

**$PM_{2.5}$.** A small portion of particulate matter is the product of fuel combustion processes. In the case of $PM_{2.5}$, the combustion of fossil fuels accounts for a significant portion of this pollutant. The main health effect of airborne particulate matter is on the respiratory system. $PM_{2.5}$ refers to particulates that are 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair. $PM_{2.5}$ results from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. Like $PM_{10}$, $PM_{2.5}$ can penetrate the human respiratory system's natural defenses and damage the respiratory tract when inhaled. Whereas, particles 2.5 to 10 microns in diameter tend to collect in the upper portion of the respiratory system, particles 2.5 microns or less are so tiny that they can penetrate deeper into the lungs and damage lung tissues.

**Carbon Monoxide.** CO, a colorless gas, interferes with the transfer of oxygen to the brain. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban “street canyon” conditions. Consequently, CO concentrations must be predicted on a localized, or microscale, basis.

**Nitrogen Dioxide**. $NO_2$, a brownish gas, irritates the lungs. It can cause breathing difficulties at high concentrations. Like $O_3$, $NO_2$ is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and $NO_2$ are collectively referred to as nitrogen oxides ($NO_x$) and are major contributors to ozone formation. $NO_2$ also contributes to the formation of $PM_{10}$, small liquid and solid particles that are less than 10 microns in diameter (see discussion of $PM_{10}$ above). At atmospheric concentration, $NO_2$ is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility. There is some indication of a relationship between $NO_2$ and chronic pulmonary fibrosis. Some increase in bronchitis in children (two and three years old) has also been observed at concentrations below 0.3 parts per million (ppm).

**Lead.** Pb is a stable element that persists and accumulates both in the environment and in animals. Its principal effects in humans are on the blood-forming, nervous, and renal systems. Lead levels in the urban environment from mobile sources have significantly decreased due to the federally mandated switch to lead-free gasoline.

**Sulfur Dioxide.** $SO_2$ is a product of high-sulfur fuel combustion. The main sources of $SO_2$ are coal and oil used in power stations, industry and for domestic heating. Industrial chemical manufacturing is another source of $SO_2$. $SO_2$ is an irritant gas that attacks the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. $SO_2$ can also yellow plant leaves and erode iron and steel.

**Hydrogen Sulfide.** $H_2S$ is a colorless gas that is soluble in liquids such as water. It has a distinctive odor of rotten eggs. It can be formed under conditions of deficient oxygen, in the presence of organic material and sulfate. Most of the atmospheric hydrogen sulfide has natural origins. In areas of natural occurrence, such as such as in geothermal areas and sulfur springs the unpleasant smell of $H_2S$ can be a nuisance. At concentrations of 20 ppm or higher it can cause eye irritation and beginning at concentrations of 50 ppm or higher it can also cause respiratory tract irritation. The $H_2S$ concentration level is commonly used as a measure of potential odor impact for a wastewater treatment plant.

## 2.3 Climate Change and Greenhouse Gases

Climate change is an important national and global concern. While the earth has gone through many natural changes in climate in its history, there is general agreement that the earth’s climate is currently changing at an accelerated rate and will continue to do so for the foreseeable future. Anthropogenic (human-caused) greenhouse gas (GHG) emissions contribute to this rapid change. Carbon dioxide ($CO_2$) makes up the largest component of these GHG emissions. Other prominent transportation GHGs include methane ($CH_4$) and nitrous oxide ($N_2O$).

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two thirds of the natural greenhouse effect. However, the burning of fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. GHGs trap heat in the earth's atmosphere. Because atmospheric concentration of GHGs continues to climb, our planet will continue to experience climate-related phenomena. For example, warmer global temperatures can cause changes in precipitation and sea levels.

To date, no national standards have been established regarding GHGs, nor has EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for $CO_2$ under the Clean Air Act. However, there is a considerable body of scientific literature addressing the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the US National Academy of Sciences, EPA, and other federal agencies. GHGs are different from other air pollutants evaluated in federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere, which is characteristic of these gases. The affected environment for $CO_2$ and other GHG emissions is the entire planet. In addition, from a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad scale actions such as actions involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the GHG emissions impacts for a particular infrastructure project. Furthermore, presently there is no scientific methodology for attributing specific climatological changes to a particular infrastructure project's emissions.

Although there are currently no greenhouse gas (GHG) emission limits for CCH WWTPs, in 2007 the Hawaii State Legislature passed Act 234, "Global Warming Solutions Act" which was signed into law by the governor. Act 234 required the Hawaii Department of Business, Economic Development, and Tourism (DBEDT) and DOH to update their Inventory of Greenhouse Gas Emissions Estimates for 1990 by December 31, 2008. The *Hawaii Greenhouse Gas Inventory: 1990 and 2007* was completed on time in December 2008 by ICF International for DBEDT. Act 234 also requires a reduction in the amount of GHG emissions in Hawaii to levels at or below 1990 levels by 2020.

# 3 Existing Air Quality Conditions

## 3.1 Climate

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 leeward and coastal situation. Winds are predominantly trade winds from the east northeast except for occasional periods when Kona storms (seasonal cyclones) may generate strong winds from the south or when the trade winds are weak and land breeze-sea breeze circulations may develop. Wind speeds typically vary between about 5 and 15 miles per hour providing relatively good ventilation much of the time. Temperatures in leeward areas of Oahu are generally very moderate with average daily temperatures ranging from about 70°F to 84°F. The extreme minimum temperature recorded at Honolulu Airport is 54°F, while the extreme maximum temperature is 95°F. This area of Oahu is one of the drier locations in the state with rainfall often highly variable from one year to the next. Monthly rainfall has been measured to vary from as little as a trace to as much as 10 inches. Average annual rainfall amounts to about 20 to 30 inches with summer months being the driest.

## 3.2 Current Air Quality

Based on air quality data collected and published by the EPA and DOH, the State of Hawaii complies with the standards of the CAA, including the NAAQS and State Ambient Air Quality Standards. The air in Hawaii is clean and low in pollutants, and the area where the project is located is in attainment of all air quality standards. Consistent trade winds also contribute to the clean air in Hawaii.

The present good air quality of the project area can be represented based on ambient air quality monitoring data in the state. Collected at the closest monitoring station 3.6 miles east of the project site as provided in **Table 3-1**. Both national and Hawaii ambient air quality standards are currently being met.

**Table 3-1. 2013 Monitored Ambient Air Quality Conditions**

| Pollutant | Location | Units | Averaging Period | Concentration | NAAQS |
|---|---|---|---|---|---|
| CO | 2052 Lauwiliwili Street, Honolulu, HI | ppm | 8-hour | 1 | 9 |
| | | | 1-hour | 1 | 35 |
| Lead (Pb) | 2052 Lauwiliwili Street, Honolulu, HI | μg/m3 | 3 - month Avg | - | 0.15 |
| | | | 24-hour | 0.001 | - |
| $SO_2$ | 2052 Lauwiliwili Street, Honolulu, HI | μg/m$^3$ | 1-hour | 16 | 75 |
| | | | 3-hour | - | 1300 |
| | | | 24-hour | 5 | 140 |
| PM10 | 2052 Lauwiliwili Street, Honolulu, HI | ug/m3 | 24-hour | 39 | 150 |
| $PM_{2.5}$ | 2052 Lauwiliwili Street, Honolulu, HI | μg/m$^3$ | Annual | 3 | 15 |
| | | | 24-hour | 10 | 35 |
| $NO_2$ | 2052 Lauwiliwili Street, Honolulu, HI | μg/m$^3$ | 1-hour | 23 | 100 |
| | | | Annual | - | 53 |
| Ozone | 2052 Lauwiliwili Street, Honolulu, HI | ppm | 8-hour | 0.051 | 0.075 |

Notes:
CO and Pb levels are the first-highest.
$SO_2$ levels are the 99-percenrile for 1-hour average and highest for 24-hour average.
$PM_{2.5}$ 24-hour level is the 98th percentile level.
$NO_2$ 1-hour level the 98th percentile.
Ozone 8-hour average level is the 4th highest-daily value.

## 3.3 Existing Facility Air Permit

The Honouliuli WWTP is minor source for criteria pollutants and HAPs and is operating under a noncovered source permit (No. 0215-020N) issued by the DOH, and therefore not subject to CAA Title V permitting. Various plant stationary sources emitting criteria pollutants, $H_2S$, and HAPs that are covered by this permit include:

- Cleaver Brooks boiler – 2.5 million Btu/hour heat input, 60 horsepower.
- Various tanks and odor control systems.
- Flares.

With respect to the $H_2S$ emission concentration from the outlet stacks, the following limits were established in the permit for the following odor control systems:

- 2.0 parts per million by volume (ppmv) for the Central Odor Control System;
- 3.0 ppmv for the Headworks Odor Control System;
- 1.0 ppmv for the Secondary Odor Control System;
- 3.0 ppmv for the Biofilter Odor Control System; and
- 3.0 ppmv for the Chemical Scrubber Odor Control System.

## 3.4 Odor Control System

The Honouliuli WWTP has six separate odor control systems that collect and treat foul air consisting of:

- Preliminary Odor Control System – collects and treats foul air from the influent sewers, influent screens, and influent pump station wet well. This foul air is conveyed to two activated carbon scrubbers, which are run in parallel. The total capacity of the activated carbon scrubbers is 7,000 cubic feet per minute (cfm).
- Primary Odor Control System – collects and treats foul air from the aerated grit chambers, preaeration tanks, and primary clarifier weirs. This system consists of two-stage treatment that includes two catalytic scrubbers that have been converted into caustic scrubbers, followed by five dual-bed activated carbon scrubbers. The total capacity of the system is 24,000 cfm.
- Secondary Odor Control System – collects and treats foul air from the secondary treatment processes including the biotower pump station and trickling filter/solids contact (TF/SC) process. Like the primary odor control system, the Secondary Odor Control System consists of a two-stage treatment system that includes two catalytic scrubbers that have been converted into caustic scrubbers, followed by five dual-bed activated carbon scrubbers. The total capacity of the secondary odor control system is 25,000 cfm.
- Primary Sludge Odor Control System – consists of a four-cell stone media biofilter system that collects and treats foul air from the gravity thickeners and sludge blend tanks. The total capacity of the Primary Sludge Odor Control System is 16,400 cfm.
- Secondary Sludge Odor Control System – consists of an activated carbon system with two units that collect and treat foul air from the gravity belt thickeners. The capacity of the Secondary Sludge Odor Control System is 3,000 cfm.
- Solids Dewatering Odor Control System – consists of a multistage chemical unit that collects and treats foul air from the centrifuge dewatering building. The Solids Dewatering Odor Control System has a treatment capacity of 22,000 cfm.

The existing wastewater pumping stations and force mains generally are not significant sources of air pollution emissions or nuisance odor issues (AECOM, 2010). Odorous emissions may occasionally occur with outgassing leaks from the conveyance system and/or from wastewater upset or overflow situations. Odor Control System Permit No. 0215-02-N limits the $H_2S$ concentrations at each individual odor control system outlet. Detailed Honouliuli Wastewater Basin Odor Control Project (HWBOCP) performance monitoring results from each of the existing odor control systems are provided in the Odor Control Strategy (AECOM, April 2013) and summarized in

Table 3-2. Ongoing monitoring is conducted at 13 fence line monitoring locations along the original property line and at the outlet stacks of each odor control system to meet permit requirements.

**Table 3-2. HWBOCP Performance Monitoring**

| Odor Control System | Location of Monitoring | Test Duration (days) | Average Removal Efficiency | Average Inlet $H_2S$ (ppmV) | Peak Inlet $H_2S$ (ppmV) | Average outlet $H_2S$ (ppmV) | Peak outlet $H_2S$ (ppmV) |
|---|---|---|---|---|---|---|---|
| Preliminary | Influent Junction Box | 12 | n/a | 86 | 213 | n/a | n/a |
| | IPS Wetwell | 12 | n/a | 21 | 46 | n/a | n/a |
| | GAC 1 | 8 | n/a * | 26 | 134 | n/a * | >2.0* |
| | GAC 2 | 8 | n/a * | 13 | 65 | n/a * | >2.0* |
| Primary | Caustic Scrubber | 8 | 98% | 59 | 154 | 2 ** | 11** |
| | GAC 1 | 8 | 99% | 2 | 11 | 0.024 | 0.049 |
| Secondary | Caustic Scrubber | 7 | >99% | 1 | 3 | 0.01 | 0.12 |
| | GAC 1 | 7 | 75% | 0.02 | 0.11 | 0.005 | 0.015 |
| Primary Sludge | Biofilter | 7 | >99% | 33 | 55 | 0.00 | 0.04 |
| Secondary Sludge | GAC 1 | 8 | 98% | 0.04 | 0.27 | 0.001 | 0.004 |
| Solids Dewatering | Chemical Scrubber 1 *** | 10 | <70% | <1 | 3 | 0.31 | 0.58 |
| | Chemical Scrubber 2 *** | 10 | 85% | 1 | 1 | 0.15 | 0.31 |

*A reading of >2.0 is over scale for the low range Odalogs, which indicates an unknown value that is greater than 2 ppmV.

**A low range logger was used for the Primary Caustic Scrubber outlet. H2S concentration was too high for the logger type. At nearly the same location, a standard logger was used for the Primary GAC 1 inlet. Therefore, the Primary GAC 1 inlet results are also used for the Primary Caustic Scrubber outlet.

***Water only, chemicals are not presently used in these units.

Source: Honouliuli Wastewater Basin Odor Control Project (HWBOCP), 2013

It should be noted that odor complaints may occur even when the Hawaii standard of 0.025 ppm for $H_2S$ is met because people's odor thresholds are variable and range from about 0.001 to 0.02 ppm for detection of $H_2S$. Also, the Hawaii standard for hydrogen sulfide relates to 1-hour averaging periods, while odor can typically be detected by individuals when concentrations are present for only a few seconds to a few minutes. Due to the nature of atmospheric dispersion, concentrations averaged over a few minutes will be higher than concentrations averaged over 1 hour.

The existing Honouliuli WWTP odor control systems are presently being evaluated under a separate CCH project entitled *Honouliuli Wastewater Basin Odor Control*. The purpose of this on-going project is to identify deficiencies in the odor control systems at the Honouliuli WWTP; identify odor sources from within the Honouliuli Wastewater Basin; and provide recommendations for effective and economical improvements to address current odor control needs. Results of the HWBOCP will be incorporated as a baseline for development of recommendations to control odors from future wastewater treatment process that are being addressed under the Honouliuli WWTP Facility Plan and Conceptual Design (AECOM, April 2013).

# 4 Construction Impacts

## 4.1 Sources of Emissions

The major potential short-term air quality impact of the project will occur from the emission of fugitive dust during construction operations. During construction phases, emissions from engine exhausts 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 construction sites. Increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction workers can be alleviated by moving equipment and personnel to the site during off-peak traffic hours.

## 4.2 Construction Impacts

Three action alternatives are considered for secondary treatment upgrades and modifications to the Honouliuli WWTP to meet future flow and water quality requirements as well as the No Action Alternative. In addition, four primary alternatives and the No Action Alternative for site layouts are also evaluated in the DEIS. However, construction air quality impacts from the site layout alternatives are considered to be the same and therefore analyses of the different site layouts were not performed.

### 4.2.1 On-site Equipment Impacts

The proposed upgrades to the Honouliuli Wastewater Treatment Plant will require a variety of heavy construction equipment to implement. Generally, for heavy construction such as that proposed for the Honouliuli WWTP, construction equipment will include a variety of cranes (ranging from smaller tire-mount units for unloading of delivered materials, to large crawler cranes for lifting in place and setting large pieces of equipment and structural steel), earthmoving equipment, hydraulic rams, concrete delivery trucks and pumpers, and a variety of gasoline- and pneumatically-powered hand tools.

Because the scope of the proposed program is well-defined in terms of what is to be constructed, the primary variable in determining equipment needs is the construction phasing. The contracting approaches considered call for the letting of one, two or four separate construction contract packages, with the latter two options corresponding to a two-phase approach to the construction. Different phases of construction would not overlap under any of the proposed approaches, although the total length of active construction differs with the alternatives. The shortest duration alternative is the single-phase/single-contract approach, which would result in peak construction equipment. Accordingly, for purposes of this estimate, the single-phase/single-contract approach is considered the primary option; other alternatives would generate less intense scheduling.

A detailed construction and equipment schedule would be developed by the contractor(s). However, it is possible to estimate the approximate needs and schedule for large equipment based on the currently-available project descriptions. The work proposed is heavy civil work, and while not defined in the *Facilities Plan*, it is assumed that significant effort will be ultimately expended in foundation work. This will likely include installation of piles at key support locations. Significant concreting operations occur as part of both the foundation construction and superstructure construction. In parallel, structural steel work will likely be a significant phase of work for most major scope items. Finally, equipment installation will occur at the various process structures.

Based on the construction conceptual plan and past construction project experience, equipment requirements for these various demolition and construction stages would likely include:

- A combination of backhoes, bulldozers, cranes, compressors, pile drivers, dump trucks, etc. as necessary, during heavy earth-moving/foundation demolition and construction phases over the first 48-month period.
- Concrete pump and mix trucks, compressors, certain hand-held pieces of equipment such as slab smoothing, etc. over the first 48-month duration.

- Cranes, compressors, and some hand-held equipment during the building/facility erection phases between Month 12 and Month 72.
- Cranes, forklifts, compressors, etc., during final equipment installation stage between Month 48 and Month 70.

Alternate phasing (e.g., the two- or four-contract approaches) would have similar equipment requirements over a longer duration (108 months for the 2-contract option, 144 months for the 4-contract option). The extension in schedule would be driven more by inefficiencies inherent in subdividing the work, such as multiple mobilizations and demobilizations, as opposed to duplicative work. Since the scale of project remains the same, the usage of equipment under varied scenarios would differ with worse short-term air quality impacts under the compressed construction schedule. However, given the spreading of the construction activity over the years, hot spot air quality concerns associated with concentrated equipment operations would be limited. Moreover these construction equipment are typical of routine infrastructure development projects in urban areas, short-term emissions from the small number of construction equipment would be inconsequential compared to the regional emissions, factoring in the substantially greater number of unrelated on-road vehicles and associated emissions that constitute the majority of baseline mobile emissions. Therefore construction equipment operational impacts are anticipated to be less than significant.

### 4.2.2 On-road Vehicle Impacts

According to the worst-case construction year, 2021, trip generation, it is anticipated that 185 construction workers would arrive to the site during the AM peak hour and 185 construction workers would exit the site during the PM peak, in addition to 8 total trips (4 entering and 4 exiting) generated by cement trucks during each of the AM and PM peak hours of traffic.

Based on the level of service comparison between Future Year 2021 (with project) and Base Year 2021 (without project), the majority of traffic congestion at analyzed affected intersections would continue operating at similar levels of service with or without construction activities. Therefore, the on-road mobile source air quality impacts would be temporary and comparable to the 2021 baseline condition causing no significant impacts.

## 4.3 Best Management Practices

Short-term impacts to air quality would result from the demolition of old facilities and construction of the secondary treatment upgrades and modifications. Regardless of the alternative, there would be temporary impacts to air quality due to fugitive dust during construction, exhaust emissions from stationary and mobile construction equipment, from the disruption of traffic, and from workers' vehicles that may also affect air quality during the period of construction.

The best management practices to control construction emissions would be implemented in accordance with state air pollution control regulations which require that there be no visible fugitive dust emissions at the property line.

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 could include limiting the area that can be disturbed at any given time and/or mulching or chemically stabilizing inactive areas that have been worked. Dirt-hauling trucks should be covered when traveling on roadways to prevent loss of dirt. A routine road cleaning and/or tire washing program can also help to reduce fugitive dust emissions that may occur as a result of trucks tracking dirt onto paved roadways in the project area. Paving and landscaping of project areas early in the construction schedule would also reduce dust emissions.

Monitoring dust at the project boundaries during periods of construction could be considered as a means to evaluate the effectiveness of the project dust control program and to adjust the program if necessary. Localized effects of exhaust emissions can be reduced by using newer construction equipment, reducing truck on-site idling time, and moving construction materials and workers to and from the project sites during off-peak traffic hours.

# 5 Operation Impacts

Potential operational impacts with the implementation of the proposed project would include an upgrade on the standby power capacity, possible introduction of a new energy saving combined and heat (CHP) system by burning currently flared digested gas, and increase in mobile source operation. This section discusses the evaluation of potential operational air quality including odor impacts from the proposed plant expansion.

## 5.1 Stationary Source Impacts

### 5.1.1 Standby Power Upgrade

The WWTP standby power system provides power to the WWTP when the utility feed is interrupted.

The existing configuration of standby power has a total of 4 diesel generators with a capacity of 1.25 MW, 1 MW, 0.65 MW and 0.9 MW, respectively.

Under the improvement plan, it is recommended that three smaller existing generators that are still in good shape would continue to provide power to the current load and a central 10 MW diesel powered medium voltage generator plant would provide standby power to the new loads. Given their emergency use, these generators are exempt from obtaining air permit.

The emissions standards for diesel generators are governed by the EPA as well as any state requirements. Standby/emergency generators above 2 MW are currently required to meet the EPA Tier 2 emissions requirements. To meet this requirement, the generator must be used as a standby/emergency generator which limits its operation to only during a utility outage and for some testing purposes for a maximum of 500 hours per year. However, at the time when these generators are installed, the emissions control requirement could be more stringent since the installation of these generators may not occur until 2021. Table 5-1 summarizes the net increase in potential annual standby generator emissions assuming each generator has a potential to operate for a maximum of 500 hours per year.

**Table 5-1. Emergency Diesel Generator Emissions**

| Generator Power (kW) | Annual Hours | Diesel Generator Annual Emissions (TPY) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | VOC | NOx | CO | $PM_{10}$ | $PM_{2.5}$ | SOx | HAPs | $CO_2e$ |
| Existing | | | | | | | | | |
| 3,800 | 500 | 0.90 | 30.57 | 7.01 | 0.44 | 0.43 | 0.02 | 0.04 | 1344 |
| Future | | | | | | | | | |
| 12,550 | 500 | 2.89 | 98.56 | 22.59 | 1.46 | 1.41 | 0.05 | 0.13 | 4441 |
| Net Increase Under the Improvement Plan | | **2.0** | **68.0** | **15.6** | **1.0** | **1.0** | **0.03** | **0.1** | **3096** |

Notes
1. USEPA AP-42 emission factors for large diesel engines
2. Uncontrolled NOx emission factor
3. VOC emissions use TOC (as $CH_4$) emission factor
4. ULSD 15 ppm (0.0015%)

However, given their emergency usage purposes, potential air quality impacts would be short in duration unlikely causing significant air quality impacts. If these generators would be used for peak power shaving purposes as compared to emergency use, they would have to comply with more stringent emissions requirement, i.e., EPA Tier 4 requirements involving treatment of exhaust emissions and greater air quality impacts would occur. Under this circumstance, the future CAA air permitting process would ensure the compliance of the NAAQS as a result of increasing stationary source operational emissions on site when a final design plan is available. Therefore, the proposed project would be unlikely to result in significant air quality impacts.

### 5.1.2 New Combined Heat and Power Facility

A combined heat and power (CHP) facility may be incorporated at Honouliuli WWTP to make beneficial use of digester biogas. The most common CHP systems for medium size wastewater treatment plants are reciprocating engines or microturbines. If a CHP facility is incorporated at Honouliuli WWTP, it would need to be permitted according to state and federal air regulations. Since this facility would be a new stationary source and the emissions at Honouliuli WWTP would increase resulting in adverse air quality impacts on the local level. However, because the feasibility of constructing such facility is still under evaluation and has no design specifics, the potential air emissions from the facility cannot be reasonably estimated. If the CHP facility option is elected in the future, the CHP facility would need to be considered for future air permitting in conjunction with the biosolids disposal process during the design stage. During the air permitting process, it is anticipated that a separate air quality impact modeling analysis would be conducted to address potential air quality impact significance from the CHP facility.

## 5.2 Mobile Source Impacts

With an anticipated 55 peak hour vehicles entering the project site under the future operational condition, the on-road traffic induced air quality impacts are anticipated to be minimal.

Based on the level of service comparison between Future Year 2030 and Baseline Year 2030 conditions, the congestions at each affected intersection will operate at similar levels of service with minimal impacts. Therefore, the mobile source air quality impacts under the plant improvement plan would not be significant.

## 5.3 Odor Impacts

The operation of the Honouliuli WWTP generates odors under current conditions (No Action Alternative) and would also generate odors under all upgrade options. The Honouliuli Wastewater Basin Odor Control Project evaluated and recommended improvements to the odor control systems at the Honouliuli WWTP to be incorporated into upgrades to the facilities Under the proposed project, the existing Preliminary and Primary Odor Control Systems would be replaced with a combined new treatment system and no upgrades would be required for the existing Secondary Odor Control System, Primary Sludge Odor Control System, Secondary Sludge Odor Control System, and Dewatering Odor Control System. These improvements would consider future needs and allow for expansion of the system, as needed.

The proposed project recommends replacing the existing Primary Odor Control System with biofilters. In addition, odor control will be provided to the new treatment facilities with biofilters. The odor control improvements can be centralized or decentralized. In addition to the biofilters, grit covers, primary clarifier covers, and primary effluent channel covers are recommended for odor containment. These project activities and upgrades for components are common to each of the secondary treatment options. Under the No Action Alternative, there would be no upgrades to the current system.

Covers keep foul odors contained within the headspace of process units. By ventilating the headspace, odorous air can be exhausted and treated. Several proposed new process units would be covered or enclosed to contain foul air for the Phase 1 Secondary Treatment Improvements Odor Control System as described in the Odor Control Strategy *Technical Memorandum 12.G* (AECOM, 2013).

All three of the secondary treatment alternatives would result in improvements in the long-term air quality of the project area in terms of the nuisance odor that could occur from sewer overflows. The improvements would also likely result in a reduced number of incidents of offsite odor near the plant as compared to the No Action Alternative.

Therefore, compounded with the improvements on existing Primary Odor Control System and the proposed secondary treatment alternative, the odor impacts under the proposed plant improvement plan would be unlikely significant. The ambient odor monitoring program to be implemented after the completion of the project would demonstrate the compliance of the DOH ambient odor standard in terms of $H_2S$ concentration levels.

## 5.4 Conclusion

After construction activities are completed, the potential long-term air quality impacts to the project area would be unlikely significant although there is a potential to increase on-site stationary and mobile source emissions due to an increase in operational capacity.  However, the possibility of nuisance odor from the sewer system would likely be reduced by the upgrade odor control system causing lower nuisance odor downwind of the Honouliuli WWTP. The compliance of all applicable ambient standards including odor in terms of ambient $H_2S$ concentration levels would be further demonstrated 1) during the final design stage of the project when the air permit is modified for applicable criteria pollutants and 2) after the completion of construction with an ambient monitoring program for odor.

Although the proposed project is not expected to cause or promote population growth or any associated secondary air quality impacts, population growth in the project area is expected to occur at an annual rate of about 1.2 percent through the year 2030. Despite the expected population growth, it appears likely that the overall good cumulative air quality of the project area would be maintained.  Higher levels of emission control, both from industrial sources (including Honouliuli WWTP) and from motor vehicles, would likely largely offset the potentially higher emissions from a larger population.

Similar to the criteria pollutants, it is anticipated that an increase in the GHG would occur associated with the WWTP expansion project. However, such an increase would be further evaluated during the final design stage when each improvement element is well defined and such emissions can be reasonably forecasted. Given its global effects, such a typical infrastructure development project in an urban area would unlikely cause any meaningful global warming effects.