APPENDIX E

Greenhouse Gas Emissions Analysis

Greenhouse Gas Emissions Analysis
for the
North City Project
City of San Diego, California
PTS#499621

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
AADF	annual average daily flow
AB	Assembly Bill
BAC	biological activated carbon
BAU	business-as-usual
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CALGreen	California's Green Building Standards
CalRecycle	California Department of Resources Recycling and Recovery
CAP	Climate Action Plan (California)
CARB	California Air Resources Board
CAT	Climate Action Team
CEQA	California Environmental Quality Act
CH_4	methane
City	City of San Diego
CO_2	carbon dioxide
CO_2E	carbon dioxide equivalent
CFCs	chlorofluorocarbons
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
GHG	greenhouse gas emissions
GWP	global warming potential
HCFCs	hydrochlorofluorocarbons
HDPE	high-density polyethylene
HFCs	hydrofluorocarbons
I-	Interstate
ICE	internal combustion engine
IPCC	Intergovernmental Panel on Climate Change
kWh	kilowatt-hour
lb	pound
LEED	Leadership in Energy and Environmental Design
LFG	landfill gas
LFG Pipeline	Landfill Gas Pipeline
MBC	Metro Biosolids Center
MCAS Miramar	Marine Corps Air Station Miramar
MF	membrane filtration
MG	million gallons

Acronym/Abbreviation	Definition
MGD	million gallons per day
MMT	million metric tons
MOU	Memorandum of Understanding
mpg	miles per gallon
MT	metric tons
MTBS	Mission Trails Booster Station
MTS	Metropolitan Transit System
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NCPWF	North City Pure Water Facility
NCWRP	North City Water Reclamation Plant
NF_3	nitrogen trifluoride
NHTSA	National Highway Traffic Safety Association
N_2	nitrogen gas
N_2O	nitrous oxide
NO_x	oxides of nitrogen
NO_3	nitrate
O_3	ozone
O&M	operations and maintenance
PFCs	perfluorocarbons
Plan	federal Climate Action Plan
Point Loma WWTP	Point Loma Wastewater Treatment Plant
Project	North City Project
RO	reverse osmosis
RPS	Renewable Portfolio Standard
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SANDAG	San Diego Association of Governments
SB	Senate Bill
SCS	Sustainable Communities Strategy
SDAB	South Diego Air Basin
SDAPCD	San Diego Air Pollution Control District
SDG&E	San Diego Gas and Electric
SF_6	sulfur hexafluoride
SR-	State Route
SPPF	Small Power Producing Facility
TAC	toxic air contaminant
TPA	Transit Priority Area
TSS	total dissolved solids
UV/AOP	ultraviolet/advanced oxidation process
WRP	water reclamation plant
WTP	water treatment plant
WWTP	wastewater treatment plant

SUMMARY

The North City Project (Project) is a City of San Diego Public Utilities Department plan to produce 30 million gallons per day (MGD) of potable recycled water. The North City Project will expand the existing North City Water Reclamation Plant (NCWRP) and construct an adjacent North City Pure Water Facility (NCPWF). Two alternative purified water pipelines are considered: one to Miramar Reservoir and one to San Vicente Reservoir. Other Project components include a new pump station and wastewater forcemain to deliver additional wastewater to the NCWRP; a brine/centrate discharge pipeline; upgrades to the existing Metro Biosolids Center (MBC); a new renewable energy facility at the NCWRP (North City Renewable Energy Facility); and a new Landfill Gas (LFG) Pipeline between the Miramar Landfill gas collection system and the NCWRP.

There are two Project Alternatives proposed. The Miramar Reservoir Alternative would construct the NCPWF – Miramar Reservoir and would pipe purified water to Miramar Reservoir. The San Vicente Reservoir Alternative would construct the NCPWF – San Vicente Reservoir at the same location as the NCPWF, but would include fewer treatment processes and would pipe purified water to the San Vicente Reservoir rather than the Miramar Reservoir. The San Vicente Reservoir Alternative would also include an additional pump station, the Mission Trails Booster Station (MTBS), along the San Vicente Pure Water Pipeline (San Vicente Pipeline). The Miramar Reservoir Alternative would include improvements at the Miramar Water Treatment Plant (WTP).

The Project's potential effect on global climate change was evaluated, and emissions of greenhouse gases (GHGs) were estimated based on the use of construction equipment and vehicle trips associated with construction activities, as well as operational emissions once construction phases are complete. The annual Project-generated GHG emissions were estimated to result in a net reduction of approximately 32,367 metric tons of carbon dioxide equivalent (MT CO_2E) per year as a result of Project operations for the Miramar Reservoir Alternative and 34,930 MT CO_2E for the San Vicente Reservoir Alternative. The North City Project was deemed to be consistent with the City of San Diego's Climate Action Plan (CAP) Measures. The Project did not have a cumulative impact on the environment when evaluated against the City of San Diego's CAP Checklist. Therefore, GHG impacts would be considered **less than significant**.

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1 INTRODUCTION

The North City Project would use advanced water purification technology to produce potable water from recycled water and provide a safe, reliable, and cost-effective drinking water supply for San Diego. The North City Project consists of the design and construction of a new North City Pure Water Facility (NCPWF), upgrades to existing water reclamation facilities, and design and construction of new pump stations and pipelines. The North City Project would construct the NCPWF adjacent to the existing North City Water Reclamation Plant (NCWRP). Upgrades would occur at the existing NCWRP in order to provide sufficient tertiary influent for the NCPWF as well as to connect the existing centrate line with the proposed brine/centrate line. Pump station and pipeline facilities would convey different types of flows to and from the treatment facilities for: (1) diverting wastewater flows to NCWRP, (2) conveying recycled water to the NCPWF, (3) conveying purified water from the NCPWF to a reservoir, and (4) transporting waste flows (brine and sludge) from treatment processes to solids handling facilities or back into the Metro Sewer System. Upgrades would also occur at the Metro Biosolids Center (MBC) to handle the additional brine and sludge produced by the NCWRP expansion and advanced water purification process. A new renewable energy facility would be constructed at NCWRP, which would receive landfill gas (LFG) from the City's Miramar Landfill gas collection system via a new gas pipeline.

From the NCPWF, purified water would be piped to either the Miramar Reservoir or San Vicente Reservoir via a purified water pipeline.

The North City Project would create up to 30 million gallons per day (MGD) of locally controlled potable water and reduce flows to the Point Loma Wastewater Treatment Plant (Point Loma WWTP), which in turn would reduce total suspended solids (TSS) discharged to the ocean.

1.1 Purpose

The purpose of this report is to estimate and evaluate the potential greenhouse gas (GHG) impacts associated with implementation of the North City Project (Project) relative to the City's Significance Determination Thresholds for GHGs (City of San Diego 2016a). The report includes a quantitative analysis of Project-related greenhouse gas emissions.

1.2 Project Location

The Project includes a variety of facilities located throughout the central coastal areas of San Diego County. An overview of the overall Project system is shown on Figures 1 and 2. Figures 3 and 4 show the location of proposed facilities and pipelines for the Miramar Reservoir Alternative and San Vicente Reservoir Alternative. A new pure water facility and three pump stations would be located within the corporate boundaries of the City of San Diego (City). Pipelines would traverse a number of local jurisdictions, including the cities of San Diego and

Santee, and the community of Lakeside and other areas of unincorporated San Diego County, in addition to federal lands within Marine Corps Air Station (MCAS) Miramar.

1.3 Project Description

The North City Project would use advanced water purification technology to produce purified water from recycled water. From the NCPWF, purified water would be piped to a reservoir, where it would blend with impounded water and imported supplies. The water would then receive further treatment at a potable water treatment plant before being distributed as potable water.

The North City Project would create up to 30 MGD of locally controlled potable water and reduce flows to the Point Loma WWTP, which in turn would reduce TSS discharged to the ocean. The North City Project would construct facilities that have the ability to produce at least 30 MGD by 2021.

There are two North City Project Alternatives (Project Alternatives) proposed. The Miramar Reservoir Alternative would construct the NCPWF – Miramar Reservoir and would convey purified water to the Miramar Reservoir. The San Vicente Reservoir Alternative would also construct the NCPWF – San Vicente Reservoir at the same location as the NCPWF, but would include fewer treatment processes and would pipe purified water to the San Vicente Reservoir rather than the Miramar Reservoir. The San Vicente Reservoir Alternative would also include an additional pump station, the Mission Trails Booster Station (MTBS), along the San Vicente Pure Water Pipeline (San Vicente Pipeline). The Miramar Reservoir Alternative would include improvements at the Miramar Water Treatment Plant (WTP) (see Figure 3 for a map of facilities proposed by the Miramar Reservoir Alternative and Figure 4 for a map of facilities proposed by the San Vicente Reservoir Alternative). Table 1.3-1 shows a comprehensive list of all components associated with the North City Project and which components are associated with each Project Alternative. The two Project Alternatives are discussed in more detail below.

Table 1.3-1
North City Project Components

Segment	Miramar Reservoir Alternative	San Vicente Reservoir Alternative
Morena Pump Station, Wastewater Force Main, and Brine/Centrate Line (Morena Pump Station and Pipelines)	X	X
North City Water Reclamation Plant (NCWRP) Expansion	X	X
North City Pure Water Facility (NCPWF) Influent Pump Station	X	X
North City Pure Water Facility (NCPWF)	X	X
North City Pump Station	X	X
North City Pure Water Pipeline (North City Pipeline)	X	
San Vicente Pure Water Pipeline (San Vicente Pipeline)		X

Table 1.3-1
North City Project Components

Segment	Miramar Reservoir Alternative	San Vicente Reservoir Alternative
Mission Trails Booster Station (MTBS)		X
Metro Biosolids Center (MBC) Improvements	X	X
Miramar Water Treatment Plant (WTP) Improvements	X	
North City Renewable Energy Facility	X	X
Landfill Gas (LFG) Pipeline	X	X
Pure Water Dechlorination Facility (Dechlorination Facility)	X	

1.3.1 Miramar Reservoir Alternative

The Miramar Reservoir Alternative includes (1) a new pump station at Morena Boulevard, a wastewater forcemain, and brine/centrate pipeline (Morena Pump Station and Pipelines); (2) expansion of the existing NCWRP; (3) construction of a new influent pump station at NCWRP and conveyance pipeline between NCWRP and the NCPWF; (4) construction of the new NCPWF; (5) construction of a new North City Pump Station; (6) construction of a new North City Pure Water Pipeline (North City Pipeline); (7) construction of a new renewable energy facility at NCWRP (North City Renewable Energy Facility); (8) a new landfill gas pipeline between the Miramar Landfill gas collection system and the NCWRP; (9) upgrades at the MBC; and (10) improvements at the Miramar WTP).

Figure 3 provides an overview of the Miramar Reservoir Alternative. The Miramar Reservoir Alternative project facilities and components are described in detail below.

Morena Pump Station and Pipelines

In order to utilize the proposed expanded capacity of the NCWRP, approximately 32 MGD annual average daily flow (AADF) of additional wastewater flows that would normally be conveyed to the Point Loma WWTP would need to be diverted to the NCWRP. The Morena Pump Station and Wastewater Forcemain are proposed to deliver maximum flow of 37.7 MGD of raw wastewater to the NCWRP, expanding the NCWRP's production capacity from 30 MGD to 52 MGD in dry weather conditions. Wastewater will be conveyed to the Morena Pump Station by connections with four existing sanitary sewer trunk sewers: the 78-inch North Mission Valley Interceptor, the 72-inch Morena Boulevard Interceptor No. 14, the 33-inch Morena Boulevard Trunk Sewer No. 11, and the 60-inch East Mission Bay Trunk Sewer No. 4.

The proposed Morena Pump Station is to be located on a parcel currently owed by the San Diego Humane Society and the Society for the Prevention of Cruelty to Animals. The site is

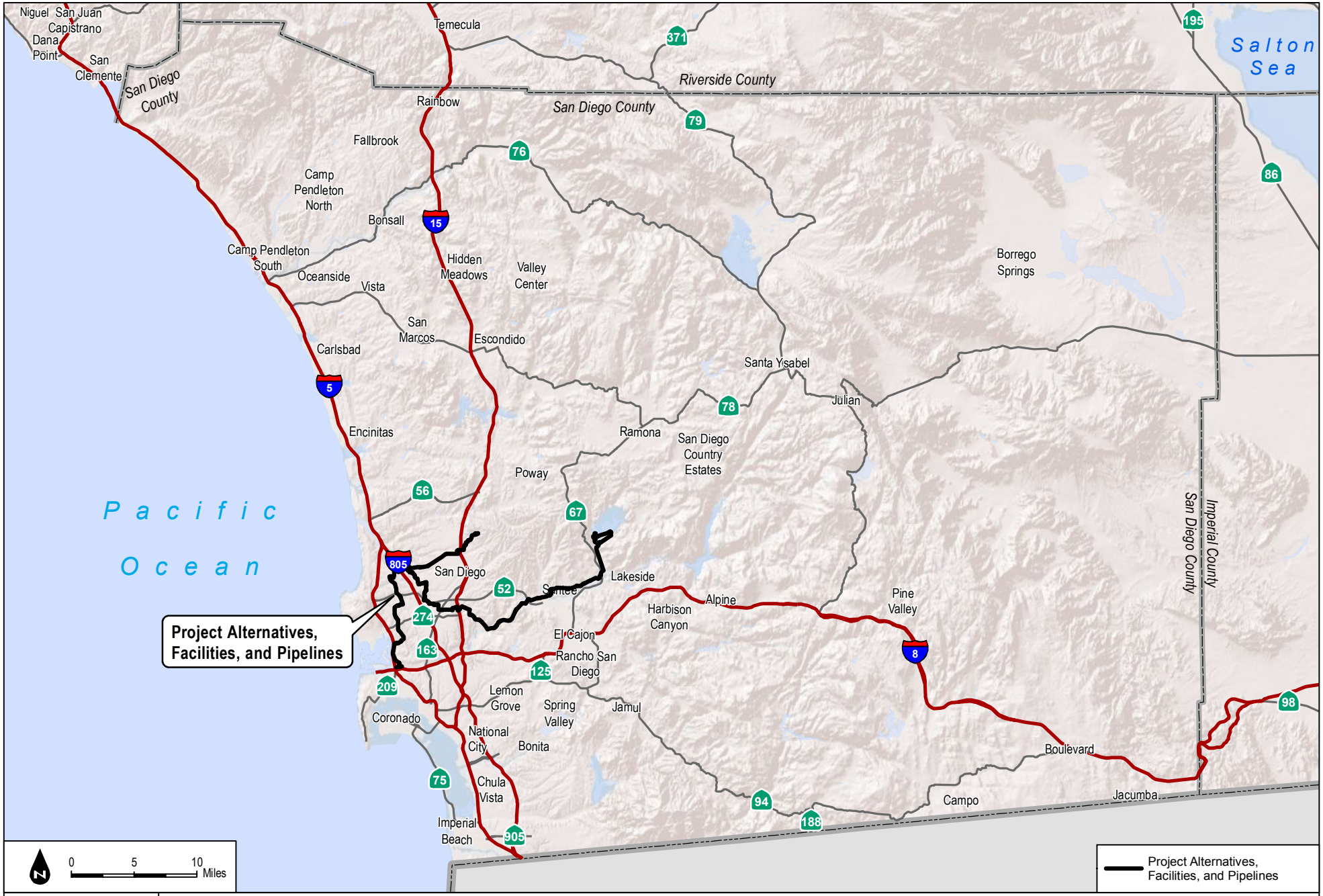
approximately 1 acre and is near the intersection of Sherman Street and Custer Street. The proposed Morena Pump Station would consist of (1) a junction structure and intake screening facility – flow separator and screening structures, (2) a pump station building, (3) odor control and chemical storage, (4) an energy dissipater for the 30-inch brine/centrate line, (5) a transformer, (6) an electrical and motor control center building, and (7) a diversion structure.

The pump station will be an approximately 92-foot-long x 66-foot-wide, reinforced, cast-in-place concrete structure. The finished floor of the pump room and wet well will be approximately 52 feet below finished grade. Due to the location of the pump station, and additional depth of 6 to 10 feet may be required for sub-grade stabilization below the groundwater level. The top slab will extend above finish grade approximately 1 foot, 6 inches at the ridge and taper down to 1 foot, 3 inches at the edges. It is anticipated that the cast-in-place walls will be approximately 4 feet thick and include external buttresses for lateral soil support.

Off-site infrastructure of the pump station facility, excluding the Morena Wastewater Forcemain and Brine/Centrate Line (Morena Pipelines), consists of a storm drainage line, pump station inflow piping, overflow piping, and associated subgrade diversion structures. Diversion structure No. 1 will be approximately 14 feet long by 12 feet wide; diversion structure No. 2 will be approximately 18 feet long by 10 feet wide. Flow control gates will be installed at each diversion structure for flow management into the pump station.

The Morena Pump Station would convey new wastewater approximately 11 miles through a new 48-inch-diameter wastewater forcemain to the existing NCWRP. The wastewater forcemain will connect to the existing 60-inch-diameter reinforced steel (RS) line prior to entering the existing headworks building at NCWRP.

Approximately 6 MGD AADF of brine (produced as a by-product of the advanced water purification treatment process) and 6 MGD AADF of centrate (product remaining after centrifugation at MBC) will be conveyed via a new 30-inch-diameter gravity flow line from the new NCPWF back to Morena Pump Station, and then to a sanitary sewer located in Friars Road where it will ultimately flow to the Point Loma WWTP. The brine/centrate line will combine with the 60-inch-diameter overflow sewer and would discharge downstream of the diversion structures back to the Mission Valley Interceptor with sufficient distance as to not recirculate brine flows into the screening facility of the pump station.



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SOURCE: City San Diego 2016; ESRI 2016

FIGURE 1

Regional Map

Pure Water San Diego Program North City Project Greenhouse Gas Technical Report

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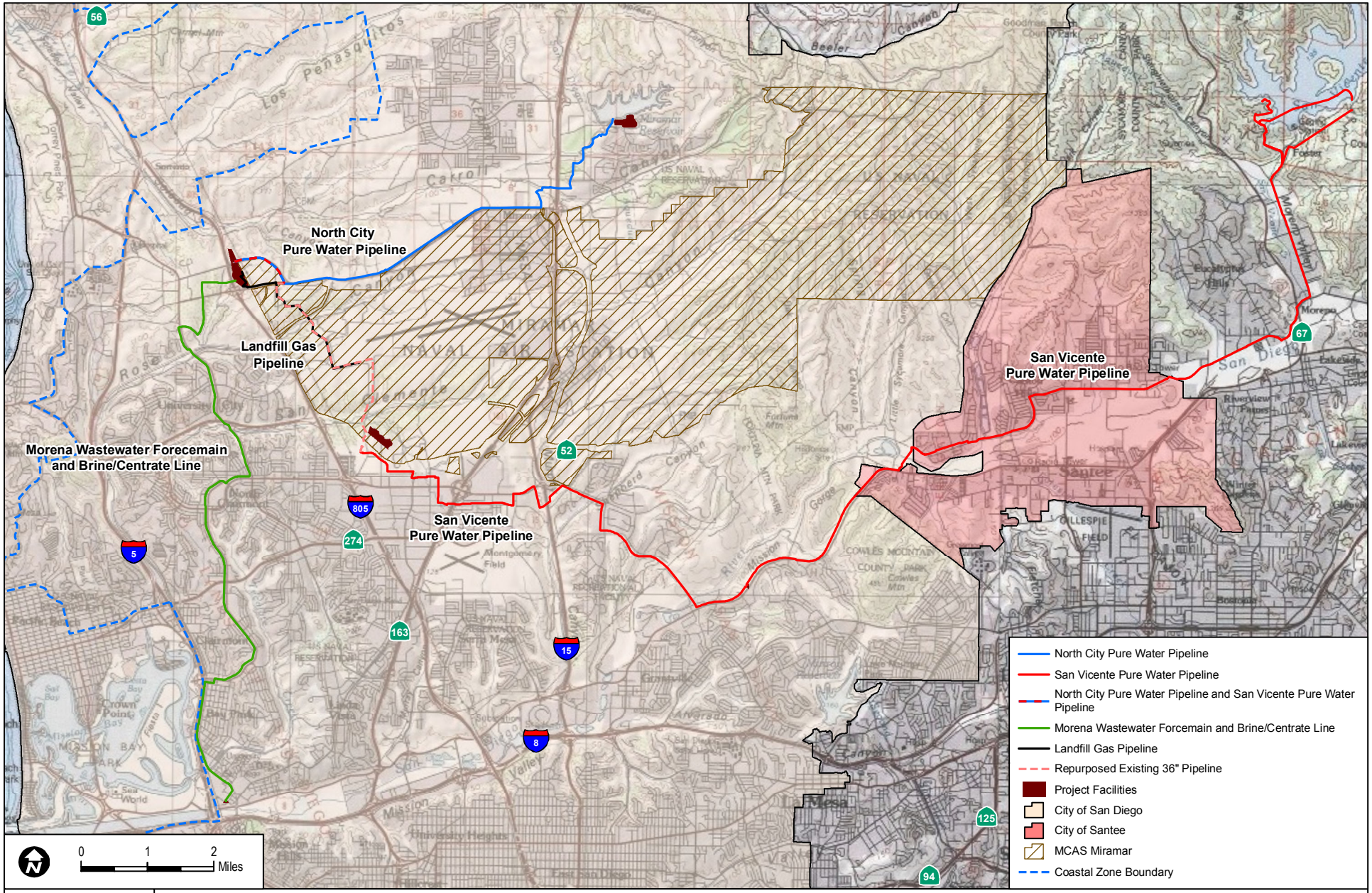

SOURCE: USGS 7.5-Minute Series Del Mar, Poway, San Vicente Reservoir, La Jolla, La Mesa, El Cajon Quadrangles; City of San Diego 2016; CA Coastal Commission

FIGURE 2

Vicinity Map

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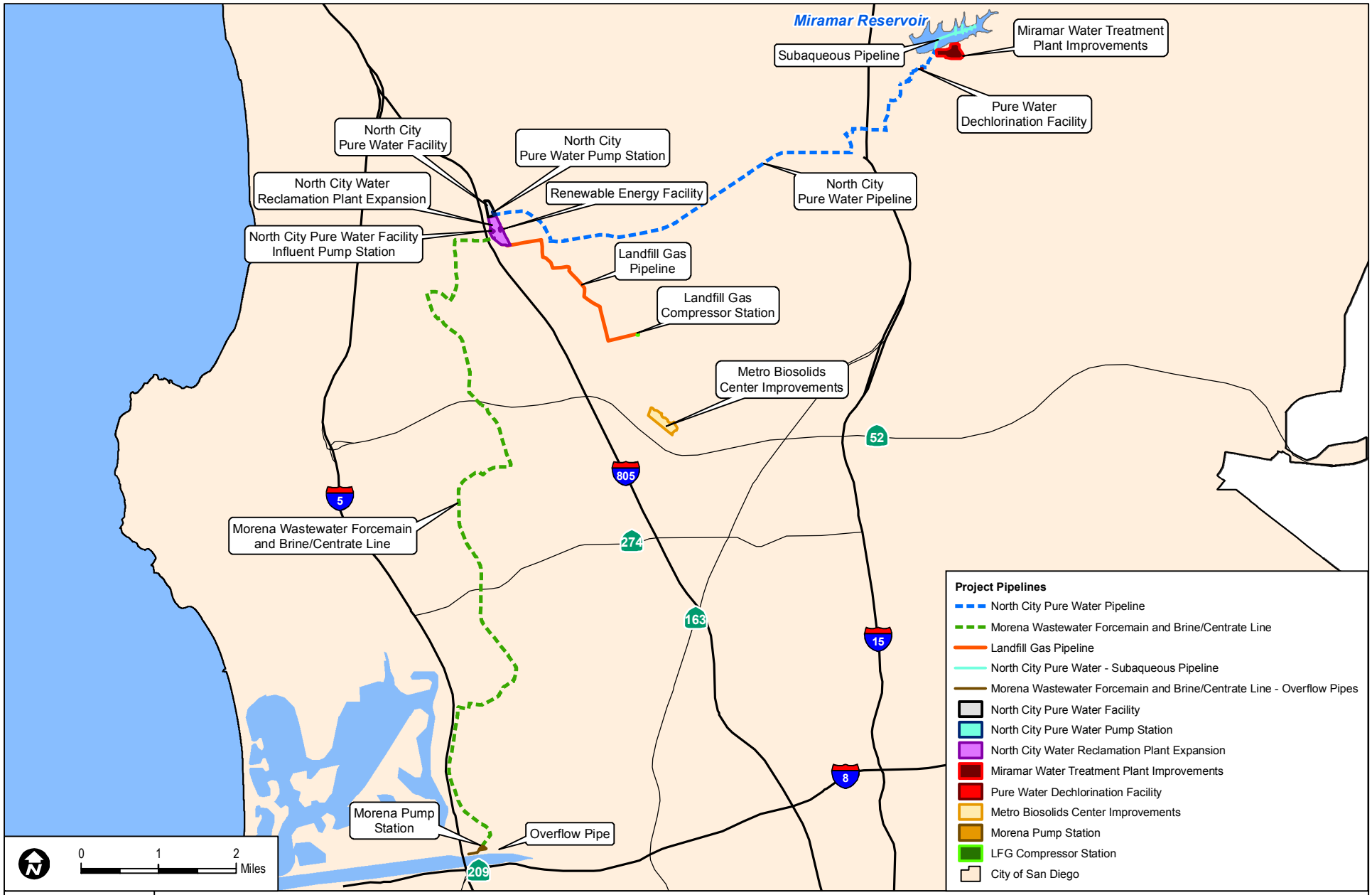

SOURCE: City of San Diego, 2015, 2016; SanGIS 2016

FIGURE 3

Miramar Reservoir Alternative

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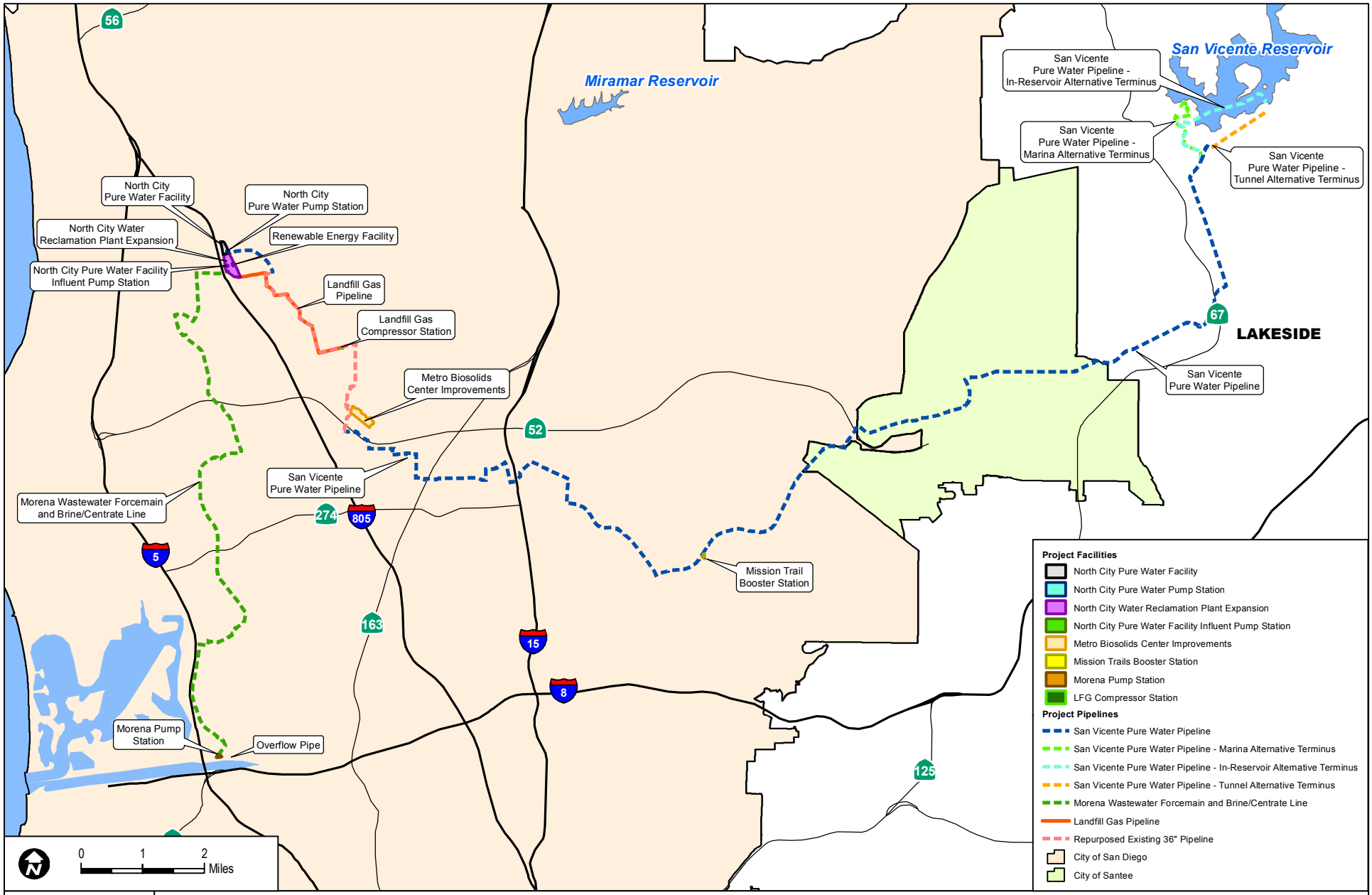

SOURCE: City of San Diego, 2015, 2016; SanGIS 2016

FIGURE 4

San Vicente Reservoir Alternative

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The Morena Pipelines will follow the same alignment as depicted in Figure 2. The alignment would begin in an open-cut section near the north corner of the Morena Pump Station site, entering the public street right-of-way on Custer Street. The alignment would generally head north along Sherman Street, Morena Boulevard, and West Morena Boulevard. The alignment would cross Tecolote Road bridge and Tecolote Creek, then continue generally heading north and east along Ingulf Street, Denver Street, Clairemont Drive, Clairemont Mesa Boulevard, and Genesee Avenue. It would cross under the bridge at San Clemente Canyon near the State Route 52 (SR-52) on-ramp. Following the bridge, the alignment would continue along Genesee Avenue, crossing SR-52 and the Metropolitan Transit System (MTS) railroad tracks. After the railroad tracks, the alignment would head east on Nobel Drive and then continue heading north on Towne Centre Drive. The alignment would turn east on Executive Drive and cross Interstate 805 (I-805). The alignment would end at NCWRP. Two trenchless installations are proposed along the Morena Pipelines alignment and included the following: (1) the railroad tracks owned by the MTS at Rose Canyon north of University City High School and (2) the I-805 at the terminus of Executive Drive to the NCWRP. An additional trenchless installation would occur where the overflow pipeline crosses MTS right-of-way near the Morena Pump Station.

North City Water Reclamation Plant Expansion

To ensure the 30 MGD of purified water can be produced at the NCPWF, the NCWRP will undergo an expansion of the primary, secondary, and tertiary treatment processes, as well as the corresponding support systems.

To increase capacity at the NCWRP, a number of new process units and tankage would be required. Process units requiring expansion include influent screening, primary sedimentation, flow equalization, aeration basins, secondary clarification, and tertiary filtration. The expanded NCWRP facilities are expected to include an additional bar screen, grit pumps, primary sedimentation with chemically enhanced primary treatment, a primary equalization basin, aeration basins using biological nutrient removal, secondary clarifiers, tertiary filters, and additional ancillary and support systems.

A brine-centrate valve vault will be constructed on the NCWRP site adjacent to the tunnel that conveys the brine/centrate and wastewater force mains on the western edge of the NCWRP next to the existing aeration basins. The brine-centrate valve vault would be approximately 22 feet by 14 feet, within which the centrate pipeline would connect into the brine/centrate pipeline. The vault would allow for personnel access to check valves and perform routine maintenance.

North City Pure Water Facility Influent Pump Station

The NCPWF Influent Pump Station will be constructed at the NCWRP and will convey tertiary effluent from the NCWRP to the NCPWF. The NCPWF Influent Pump Station will have a

maximum capacity of 42.5 MGD to enable the NCPWF to produce a maximum of 34 MGD AADF of purified water after accounting for recycle and other streams. The NCPWF Influent Pump Station would be located on the west side of the NCWRP adjacent to the tertiary filters to divert tertiary effluent from upstream of the chlorination facilities and pump it to the NCPWF. The NCPWF Influent Pump Station would consist of a single enclosed 6,700-square-foot building approximately 45 feet high and would contain three separate rooms: a pump room, HVAC equipment room, and electrical room.

A pump station and associated pipes and appurtenances are currently located within the site. These components will be removed prior to construction of the NCPWF Influent Pump Station. The site is partly covered with grass and is relatively flat.

North City Pure Water Facility

The new NCPWF would be located on the vacant 10-acre City-owned lot across Eastgate Mall to the north of the NCWRP. The NCPWF would produce 30 MGD AADF of purified water. A portion of the purified water would be returned to the NCWRP to reduce the TSS concentration of the disinfected tertiary treated effluent to 1,000 milligrams per liter (mg/L), a level suitable for irrigation. Approximately 30 MGD AADF of purified water will be pumped to Miramar Reservoir.

The treatment process includes an ozone system, biological activated carbon filtration (BAC), membrane filtration (MF), reverse osmosis (RO), and ultraviolet/advanced oxidation process (UV/AOP), before it is stabilized and chlorinated prior to pumping out to the reservoir (note under the San Vicente Reservoir Alternative the NCPWF would not include the ozone system or BAC). In addition to process areas for each stage of treatment at the NCPWF, the facility would include chemical feed systems and post-treatment chemical storage.

Access to the site will be from Eastgate Mall, and the entrance will be coordinated with the entrance to the NCWRP to be at the same traffic signal along Eastgate Mall. An approximately 15,000-square-foot operations and maintenance (O&M) building with three above-grade stories will be built as part of the NCPWF. The third level of the O&M building will be dedicated for a water quality testing laboratory.

North City Pure Water Pump Station

The North City Pump Station would be located on the southeast corner of the NCPWF. The North City Pump Station will have three duty pumps and one standby pump, all of which are 1,000 horsepower (HP) motor pumps and vertical-turbine. Each pump will be design to deliver a flow rate of 7,593 gallons per minute. The North City Pump Station will serve as the NCPWF's only effluent pump station and will convey purified water from the NCPWF Product Water Storage Tank to a reservoir.

North City Pure Water Pipeline

The North City Pipeline will transmit purified water approximately 8 miles from the NCPWF to Miramar Reservoir where it will be blended with the imported raw water in the Miramar Reservoir and receive additional treatment at the Miramar WTP.

The North City Pipeline will be designed for an average daily flow of 30 MGD with a minimum daily flow of 23 MGD and a maximum daily flow of 33 MGD. A 48-inch-diameter welded steel pipe is the recommended width and material for the North City Pipeline as the most suitable for the design conditions.

The North City Pipeline alignment is shown on Figure 2. Detailed cross sections of the North City Pipeline are included on Sheets C1 through C51 in the Basis of Design Report for the North City Conveyance System (Brown and Caldwell 2016). The North City Pipeline is proposed to travel through the University, Mira Mesa, and Scripps Miramar Ranch communities (City of San Diego). The North City Pipeline would also cross federal lands in MCAS Miramar along segments of Miramar Road and would cross an unincorporated area of the County of San Diego immediately after the I-15 crossing.

The North City Pipeline alignment would begin in an open trench in Eastgate Mall and would head southeast, with a short trenchless section just before Eastgate Court. At Miramar Road, the North City Pipeline would continue east for approximately 4.5 miles, with a bridge over the MTS Railway crossing and a short trenchless section under the BNSF Railway crossing. The North City Pipeline would turn north on Kearny Villa Road and then turn east on Candida Street. The North City Pipeline would head north on Via Pasar via a trenchless segment, and then continue east on Via Excelencia in an open-cut section. A trenchless segment would cross I-15 then would return to an open-cut section across private property then turn north on Businesspark Avenue. The North City Pipeline would continue north on Carroll Canyon Road then head east on Hoyt Park Drive and Meanley Drive, continuing east/northeast before crossing Evans Pond in a trenchless segment.

The final segment of the North City Pipeline will consist of a subaqueous pipeline within Miramar Reservoir. The segment of pipeline will begin at the Miramar WTP site and continue to the far east bank of Miramar Reservoir. The pipeline would be a submerged, 4,800-foot-long HDPE pipe ranging in diameter from 8 inches to 54 inches with 94 outlets and 188 subaqueous diffusers along the bottom of Miramar Reservoir.

North City Renewable Energy Facility

The Project requires new renewable energy facilities in order to provide power to the expanded NCWRP facilities as well as the NCPWF and North City Pump Station. The new facility

includes a total of 15.4 megawatts (MW) of new generation capacity combined with 5 MW of existing power generation capacity at NCWRP.

The new North City Renewable Energy Facility consists of 6.3 MW of new capacity in a Small Power Producing Facility (SPPF) that uses 100% LFG as fuel. The additional 9.1 MW of new power generation capacity within the facility uses LFG supplemented with natural gas as fuels, with 80% LFG and 20% natural gas.

The SPPF system requires a total of three new internal combustion engines (ICE) and generator units, the 3.8 MW Caterpillar Model CG260-16 IC or equivalent. The remaining power generation capacity requires a total of three new ICE and generator units, the same model as the SPPF. One additional 3.8 MW Caterpillar Model CG260-16 IC or equivalent ICE will serve as backup to the SPPF engines or the mixed-gas power generation engines.

The engines will be placed inside a building located immediately south of the new circular secondary clarifiers and north of the existing emergency power generation facility at NCWRP. The estimated stack height of the engines' exhaust stacks is 55 feet measured from the finished ground elevation immediately adjacent to the renewable energy building (at approximate elevation 354 feet) which is approximately 30 feet above the top of the building.

A skid-mounted equipment package consisting of a natural gas compressor system, air receivers, and oil storage will be located on the site adjacent to the renewable energy building. Two additional buildings will be included on the site for controls equipment and storage. The facility will also include a gas cleaning and cooling equipment skid and an electrical switchyard. An area chemical storage, containment, and feed facility will be provided for emissions control.

The facility layout includes relocation of the City's existing 1.6 MW SPPF engine to a new location on the site near the existing emergency power generation equipment at NCWRP in order to accommodate the layout of the new renewable energy facility.

The expanded renewable energy facility covers an area of approximately 1 acre and is fully contained within the existing NCWRP property. Approximately half of that area is existing impervious paved surface, and the entire area will be impervious once the facility is constructed. The site topography for the new renewable energy facility at NCWRP will necessitate a perimeter retaining wall approximately 300 feet in length with a maximum height of 22 feet. The retaining wall will be either a mechanically stabilized earth wall or reinforced concrete. The Project will include earthwork and other site preparation activities for construction of the retaining wall. The renewable energy facility will include utility relocations, new utilities, equipment, earthwork, retaining wall, paving, and other site-preparation activities.

Landfill Gas Pipeline

The new North City Renewable Energy Facility will receive LFG from the City's Miramar Landfill gas collection system via a new 12-inch diameter gas line. The new gas line will parallel an existing 10-inch gas line that conveys LFG from the landfill to fuel the existing emergency power generation units at NCWRP. Approximately 3,627 linear feet of the new gas pipeline will be constructed within the limits of the City's existing 40-foot utility easement where it crosses the Veteran's Administration (VA) Miramar National Cemetery. An expanded additional 10-foot easement is planned along the remainder of the alignment outside of the VA to facilitate construction and future maintenance activities. The approximately 15,885 linear feet alignment runs from the existing Miramar Landfill north along the western end of the MCAS Miramar property to the NCWRP site.

A new 5,000-square-foot gas compressor station will be sited immediately adjacent to an existing gas compressor station at the Miramar Landfill in order to pressurize and convey the LFG gas from the landfill to NCWRP.

Metro Biosolids Center Improvements

The MBC is located north of SR-52, adjacent to the Miramar Landfill. Projected flows of raw solids from the NCWRP will increase, while projected flows of digested solids from Point Loma WWTP will remain roughly constant such that MBC will be required to provide on-site anaerobic digestion for a greater percentage of the system's biosolids output. In addition to changes in quantity, changes in treatment processes at the NCWRP and Point Loma WWTP may change the quality, and hence treatability, of the two biosolids streams. Raw solids flows are expected to increase by a factor of 7 from a current maximum operating flow of 0.89 MGD to a projected flow of 6.55 MGD at maximum conditions; solids in pounds per day (lb/d) are expected to increase by a factor of 5:1 from 56,000 lb/d (current) to 294,000 lb/d (maximum conditions).

Improvements at MBC would include expanding the existing closed-loop grit removal system; replacing the existing thickening centrifuges (a total of six new centrifuges will be installed); upgrading digesters, including replacing the existing digester gas laterals with larger lines and larger gas handling appurtenances, installing one additional flare, and replacing existing biogas booster blowers with three new blowers and increasing the size of the biogas feed line from the blowers to the cogeneration facility; installing new thickened sludge supply line; upgrading the sludge feed pumps and polymer feed pumps; installing three new centrate pumps and variable frequency drives; adding a fourth off-the-shelf replacement peristaltic pump; and expansion of existing piping systems. The current centrate pump station at MBC would require pumps to be upgraded to be capable of higher flows and pressure. In addition, the centrate forcemain would need regular maintenance to clean the pipe and restore capacity to its full potential. As part of the

pipe cleaning, existing plug valves would need to be replaced with full port valves. Launching and receiving pits may need to be constructed.

Miramar Water Treatment Plant Improvements

Under the Miramar Reservoir Alternative, purified water discharged into the Miramar Reservoir will be pumped via the existing Miramar Reservoir Pump Station to the Miramar WTP for treatment and eventual distribution. Currently, the majority of the water treated at the Miramar WTP is fed directly to the plant, and the Miramar Reservoir is primarily used for balancing flows and emergency storage. Under the Miramar Reservoir Alternative, the Miramar Reservoir will receive approximately 30 MGD AADF of purified water on a more or less continuous basis, meaning that the Miramar Reservoir Pump Station must operate at roughly 30 MGD AADF to maintain the inflow/outflow balance in the reservoir.

This increased use calls for rehabilitation of the Miramar Reservoir Pump Station, which includes upgrading the existing pumps with variable frequency drives along with various mechanical upgrades to the valves and piping. The additional pumping will result in an additional annual power demand of 586,000 kilowatt-hours (kWh). However, an on-site 1 MW solar photovoltaic system will be installed to completely cover the power needs of the facility.

Pure Water Dechlorination Facility

The Dechlorination Facility will be located at the end of Meanley Drive off the cul-de-sac on the City's property for the Miramar Recycled Water Storage Tank. The facility will include an approximately 768-square-foot above-grade building to house chemical storage tanks, dosing pumps, analyzers, and associated piping valves and appurtenances. The NCPWF purified water will be chlorinated to maintain chlorine residual and prevent regrowth within the North City Pipeline. Prior to blending the purified water with the raw water at Miramar Reservoir, the remaining free chlorine residual will be removed from the purified water to protect the aquatic life in the lake. The Dechlorination Facility would reduce the residual chlorine concentration to below the required limit.

1.3.2 San Vicente Reservoir Alternative

The San Vicente Reservoir Alternative shares most of the same components with the Miramar Reservoir Alternative. Project components described above under the Miramar Reservoir Alternative that are also common to the San Vicente Reservoir Alternative include (1) the Morena Pump Station and Pipelines, (2) expansion of the existing NCWRP, (3) construction of a new influent pump station at NCWRP and conveyance pipeline between NCWRP and the NCPWF, (4) a new renewable energy facility at the NCWRP, (5) a new gas pipeline between the Miramar Landfill gas collection system and the NCWRP, and (6) upgrades at the MBC.

Because of the different sizes of the Miramar Reservoir and San Vicente Reservoir, the design of the NCPWF for each will be slightly different. However, for the purposes of the noise analysis, the facilities would be similar enough that no additional discussion is provided under this alternative, and the reader is referred to the discussion under the Miramar Reservoir Alternative. Project components which are applicable only to the San Vicente Reservoir Alternative are discussed separately below and include (1) San Vicente Purified Water Pipeline (San Vicente Pipeline) including the three alternative reservoir inlet options: Tunnel Alternative Terminus, In-Reservoir Alternative Terminus, and Marina Alternative Terminus; and (2) Mission Trails Booster Station (MTBS). Figure 4 provides an overview of the San Vicente Reservoir Alternative.

San Vicente Pipeline

The San Vicente Pipeline will be designed for an average daily flow of 30 MGD with a minimum daily flow of 27 MGD and a maximum daily flow of 35 MGD. The San Vicente Pipeline includes a segment (approximately 21,300 linear feet) of existing recycled water pipe that will be repurposed for purified water conveyance. That segment currently serves non-potable reuse customers. Under the San Vicente Reservoir Alternative, the San Vicente Pipeline will continue to supply those non-potable reuse customers with purified water. Approximately 1.4 MGD AADF will be provided as non-potable reuse to existing customers.

The remaining 133,475 linear feet of the San Vicente Pipeline would be newly constructed using a combination of open-cut trench and trenchless construction methods to deliver 30 MGD AADF to the San Vicente Reservoir. A 48-inch-diameter and 60-inch-diameter welded steel pipe is the recommended width and material for the San Vicente Pipeline as the most suitable for the design conditions.

The general alignment of the San Vicente Pipeline is shown on Figure 4. Detailed cross sections of the San Vicente Pipeline are included on Sheets 7 through 89 in Appendix K of the 10% Engineering Design Report North City Plant to San Vicente Pipeline (Brown and Caldwell 2015). The pipeline is proposed to travel through the University, Kearny Mesa, Navajo, and Tierrasanta, and East Elliot communities of the City of San Diego; the City of Santee; and the incorporated community of Lakeside in the County of San Diego.

The first approximately 5,500 linear feet of the San Vicente Pipeline would follow the same alignment as the North City Pipeline along Eastgate Mall. At Miramar Road, purified water would be conveyed via an existing 36-inch-diameter recycled water pipeline for approximately 21,300 linear feet as described above. This repurposed 36-inch-diameter pipeline traverses federal lands, including the Miramar National Cemetery and MCAS Miramar. The new 48-inch-diameter San Vicente Pipeline would begin again in an open-cut segment on Copley Drive and would continue southeast until heading due east on Copley Park Place, then south on Convoy

Street, then east again on Convoy Court. The San Vicente Pipeline would continue east on Mercury Court, passing through various business park and industrial uses before heading south on Industrial Park Driveway.

A trenchless segment would cross Clairemont Mesa Boulevard, and the San Vicente Pipeline would continue south on Ronson Court before heading east on Ronson Road. A trenchless segment would cross SR-163, and then the San Vicente Pipeline would continue again in an open-cut segment east along Lightwave Avenue. The alignment would continue north on Ruffin Road, east on Clairemont Mesa Boulevard and then south on Murphy Canyon Road. At Elanus Canyon, the alignment would head east across a parking lot before crossing I-15 in a trenchless segment and traversing the canyon until rejoining Clairemont Mesa Boulevard. At Santo Road the alignment would head south then east along Tierrasanta Boulevard. A trenchless segment would continue south across the San Diego River and then the alignment would turn east on Mission Gorge Road, traversing the Mission Trails Regional Park. A trenchless segment would cross the SR-52 at West Hills Parkway before continuing east on Carlton Oaks Drive. The alignment would leave the roadway right-of-way for a short segment and then cross Sycamore Canyon via a trenchless crossing before continuing east again within Carlton Oaks Drive.

The San Vicente Pipeline would continue north on Halberns Boulevard, then east on Mast Boulevard with another trenchless segment between two disconnected portions of Mast Boulevard. The alignment would continue east on Riverside Drive and Lakeside Avenue before connecting with Willow Road. From Willow Road the San Vicente Pipeline would turn north on Moreno Avenue, continuing north to the shore of the San Vicente Reservoir.

San Vicente Reservoir Inlet Alignment Alternatives

The San Vicente Reservoir Alternative proposes three alternative reservoir inlet options: (1) a Tunnel Alternative Terminus, (2) an In-Reservoir Alternative Terminus, and (3) a Marina Alternative Terminus.

For the Tunnel Alternative Terminus, an approximately 5,400-linear-foot tunnel would be located at the end of the San Vicente Pipeline. The Tunnel Alternative Terminus would discharge 32 feet above the spillway elevation of the San Vicente Dam (elevation 766 feet) into a reinforced concrete discharge structure and flow down a natural drainage way into the San Vicente Reservoir. Prior to the structure itself, a dechlorination injection point is envisioned to be incorporated to eliminate any residual chlorine in the purified water prior to discharge. Monitoring and injection equipment could be located on an existing City property nearby or at the structure itself, provided regular maintenance can be accommodated.

The In-Reservoir Alternative Terminus would continue via open trench from Moreno Avenue approximately 6,900 linear feet up the existing Marina access road to the San Vicente Reservoir's western side near the newly constructed Marina. An approximately 10,000-linear-foot subaqueous pipeline constructed of HDPE would then convey water across the San Vicente Reservoir, existing up the far bank where it would connect to the same discharge structure as proposed for the Tunnel Alternative Terminus. The subaqueous pipeline would be weighted to ensure it remains on the San Vicente Reservoir bottom in its final position.

The Marina Alternative Terminus would follow the same alignment as the In-Reservoir Alternative Terminus from the intersection of Vigilante Road and Moreno Avenue along the Marina access road. At the road's high point, near the saddle dam, the pipeline would continue in the access road to the Marina parking area rather than transition to a subaqueous pipeline. The pipeline would continue in the access road that runs along the shoreline and would discharge at the western shore of the San Vicente Reservoir. The Marina Alternative Terminus pipeline would be approximately 8,625 linear feet.

Mission Trails Booster Station

The MTBS will receive purified water pumped from the North City Pump Station via the San Vicente Pipeline. The purified water will be pumped from the MTBS to the San Vicente Reservoir via the San Vicente Pipeline. The MTBS will be located along Mission Gorge Road across two privately owned parcels. The MTBS will have three duty pumps and one standby pump, all of which are 1,000 HP vertical-turbine motor pumps.

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2 EXISTING CONDITIONS

2.1 The Greenhouse Effect

Climate change refers to any significant change in measures of climate, such as temperature, precipitation, or wind, lasting for an extended period (decades or longer). Gases that trap heat in the atmosphere are often called GHGs. The greenhouse effect traps heat in the troposphere through a threefold process: short-wave radiation emitted by the Sun is absorbed by the Earth; the Earth emits a portion of this energy in the form of long-wave radiation; and GHGs in the upper atmosphere absorb this long-wave radiation and emit it into space and back toward the Earth. This "trapping" of the long-wave (thermal) radiation emitted back toward the Earth is the underlying process of the greenhouse effect.

The greenhouse effect is a natural process that contributes to regulating the Earth's temperature. Without it, the temperature of the Earth would be about 0° Fahrenheit (°F; −18° Celsius (°C)) instead of its current 57°F (15°C) (Qiancheng 1998). Global climate change concerns are focused on whether human activities are leading to an enhancement of the greenhouse effect.

2.2 Greenhouse Gases

GHGs include, but are not limited to, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), O_3, water vapor, fluorinated gases (hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3)), chlorofluorocarbons (CFCs), and hydrochlorofluorocarbons (HCFCs). Some GHGs, such as CO_2, CH_4, and N_2O, occur naturally and are emitted to the atmosphere through natural processes and human activities. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Manufactured GHGs, which have a much greater heat-absorption potential than CO_2, include fluorinated gases, such as HFCs, PFCs, and SF_6, which are associated with certain industrial products and processes. A summary of the most common GHGs and their sources is included in the following text.[1]

Carbon Dioxide. CO_2 is a naturally occurring gas and a by-product of human activities and is the principal anthropogenic GHG that affects the Earth's radiative balance. Natural sources of CO_2 include respiration of bacteria, plants, animals, and fungus; evaporation from oceans, volcanic out-gassing; and decomposition of dead organic matter. Human activities that generate CO_2 are from the combustion of coal, oil, natural gas, and wood.

[1] The descriptions of GHGs are summarized from the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (1995), IPCC Fourth Assessment Report (2007), the California Air Resources Board's (CARB's) Glossary of Terms Used in GHG Inventories (2015), and the U.S. Environmental Protection Agency's (EPA's) Glossary of Climate Change Terms (2016).

Methane. CH_4 is a flammable gas and is the main component of natural gas. Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, flooded rice fields, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

Nitrous Oxide. Sources of N_2O include soil cultivation practices (microbial processes in soil and water), especially the use of commercial and organic fertilizers, manure management, industrial processes (such as in nitric acid production, nylon production, and fossil-fuel-fired power plants), vehicle emissions, and the use of N_2O as a propellant (such as in rockets, racecars, aerosol sprays).

Fluorinated Gases. Fluorinated gases (also referred to as F-gases) are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are commonly used as substitutes for stratospheric ozone-depleting substances (e.g., CFCs, HCFCs, and halons). The most prevalent fluorinated gases include the following:

- ***Hydrofluorocarbons:*** HFCs are compounds containing only hydrogen, fluorine, and carbon atoms. HFCs are synthetic chemicals that are used as alternatives to ozone-depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are used in manufacturing.
- ***Perfluorocarbons:*** PFCs are a group of human-made chemicals composed of carbon and fluorine only. These chemicals were introduced as alternatives, along with HFCs, to the ozone depleting substances. The two main sources of PFCs are primarily aluminum production and semiconductor manufacturing. Since PFCs have stable molecular structures and do not break down through the chemical processes in the lower atmosphere, these chemicals have long lifetimes, ranging between 10,000 and 50,000 years.
- ***Sulfur Hexafluoride:*** SF_6 is a colorless gas that is soluble in alcohol and ether and slightly soluble in water. SF_6 is used for insulation in electric power transmission and distribution equipment, semiconductor manufacturing, the magnesium industry, and as a tracer gas for leak detection.
- ***Nitrogen trifluoride:*** NF_3 is used in the manufacture of a variety of electronics, including semiconductors and flat panel displays.

Chlorofluorocarbons. CFCs are synthetic chemicals that have been used as cleaning solvents, refrigerants, and aerosol propellants. CFCs are chemically unreactive in the lower atmosphere (troposphere) and the production of CFCs was prohibited in 1987 due to the chemical destruction of stratospheric O_3.

Hydrochlorofluorocarbons. HCFCs are a large group of compounds, whose structure is very close to that of CFCs—containing hydrogen, fluorine, chlorine, and carbon atoms—but including one or more hydrogen atoms. Like HFCs, HCFCs are used in refrigerants and propellants. HCFCs were also used in place of CFCs for some applications; however, their use in general is being phased out.

Black Carbon. Black carbon is a component of fine particulate matter, which has been identified as a leading environmental risk factor for premature death. It is produced from the incomplete combustion of fossil fuels and biomass burning, particularly from older diesel engines and forest fires. Black carbon warms the atmosphere by absorbing solar radiation, influences cloud formation, and darkens the surface of snow and ice, which accelerates heat absorption and melting. Black carbon is a short-lived species that varies spatially, which makes it difficult to quantify the global warming potential (GWP). Diesel particulate matter emissions are a major source of black carbon and are also toxic air contaminants (TACs) that have been regulated and controlled in California for several decades to protect public health. In relation to declining diesel particulate matter from the California Air Resources Board's (CARB's) regulations pertaining to diesel engines, diesel fuels, and burning activities, CARB estimates that annual black carbon emissions in California have reduced by 70% between 1990 and 2010, with 95% control expected by 2020 (CARB 2014a).

Water Vapor. The primary source of water vapor is evaporation from the ocean, with additional vapor generated by sublimation (change from solid to gas) from ice and snow, evaporation from other water bodies, and transpiration from plant leaves. Water vapor is the most important, abundant, and variable GHG in the atmosphere and maintains a climate necessary for life.

Ozone. Tropospheric O_3, which is created by photochemical reactions involving gases from both natural sources and human activities, acts as a GHG. Stratospheric O_3, which is created by the interaction between solar ultraviolet radiation and molecular oxygen (O_2), plays a decisive role in the stratospheric radiative balance. Depletion of stratospheric O_3, due to chemical reactions that may be enhanced by climate change, results in an increased ground-level flux of ultraviolet-B radiation.

Aerosols. Aerosols are suspensions of particulate matter in a gas emitted into the air through burning biomass (plant material) and fossil fuels. Aerosols can warm the atmosphere by absorbing and emitting heat and can cool the atmosphere by reflecting light.

2.2.1 Global Warming Potential

Gases in the atmosphere can contribute to climate change both directly and indirectly. Direct effects occur when the gas itself absorbs radiation. Indirect radiative forcing occurs when chemical transformations of the substance produce other GHGs, when a gas influences the

atmospheric lifetimes of other gases, and/or when a gas affects atmospheric processes that alter the radiative balance of the Earth (e.g., affect cloud formation or albedo) (EPA 2015).

The Intergovernmental Panel on Climate Change (IPCC) developed the GWP concept to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. The GWP of a GHG is defined as the ratio of the time-integrated radiative forcing from the instantaneous release of 1 kilogram of a trace substance relative to that of 1 kilogram of a reference gas (IPCC 2014). The reference gas used is CO_2; therefore, GWP-weighted emissions are measured in metric tons of CO_2 equivalent (MT CO_2E).

The current version of the California Emissions Estimator Model (CalEEMod) (version 2016.3.1) assumes that the GWP for CH_4 is 25 (which means that emissions of 1 MT of CH_4 are equivalent to emissions of 25 MT of CO_2), and the GWP for N_2O is 298, based on the IPCC Fourth Assessment Report (IPCC 2007). The GWP values identified in CalEEMod were applied to the Project.

2.3 Contributions to Greenhouse Gas Emissions

Per the EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2013 (EPA 2015), total U.S. GHG emissions were approximately 6,870.5 million metric tons (MMT) CO_2E in 2014. The primary GHG emitted by human activities in the United States was CO_2, which represented approximately 80.9% of total GHG emissions (5,556.0 MMT CO_2E). The largest source of CO_2, and of overall GHG emissions, was fossil-fuel combustion, which accounted for approximately 93.7% of CO_2 emissions in 2014 (5,208.2 MMT CO_2E). Total U.S. GHG emissions have increased by 7.4% from 1990 to 2014, and emissions increased from 2013 to 2014 by 1.0% (70.5 MMT CO_2E). Since 1990, U.S. GHG emissions have increased at an average annual rate of 0.3%; however, overall, net emissions in 2014 were 8.6% below 2005 levels (EPA 2015).

According to California's 2000–2014 GHG emissions inventory (2016 edition), California emitted 441.5 MMT CO_2E in 2014, including emissions resulting from out-of-state electrical generation (CARB 2016). The sources of GHG emissions in California include transportation, industry, electric power production from both in-state and out-of-state sources, residential and commercial activities, agriculture, high GWP substances, and recycling and waste. The California GHG emission source categories and their relative contributions in 2014 are presented in Table 2.3-1.

Table 2.3-1
GHG Emissions Sources in California

Source Category	Annual GHG Emissions (MMT CO_2E)	Percent of Total[a]
Transportation	159.53	36%
Industrial uses	93.32	21%

Table 2.3-1
GHG Emissions Sources in California

Source Category	Annual GHG Emissions (MMT CO_2E)	Percent of Total[a]
Electricity generation[b]	88.24	20%
Residential and commercial uses	38.34	9%
Agriculture	36.11	8%
High global warming potential substances	17.15	4%
Recycling and waste	8.85	2%
Totals	**441.54**	**100%**

Source: CARB 2016.
Notes: Emissions reflect the 2014 California GHG inventory.
MMT CO_2E = million metric tons of CO_2 equivalent per year
[a] Percentage of total has been rounded, and total may not sum due to rounding.
[b] Includes emissions associated with imported electricity, which account for 36.51 MMT CO_2E annually.

During the 2000 to 2014 period, per-capita GHG emissions in California have continued to drop from a peak in 2001 of 13.9 metric tons (MT) per person to 11.4 MT per person in 2014, representing an 18% decrease. In addition, total GHG emissions in 2014 were 2.8 MMT CO_2E less than 2013 emissions. The declining trend in GHG emissions, coupled with programs that will continue to provide additional GHG reductions going forward, demonstrates that California is on track to meet the statewide 2020 target of 431 MMT CO_2E established by Assembly Bill (AB) 32, discussed in the following text (CARB 2016).

2.4 Potential Effects of Human Activity on Climate Change

Globally, climate change has the potential to affect numerous environmental resources through uncertain impacts related to future air temperatures and precipitation patterns. The 2014 IPCC Synthesis Report indicated that warming of the climate system is unequivocal and since the 1950s, many of the observed changes are unprecedented over decades to millennia. Signs that global climate change has occurred include warming of the atmosphere and ocean, diminished amounts of snow and ice, and rising sea levels (IPCC 2014).

In California, climate change impacts have the potential to affect sea level rise, agriculture, snowpack and water supply, forestry, wildfire risk, public health, and electricity demand and supply. The primary effect of global climate change has been a 0.2°C rise in average global tropospheric temperature per decade, determined from meteorological measurements worldwide between 1990 and 2005. Scientific modeling predicts that continued emissions of GHGs at or above current rates would induce more extreme climate changes during the twenty-first century than were observed during the twentieth century. A warming of about 0.2°C (0.36°F) per decade is projected, and there are identifiable signs that global warming could be taking place.

Although climate change is driven by global atmospheric conditions, climate change impacts are felt locally. A scientific consensus confirms that climate change is already affecting California. The average temperatures in California have increased, leading to more extreme hot days and fewer cold nights; shifts in the water cycle have been observed, with less winter precipitation falling as snow, and both snowmelt and rainwater running off earlier in the year; sea levels have risen; and wildland fires are becoming more frequent and intense due to dry seasons that start earlier and end later (CAT 2010a).

An increase in annual average temperature is a reasonably foreseeable effect of climate change. Observed changes over the last several decades across the western United States reveal clear signals of climate change. Statewide average temperatures increased by about 1.7°F from 1895 to 2011, and warming has been greatest in the Sierra Nevada. By 2050, California is projected to warm by approximately 2.7°F above 2000 averages, a threefold increase in the rate of warming over the last century. By 2100, average temperatures could increase by 4.1°F to 8.6°F, depending on emissions levels. Springtime warming—a critical influence on snowmelt—will be particularly pronounced. Summer temperatures will rise more than winter temperatures, and the increases will be greater in inland California, compared to the coast. Heat waves will be more frequent, hotter, and longer. There will be fewer extremely cold nights. A decline of Sierra snowpack, which accounts for approximately half of the surface water storage in California and much of the state's water supply, by 30% to as much as 90% is predicted over the next 100 years (CAT 2010a).

Model projections for precipitation over California continue to show the Mediterranean pattern of wet winters and dry summers with seasonal, year-to-year, and decade-to-decade variability. For the first time, however, several of the improved climate models shift toward drier conditions by the mid-to-late 21st century in central and, most notably, Southern California. By late-century, all projections show drying, and half of them suggest 30-year average precipitation will decline by more than 10% below the historical average (CAT 2010a).

A summary of current and future climate change impacts to resource areas in California, as discussed in Safeguarding California: Reducing Climate Risk (NRA 2014), is provided in the following text.

Agriculture. The impacts of climate change on the agricultural sector are far more severe than the typical variability in weather and precipitation patterns that occur year to year. Some of the specific challenges faced by the agricultural sector and farmers include more drastic and unpredictable precipitation and weather patterns; extreme weather events that range from severe flooding to extreme drought, to destructive storm events; significant shifts in water availably and water quality; changes in pollinator lifecycles; temperature fluctuations, including extreme heat stress and decreased chill hours; increased risks from invasive species and weeds, agricultural pests, and plant diseases; and disruptions to the transportation and energy infrastructure supporting

agricultural production. These challenges and associated short-term and long-term impacts can have both positive and negative effects on agricultural production. Nonetheless, it is predicted that current crop and livestock production will suffer long-term negative effects resulting in a substantial decrease in the agricultural sector if not managed or mitigated (NRA 2014).

Biodiversity and Habitat. The state's extensive biodiversity stems from its varied climate and assorted landscapes, which have resulted in numerous habitats where species have evolved and adapted over time. Specific climate change challenges to biodiversity and habitat include species migration in response to climatic changes, range shift, and novel combinations of species; pathogens, parasites and disease; invasive species; extinction risks; changes in the timing of seasonal life-cycle events; food web disruptions; and threshold effects (i.e., a change in the ecosystem that results in a "tipping point" beyond which irreversible damage or loss has occurred). Habitat restoration, conservation, and resource management across California and through collaborative efforts among public, private, and nonprofit agencies has assisted in the effort to fight climate change impacts on biodiversity and habitat. One of the key measures in these efforts is ensuring species' ability to relocate as temperature and water availability fluctuate as a result of climate change, based on geographic region.

Energy. The energy sector provides California residents with a supply of reliable and affordable energy through a complex integrated system. Specific climate change challenges for the energy sector include temperature, fluctuating precipitation patterns, increasing extreme weather events and sea level rise. Increasing temperatures and reduced snowpack negatively impact the availability of a steady flow of snowmelt to hydroelectric reservoirs. Higher temperatures also reduce the capacity of thermal power plants since power plant cooling is less efficient at higher ambient temperatures. Natural gas infrastructure in coastal California is threatened by sea level rise and extreme storm events (NRA 2014).

Forestry. Forests occupy approximately 33% of California's 100 million acres and provide key benefits such as wildlife habitat, absorption of CO_2, renewable energy and building materials. The most significant climate change related risk to forests is accelerated risk of wildfire and more frequent and severe droughts. Droughts have resulted in more large scale mortalities and combined with increasing temperatures have led to an overall increase in wildfire risks. Increased wildfire intensity subsequently increases public safety risks, property damage, fire suppression and emergency response costs, watershed and water quality impacts and vegetation conversions. These factors contribute to decreased forest growth, geographic shifts in tree distribution, loss of fish and wildlife habitat and decreased carbon absorption. Climate change may result in increased establishment of non-native species, particularly in rangelands where invasive species are already a problem. Invasive species may be able to exploit temperature or precipitation changes, or quickly occupy areas denuded by fire, insect mortality or other climate change effects on vegetation (NRA 2014).

Ocean and Coastal Ecosystems and Resources. Sea level rise, changing ocean conditions and other climate change stressors are likely to exacerbate long-standing challenges related to ocean and coastal ecosystems in addition to threatening people and infrastructure located along the California coastline and in coastal communities. Sea level rise in addition to more frequent and severe coastal storms and erosion are threatening vital infrastructure such as roads, bridges, power plants, ports and airports, gasoline pipes, and emergency facilities, as well as negatively impacting the coastal recreational assets such as beaches and tidal wetlands. Water quality and ocean acidification threaten the abundance of seafood and other plant and wildlife habitats throughout California and globally (NRA 2014).

Public Health. Climate change can impact public health through various environmental changes and is the largest threat to human health in the twenty-first century. Changes in precipitation patterns affect public health primarily through potential for altered water supplies, and extreme events such as heat, floods, droughts, and wildfires. Increased frequency, intensity and duration of extreme heat and heat waves is likely to increase the risk of mortality due to heat related illness as well as exacerbate existing chronic health conditions. Other extreme weather events are likely to negatively impact air quality and increase or intensify respiratory illness such as asthma and allergies. Additional health impacts that may be impacted by climate change include cardiovascular disease, vector-borne diseases, mental health impacts, and malnutrition injuries. Increased frequency of these ailments is likely to subsequently increase the direct risk of injury and/or mortality (NRA 2014).

Transportation. Residents of California rely on airports, seaports, public transportation and an extensive roadway network to gain access to destinations, goods and services. While the transportation industry is a source of GHG emissions it is also vulnerable to climate change risks. Particularly, sea level rise and erosion threaten many coastal California roadways, airports, seaports, transit systems, bridge supports, and energy and fueling infrastructure. Increasing temperatures and extended periods of extreme heat threaten the integrity of the roadways and rail lines. High temperatures cause the road surfaces to expand which leads to increased pressure and pavement buckling. High temperatures can also cause rail breakages, which could lead to train derailment. Other forms of extreme weather events, such as extreme storm events, can negatively impact infrastructure which can impair movement of peoples and goods, or potentially block evacuation routes and emergency access roads. Increased wildfires, flooding, erosion risks, landslides, mudslides, and rockslides can all profoundly impact the transportation system and pose a serious risk to public safety (NRA 2014).

Water. Water resources in California support residences, plants, wildlife, farmland, landscapes, and ecosystems and bring trillions of dollars in economic activity. Climate change could seriously impact the timing, form, amount of precipitation, runoff patterns, and frequency and severity of precipitation events. Higher temperatures reduce the amount of snowpack and lead to

earlier snowmelt, which can impact water supply availability, natural ecosystems, and winter recreation. Water supply availability during the intense dry summer months is heavily dependent on the snowpack accumulated during the winter time. Increased risk of flooding has a variety of public health concerns including water quality, public safety, property damage, displacement, and post-disaster mental health problems. Prolonged and intensified droughts can also negatively impact groundwater reserves and result in increased overdraft and subsidence. Droughts can also negatively impact agriculture and farmland throughout the state. The higher risk of wildfires can lead to increased erosion, which can negatively impact watersheds and result in poor water quality. Water temperatures are also prone to increase, which can negatively impact wildlife that rely on a specific range of temperatures for suitable habitat (NRA 2014).

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3 REGULATORY SETTING

3.1 Federal Activities

Massachusetts v. EPA. On April 2, 2007, in *Massachusetts v. EPA*, the Supreme Court directed the U.S. Environmental Protection Agency (EPA) Administrator to determine whether GHG emissions from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In making these decisions, the EPA Administrator is required to follow the language of Section 202(a) of the Clean Air Act (CAA). On December 7, 2009, the Administrator signed a final rule with two distinct findings regarding GHGs under Section 202(a) of the CAA:

- The Administrator found that elevated concentrations of GHGs—CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6—in the atmosphere threaten the public health and welfare of current and future generations. This is referred to as the "endangerment finding."
- The Administrator further found the combined emissions of GHGs—CO_2, CH_4, N_2O, and HFCs—from new motor vehicles and new motor vehicle engines contribute to the GHG air pollution that endangers public health and welfare. This is referred to as the "cause or contribute finding."

These two findings were necessary to establish the foundation for regulation of GHGs from new motor vehicles as air pollutants under the CAA.

Energy Independence and Security Act. On December 19, 2007, President Bush signed the Energy Independence and Security Act of 2007. Among other key measures, the Act would do the following, which would aid in the reduction of national GHG emissions:

1. Increase the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard requiring fuel producers to use at least 36 billion gallons of biofuel in 2022.
2. Set a target of 35 miles per gallon (mpg) for the combined fleet of cars and light trucks by model year 2020 and direct the National Highway Traffic Safety Administration (NHTSA) to establish a fuel economy standard for medium- and heavy-duty trucks and create a separate fuel economy standard for work trucks.
3. Prescribe or revise standards affecting regional efficiency for heating and cooling products and procedures for new or amended standards, energy conservation, energy efficiency labeling for consumer electronic products, residential boiler efficiency, electric motor efficiency, and home appliances.

EPA and NHTSA Joint Final Rule for Vehicle Standards. On April 1, 2010, the EPA and NHTSA announced a joint final rule to establish a national project consisting of new standards for light-duty vehicles model years 2012 through 2016. The joint rule is intended to reduce GHG emissions and improve fuel economy. The EPA is finalizing the first-ever national GHG emissions standards under the CAA, and NHTSA is finalizing Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act (EPA 2010). This final rule follows the EPA and Department of Transportation's joint proposal on September 15, 2009, and is the result of President Obama's May 2009 announcement of a national project to reduce GHG and improve fuel economy (EPA 2011). The final rule became effective on July 6, 2010 (75 FR 25324–25728).

The EPA GHG standards require new passenger cars, light-duty trucks, and medium-duty passenger vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile in model year 2016, equivalent to 35.5 mpg if the automotive industry were to meet this CO_2 level through fuel economy improvements alone. The CAFE standards for passenger cars and light trucks will be phased in between 2012 and 2016, with the final standards equivalent to 37.8 mpg for passenger cars and 28.8 mpg for light trucks, resulting in an estimated combined average of 34.1 mpg. Together, these standards will cut GHG emissions by an estimated 960 MMT and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the project. The rules will simultaneously reduce GHG emissions, improve energy security, increase fuel savings, and provide clarity and predictability for manufacturers (EPA 2011).

In August 2012, the EPA and NHTSA approved a second round of GHG and CAFE standards for model years 2017 and beyond (77 FR 62623–63200). These standards will reduce motor vehicle GHG emissions to 163 grams of CO_2 per mile, which is equivalent to 54.5 mpg if this level were achieved solely through improvements in fuel efficiency, for cars and light-duty trucks by model year 2025. A portion of these improvements, however, will likely be made through improvements in air conditioning leakage and through use of alternative refrigerants, which would not contribute to fuel economy. The first phase of the CAFE standards, for model year 2017 to 2021, are projected to require, on an average industry fleet-wide basis, a range from 40.3 to 41.0 mpg in model year 2021. The second phase of the CAFE project, for model years 2022 to 2025, are projected to require, on an average industry fleet-wide basis, a range from 48.7 to 49.7 mpg in model year 2025. The second phase of standards have not been finalized due to the statutory requirement that NHTSA set average fuel economy standards not more than five model years at a time. The regulations also include targeted incentives to encourage early adoption and introduction into the marketplace of advanced technologies to dramatically improve vehicle performance, including:

- Incentives for electric vehicles, plug-in hybrid electric vehicles, and fuel cells vehicles.
- Incentives for hybrid technologies for large pickups and for other technologies that achieve high fuel economy levels on large pickups.

- Incentives for natural gas vehicles.
- Credits for technologies with potential to achieve real-world GHG reductions and fuel economy improvements that are not captured by the standards test procedures.

Climate Action Plan. In June 2013, President Obama issued a national Climate Action Plan (Plan) that consisted of a wide variety of executive actions and had three pillars: (1) cut carbon in America, (2) prepare the United States for impacts of climate change, and (3) lead international efforts to combat global climate change and prepare for its impacts (EOP 2013).

The Plan outlines 75 goals within the three main pillars.

1. ***Cut Carbon in America.*** The Plan consists of actions to help cut carbon by deploying clean energy, such as cutting carbon from power plants, promoting renewable energy, and unlocking long-term investment in clean energy innovation. In addition, the Plan includes actions designed to help build a twenty-first century transportation sector; cut energy waste in homes, businesses, and factories; and reduce other GHG emissions, such as HFCs and methane. The Plan commits to lead in clean energy and energy efficiency at the federal level.
2. ***Prepare the United States for Impacts of Climate Change.*** The Plan consists of actions to help prepare for the impacts of climate change through building stronger and safer communities and infrastructure, supporting climate resilient investments, supporting communities and tribal areas as they prepare for impacts, and boosting resilience of building and infrastructure; protecting the economy and natural resources by identifying vulnerabilities, promoting insurance leadership, conserving land and water resources, managing drought, reducing wildfire risks, and preparing for future floods; and using sound science to manage climate impacts.
3. ***Lead International Efforts.*** The Plan consists of actions to help the United States lead international efforts through working with other countries to take action by enhancing multilateral engagements with major economies, expanding bilateral cooperation with major emerging economies, combating short-lived climate pollutants, reducing deforestation and degradation, expanding clean energy use and cutting energy waste, global free trade in environmental goods and services, and phasing out subsidies that encourage wasteful use of fossil fuels and by leading efforts to address climate change through international negotiations.

In June 2014, the Center for Climate and Energy Solutions (C2ES) published a 1-year review of progress in implementation of the Plan (C2ES 2014). C2ES found that the administration had made marked progress in its initial implementation. The administration made at least some progress on most of the Plan's 75 goals, and many of the specific tasks outlined had been

completed. Notable areas of progress included steps to limit carbon pollution from power plants; improve energy efficiency; reduce CH_4 and HFC emissions; help communities and industry become more resilient to climate change impacts; and end U.S. lending for coal-fired power plants overseas.

U.N. Framework Convention on Climate Change Pledge. On March 31, 2015, the State Department submitted to the United Nations Framework Convention on Climate Change the U.S. target to cut net GHG emissions. The submission, referred to as an Intended Nationally Determined Contribution, is a formal statement of the U.S. target, announced in China, to reduce emissions by 26%–28% below 2005 levels by 2025, and to make best efforts to reduce by 28% (C2ES 2016).

The target reflects a planning process that examined opportunities under existing regulatory authorities to reduce emissions in 2025 of all GHGs from all sources in every economic sector. Several U.S. laws, as well as existing and proposed regulations thereunder, are relevant to the implementation of the U.S. target, including the CAA (42 U.S.C. 7401 et seq.), the Energy Policy Act (42 U.S.C. 13201 et seq.), and the Energy Independence and Security Act (42 U.S.C. 17001 et seq.).

Clean Power Plan and New Source Performance Standards for Electric Generating Units. On October 23, 2015, EPA published a final rule (effective December 22, 2015) establishing the Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units (80 FR 64510–64660), also known as the Clean Power Plan. These guidelines prescribe how states must develop plans to reduce GHG emissions from existing fossil-fuel-fired electric generating units. The guidelines establish CO_2 emission performance rates representing the best system of emission reduction for two subcategories of existing fossil-fuel-fired electric generating units: (1) fossil-fuel-fired electric utility steam-generating units and (2) stationary combustion turbines. Concurrently, EPA published a final rule (effective October 23, 2015) establishing Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units (80 FR 64661–65120). The rule prescribes CO_2 emission standards for newly constructed, modified, and reconstructed affected fossil-fuel-fired electric utility generating units. Implementation of the Clean Power Plan has been stayed by the U.S. Supreme Court pending resolution of several lawsuits.

Mandatory Greenhouse Gas Reporting Rule. On September 22, 2009, EPA published the Final Mandatory Greenhouse Gas Reporting Rule (Reporting Rule) in the Federal Register (74 FR 56260–56373). The Reporting Rule requires reporting of GHG data and other relevant information from fossil fuel and industrial GHG suppliers, vehicle and engine manufacturers, and all facilities that would emit 25,000 MT CO_2E or more per year. Facility owners are required to submit an annual report with detailed calculations of facility GHG emissions on March 31 for

emissions from the previous calendar year. The Reporting Rule also mandates recordkeeping and administrative requirements to enable EPA to verify the annual GHG emissions reports.

Council on Environmental Quality Guidance. On August 1, 2016, the Council on Environmental Quality (CEQ) released final guidance for federal agencies on considering the impacts of GHG emissions in NEPA reviews (CEQ 2016). This guidance supersedes the draft GHG and climate change guidance released by CEQ in 2010 and 2014. The final guidance applies to all proposed federal agency actions, including land and resource management actions. This guidance explains that agencies should consider both the potential effects of a proposed action on climate change, as indicated by its estimated GHG emissions, and the implications of climate change for the environmental effects of a proposed action. The guidance recommends that agencies quantify a proposed agency action's projected direct and indirect GHG emissions, taking into account available data and GHG quantification tools that are suitable for the proposed agency action.

3.2 State of California

State Climate Change Targets

Executive Order (EO) S-3-05. EO S-3-05 (June 2005) established the following goals: GHG emissions should be reduced to 2000 levels by 2010; GHG emissions should be reduced to 1990 levels by 2020; and GHG emissions should be reduced to 80% below 1990 levels by 2050. Under EO S-3-05, the California Environmental Protection Agency is directed to report biannually on progress made toward meeting the GHG targets and the impacts to California due to global warming, including impacts to water supply, public health, agriculture, the coastline, and forestry. The Climate Action Team was formed, which subsequently issued the 2006 Climate Action Team Report to Governor Schwarzenegger and the Legislature (CAT 2006).

The 2009 Climate Action Team Biennial Report (CAT 2010b) expands on the policy outlined in the 2006 assessment. The 2009 report identifies the need for additional research in several different aspects that affect climate change to support effective climate change strategies. Subsequently, the 2010 Climate Action Team Report to Governor Schwarzenegger and the California Legislature (CAT 2010a) reviews past climate action milestones including voluntary reporting programs, GHG standards for passenger vehicles, the Low Carbon Fuel Standard, a statewide renewable energy standard, and the cap-and-trade program.

AB 32. In furtherance of the goals established in EO S-3-05, the Legislature enacted AB 32 (Núñez and Pavley), the California Global Warming Solutions Act of 2006 (September 27, 2006). AB 32 requires California to reduce its GHG emissions to 1990 levels by 2020, representing a reduction of approximately 15% below emissions expected under a "business-as-usual" (BAU) scenario.

CARB has been assigned responsibility for carrying out and developing the programs and requirements necessary to achieve the goals of AB 32. Under AB 32, CARB must adopt regulations requiring the reporting and verification of statewide GHG emissions. This program will be used to monitor and enforce compliance with the established standards. CARB is also required to adopt rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emission reductions. AB 32 also authorized CARB to adopt market-based compliance mechanisms to meet the specified requirements. Finally, CARB is ultimately responsible for monitoring compliance and enforcing any rule, regulation, order, emission limitation, emission reduction measure, or market-based compliance mechanism adopted. These efforts target GHG emission reductions from cars and trucks, electricity production, fuels, and other sources. The full implementation of AB 32 will help mitigate risks associated with climate change while improving energy efficiency, expanding the use of renewable energy resources and cleaner transportation, and reducing waste.

Of relevance to this analysis, in 2007, CARB approved a statewide limit on the GHG emissions level for year 2020 consistent with the determined 1990 baseline (427 MMT CO_2E). CARB's adoption of this limit is in accordance with Health and Safety Code Section 38550. In addition to the 1990 emissions inventory, CARB also adopted regulations requiring mandatory reporting of GHGs for the large facilities that account for 94% of GHG emissions from industrial and commercial stationary sources in California.

Further, in 2008, CARB adopted the Climate Change Scoping Plan: A Framework for Change (Scoping Plan) in accordance with Health and Safety Code, Section 38561. The Scoping Plan establishes an overall framework for the measures that will be adopted to reduce California's GHG emissions for various emission sources/sectors to 1990 levels by 2020. The 2020 emissions limit was set at 427 MMT of CO_2E (CARB 2008). The Scoping Plan establishes an overall framework for a suite of measures that will be adopted to sharply reduce California's GHG emissions. The Scoping Plan evaluates opportunities for sector-specific reductions, integrates all CARB and Climate Action Team early actions and additional GHG reduction features by both entities, identifies additional measures to be pursued as regulations, and outlines the role of a cap-and-trade program. The key elements of the Scoping Plan include the following (CARB 2008):

1. Expanding and strengthening existing energy efficiency programs as well as building and appliance standards.
2. Achieving a statewide renewable energy mix of 33%.
3. Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system and caps sources contributing 85% of California's GHG emissions.

4. Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets.
5. Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard.
6. Creating targeted fees, including a public goods charge on water use, fees on high GWP gases, and a fee to fund the administrative costs of the State of California's long-term commitment to AB 32 implementation.

In the Scoping Plan, CARB determined that achieving the 1990 emissions level in 2020 would require a reduction in GHG emissions of approximately 28.5% from the otherwise projected 2020 emissions level; i.e., those emissions that would occur in 2020, absent GHG-reducing laws and regulations (referred to as "Business-As-Usual" (BAU)). For example, in further explaining CARB's BAU methodology, CARB assumed that all new electricity generation would be supplied by natural gas plants; no further regulatory action would impact vehicle fuel efficiency; and building energy efficiency codes would be held at 2005 standards.

In the 2011 Final Supplement to the Scoping Plan's Functional Equivalent Document, CARB revised its estimates of the projected 2020 emissions level in light of the economic recession and the availability of updated information about GHG reduction regulations. Based on the new economic data, CARB determined that achieving the 1990 emissions level by 2020 would require a reduction in GHG emissions of 21.7% (down from 28.5%) from the BAU conditions (CARB 2011a). When the 2020 emissions level projection also was updated to account for newly implemented regulatory measures, including Pavley I (model years 2009–2016) and the Renewable Portfolio Standard (12% to 20%), CARB determined that achieving the 1990 emissions level in 2020 would require a reduction in GHG emissions of 16% (down from 28.5%) from the BAU conditions.

Most recently, in 2014, CARB adopted the *First Update to the Climate Change Scoping Plan: Building on the Framework* (First Update; CARB 2014b). The stated purpose of the First Update is to "highlight California's success to date in reducing its GHG emissions and lay the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80% below 1990 levels by 2050." The First Update found that California is on track to meet the 2020 emissions reduction mandate established by AB 32, and noted that California could reduce emissions further by 2030 to levels squarely in line with those needed to stay on track to reduce emissions to 80% below 1990 levels by 2050 if the state realizes the expected benefits of existing policy goals.

In the First Update, CARB identified "six key focus areas comprising major components of the state's economy to evaluate and describe the larger transformative actions that will be needed to

meet the state's more expansive emission reduction needs by 2050" (CARB 2014b). Those six areas are: (1) energy, (2) transportation (vehicles/equipment, sustainable communities, housing, fuels, and infrastructure), (3) agriculture, (4) water, (5) waste management, and (6) natural and working lands. The First Update identifies key recommended actions for each sector that will facilitate achievement of Executive Order S-3-05's 2050 reduction goal.

Based on CARB's research efforts presented in the First Update, CARB has a "strong sense of the mix of technologies needed to reduce emissions through 2050." Those technologies include energy demand reduction through efficiency and activity changes; large-scale electrification of on-road vehicles, buildings, and industrial machinery; decarbonizing electricity and fuel supplies; and, the rapid market penetration of efficient and clean energy technologies.

As part of the First Update, CARB recalculated the state's 1990 emissions level using more recent GWPs identified by the IPCC. Using the recalculated 1990 emissions level (431 MMT CO_2E) and the revised 2020 emissions level projection identified in the 2011 Final Supplement, CARB determined that achieving the 1990 emissions level by 2020 would require a reduction in GHG emissions of approximately 15% (instead of 28.5% or 16%) from the BAU conditions. The update also recommends that a statewide mid-term target and mid-term and long-term sector targets be established toward meeting the 2050 goal established by EO S-3-05 (i.e., reduce California's GHG emissions to 80% below 1990 levels), although no specific recommendations are made.

On January 20, 2017, CARB released The 2017 Climate Change Scoping Plan Update (Second Update) for public review and comment (CARB 2017). This update to the Scoping Plan proposes CARB's strategy for achieving the states 2030 GHG target, including continuing the Cap-and-Trade Program through 2030, and includes a new approach to reduce GHGs from refineries by 20%. The Second Update incorporates approaches to cutting super pollutants from the Short Lived Climate Pollutants Strategy, acknowledges the need for reducing emissions in agriculture, and highlights the work underway to ensure that California's natural and working lands increasingly sequester carbon. During development of the Second Update, CARB held a number of public workshops in the Natural and Working Lands, Agriculture, Energy and Transportation sectors to inform development of the 2030 Scoping Plan Update. When discussing project-level GHG emissions reduction actions and thresholds, the Second Update states "achieving no net increase in GHG emissions is the correct overall objective, but it may not be appropriate or feasible for every development project. And the inability to mitigate a project's GHG emissions to zero does not necessarily imply a substantial contribution to the cumulatively significant environmental impact of climate change under CEQA." The deadline to submit comments on the Second Update was March 6, 2017. It is expected that the Second Update will be heard by CARB at the April 27 and 28, 2017 CARB meeting.

EO B-30-15. EO B-30-15 (April 2015) identified an interim GHG reduction target in support of targets previously identified under S-3-05 and AB 32. EO B-30-15 set an interim target goal of reducing GHG emissions to 40% below 1990 levels by 2030 to keep California on its trajectory toward meeting or exceeding the long-term goal of reducing GHG emissions to 80% below 1990 levels by 2050 as set forth in S-3-05. To facilitate achievement of this goal, EO B-30-15 calls for an update to CARB's Scoping Plan to express the 2030 target in terms of MMT CO_2E. The EO also calls for state agencies to continue to develop and implement GHG emission reduction programs in support of the reduction targets. Sector-specific agencies in transportation, energy, water, and forestry were required to prepare GHG reduction plans by September 2015, followed by a report on action taken in relation to these plans in June 2016. EO B-30-15 does not require local agencies to take any action to meet the new interim GHG reduction threshold. It is important to note that EO B-30-15 was not adopted by a public agency through a public review process that requires analysis pursuant to the California Environmental Quality Act (CEQA) Guidelines, Section 15064.4, and that it has not been subsequently validated by a statute as an official GHG reduction target of California. EO B-30-15 itself states it is "not intended to create, and does not create, any rights of benefits, whether substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person."

Senate Bill (SB) 32 and AB 197. SB 32 and AB 197 (enacted in 2016) are companion bills that set a new statewide GHG reduction targets; make changes to CARB's membership, and increase legislative oversight of CARB's climate change-based activities; and expand dissemination of GHG and other air quality-related emissions data to enhance transparency and accountability. SB 32 codified the 2030 emissions reduction goal of EO B-30-15 by requiring CARB to ensure that statewide GHG emissions are reduced to 40% below 1990 levels by 2030. AB 197 established the Joint Legislative Committee on Climate Change Policies, consisting of at least three members of the Senate and three members of the Assembly, in order to provide ongoing oversight over implementation of the state's climate policies. AB 197 also added two members of the Legislature to CARB as nonvoting members; requires CARB to make available and update (at least annually via its website) emissions data for GHGs, criteria air pollutants, and TACs from reporting facilities; and, requires CARB to identify specific information for GHG emissions reduction measures when updating the scoping plan.

EO B-18-12. EO B-18-12 (April 2012) directs state agencies, departments, and other entities under the governor's executive authority to take action to reduce entity-wide GHG emissions by at least 10% by 2015 and 20% by 2020, as measured against a 2010 baseline. EO B-18-12 also established goals for existing state buildings for reducing grid-based energy purchases and water use.

SB 605. SB 605 (September 2014) requires CARB to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants in the state no later than January 1, 2016. As

defined in the statute, short-lived climate pollutant means "an agent that has a relatively short lifetime in the atmosphere, from a few days to a few decades, and a warming influence on the climate that is more potent than that of carbon dioxide" (SB 605). SB 605, however, does not prescribe specific compounds as short-lived climate pollutants or add to the list of GHGs regulated under AB 32. In developing the strategy, CARB must complete an inventory of sources and emissions of short-lived climate pollutants in the state based on available data, identify research needs to address any data gaps, identify existing and potential new control measures to reduce emissions, and prioritize the development of new measures for short-lived climate pollutants that offer co-benefits by improving water quality or reducing other criteria air pollutants that impact community health and benefit disadvantaged communities. The Proposed Short-Lived Climate Pollution Reduction Strategy released by CARB in April 2016 focuses on CH_4, black carbon, and fluorinated gases, particularly HFCs, as important short-lived climate pollutants. The strategy recognizes emission reduction efforts implemented under AB 32 (e.g., refrigerant management programs) and other regulatory programs (e.g., in-use diesel engines, solid waste diversion) along with additional measures to be developed.

Building Energy

Title 24, Part 6. Title 24 of the California Code of Regulations was established in 1978 and serves to enhance and regulate California's building standards. While not initially promulgated to reduce GHG emissions, Part 6 of Title 24 specifically establishes Building Energy Efficiency Standards that are designed to ensure new and existing buildings in California achieve energy efficiency and preserve outdoor and indoor environmental quality. The California Energy Commission (CEC) is required by law to adopt standards every 3 years that are cost effective for homeowners over the 30-year lifespan of a building. These standards are updated to consider and incorporate new energy efficient technologies and construction methods. As a result, these standards save energy, increase electricity supply reliability, increase indoor comfort, avoid the need to construct new power plants, and help preserve the environment.

The current Title 24 standards are the 2013 standards, which became effective on July 1, 2014. Buildings constructed in accordance with the 2013 standards will use 25% less energy for lighting, heating, cooling, ventilation, and water heating than the 2008 standards (CEC 2014).

The 2016 Title 24 building energy efficiency standards, which became effective January 1, 2017, will further reduce energy used and associated GHG emissions. In general, single-family homes built to the 2016 standards are anticipated to use about 28% less energy for lighting, heating, cooling, ventilation, and water heating than those built to the 2013 standards, and nonresidential buildings built to the 2016 standards will use an estimated 5% less energy than those built to the 2013 standards (CEC 2015). Although the North City Project would be required to comply with 2016 Title 24 standards because its building construction phase would commence after January

1, 2017, this analysis conservatively does not quantify the increase energy efficiency associated with the more stringent 2016 Title 24 standards.

Title 24, Part 11. In addition to the CEC's efforts, in 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (Part 11 of Title 24), commonly referred to as CALGreen, establishes minimum mandatory standards as well as voluntary standards pertaining to the planning and design of sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and interior air quality. The CALGreen standards took effect in January 2011 and instituted mandatory minimum environmental performance standards for all ground-up, new construction of commercial, low-rise residential and state-owned buildings and schools and hospitals. The CALGreen 2016 standards became effective January 1, 2017. The mandatory standards require the following (24 CCR Part 11):

- Mandatory reduction in indoor water use through compliance with specified flow rates for plumbing fixtures and fittings.
- Mandatory reduction in outdoor water use through compliance with a local water efficient landscaping ordinance or the California Department of Water Resources' Model Water Efficient Landscape Ordinance.
- 65% of construction and demolition waste must be diverted from landfills.
- Mandatory inspections of energy systems to ensure optimal working efficiency.
- Inclusion of electric vehicle charging stations or designated spaces capable of supporting future charging stations.
- Low-pollutant emitting exterior and interior finish materials, such as paints, carpets, vinyl flooring, and particle boards.

The CALGreen standards also include voluntary efficiency measures that are provided at two separate tiers and implemented at the discretion of local agencies and applicants. CALGreen's Tier 1 standards call for a 15% improvement in energy requirements, stricter water conservation, 65% diversion of construction and demolition waste, 10% recycled content in building materials, 20% permeable paving, 20% cement reduction, and cool/solar-reflective roofs. CALGreen's more rigorous Tier 2 standards call for a 30% improvement in energy requirements, stricter water conservation, 75% diversion of construction and demolition waste, 15% recycled content in building materials, 30% permeable paving, 25% cement reduction, and cool/solar-reflective roofs.

The California Public Utilities Commission (CPUC), CEC, and CARB also have a shared, established goal of achieving zero net energy for new construction in California. The key policy

timelines include: (1) all new residential construction in California will be zero net energy by 2020, and (2) all new commercial construction in California will be zero net energy by 2030.[2]

Title 20. Title 20 of the California Code of Regulations requires manufacturers of appliances to meet state and federal standards for energy and water efficiency. Performance of appliances must be certified through the CEC to demonstrate compliance with standards. New appliances regulated under Title 20 include refrigerators, refrigerator-freezers, and freezers; room air conditioners and room air-conditioning heat pumps; central air conditioners; spot air conditioners; vented gas space heaters; gas pool heaters; plumbing fittings and plumbing fixtures; fluorescent lamp ballasts; lamps; emergency lighting; traffic signal modules; dishwaters; clothes washers and dryers; cooking products; electric motors; low voltage dry-type distribution transformers; power supplies; televisions and consumer audio and video equipment; and battery charger systems. Title 20 presents protocols for testing for each type of appliance covered under the regulations and appliances must meet the standards for energy performance, energy design, water performance, and water design. Title 20 contains the following three types of standards for appliances: federal and state standards for federally regulated appliances, state standards for federally regulated appliances, and state standards for non-federally regulated appliances.

Mobile Sources

AB 1493. In a response to the transportation sector accounting for more than half of California's CO_2 emissions, AB 1493 (Pavley) was enacted in July 2002. AB 1493 required CARB to set GHG emission standards for passenger vehicles, light-duty trucks, and other vehicles determined by the state board to be vehicles that are primarily used for noncommercial personal transportation in the state. The bill required that CARB set GHG emission standards for motor vehicles manufactured in 2009 and all subsequent model years. CARB adopted the standards in September 2004. When fully phased in, the near-term (2009–2012) standards will result in a reduction of about 22% in GHG emissions compared to the emissions from the 2002 fleet, while the mid-term (2013–2016) standards will result in a reduction of about 30%.

EO S-1-07. Issued on January 18, 2007, EO S-1-07 sets a declining Low Carbon Fuel Standard for GHG emissions measured in CO_2E grams per unit of fuel energy sold in California. The target of the Low Carbon Fuel Standard is to reduce the carbon intensity of California passenger vehicle fuels by at least 10% by 2020. The carbon intensity measures the amount of GHG emissions in the lifecycle of a fuel, including extraction/feedstock production, processing, transportation, and final consumption, per unit of energy delivered. CARB adopted the implementing regulation in April 2009. The regulation is expected to increase the production of

[2] See CPUC's California's Zero Net Energy Policies and Initiatives (CPUC 2013). It is expected that achievement of the zero net energy goal will occur via revisions to the Title 24 standards.

biofuels, including those from alternative sources, such as algae, wood, and agricultural waste. In addition, the Low Carbon Fuel Standard would drive the availability of plug-in hybrid, battery electric, and fuel-cell power motor vehicles. The Low Carbon Fuel Standard is anticipated to lead to the replacement of 20% of the fuel used in motor vehicles with alternative fuels by 2020.

SB 375. SB 375 (Steinberg) (September 2008) addresses GHG emissions associated with the transportation sector through regional transportation and sustainability plans. SB 375 required CARB to adopt regional GHG reduction targets for the automobile and light-truck sector for 2020 and 2035. Regional metropolitan planning organizations are then responsible for preparing a Sustainable Communities Strategy (SCS) within their Regional Transportation Plan (RTP). The goal of the SCS is to establish a forecasted development pattern for the region that, after considering transportation measures and policies, will achieve, if feasible, the GHG reduction targets. If an SCS is unable to achieve the GHG reduction target, a metropolitan planning organization must prepare an Alternative Planning Strategy demonstrating how the GHG reduction target would be achieved through alternative development patterns, infrastructure, or additional transportation measures or policies.

Pursuant to Government Code Section 65080(b)(2)(K), a sustainable communities strategy does not: (i) regulate the use of land; (ii) supersede the land use authority of cities and counties; or (iii) require that a city's or county's land use policies and regulations, including those in a general plan, be consistent with it. Nonetheless, SB 375 makes regional and local planning agencies responsible for developing those strategies as part of the federally required metropolitan transportation planning process and the state-mandated housing element process.

In 2010, CARB adopted the SB 375 targets for the regional metropolitan planning organizations. The targets for the San Diego Association of Governments (SANDAG) are a 7% reduction in emissions per capita by 2020 and a 13% reduction by 2035.

SANDAG completed and adopted its *2050 Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS) in October 2011 (SANDAG 2011). In November 2011, CARB, by resolution, accepted SANDAG's GHG emissions quantification analysis and determination that, if implemented, the SCS would achieve CARB's 2020 and 2035 GHG emissions reduction targets for the region.

After SANDAG's 2050 RTP/SCS was adopted, a lawsuit was filed by the Cleveland National Forest Foundation and others. In November 2014, Division One of the Fourth District Court of Appeal issued its decision in *Cleveland National Forest Foundation v. SANDAG*, Case No. D063288. In its decision, the Fourth District held that SANDAG abused its discretion when it certified the environmental impact report (EIR) for the 2050 RTP/SCS because it did not adequately analyze and mitigate GHG emission levels after year 2020. The 2050 RTP/SCS

EIR complied with CARB's AB 32–related GHG reduction target through 2020, but the EIR found that plan-related emissions would substantially increase after 2020 and through 2050. The majority of the Fourth District in the *Cleveland National* decision found SANDAG's EIR deficient because, although the EIR used three significance thresholds authorized by CEQA Guidelines, Section 15064.4(b), it did not assess the 2050 RTP/SCS's consistency with the 2050 GHG emissions goal identified in EO S-03-05, which the majority construed as "state climate policy." The Fourth District did not require the set aside of SANDAG's 2050 RTP/SCS itself. In March 2015, the California Supreme Court granted SANDAG's petition for review of the Fourth District's decision (Case No. S223603), and the matter currently is pending before the state's highest court.

Although the EIR for SANDAG's 2050 RTP/SCS is still pending before the California Supreme Court, SANDAG recently adopted the next iteration of its RTP/SCS in accordance with statutorily mandated timelines. More specifically, in October 2015, SANDAG adopted San Diego Forward: The Regional Plan. Like the 2050 RTP/SCS, this planning document meets CARB's 2020 and 2035 reduction targets for the region (SANDAG 2015).

Advanced Clean Cars Program. In January 2012, CARB approved the Advanced Clean Cars program, a new emissions-control program for model years 2015 through 2025. The program combines the control of smog- and soot-causing pollutants and GHG emissions into a single coordinated package. The package includes elements to reduce smog-forming pollution, reduce GHG emissions, promote clean cars, and provide the fuels for clean cars (CARB 2012). To improve air quality, CARB has implemented new emission standards to reduce smog-forming emissions beginning with 2015 model year vehicles. It is estimated that in 2025, cars will emit 75% less smog-forming pollution than the average new car sold today. To reduce GHG emissions, CARB, in conjunction with the EPA and the NHTSA, has adopted new GHG standards for model year 2017 to 2025 vehicles; the new standards are estimated to reduce GHG emissions by 34% in 2025. The zero-emission vehicle program will act as the focused technology of the Advanced Clean Cars program by requiring manufacturers to produce increasing numbers of zero-emission vehicles and plug-in hybrid electric vehicles in the 2018 to 2025 model years. The Clean Fuels Outlet regulation will ensure that fuels such as electricity and hydrogen are available to meet the fueling needs of the new advanced technology vehicles as they come to the market.

EO B-16-12. EO B-16-12 (March 2012) directs state entities under the Governor's direction and control to support and facilitate development and distribution of zero-emission vehicles. This EO also sets a long-term target of reaching 1.5 million zero-emission vehicles on California's roadways by 2025. On a statewide basis, EO B-16-12 also establishes a GHG emissions reduction target from the transportation sector equaling 80% less than 1990 levels by 2050.

Renewable Energy and Energy Procurement

SB 1078. SB 1078 (Sher) (September 2002) established the Renewable Portfolio Standard (RPS) program, which requires an annual increase in renewable generation by the utilities equivalent to at least 1% of sales, with an aggregate goal of 20% by 2017. This goal was subsequently accelerated, requiring utilities to obtain 20% of their power from renewable sources by 2010 (see SB 107, EOs S-14-08, and S-21-09.)

SB 1368. In September 2006, Governor Schwarzenegger signed SB 1368, which requires the CEC to develop and adopt regulations for GHG emission performance standards for the long-term procurement of electricity by local publicly owned utilities. These standards must be consistent with the standards adopted by the CPUC. This effort will help protect energy customers from financial risks associated with investments in carbon-intensive generation by allowing new capital investments in power plants whose GHG emissions are as low as or lower than new combined-cycle natural gas plants by requiring imported electricity to meet GHG performance standards in California and by requiring that the standards be developed and adopted in a public process.

EO S-14-08. EO S-14-08 (November 2008) focuses on the contribution of renewable energy sources to meet the electrical needs of California while reducing the GHG emissions from the electrical sector. This EO requires that all retail suppliers of electricity in California serve 33% of their load with renewable energy by 2020. Furthermore, the EO directs state agencies to take appropriate actions to facilitate reaching this target. The California Natural Resources Agency, through collaboration with the CEC and California Department of Fish and Wildlife (formerly the California Department of Fish and Game), is directed to lead this effort. Pursuant to a Memorandum of Understanding between the CEC and California Department of Fish and Wildlife regarding creating the Renewable Energy Action Team, these agencies will create a "one-stop" process for permitting renewable energy power plants.

EO S-21-09. EO S-21-09 (September 2009) directed CARB to adopt a regulation consistent with the goal of EO S-14-08 by July 31, 2010. CARB is further directed to work with the CPUC and CEC to ensure that the regulation builds upon the RPS program and is applicable to investor-owned utilities, publicly owned utilities, direct access providers, and community choice providers. Under this order, CARB is to give the highest priority to those renewable resources that provide the greatest environmental benefits with the least environmental costs and impacts on public health and can be developed the most quickly in support of reliable, efficient, cost-effective electricity system operations. On September 23, 2010, CARB adopted regulations to implement a Renewable Electricity Standard, which would achieve the goal of the EO with the following intermediate and final goals: 20% for 2012–2014, 24% for 2015–2017, 28% for 2018–2019, and 33% for 2020 and beyond. Under the regulation, wind; solar; geothermal; small

hydroelectric; biomass; ocean wave, thermal, and tidal; landfill and digester gas; and biodiesel would be considered sources of renewable energy. The regulation would apply to investor-owned utilities and public (municipal) utilities. The Renewable Electricity Standard did not go into effect as SB X1 2 superseded it as discussed below.

SB X1 2. SB X1 2 (April 2011) expanded the RPS by establishing a goal of 20% of the total electricity sold to retail customers in California per year by December 31, 2013, and 33% by December 31, 2020, and in subsequent years. Under the bill, a renewable electrical generation facility is one that uses biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts or less, digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current, and that meets other specified requirements with respect to its location. In addition to the retail sellers covered by SB 107, SB X1 2 adds local, publicly owned electric utilities to the RPS. By January 1, 2012, the CPUC is required to establish the quantity of electricity products from eligible renewable energy resources to be procured by retail sellers to achieve targets of 20% by December 31, 2013; 25% by December 31, 2016; and 33% by December 31, 2020. The statute also requires that the governing boards for local, publicly owned electric utilities establish the same targets, and the governing boards would be responsible for ensuring compliance with these targets. The CPUC will be responsible for enforcement of the RPS for retail sellers, while the CEC and CARB will enforce the requirements for local publicly owned electric utilities.

SB 350. SB 350 (October 2015) expands the RPS by establishing a goal of 50% of the total electricity sold to retail customers in California per year by December 31, 2030. In addition, SB 350 includes the goal to double the energy efficiency savings in electricity and natural gas final end uses (such as heating, cooling, lighting, or class of energy uses on which an energy-efficiency program is focused) of retail customers through energy conservation and efficiency. The bill also requires the CPUC, in consultation with the CEC, to establish efficiency targets for electrical and gas corporations consistent with this goal. SB 350 also provides for the transformation of the California Independent System Operator into a regional organization to promote the development of regional electricity transmission markets in the western states and to improve the access of consumers served by the California Independent System Operator to those markets, pursuant to a specified process.

Water

EO B-29-15. In response to the ongoing drought in California, EO B-29-15 (April 2015) set a goal of achieving a statewide reduction in potable urban water usage of 25% relative to water use in 2013. The term of the EO extended through February 28, 2016, although many of the directives have become permanent water-efficiency standards and requirements. The EO includes specific directives that set strict limits on water usage in the state. In response to EO B-

29-15, the California Department of Water Resources has modified and adopted a revised version of the Model Water Efficient Landscape Ordinance that, among other changes, significantly increases the requirements for landscape water use efficiency and broadens its applicability to include new development projects with smaller landscape areas.

Solid Waste

AB 939 and AB 341. In 1989, AB 939, known as the Integrated Waste Management Act (California Public Resources Code Section 40000 et seq.), was passed because of the increase in waste stream and the decrease in landfill capacity. The statute established the California Integrated Waste Management Board, which oversees a disposal reporting system. AB 939 mandated a reduction of waste being disposed where jurisdictions were required to meet diversion goals of all solid waste through source reduction, recycling, and composting activities of 25% by 1995 and 50% by the year 2000.

AB 341 (Chapter 476, Statutes of 2011 (Chesbro)) amended the California Integrated Waste Management Act of 1989 to include a provision declaring that it is the policy goal of the state that not less than 75% of solid waste generated be source-reduced, recycled, or composted by the year 2020, and annually thereafter. In addition, AB 341 required the California Department of Resources Recycling and Recovery (CalRecycle) to develop strategies to achieve the state's policy goal. CalRecycle conducted several general stakeholder workshops and several focused workshops and in August 2015 published a discussion document titled AB 341 Report to the Legislature, which identifies five priority strategies that CalRecycle believes would assist the state in reaching the 75% goal by 2020, legislative and regulatory recommendations, and an evaluation of program effectiveness.

Increasing the amount of commercial solid waste that is recycled, reused, or composted will reduce GHG emissions primarily by (1) reducing the energy requirements associated with the extraction, harvest, and processing of raw materials; and (2) using recyclable materials that require less energy than raw materials to manufacture finished products (CalRecycle 2015). Increased diversion of organic materials (green and food waste) will also reduce GHG emissions (CO_2 and CH_4) resulting from decomposition in landfills by redirecting this material to processes that use the solid waste material to produce vehicle fuels, heat, electricity, or compost.

Other State Regulations and Goals

EO S-13-08. EO Order S-13-08 (November 2008) is intended to hasten California's response to the impacts of global climate change, particularly sea-level rise. It directs state agencies to take specified actions to assess and plan for such impacts. It directed the California Natural Resources Agency, in cooperation with the California Department of Water Resources, CEC, California's

coastal management agencies, and the Ocean Protection Council, to request that the National Academy of Sciences prepare a Sea Level Rise Assessment Report by December 1, 2010. The Ocean Protection Council, California Department of Water Resources, and CEC, in cooperation with other state agencies, were required to conduct a public workshop to gather information relevant to the Sea Level Rise Assessment Report. The Business, Transportation, and Housing Agency was ordered to assess within 90 days of issuance of the EO the vulnerability of the state's transportation systems to sea-level rise. The Governor's Office of Planning and Research and the California Natural Resources Agency are required to provide land use planning guidance related to sea-level rise and other climate change impacts. The EO also required the other state agencies to develop adaptation strategies by June 9, 2009, to respond to the impacts of global climate change that are predicted to occur over the next 50 to 100 years. A discussion draft adaptation strategies report was released in August 2009, and the final 2009 California Climate Adaptation Strategy report was issued in December 2009 (NRA 2009). An update to the 2009 report, Safeguarding California: Reducing Climate Risk, was issued in July 2014 (NRA 2014). To assess the state's vulnerability, the report summarizes key climate change impacts to the state for the following areas: agriculture, biodiversity and habitat, emergency management, energy, forestry, ocean and coastal ecosystems and resources, public health, transportation, and water.

2015 State of the State Address. In January 2015, Governor Brown in his inaugural address and annual report to the Legislature established supplementary goals which would further reduce GHG emissions over the next 15 years. These goals include an increase in California's renewable energy portfolio from 33% to 50%, a reduction in vehicle petroleum use for cars and trucks by up to 50%, measures to double the efficiency of existing buildings, and decreasing emissions associated with heating fuels.

2016 State of the State Address. In his January 2016 address, Governor Brown established a statewide goal to bring per-capita GHG emissions down to 2 tons per person, which reflects the goal of the Global Climate Leadership Memorandum of Understanding (Under 2 MOU; OPR 2016) to limit global warming to less than 2°C by 2050. The Under 2 MOU agreement pursues emission reductions of 80% to 95% below 1990 levels by 2050 and/or reach a per-capita annual emissions goal of less than 2 MT by 2050. A total of 135 jurisdictions representing 32 countries and 6 continents, including California, have signed or endorsed the Under 2 MOU (OPR 2016).

Local Plans

City of San Diego General Plan

The State of California requires cities and counties to prepare and adopt a general plan to set out a long-range vision and comprehensive policy framework for its future. The state also mandates that the plan be updated periodically to ensure relevance and utility. The City of San

Diego General Plan 2008 (General Plan) was unanimously adopted by the City Council on March 10, 2008, with additional amendments approved in December 2010, January 2012, and June 2015. The General Plan builds upon many of the goals and strategies of the former 1979 General Plan, in addition to offering new policy direction in the areas of urban form, neighborhood character, historic preservation, public facilities, recreation, conservation, mobility, housing affordability, economic prosperity, and equitable development. It recognizes and explains the critical role of the community planning project as the vehicle to tailor the City of Villages strategy for each neighborhood. It also outlines the plan amendment process, and other implementation strategies, and considers the continued growth of the City beyond the year 2020 (City of San Diego 2015a).

Conservation Element. The Conservation Element contains policies to guide the conservation of resources that are fundamental components of San Diego's environment, that help define the City's identity, and that are relied upon for continued economic prosperity. The purpose of this element is to help the City become an international model of sustainable development and conservation and to provide for the long-term conservation and sustainable management of the rich natural resources that help define the City's identity, contribute to its economy, and improve its quality of life.

The City has also adopted the following General Plan Conservation Element policies (City of San Diego 2008) related to climate change:

- **CE-A.2.** Reduce the City's carbon footprint. Develop and adopt new or amended regulations, projects, and incentives as appropriate to implement the goals and policies set forth in the General Plan to:
    - Create sustainable and efficient land use patterns to reduce vehicular trips and preserve open space;
    - Reduce fuel emission levels by encouraging alternative modes of transportation and increasing fuel efficiency;
    - Improve energy efficiency, especially in the transportation sector and buildings and appliances;
    - Reduce the Urban Heat Island effect through sustainable design and building practices, as well as planting trees (consistent with habitat and water conservation policies) for their many environmental benefits, including natural carbon sequestration;
    - Reduce waste by improving management and recycling projects;
    - Plan for water supply and emergency reserves.

- **CE-A.8.** Reduce construction and demolition waste in accordance with Public Facilities Element, Policy PF-1.2, or by renovating or adding on to existing buildings, rather than constructing new buildings.
- **CE-A.9.** Reuse building materials, use materials that have recycled content, or use materials that are derived from sustainable or rapidly renewable sources to the extent possible, through factors including:
    - Scheduling time for deconstruction and recycling activities to take place during project demolition and construction phases;
    - Using life cycle costing in decision-making for materials and construction techniques. Life cycle costing analyzes the costs and benefits over the life of a particular product, technology, or system.
- **CE-F.3.** Continue to use methane as an energy source from inactive and closed landfills.
- **CE-I.4.** Maintain and promote water conservation and waste diversion projects to conserve energy.
- **CE-I.5.** Support the installation of photovoltaic panels, and other forms of renewable energy production.
    - Seek funding to incorporate renewable energy alternatives in public buildings.
    - Promote the use and installation of renewable energy alternatives in new and existing development.
- **CE-I.10.** Use renewable energy sources to generate energy to the extent feasible.

City of San Diego Climate Action Plan

On January 29, 2002, the San Diego City Council unanimously approved the San Diego Sustainable Community Program. Actions identified include:

1. Participation in the Cities for Climate Protection program coordinated through the International Council of Local Environmental Initiatives;
2. Establishment of a 15% GHG reduction goal set for 2010, using 1990 as a baseline; and
3. Direction to use the recommendations of a scientific Ad Hoc Advisory Committee as a means to improve the GHG Emission Reduction Action Plan within the City organization and to identify additional community actions.

In 2005, the City released a Climate Protection Action Plan. This report includes many of the recommendations provided by the Ad Hoc Advisory Committee and City staff. By implementing these recommendations, the City could directly address the challenges relating to

mitigation for state and federal ozone standards nonattainment (with associated health benefits) and enhanced economic prosperity, specifically related to the tourism and agricultural sectors.

The Climate Protection Action Plan evaluated citywide GHG emissions, particularly three contentions: (1) the GHG projection in 2010 resulting from no action taken to curb emissions; (2) the GHG emission reductions due to City of San Diego actions implemented between 1990 and 2003; and, (3) the GHG reductions needed by 2010 to achieve 15% reduction. The Climate Protection Action Plan does not recommend or require specific strategies or measures for projects within the City to reduce emissions.

In December 2015, the City adopted its final Climate Action Plan (CAP) (City of San Diego 2015b). A Program EIR was prepared for the City's Draft CAP, which was certified in December 2015. With implementation of the CAP, the City aims to reduce emissions 15% below the baseline to approximately 11.1 MMT CO_2E by 2020, 40% below the baseline to approximately 7.8 MMT CO_2E by 2030, and 50% below the baseline to approximately 6.5 MMT CO_2E by 2035. It is anticipated that the City would exceed its reduction target by 1.3 MMT CO_2E in 2020, 176,528 MT CO_2E in 2030, and 127,135 MT CO_2E in 2035 with implementation of the CAP. The CAP relies on significant City and regional actions, continued implementation of federal and state mandates, and five local strategies with associated action steps for target attainment. The City has identified the following five strategies to reduce GHG emissions to achieve the 2020 and 2035 targets:

1. Energy and water efficient buildings;
2. Clean and renewable energy;
3. Bicycling, walking, transit, and land use;
4. Zero waste (gas and waste management); and
5. Climate resiliency.

Implementation of the CAP is divided into three actions:

- Early Actions (Adoption of the CAP–December 31, 2017)
- Mid-Term Actions (January 1, 2018–December 31, 2020)
- Longer-Term Actions (2021–2035)

The CAP contains five chapters: Background, Reducing Emissions, Implementation and Monitoring, Social Equity and Job Creation, and Adaptation. The 2015 CAP demonstrates to San Diego businesses and residents that the City acknowledges the existing and potential impacts of a changing climate and is committed to keeping it in the forefront of decision-making. Successful

implementation of the CAP will: (1) prepare for anticipated climate change impacts in the coming decades, (2) help the State of California achieve its reduction target by contributing the City's fair share of GHG reductions, and (3) have a positive impact on the regional economy.

Through 2020, the CAP meets the requirements set forth in CEQA Guidelines Section 15183.5, whereby a lead agency (e.g., the City of San Diego) may analyze and mitigate the significant effects of GHG emissions at a programmatic level, such as in a general plan, a long-range development plan, or a separate plan to reduce GHG emissions.

On July 12, 2016, The City amended the CAP to include a Consistency Review Checklist, which is intends to provide a streamlined review process for the GHG emissions analysis of proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to CEQA. The checklist is part of the CAP and contains measures that are required to be implemented on a project-by-project basis to ensure that the specified emissions targets identified in the CAP are achieved. Implementation of these measures would ensure that new development is consistent with the CAP's assumptions for relevant CAP strategies toward achieving the identified GHG reduction targets. Projects that are consistent with the CAP as determined through the use of this checklist may rely on the CAP for the cumulative impacts analysis of GHG emissions. Projects that are not consistent with the CAP must prepare a comprehensive project-specific analysis of GHG emissions, including quantification of existing and projected GHG emissions and incorporation of the measures in this checklist to the extent feasible. Cumulative GHG impacts would be significant for any project that is not consistent with the CAP.

4 THRESHOLDS OF SIGNIFICANCE

The California Natural Resources Agency, through its December 2009 amendments to the CEQA Guidelines (14 CCR 15000 et seq.), and the City of San Diego, through its interim guidance for assessment of GHG emissions, provide a framework for the evaluation of the GHG emissions associated with construction and operation of the Project components. The state's and City's guidance are discussed in the following sections.

4.1 State of California

The State of California has developed guidelines to address the significance of climate change impacts based on Appendix G of the CEQA Guidelines, which provides guidance that a project would have a significant environmental impact if it would:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment
2. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Neither the State of California nor the San Diego Air Pollution Control District (SDAPCD) has adopted emission-based thresholds for GHG emissions under CEQA. The Office of Planning and Research's (OPR's) Technical Advisory titled CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review states that "public agencies are encouraged but not required to adopt thresholds of significance for environmental impacts. Even in the absence of clearly defined thresholds for GHG emissions, the law requires that such emissions from CEQA projects must be disclosed and mitigated to the extent feasible whenever the lead agency determines that the project contributes to a significant, cumulative climate change impact" (OPR 2008). Furthermore, the advisory document indicates in the third bullet item on page 6 that "in the absence of regulatory standards for GHG emissions or other scientific data to clearly define what constitutes a 'significant impact,' individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice."

4.2 City of San Diego

The City of San Diego's latest update to the CEQA Significance Determination Thresholds document in July 2016 added a GHG emissions threshold section. Pursuant to CEQA Guidelines Sections 15183.5(b), 15064(h)(3), and 15130(d), the City may determine that a project's incremental contribution to a cumulative GHG effect is not cumulatively considerable if the project complies with the requirements of a previously adopted GHG emission reduction plan.

CEQA Guidelines Section 15183.5(b)(1)(A-F) specifically provides that a GHG emissions reduction plan should:

A. Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;

B. Establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable;

C. Identify and analyze the greenhouse gas emissions resulting from specific actions or categories of actions anticipated within the geographic area;

D. Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;

E. Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels; and

F. Be adopted in a public process following environmental review.

An environmental document that relies on a GHG emissions reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project (CEQA Guidelines Section 15183.5(b)(2)).

The City's CAP was adopted by the City Council on December 15, 2015. The CAP quantifies existing GHG emissions as well as projected emissions for the years 2020, 2030, and 2035 resulting from activities within the City's jurisdiction. The CAP also identifies City target emissions levels, below which the citywide GHG impacts would be less than significant. The CAP and the accompanying certified Final EIR also identify and analyze the GHG emissions that would result from the bBAU scenario for the years 2020, 2030, and 2035. The CAP includes a monitoring and reporting program to ensure its progress toward achieving the specified GHG emissions reductions, and specifies 17 actions that if implemented, would achieve the specified GHG emissions reductions targets. The CAP was adopted in a public process following certification of the Final EIR. Subsequent to the adoption of the CAP, the City has also established additional specific measures that if implemented on a project-by-project basis, would further ensure that the City as a whole achieves the specified GHG emissions reduction targets in the CAP.

The CAP has been developed in response to state legislation and policies that are aimed at reducing California's GHG emissions. Consistent with AB 32 and the CARB Scoping Plan, the CAP sets a GHG target for 2020 equivalent to 15% below the City's 2010 baseline emissions to ensure that it meets its proportional share of the 2020 AB 32 reductions. For 2035, the CAP

sets a GHG target equivalent to a 50% reduction from baseline emissions to ensure it is on the trajectory toward achieving its proportional share of the 2050 state target identified in EO S-3-05. The 2035 target also ensures that the City would be consistent with the 2030 state target identified in EO B-30-15. Since CARB has not provided guidance on a specific reduction target for local governments to use for 2030 and 2050, it was determined that a 50% reduction from baseline emissions by 2035 would ensure that the City achieved a proportional share of the statewide GHG reductions. In terms of consistency with EOs S-3-05 and B-30-15, the CAP's 2035 target provides a conservative target toward achieving the statewide reductions. If CARB provides new guidance on how cities should address the 2030 targets, the City will adjust the CAP accordingly.

Under the City's CEQA Thresholds, the method for determining significance for project-level environmental documents is through the CAP Consistency Checklist (City of San Diego 2015b). The CAP Consistency Checklist, adopted July 12, 2016, is the primary document used by the City of San Diego to ensure project-by-project consistency with the underlying assumptions in the CAP and that the City would achieve its emissions reduction targets identified in the CAP. The CAP Checklist includes a three-step process to determine project consistency (City of San Diego 2015b). Step 1 consists of an evaluation to determine the project's consistency with existing General Plan, Community Plan, and zoning designations for the site. If the project is able to answer "yes" to Step 1 and demonstrate the project would be consistent with existing General Plan, Community Plan, and zoning designations for the site, or the project can demonstrate consistency with existing land uses by comparing the North City Project's GHG emissions with those that would be generated under existing land uses, then the project may proceed to Step 2. If the project must answer "no" to Step 1, then the project would be deemed inconsistent with the CAP, and GHG impacts as identified under CEQA would be considered significant and unavoidable.

Step 2 includes the list of measures each project would be required to implement. Regardless of whether the project would answer "yes" or "no" to Step 1, implementation of the measures listed in Step 2 would be required for all projects, if applicable.

Step 3 would only be applicable for projects that would not be consistent with existing land use designations and would not be consistent with planned site land use GHG emissions, but that would be located in a Transit Priority Area (TPA) as defined by the City's Development Services Department. In accordance with SB 743, a TPA is defined as "an area within one-half mile of a major transit stop that is existing or planned, if the planned stop is scheduled to be completed within the planning horizon included in a Transportation Improvement Program adopted pursuant to Section 450.216 or 450.322 of Title 23 of the Code of Federal Regulations (City of San Diego 2016b). Appendix B, "Transit Priority Areas per SB 743," of the CAP includes a map of TPAs as designated by the City. The TPAs map is based on the adopted SANDAG San Diego Forward Regional Plan.

4.3 NEPA Considerations

The Bureau of Reclamation considers the consistency of a proposed project with federal guidance concerning the evaluation and reduction of GHG emissions. There are no federal significance criteria established for GHG emissions; however, CEQ recommends evaluating an action in several contexts and the severity of the impact (CEQ 2016). Additionally, based on CEQ recommendation, a project would result in a significant impact if it would exacerbate the adverse effects of climate change or result in a substantial increase in exposure to these effects. Accordingly, the Mandatory Greenhouse Gas Reporting Rule threshold of 25,000 MT CO_2E per year is used as a level at which potentially adverse effects would occur.

5 IMPACTS

5.1 Generate Greenhouse Gas Emissions, Either Directly or Indirectly, That May Have a Significant Impact on the Environment

5.1.1 Construction Impacts

5.1.1.1 General Approach and Methodology

GHG emissions would be associated with the construction phase of the North City Project components through use of construction equipment and vehicle trips. Emissions of CO_2 were estimated using CalEEMod, Version 2016.3.1, available online (www.caleemod.com). For the purposes of modeling, it was assumed that construction of Project components would commence in November 2018 and final facilities may come online as late as 2021. It is anticipated that the 30 MGD "buildout" of the Project would be completed during this time.

Table 5.1-1 provides the construction timeline and potential phasing of the components that would come online to achieve the target milestones. The construction schedule has been developed based on available information provided by the City, typical construction practices, and best engineering judgment. Construction phasing is intended to represent a schedule of anticipated activities for use in estimating potential Project-generated construction emissions.

Table 5.1-1
North City Construction Phasing Assumptions

Project Component	Construction Start Date	Construction End Date
Project Components Common to Alternatives		
NCWRP Expansion	10/1/2018	12/6/2021
NCPWF Influent Pump Station	1/7/2019	10/21/2021
Morena Pump Station and Pipelines	4/2/2019	10/7/2021
MBC Improvements	4/24/2019	10/20/2021
North City Pump Station	5/21/2019	11/22/2021
NCPWF	10/1/2018	11/4/2021
North City Renewable Energy Facility	3/2/2020	12/5/2021
Landfill Gas Pipeline	3/2/2020	10/5/2021
Miramar Reservoir Alternative		
North City Pipeline	11/14/2018	10/22/2021
Dechlorination Facility	1/7/2019	10/22/2021
Miramar WTP Improvements	7/24/2020	9/21/2021
San Vicente Reservoir Alternative		
San Vicente Pipeline	12/3/2018	5/18/2021
Mission Trails Booster Station	5/9/2019	9/13/2021

Equipment mix for construction of the North City Project was provided by the Project applicant. The equipment mix assumptions were based on Project design documents, review of related projects conducted in the Southern California area, and CalEEMod default equipment, where appropriate. The equipment mix is meant to represent a reasonably conservative estimate of construction activity. For the analysis, it is generally assumed that heavy construction equipment would be operating at the site for approximately 8 hours per day, 5 days per week. Default assumptions provided in CalEEMod were utilized to determine worker trips for each potential construction phase during pipeline, pump station, and facility construction. Generally, one worker per piece of construction equipment, a foreman, and several additional workers would be anticipated on a daily basis. Additionally, it was assumed that approximately two vendor trucks per day would be required for general material deliveries, and approximately five haul trucks per day would be required for backfill/slurry deliveries and soil export. The default CalEEMod trip distance for construction vehicles was assumed, which was a one-way distance of 10.8 miles for worker trips, 7.3 miles for vendor trips, and 20 miles for haul trips. To conservatively estimate potential daily emissions, it was assumed pipelines and force main facilities would be constructed simultaneously with other construction components including pump stations and treatment facilities.

Pipelines

Pipeline construction would require both open-trench construction and trenchless tunneling depending on the location of the pipeline to be installed. A description of construction activities and equipment associated with each of these methods is provided.

Open Trench

Open-trench construction would involve an open trench to be dug for the direct installation of pipeline. The sequence of activities for open-trench pipeline construction would typically commence with trenching and excavation, followed by pipe installation and covering of the installed pipe, and concluding with paving the pipeline corridor area of disturbance. For the purposes of quantifying emissions from daily construction activity associated with pipeline construction, it was assumed that each contractor would complete construction of approximately 75 linear feet of pipeline per day; however, daily activity and linear feet installed would vary depending on field conditions, site/easement access, and other factors associated with continual site location changes. Assuming concurrent construction by two contractors, approximately 200 to 150 linear feet of pipeline installation could occur each day depending on the component under construction and total linear feet of pipeline or conveyance infrastructure to be constructed over a given period.[3] For the purposes of modeling, it was assumed that paving activities would

[3] Linear feet per day assumptions based on typical construction practices for pipeline construction, and review of related projects.

occur for approximately 2 weeks every 6 months over a given construction period throughout the pipeline installation phases. It was also assumed that after pipe installation is completed, a portion of the paved roads would require light grading and reapplication of pavement, which was assumed to occur during the last month of pipeline construction for each Project component. In addition, for the purposes of estimating emissions, it was assumed that typical open trench construction phasing would occur as follows:

- Trenching and excavation would be ongoing throughout pipeline construction phase.
- Pipe installation would occur intermittently as trenching and excavation activities occur throughout the pipeline construction phase.
- Paving, intermittent, would occur for approximately 2 weeks every 6 months for duration of pipeline construction.
- Final paving would occur for 1 month at the end of the construction phase.

Due to the length of the alignment, it was assumed that two contractors would potentially be required for construction of the North City Project.

Trenchless Tunneling

Trenchless tunneling would involve the excavation of a portal at either end of the pipeline segment to be installed, where the pipeline would be fed through and connected. The sequence of activities for trenchless tunneling construction would typically commence with site preparation of the first portal location followed by excavation of the portal. Excavation of the tunnel would occur following portal excavation. It is assumed all excavated material would be hauled off site. The second portal location would then be prepped and excavated. Installation of pipeline would occur once the tunnel has been fully excavated and portals are clear. The pipeline would then be connected, and the portal sites would be restored to their pre-construction condition. Trenchless tunneling practices would be employed for the specific segments of other pipeline alignments such as freeway or waterway crossings or within avoidance areas where ground disturbance (i.e., an open trench) is not permitted such as wetlands or other environmentally sensitive locations.

For the purposes of estimating emissions, it was assumed that typical construction phasing would occur as follows during tunneling:

- Site preparation at first portal site
- Excavation of first portal site
- Tunnel excavation
- Site preparation at second portal site

- Excavation of second portal site
- Pipeline installation
- Pipeline connection
- Site restoration

Pump Stations and Treatment Facilities

For the purposes of estimating emissions, construction timelines vary based on the type of feature and are summarized in the following tables.

5.2 Common Project Components

5.2.1 North City Water Reclamation Plant Expansion

To ensure the 30 MGD of pure water can be produced at the NCPWF, the NCWRP will undergo an expansion of the primary, secondary, and tertiary treatment processes, as well as the corresponding support systems. The proposed construction equipment for the NCWRP Expansion is shown in Table 5.2-1.

Table 5.2-1
Construction Scenario Assumptions – NCWRP Expansion

Construction Phase (Duration)	One-way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Demolition (107 days)	16	0	0	Saws	1	8
				Dumpers/Tenders	1	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
Grading/trenching (150 days)	16	0	1,009	Dumpers/Tenders	2	8
				Excavators	2	8
				Plate Compactors	2	8
Building construction (428 days)	102	40	0	Cement and Mortar Mixers	1	8
				Cranes	1	8
				Pumps	1	8
				Tractors/loaders/backhoes	1	8
				Welders	1	8
Paving (107 days)	16	0	0	Dumpers/Tenders	1	8
				Pavers	1	8
				Rollers	1	8

Table 5.2-1
Construction Scenario Assumptions – NCWRP Expansion

Construction Phase (Duration)	One-way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Architectural coating (107 days)	20	0	0	Air compressors	1	8
				Cranes	1	8

Source: See Appendix A for details.

5.2.2 North City Pure Water Facility Influent Pump Station

The NCPWF Influent Pump Station will be constructed at the NCWRP and will convey tertiary effluent from the NCWRP to the NCPWF. The NCPWF Influent Pump Station will have a maximum capacity of 42.5 MGD to enable the NCPWF to produce 30 MGD of purified water after accounting for recycle and other streams. The proposed construction equipment for the NCPWF Influent Pump Station and pipelines are shown in Table 5.2-2.

Table 5.2-2
Construction Scenario Assumptions – NCPWF Influent Pump Station

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Demolition (21 days)	10	0	0	Saws	1	8
				Dumpers/Tenders	2	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
Grading (97 days)	10	0	63	Dumpers/Tenders	2	8
				Excavators	2	8
				Plate Compactors	2	8
Building construction (260 days)	100	6	0	Cement and Mortar Mixers	1	8
				Cranes	1	8
				Pumps	1	8
				Tractors/loaders/backhoes	1	8
				Welders	1	8
Paving (80 days)	18	0	0	Dumpers/Tenders	1	8
				Pavers	1	8
				Rollers	1	8
Architectural coating (14 days)	6	0	0	Air compressors	1	8
				Cranes	2	8

Source: See Appendix A for details.

5.2.3 Morena Pump Station and Pipelines

Morena Pump Station

The Morena Pump Station and Wastewater Forcemain are proposed to deliver maximum flow of 37.7 MGD of raw wastewater to the NCWRP, expanding the NCWRP's production capacity from 30 MGD to 54 MGD in dry weather conditions. The assumed construction equipment for the Morena Pump Station is shown in Table 5.2-3.

Table 5.2-3
Construction Scenario Assumptions – Morena Pump Station

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Demolition (45 days)	14	0	0	Saws	1	8
				Dumpers/Tenders	2	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
Grading/trenching (90 days)	16	0	400	Dumpers/Tenders	2	8
				Excavators	2	8
				Plate Compactors	2	8
Building construction (180 days)	16	2	0	Cement and Mortar Mixers	1	8
				Cranes	1	8
				Pumps	1	8
				Tractors/loaders/backhoes	1	8
				Welders	1	8
Paving (14 days)	16	0	0	Paving Equipment	1	8
				Pavers	1	8
				Rollers	1	8
Architectural coating (7 days)	8	0	0	Air compressors	1	8
				Cranes	1	8

Source: See Appendix A for details.

Morena Pipelines

Off-site infrastructure of the pump station facility, excluding the Wastewater Forcemain and Brine/Centrate Line, consists of a storm drainage line, pump station inflow piping, overflow piping, and associated subgrade diversion structures. The proposed Morena Pipelines alignment and type of construction is shown in Table 5.2-4. The proposed construction equipment for the trenched portion of the Morena Pipelines is shown in Table 5.2-5, and the construction equipment for the tunneling sections of the Morena Pipelines is shown in Table 5.2-6.

Table 5.2-4
Morena Pipeline Alignment Summary

Segment	Horizontal Distance (LF)	Open Cut (LF)	Trenchless or Other Method (LF)
48-in forcemain and 24-in brine/centrate line	50,890	50,890	—
Tecolote Road Bridge and Creek	395	—	395
San Clemente Canyon Bridge	510	—	510
SR-52	1,510	—	1,510
MTS Railroad Tracks	300	—	300
Judicial Drive Intersection	290	—	290
I-805	1,100	—	1,100
Trenchless Subtotal	*4,105*	—	*4,105*
Total	**54,995 (10.4 miles)**	**50,890**	**4,105**

Notes: LF = linear feet; in = inch

Table 5.2-5
Construction Scenario Assumptions – Morena Pipelines Trenched Sections

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Trenching (200 days)	26	0	5,154	Excavators	2	8
				Rubber-Tired Dozers	2	8
				Tractors/Loaders/Backhoes	4	8
				Trenchers	2	8
Building construction (200 days)	16	2	0	Forklifts	2	8
				Cranes	2	8
				Tractors/Loaders/Backhoes	2	8
Paving (200 days)	16	0	0	Paving Equipment	2	8
				Pavers	2	8
				Rollers	2	8

Source: See Appendix A for details.

Table 5.2-6
Construction Scenario Assumptions – Morena Pipelines Trenchless Sections

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Site Preparation at Portal Sites (25 days)	8	0	0	Graders	1	8
				Scrapers	1	8
				Tractors/Loaders/Backhoes	1	8

Table 5.2-6
Construction Scenario Assumptions – Morena Pipelines Trenchless Sections

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Portal Excavation (150 days)	16	0	0	Crushing Equipment	1	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
				Tractors/Loaders/Backhoes	1	8
				Trenchers	1	8
Tunnel Excavation (190 days)	26	2	0	Crushing Equipment	1	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
				Tractors/Loaders/Backhoes	1	8
				Trenchers	1	8
Site Restoration (150 days)	4	0	0	Tractors/Loaders/Backhoes	1	8

Source: See Appendix A for details.

5.2.4 Metro Biosolids Center Improvements

Diverting additional wastewater flows to the NCWRP ultimately changes the relative contribution of biosolids received at the MBC from the NCWRP and the Point Loma WWTP. The anticipated construction details for the MBC improvements are shown in Table 5.2-7.

Table 5.2-7
Construction Scenario Assumptions – MBC Improvements

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Demolition (15 days)	10	0	0	Concrete/Industrial Saws	1	8
				Dumpers/Tenders	2	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
Grading (30 days)	10	0	0	Dumpers/Tenders	2	8
				Excavators	2	8
				Plate Compactors	2	8
Construction (200 days)	16	2	0	Cement and Mortar Mixers	1	8
				Cranes	1	8
				Pumps	1	8
				Tractors/Loaders/Backhoes	1	8
				Welders	1	8

Table 5.2-7
Construction Scenario Assumptions – MBC Improvements

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Paving (7 days)	18	2	0	Pavers	1	8
				Paving Equipment	1	8
				Rollers	1	8

Source: See Appendix A for details.

5.2.5 North City Pump Station

The North City Pump Station will be constructed on the same site as the NCPWF. Any grading associated with the NCPWF will be captured in that phase. The anticipated construction equipment for the North City Pump Station is shown in Table 5.2-8.

Table 5.2-8
Construction Scenario Assumptions – North City Pump Station

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Grading (15 days)	14	0	0	Excavators	1	8
				Rubber-Tired Dozers	2	8
				Tractors/Loaders/Backhoes	2	8
Trenching (50 days)	26	0	0	Concrete/Industrial Saws	1	8
				Excavators	2	8
				Off-Highway Trucks	1	8
				Rollers	2	8
				Tractors/Loaders/Backhoes	2	8
				Welders	2	8
Building construction (230 days)	26	2	0	Aerial Lifts	2	8
				Cranes	1	8
				Forklifts	2	8
				Rollers	1	8
				Tractors/Loaders/Backhoes	1	8
				Welders	2	8
Paving (5 days)	18	0	0	Crushing/Proc. Equipment	1	8
				Off-Highway Trucks	1	8
				Pavers	1	8
				Rollers	2	8
				Tractors/Loaders/Backhoes	2	8

Source: See Appendix A for details.

5.2.6 North City Renewable Energy Facility and Landfill Gas Pipeline

The proposed renewable energy facility will require construction of a main building for the six ICEs, a control equipment building, and storage building. The Project would also require the installation of a new 12-inch-diameter gas line from the City's Miramar Landfill to the NCWRP. The proposed construction equipment for the new renewable energy facility phase of the Project is shown in Table 5.2-9, and the construction scenario assumptions for the LFG Pipeline trenched and trenchless segments are provided in Tables 5.2-10 and 5.2-11.

Table 5.2-9
Construction Scenario Assumptions – North City Renewable Energy Facility

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Demolition (10 days)	10	0	14	Concrete/Industrial Saws	1	8
				Rubber-Tired Dozers	1	8
				Tractors/Loaders/Backhoes	2	8
Grading (10 days)	10	0	0	Concrete/Industrial Saws	1	8
				Rubber-Tired Dozers	1	8
				Tractors/Loaders/Backhoes	2	8
Building Construction (300 days)	8	4	0	Cranes	1	8
				Forklifts	2	8
				Tractors/Loaders/Backhoes	2	8
Paving (10 days)	18	0	0	Cement and Mortar Mixers	4	8
				Pavers	1	8
				Rollers	1	8
				Tractors/Loaders/Backhoes	1	8

Source: See Appendix A for details.

Table 5.2-10
Construction Scenario Assumptions – LFG Pipeline Trenched Sections

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Trenching (135 days)	26	0	50	Excavators	2	8
				Rubber-Tired Dozers	2	8
				Tractors/Loaders/Backhoes	4	8
				Trenchers	2	8
Pipeline Installation (135 days)	64	2	0	Cranes	2	8
				Forklifts	2	8
				Tractors/Loaders/Backhoes	2	8

Table 5.2-10
Construction Scenario Assumptions – LFG Pipeline Trenched Sections

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Paving (134 days)	16	0	0	Pavers	2	8
				Paving Equipment	2	8
				Rollers	2	8

Source: See Appendix A for details.

Table 5.2-11
Construction Scenario Assumptions – LFG Pipeline Trenchless Sections

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Site Preparation at Portal Sites (20 days)	8	0	0	Graders	1	8
				Scrapers	1	8
				Tractors/Loaders/Backhoes	1	8
Portal Excavation (120 days)	16	0	0	Crushing Equipment	1	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
				Tractors/Loaders/Backhoes	1	8
				Trenchers	1	8
Tunnel Excavation (157 days)	26	2	0	Crushing Equipment	1	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
				Tractors/Loaders/Backhoes	1	8
				Trenchers	1	8
Site Restoration (120 days)	4	0	0	Tractors/Loaders/Backhoes	1	8

Source: See Appendix A for details.

5.2.7 North City Pure Water Facility

The new NCPWF would be located on the vacant 8.7-acre City-owned lot across Eastgate Mall to the north of the NCWRP. Table 5.2-12 provides an overview of the various structures associated with the NCPWF, and Table 5.2-13 shows the proposed construction equipment associated with the Project phase.

Table 5.2-12
NCPWF Building Components

Building Name	Footprint (Square Feet)
O&M	15,500
Ozone Generating Building	5,795
Ozone Contactor	5,408.5
BAC Building	10,823
Process Building (includes MF, RO, UV/AOP)	112,500
Main Electrical Building	3,545
Liquid Oxygen Facility	1,680
RO Feed Tank	4,961
Product Water Tank	5,850
CO_2 System	795.6
Lime System	1,668.24
Chemical Systems	10,942.08
Total	**322,468.42**

Table 5.2-13
Construction Scenario Assumptions – NCPWF

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Mass grading (60 days)	36	0	1,125	Excavators	1	8
				Graders	2	8
				Off-Highway Trucks	1	8
				Plate Compactors	2	8
				Rubber-Tired Dozers	2	8
				Scrapers	4	8
				Tractors/Loaders/Backhoes	2	8
Finish grading (141 days)	18	0	1,125	Graders	1	8
				Off-Highway Trucks	1	8
				Plate Compactors	2	8
				Scrapers	1	8
				Tractors/Loaders/Backhoes	2	8
Building construction (563 days)	136	54	0	Aerial Lifts	2	8
				Cranes	2	8
				Forklifts	2	8
				Rollers	2	8
				Tractors/Loaders/Backhoes	2	8
				Welders	2	8

Table 5.2-13
Construction Scenario Assumptions – NCPWF

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Paving (10 days)	24	0	0	Crushing/Proc. Equipment	1	8
				Off-Highway Trucks	1	8
				Pavers	2	8
				Paving Equipment	1	8
				Rollers	2	8
				Tractors/Loaders/Backhoes	2	8
Architectural coating (141 days)	28	0	0	Aerial Lifts	1	8

Source: See Appendix A for details.

5.3 Miramar Reservoir Alternative Construction Emissions

The Miramar Reservoir Alternative includes (1) a new pump station at Morena Boulevard, a Wastewater Forcemain, and Brine/Centrate Line (Morena Pump Station and Pipelines); (2) expansion of the existing NCWRP; (3) construction of a new influent pump station at NCWRP and conveyance pipeline between NCWRP and the NCPWF (NCPWF Influent Pump Station); (4) construction of the new NCPWF–Miramar Reservoir; (5) construction of a new North City Pump Station; (6) construction of a North City Pipeline; (7) construction of a renewable energy facility and LFG Pipeline; (8) upgrades at the MBC; and (9) improvements at the Miramar WTP.

5.3.1 North City Pure Water Pipeline

The North City Pipeline will be designed for an average daily flow of 30 MGD with a minimum daily flow of 23 MGD and a maximum daily flow of 33 MGD. Table 5.3-1 provides a summary of each segment, the length, the anticipated construction method, location of the pipeline in the right-of-way, and easement or City property as a percentage of the segment length. The proposed construction equipment for the North City Pipeline is shown in Tables 5.3-2 and 5.3-3.

Table 5.3-1
North City Pure Water Pipeline Alignment Summary

Segment		Horizontal Distance (LF)	Open Cut (LF)	Trenchless or Other Method (LF)
A	West Alignment: Miramar Road	25,700	25,186	514
B	West Alignment: Black Mountain Road	4,100	2,911	1,189
C	I-15 Crossing	1,340	925	415
D	East Alignment: Carroll Canyon Road	4,285	4,242	43

Table 5.3-1
North City Pure Water Pipeline Alignment Summary

Segment		Horizontal Distance (LF)	Open Cut (LF)	Trenchless or Other Method (LF)
E	East Alignment: Approach to Miramar	4,300	3,354	946
	Subtotal	*39,725*	*36,618*	*3,107*
F	Subaqueous Discharge	4,800	—	—
	Total	**44,525 (8.4 miles)**	**—**	**—**

Note: LF = linear feet

Table 5.3-2
Construction Scenario Assumptions – North City Pipeline Open Trench

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Trenching (200 days)	26	0	2,537	Concrete/Industrial Saws	1	8
				Excavators	2	8
				Off-Highway Trucks	1	8
				Rollers	2	8
				Tractors/Loaders/Backhoes	2	8
				Welders	2	8
Tunneling (200 days)	24	0	0	Bore/Drill Rigs	1	8
				Cranes	1	8
				Crushing/Proc. Equipment	1	8
				Generator Sets	1	8
				Off-Highway Trucks	1	8
				Tractors/Loaders/Backhoes	2	8
				Welders	2	8
Subaqueous Pipeline (200 days)	18	0	0	Forklifts	1	8
				Generator Sets	1	8
				Other Construction Equipment	4	8
				Tractors/Loaders/Backhoes	1	8
Paving (200 days)	18	0	0	Crushing/Proc. Equipment	1	8
				Off-Highway Trucks	1	8
				Pavers	1	8
				Rollers	2	8
				Tractors/Loaders/Backhoes	2	8

Source: See Appendix A for details.

Table 5.3-3
Construction Scenario Assumptions – North City Pipeline Trenchless

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Site Preparation at Portal Sites (100 days)	8	0	0	Graders	1	8
				Scrapers	1	8
				Tractors/Loaders/Backhoes	1	8
Portal Excavation (100 days)	14	0	0	Crushing/Proc. Equipment	1	8
				Excavators	1	8
				Rubber-Tired Dozers	1	8
				Tractors/Loaders/Backhoes	1	8
				Trenchers	1	8
Pipe Installation (100 days)	2	2	0	Cranes	1	8
				Tractors/Loaders/Backhoes	1	8
				Welders	2	8
Pipe Connection (100 days)	2	0	0	Other General Industrial Equipment	1	8
Site Restoration (100 days)	4	0	0	Tractors/Loaders/Backhoes	1	8

Source: See Appendix A for details.

5.3.2 Pure Water Dechlorination Facility

A Dechlorination Facility will be located at the end of Meanley Drive off the cul-de-sac on the City's property for the Miramar Recycled Water Storage Tank. The proposed construction equipment for the Dechlorination Facility is shown in Table 5.3-4.

Table 5.3-4
Construction Scenario Assumptions – Dechlorination Facility

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Grading (60 days)	16	0	0	Dumpers/Tenders	2	8
				Excavators	2	8
				Plate Compactors	2	8
Building construction (90 days)	100	10	0	Cement and Mortar Mixers	1	8
				Cranes	1	8
				Pumps	1	8
				Tractors/Loaders/Backhoes	1	8
				Welders	1	8

Table 5.3-4
Construction Scenario Assumptions – Dechlorination Facility

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Paving (7 days)	16	0	0	Dumpers/Tenders	1	8
				Pavers	1	8
				Rollers	1	8

Source: See Appendix A for details.

5.3.3 Miramar Water Treatment Plant Improvements

Under the Miramar Reservoir Alternative, purified water discharged into the Miramar Reservoir will be pumped to the existing Miramar Reservoir Pump Station to the Miramar WTP for treatment and eventual distribution. The construction assumptions for the Miramar WTP is shown in Table 5.3-5.

Table 5.3-5
Construction Scenario Assumptions – Miramar WTP Improvements

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Demolition (10 days)	10	0	0	Concrete/Industrial Saws	1	8
				Rubber-Tired Dozers	1	8
				Tractors/Loaders/Backhoes	2	8
Building construction (60 days)	50	10	0	Aerial Lifts	1	8
				Cranes	1	8
				Forklifts	1	8
				Rollers	1	8
				Tractors/Loaders/Backhoes	1	8
				Welders	1	8

Source: See Appendix A for details.

5.3.4 Miramar Reservoir Alternative Construction Emissions

Table 5.3-6, Estimated Annual Construction GHG Emissions, shows the estimated annual GHG construction emissions associated with Project components, as well as the annualized construction emissions over a 30-year "Project life." Complete details of the emissions calculations are provided in Appendix A of this document.

Table 5.3-6
Estimated Construction GHG Emissions

Project Component	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Miramar Reservoir Alternative – 2018				
North City Pipeline	132.39	0.03	0.00	133.21
Miramar Reservoir Alternative – 2019				
Morena Pump Station and Pipelines	1,032.70	0.24	0.00	1,038.73
NCWRP Expansion	383.55	0.07	0.00	385.20
NCPWF Influent Pump Station	283.64	0.05	0.00	284.79
MBC Improvements	147.43	0.03	0.00	148.18
North City Pump Station	233.43	0.06	0.00	234.97
NCPWF	559.52	0.15	0.00	563.18
North City Pipeline	898.73	0.21	0.00	904.03
Pure Water Dechlorination Facility	157.14	0.03	0.00	157.81
Total 2019	**3,696.14**	**0.83**	**0.00**	**3,716.90**
Miramar Reservoir Alternative – 2020				
North City Pump Station	155.12	0.04	0.00	156.14
Morena Pump Station and Pipelines	595.09	0.15	0.00	598.88
MBC Improvements	64.24	0.01	0.00	64.55
LFG Pipeline	577.08	0.16	0.00	581.07
NCPWS Influent Pump Station	217.84	0.03	0.00	218.67
NCWRP Expansion	483.65	0.06	0.00	485.05
NCPWF	703.64	0.14	0.00	707.01
North City Pipeline	591.84	0.15	0.00	595.51
North City Renewable Energy Facility	167.34	0.05	0.00	168.54
Miramar WTP Improvements	72.73	0.02	0.00	73.14
Total 2020	**3,628.56**	**0.80**	**0.00**	**3,648.56**
Miramar Reservoir Alternative — 2021				
Morena Pipelines	231.53	0.06	0.00	233.13
LFG Pipeline	448.00	0.11	0.00	450.87
NCWRP Expansion	198.77	0.03	0.00	199.57
NCPWF	348.46	0.07	0.00	350.14
North City Pipeline	409.44	0.11	0.00	412.11
North City Renewable Energy Facility	80.97	0.02	0.00	81.56
Total 2021	**1,717.17**	**0.41**	**0.00**	**1,727.39**
Total Project construction GHG emissions	*9,174.26*	*2.07*	*0.00*	*9,226.05*
Amortized construction GHG emissions				**307.54**

Source: CalEEMod Version 2016.3.1. See Appendix A for complete results.
Notes: MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

5.4 San Vicente Reservoir Alternative Construction Emissions

The San Vicente Reservoir Alternative would include those elements in common with the Miramar Reservoir Alternative, but with additional upgrades to meet the pipeline alignment increase compared to the Miramar Reservoir Alternative. The following sections describe those components unique to the San Vicente Reservoir Alternative and the construction emission assumptions associated with each.

5.4.1 San Vicente Pure Water Pipeline

The San Vicente Pipeline will be designed for an average daily flow of 31.4 MGD with a minimum daily flow of 27 MGD and a maximum daily flow of 35 MGD. Table 5.4-1 provides a summary of the anticipated construction method and length of each type of construction. The proposed construction equipment for the San Vicente Pipeline is shown in Tables 5.4-2 and 5.4-3.

Table 5.4-1
San Vicente Pipeline Segment Construction Summary

Construction Method	Segment Length (LF)	Diameter
Open Cut and Trenchless	39,232	48-inch
Open Cut and Trenchless	14,555	60-inch
Repurposed	20,583	48-inch
Open Cut	61,936	48-inch
Trenchless	2,801	48-inch
Trenchless (Microtunnel)	1,985	48-inch
Hard Rock Tunnel	5,446	60-inch

Note: LF = linear feet

Table 5.4-2
Construction Scenario Assumptions – San Vicente Pipeline Open Trench

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Trenching (200 days)	26	0	13,073	Excavators	2	8
				Rubber-Tired Dozers	2	8
				Tractors/Loaders/Backhoes	4	8
				Trenchers	2	8
Pipeline Installation (200 days)	16	0	0	Tractors/Loaders/Backhoes	1	8
Paving (200 days)	16	0	0	Pavers	2	8
				Paving Equipment	2	8
				Rollers	2	8

Source: See Appendix A for details.

Table 5.4-3
Construction Scenario Assumptions – San Vicente Pipeline Trenchless

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Trenching (200 days)	26	0	0	Excavators	2	8
				Rubber-Tired Dozers	2	8
				Tractors/Loaders/Backhoes	4	8
				Trenchers	2	8
Building Construction (200 days)	14	6	0	Cranes	1	8
				Generator Sets	1	8
				Rubber Tired Loaders	2	8
				Welders	2	8

Source: See Appendix A for details.

5.4.2 Mission Trails Booster Station

The MTBS would be located along Mission Gorge Road spread across two privately owned parcels. The proposed construction equipment for the MTBS is shown in Table 5.4-4.

Table 5.4-4
Construction Scenario Assumptions – MTBS

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Grading (30 days)	30	0	36,750	Graders	2	8
				Off-Highway Trucks	1	8
				Plate Compactors	1	8
				Rubber-Tired Dozers	2	8
				Scrapers	4	8
				Tractors/Loaders/Backhoes	2	8
Underground install and trenching (50 days)	26	0	0	Concrete/Industrial Saws	1	8
				Excavators	2	8
				Off-Highway Trucks	1	8
				Rollers	2	8
				Tractors/Loaders/Backhoes	2	8
				Welders	2	8
Building construction (230 days)	16	2	0	Aerial Lifts	2	8
				Cranes	1	8
				Forklifts	2	8
				Rollers	1	8
				Tractors/Loaders/Backhoes	1	8
				Welders	2	8

Table 5.4-4
Construction Scenario Assumptions – MTBS

Construction Phase (Duration)	One-Way Vehicle Trips			Equipment		
	Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Paving (5 days)	18	0	0	Crushing/Proc. Equipment	1	8
				Off-Highway Trucks	1	8
				Pavers	1	8
				Rollers	2	8
				Tractors/Loaders/Backhoes	2	8

Source: See Appendix B for details.

5.4.3 San Vicente Reservoir Alternative Construction Emissions

Table 5.4-5, Estimated Annual Construction GHG Emissions, shows the estimated annual GHG construction emissions associated with Project components, as well as the annualized construction emissions over a 30-year "Project life."

Table 5.4-5
Estimated Construction GHG Emissions

Project Component	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
San Vicente Reservoir Alternative – 2018				
North City Pipeline	149.92	0.03	0.00	150.74
San Vicente Reservoir Alternative - 2019				
Morena Pump Station and Pipelines	1,032.70	0.24	0.00	1,038.73
NCWRP Expansion	383.55	0.07	0.00	385.20
NCPWF Influent Pump Station	283.64	0.05	0.00	284.79
MBC Improvements	147.43	0.03	0.00	148.18
North City Pump Station	233.43	0.06	0.00	234.97
NCPWF	559.52	0.15	0.00	563.18
San Vicente Pipeline	1,396.01	0.31	0.00	1,403.75
MTBS	1,794.52	0.23	0.00	1,800.28
Total 2019	**5,830.81**	**1.13**	**0.00**	**5,859.09**
San Vicente Reservoir Alternative – 2020				
North City Pump Station	155.12	0.04	0.00	156.14
Morena Pump Station and Pipelines	595.09	0.15	0.00	598.88
MBC Improvements	64.24	0.01	0.00	64.55
Landfill Gas Pipeline	577.08	0.16	0.00	581.07
NCPWS Influent Pump Station	217.84	0.03	0.00	218.67
NCWRP Expansion	483.65	0.06	0.00	485.05
NCPWF	703.64	0.14	0.00	707.01
North City Renewable Energy Facility	167.34	0.05	0.00	168.54

Table 5.4-5
Estimated Construction GHG Emissions

Project Component	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
MTBS	161.98	0.04	0.00	163.05
San Vicente Pipeline	351.79	0.09	0.00	354.02
Total 2020	**3,477.76**	**0.77**	**0.00**	**3,496.97**
San Vicente Reservoir Alternative – 2021				
Morena Pipelines	231.53	0.06	0.00	233.13
Landfill Gas Pipeline	448.00	0.11	0.00	450.87
NCWRP Expansion	198.77	0.03	0.00	199.57
NCPWF	348.46	0.07	0.00	350.14
San Vicente Pipeline	60.90	0.02	0.00	61.35
North City Renewable Energy Facility	80.97	0.02	0.00	81.56
Total 2021	**1,368.62**	**0.32**	**0.00**	**1,376.63**
Total Project construction GHG emissions	*10,827.11*	*2.25*	*0.00*	*10,883.43*
Amortized construction GHG emissions				**362.78**

Source: CalEEMod Version 2016.3.1. See Appendix B for complete results.
Notes: Totals may not sum due to rounding.
MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

5.5 Operational Impacts

5.5.1 Miramar Reservoir Alternative

Operation of the Project would result in direct GHG emissions from vehicular traffic, testing and maintenance of stationary diesel generators, and indirect GHG emissions from use of electricity.

Mobile Sources (Motor Vehicles)

The Project would result in 60 additional staff. It is expected that during normal operations, these workers would generate in 120 one-way trips. Additionally, operational trips would be generated as a result of routine maintenance, periodic inspections and repairs of system facilities, monitoring, brush maintenance, and other operational procedures similar to those under the City's current water and wastewater treatment and distribution system. It was assumed only a minor increase in O&M trips (in addition to the 60 new employees) would be required; therefore, it was assumed on a worst-case day an additional 10 O&M-related trips would occur. In total, Project operations would be expected to generate approximately 140 average daily trips across the entire Project area.

Annual CO_2 emissions from motor vehicle trips for full Project buildout were quantified using CalEEMod Version 2016.3.1 (refer to Appendix A for additional details and model assumptions). Project-related traffic was assumed to include a mixture of vehicles in accordance

with the model outputs for traffic. Emission factors representing the vehicle mix and emissions for 2022 were used to estimate emissions associated with the first phase of the Project. Table 5.5-1 presents estimated annual mobile source GHG emissions resulting from Project-generated trips.

Table 5.5-1
Estimated Annual Mobile Source GHG Emissions

Emissions Source	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Mobile Sources	217.37	0.01	0.00	217.64

Source: Appendix A.
Notes: MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

Electricity Production and Consumption

The generation of electricity through combustion of fossil fuels typically results in emissions of CO_2 and, to a smaller extent, CH_4 and N_2O. Electricity would be required to operate various components of the Project. The Project components will be powered by an on-site renewable energy facility. The City provided the electricity use for each Project component. The GHG emissions from the renewable energy facility account for the emissions from power usage for the Miramar Reservoir Alternative. The GHG emissions were calculated using a spreadsheet-based model and emission factors provided by the engine manufacturer (Appendix C).

The LFG to be used in the Project is generated at the nearby Miramar Landfill and is currently being emitted from the surface of the landfill or flared. This LFG is a biogenic source of GHGs, i.e., GHG emissions related to nature's carbon cycle from the biological decomposition of waste in the landfill. Biogenic GHG emissions associated with the LFG already occur and can be considered baseline conditions, and are not an impact generated by the Project. Therefore, nonbiogenic GHG emissions from the combustion of natural gas generate the maximum Project-related GHG emissions. The amount of supplemental natural gas combusted per engine will fluctuate. Thus, these emissions are a conservative estimate. In actual practice, GHG emissions are expected to be significantly lower. However, for the analysis it was assumed that up to three of the engines would operate on 30% natural gas continuously.

The City's current water supply includes importing one-third from the State Water Project and two-thirds from the Colorado River. The North City Project would offset the energy needed to pump, treat, and supply the imported water. The City provided annual electricity demand for the North City Project components. For components that are expanded for the project and not entirely new, only the net electricity demand was included. The total estimated energy use for the Miramar Reservoir Alternative is 126,295,000 kWh per year, which would result in 11,534 kWh/MG, assuming 30 MGD.

The North City Renewable Energy Facility will power the NCWRP, NCPWF Influent Pump Station, NCPWF, and North City Pump Station. The Miramar WTP would receive all of its power from an on-site 1 MW solar photovoltaic system. The other components would receive electricity from San Diego Gas & Electric (SDG&E). The North City Renewable Energy Facility would export excess power to SDG&E as it will produce more energy than the Project components will demand. Although on a daily basis there would be a net import and export of electricity from the North City Renewable Energy Facility, over an entire year the Miramar Reservoir Alternative would export more power than it would import. Because the Project would offset the demand from electricity from SDG&E with power from the North City Renewable Energy Facility, the avoided GHG emissions associated with energy not used is also included in the analysis. The emissions were based on the energy demand from the Project, excess energy supplied to the grid, and emission factors for SDG&E as found in CalEEMod. The estimated GHG emissions associated with the North City Renewable Energy Facility are shown below. Table 5.5-2 presents GHG emissions associated with the Miramar Reservoir Alternative's anticipated annual electricity consumption and the avoided emissions from grid electricity.

Table 5.5-2
Estimated Annual Electricity Consumption GHG Emissions

Emissions Source	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Avoided Emissions				
Grid Energy Use[1]	41,274.36	1.66	0.35	41,421.23
Project Emissions				
Miramar Reservoir Alternative [2]	30,880.22	2.85	0.06	30,968.58
Net Change in Emissions	**(10,394.14)**	**1.19**	**(0.29)**	**(10,452.65)**

Sources: Appendices A and C.
Notes:
MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent
1 SDG&E GHG emission factors used.
2 GHG emissions calculated from North City Renewable Energy Facility.

As presented in Table 5.5-2, GHG emissions associated with avoided grid-purchased electricity would be 41,421 MT CO_2E. The purified water electrical demand and resulting GHG emissions from the natural gas use from the renewable energy facility would be 30,969 MT CO_2E per year. Accordingly, the net change in GHG emissions from the Project would be a reduction of 10,453 MT CO_2E per year. Refer to Appendices A and C for details.

Wastewater Process Emissions

Centralized wastewater treatment processes can result in CH_4 and N_2O emissions. CH_4 emissions can result under processes associated with anaerobic digestion of soluble organic material when the captured biogas is not completely combusted. It is assumed that the majority of the generated

biogas would be combusted (e.g., cogeneration, boilers, flares) but a small amount (e.g., 1%) would not be completely combusted. N_2O emissions may be generated from the treatment of municipal wastewater during both nitrification and denitrification of the nitrogen present, usually in the form of urea, ammonia, and proteins. These compounds are converted to nitrate (NO_3) through the aerobic process of nitrification. Denitrification occurs under anoxic conditions (without free oxygen), and involves the biological conversion of nitrate into nitrogen gas (N_2). N_2O can be an intermediate product of both processes (CARB et al. 2010). Methodologies used to estimate CH_4 and N_2O emissions from wastewater treatment processes were derived from the Local Government Operations Protocol (CARB et al. 2010).

Stationary CH_4 Emissions

Annual stationary CH_4 (MT CO_2E) emissions from incomplete combustion of digester gas were calculated as follows:

$$(P \times Digester\ Gas \times F_{CH4} \times D(CH_4) \times (1\text{-}DE) \times 0.0283 \times 365.25 \times 10^{-6}) \times GWP$$

Where:

P = population served by the WWTP with anaerobic digesters

Digester Gas = cubic feet of digester gas produced per person per day [ft^3/person/day]

F_{CH4} = fraction of CH_4 in biogas

$D(CH_4)$ = density of methane [g/m^3]

DE = CH_4 Destruction Efficiency

0.0283 = conversion from ft^3 to m^3

365.25 = conversion factor [day/year]

10^{-6} = conversion from g to metric ton [metric ton/g]

GWP = Global Warming Potential

According to the City of San Diego's Sewer Design Guide, daily per-capita wastewater flow is approximately 80 gallons per capita per day (City of San Diego 2015c). The NCWRP, which would generate the biosolids processed by the MBC, would have an AADF of 30 MGD after expansion; therefore, for the purposes of estimating emissions, it is estimated that the MBC facility would have a service population equivalent of 375,000. Stationary CH_4 emissions from incomplete combustion of biogas were estimated to be approximately 417 MT CO_2E per year (see Appendix A for details).

Process N_2O Emissions

Process N_2O emissions can occur in facilities with nitrification/denitrification processes, and to a lesser extent in facilities without these processes. The NCWRP would increase capacity by 21 MGD during peak daily loads resulting in a service population equivalent of 262,500. Process N_2O emissions were estimated to be approximately 684 MT CO_2E per year (see Appendix A for details). Annual process N_2O emissions (metric tons CO_2E) were calculated as follows:

$$((Ptotal \times Find\text{-}com) \times EF\ nit/denit \times 10\text{-}6) \times GWP$$

Where:

Ptotal = total population that is served by the centralized WWTP adjusted for industrial discharge

Find-com = factor for industrial and commercial co-discharge of waste into the sewer system

EF nit/denit = emission factor for a WWTP with nitrification/denitrification [g/N2O/person/year]

10-6 = conversion from g to metric ton [metric ton/g]

GWP = Global Warming Potential

N_2O emissions can also be generated through discharge to surface waters such as the Miramar Reservoir. Minimal N_2O emissions could occur from advanced water purification facility effluent discharge due to the removal of nitrogen compounds by reverse osmosis (RO). Annual N_2O emissions (MT CO_2E) from discharge were calculated as follows:

$$(N\ Load \times EF\ effluent \times 365.25 \times 10^{-3} \times 44/28) \times GWP$$

Where:

N Load = measured average total nitrogen discharged [kg N/day]

EF effluent = emission factor [kg N_2O-N/kg sewage-N produced]

365.25 = conversion factor [day/year]

10^{-3} = conversion from kg to metric ton [metric ton/kg]

44/28 = molecular weight ratio of N_2O to N_2

GWP = Global Warming Potential

The Project would produce 30 MGD of purified water that could be discharged to a surface water source resulting in minimal process emissions. Based on test results, the average total nitrogen in purified water would be 0.5 mg/L (MWH et al. 2016). N_2O emissions from discharge were estimated to be approximately 49 MT CO_2E per year (see Appendix A for details).

Table 5.5-3 provides a summary of process and discharge GHG emissions.

Table 5.5-3
Estimated Annual Wastewater Process and Discharge GHG Emissions

Source	MT CH_4	MT N_2O	MT CO_2E
Incomplete combustion of digester gas	16.68	—	416.98
WWTP with nitrification/denitrification	—	2.30	684.47
Effluent discharge emissions	—	0.16	48.53
		Total Process Emissions	**1,149.98**

Source: Appendix A.
Notes: MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

Refrigerant Use

The air-cooled chillers in the North City Project will contain refrigerant. The 60-ton chiller will have a total refrigerant charge of 131 pounds (lbs) of R-410A refrigerant. As discussed in Section 2.2, refrigerants such as R-410A are high GWP HFCs that can have a large impact if released into the atmosphere. The EPA-tolerated leak-rate for commercial HVAC equipment is 10% per year. Assuming that rate, it is estimated that up to 13.1 lbs of R-410A refrigerant would be emitted per year. The GWP for R-410A is 2,088, meaning that one lb of R-410A is 2,088 times more potent than CO_2 as a GHG (The Climate Registry 2016). Using the annual leak rate and the GWP, it is estimated that 12 MT CO_2E would be emitted per year from refrigerant use.

Diesel Generators

To conservatively estimate stationary source emissions related to generator use, it was assumed a new diesel-powered emergency generator would be required for back-up power at the NCPWF. For the purposes of a conservative analysis, it was assumed the generator would be approximately 750 kilowatts (approximately 1,000 HP). It was assumed generators would only be used for emergency back-up power in the event of power outages, as well as for routine testing and maintenance. CARB's Airborne Toxic Control Measure for stationary diesel engines restricts diesel engine operation for testing and maintenance to 50 hours per year, unless a diesel particulate filter is used to reduce PM_{10} emissions (CARB 2011b). Thus, it was assumed that the engines would operate up to 50 hours per year (1 hour per week, 50 weeks per year) for testing and maintenance. Emission factors for CO_2 and CH_4 were obtained from the CalEEMod User's Guide, Appendix D, for generators over 1,001 HP[4] operating in 2022 (first year of Project

[4] The CalEEMod User's Guide does not provide emission factors for generator sets rated at 751 to 1,000 HP; however, the CO_2 emission factor for generator sets rated at 501–750 HP and greater than 1,000 HP are the same and the CH_4 factor for the larger HP range is slightly higher than that for the smaller HP range.

operation). Table 5.5-4 presents estimated annual GHG emissions associated with testing and maintenance of emergency diesel generators.

Table 5.5-4
Estimated Annual Diesel Generators GHG Emissions

Emissions Source	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Diesel Generators	19.04	0.00	0.00	19.11

Source: Appendix A
Notes: MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

Summary of GHG Emissions

Table 5.5-5 shows the total operational GHG emissions for the Miramar Reservoir Alternative after accounting for amortized construction emissions.

Table 5.5-5
Summary of Estimated Annual GHG Emissions

Emissions Source	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Avoided Emissions				
Grid Energy Use	41,274.36	1.66	0.35	41,421.23
Miramar Reservoir Alternative				
Mobile Sources	217.37	0.01	0.00	217.64
Electricity Production	30,880.22	2.85	0.06	30,968.58
Wastewater Process Emissions	—	16.68	2.46	1,149.98
Refrigerant Use	12.41	0.00	0.00	12.41
Diesel Generators	19.04	0.00	0.00	19.11
Waste	10.53	0.62	0.00	26.10
Water	8.51	0.06	0.00	10.48
Amortized Construction Emissions				307.54
			Total Project Emissions	**32,711.84**
			Net Change in Emissions	**(8,709.39)**

Source: See Appendice A and C for complete results.
Notes: MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

Implementation of the Project, as analyzed at the Project level of analysis, would result in a net decrease of approximately 8,709 MT CO_2E per year as a result of offsetting the need for imported water sources and grid energy use.

5.5.2 San Vicente Reservoir Alternative

Operation of the Project would result in direct GHG emissions from vehicular traffic, testing and maintenance of stationary diesel generators, and indirect GHG emissions from use of electricity.

Mobile Sources (Motor Vehicles)

The Project would result in 60 additional staff. It is expected that during normal operations, these workers would generate in 120 one-way trips. Additionally, operational trips would be generated as a result of routine maintenance, periodic inspections and repairs of system facilities, monitoring, brush maintenance, and other operational procedures similar to those under the City's current water and wastewater treatment and distribution system. It was assumed only a minor increase in O&M trips (in addition to the 60 new employees) would be required; therefore, it was assumed on a worst-case day an additional O&M-related trips would occur. In total, Project operations would be expected to generate approximately 140 average daily trips across the entire Project area.

Annual CO_2 emissions from motor vehicle trips for full project buildout were quantified using CalEEMod Version 2016.3.1 (refer to Appendix B for additional details and model assumptions). Project-related traffic was assumed to include a mixture of vehicles in accordance with the model outputs for traffic. Emission factors representing the vehicle mix and emissions for 2022 were used to estimate emissions associated with the first phase of the Project. Table 5.5-6 presents estimated annual motor vehicle GHG emissions resulting from Project-generated trips.

Table 5.5-6
Estimated Annual Motor Vehicle GHG Emissions

Emissions Source	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Mobile Sources	217.37	0.01	0.00	217.64

Source: Appendix B
Notes: MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

Electricity Consumption

The generation of electricity through combustion of fossil fuels typically results in emissions of CO_2 and, to a smaller extent, CH_4 and N_2O. Electricity would be required to operate various components of the San Vicente Reservoir Alternative. The Project components will be powered either by an existing on-site North City Renewable Energy Facility or through SDG&E. The City provided electricity use for each Project component. A spreadsheet model was used to calculate GHG emissions from the North City Renewable Energy Facility. CalEEMod was used to calculate GHG emissions from power derived from SDG&E. The purified water electricity usage was estimated to be approximately 144,904,000 kWh/year. Because the Project would offset the demand from electricity from SDG&E, the avoided emissions associated with energy not used is also included in the analysis. Table 5.5-7 presents

GHG emissions associated with the typical urban imported water use and the North City Project's anticipated annual electricity consumption.

Table 5.5-7
Estimated Annual Electricity Consumption GHG Emissions

Emissions Source	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Avoided Emissions				
Grid Energy Use[1]	44,087.86	1.77	0.38	44,244.70
Project Emissions				
San Vicente Reservoir Alternative[2]	34,148.31	2.98	0.09	34,248.30
Net Change in Emissions	**(9,939.55)**	**1.21**	**(0.29)**	**(9,996.40)**

Sources: Appendices B and C.
Notes:
MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent
1 SDG&E GHG emission factors used.
2 GHG emissions calculated from North City Renewable Energy Facility and SDG&E.

As presented in Table 5.5-7, GHG emissions associated with avoided grid-purchased electricity would be 44,245 MT CO_2E. The purified water electrical demand and resulting GHG emissions from the natural gas use from the renewable energy facility and grid-purchased electricity would be 34,248 MT CO_2E per year. Accordingly, the net change in GHG emissions from the Project would be a reduction of 9,996 MT CO_2E per year. Refer to Appendices B and C for details.

Wastewater Process Emissions

Stationary CH_4 Emissions

According to the City of San Diego's Sewer Design Guide, daily per-capita wastewater flow is approximately 80 gallons per capita per day (City of San Diego 2015c). The NCWRP, which would generate the biosolids processed by the MBC, would have an AADF of 30 MGD after expansion; therefore, for the purposes of estimating emissions, it is estimated that the MBC facility would have a service population equivalent of 375,000. Stationary CH_4 emissions from incomplete combustion of biogas were estimated to be approximately 417 MT CO_2E per year (see Appendix B for details).

Process N_2O Emissions

Process N_2O emissions can occur in facilities with nitrification/denitrification processes, and to a lesser extent in facilities without these processes. The NCWRP would increase capacity by 21 MGD during peak daily loads resulting in a service population equivalent of 262,500. Process N_2O emissions were estimated to be approximately 684 MT CO_2E per year (see Appendix B for details).

N_2O emissions can also be generated through discharge to surface waters such as the Miramar Reservoir. Minimal N_2O emissions could occur from advanced water purification facility effluent discharge due to the removal of nitrogen compounds by reverse osmosis (RO). The Project would produce 30 MGD of purified water that could be discharged to a surface water source resulting in minimal process emissions. Based on test results, the average total nitrogen in discharged effluent would be 0.5 mg/L (MWH et al. 2016). N_2O emissions from discharge were estimated to be approximately 49 MT CO_2E per year (see Appendix B for details).

Table 5.5-8 provides a summary of process and discharge GHG emissions.

Table 5.5-8
Estimated Annual Wastewater Process and Discharge GHG Emissions

Source	MT CH_4	MT N_2O	MT CO_2E
Incomplete combustion of digester gas	16.68	—	416.98
WWTP with nitrification/denitrification	—	2.30	684.47
Effluent discharge emissions	—	0.16	48.53
		Total Process Emissions	**1,149.98**

Source: Appendix B
Notes: MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

Refrigerant Use

The air-cooled chillers in the North City Project will contain refrigerant. The 60-ton chiller will have a total refrigerant charge of 131 lbs of R-410A refrigerant. As discussed in Section 2.2, refrigerants such as R-410A are high GWP HFCs that can have a large impact if released into the atmosphere. The EPA-tolerated leak-rate for commercial HVAC equipment is 10% per year. Assuming that rate, it is estimated that up to 13.1 lbs of R-410A refrigerant would be emitted per year. The GWP for R-410A is 2,088, meaning that 1 lb of R-410A is 2,088 times more potent than CO_2 (The Climate Registry 2016). Using the annual leak rate and the GWP, it is estimated that 12 MT CO_2E would be emitted per year from refrigerant use.

Diesel Generators

To conservatively estimate stationary source emissions related to generator use, it was assumed a new diesel-powered emergency generator would be required for back-up power at the NCPWF. For the purposes of a conservative analysis, it was assumed the generator would be approximately 750 kilowatts (approximately 1,000 HP). It was assumed generators would only be used for emergency back-up power in the event of power outages, as well as for routine testing and maintenance. CARB's Airborne Toxic Control Measure for stationary diesel engines restricts diesel engine operation for testing and maintenance to 50 hours per year, unless a diesel particulate filter is used to reduce PM_{10} emissions (CARB 2011b). Thus, it was assumed that the

engines would operate up to 50 hours per year (1 hour per week, 50 weeks per year) for testing and maintenance. Emission factors for CO_2 and CH_4 were obtained from the CalEEMod User's Guide, Appendix D for generators over 1,001 HP[5] operating in 2022 (first year of Project operation). Table 5.5-9 presents estimated annual GHG emissions associated with testing and maintenance of emergency diesel generators.

Table 5.5-9
Estimated Annual Diesel Generators GHG Emissions

Emissions Source	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Diesel Generators	19.04	0.00	0.00	19.11

Source: Appendix B
Notes: MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

Summary of GHG Emissions

Table 5.5-10 shows the San Vicente Reservoir Alternative total operational GHG emissions after accounting for amortized construction emissions.

Table 5.5-10
Summary of Estimated Annual GHG Emissions

Emissions Source	MT CO_2	MT CH_4	MT N_2O	MT CO_2E
Avoided Emissions				
Grid Energy Use	44,087.86	1.77	0.38	44,244.70
San Vicente Reservoir Alternative				
Mobile Sources	217.37	0.01	0.00	217.64
Electricity Consumption	34,148.31	2.98	0.09	34,248.30
Wastewater Process Emissions	-	16.68	2.46	1,149.98
Refrigerant Use	12.41	0.00	0.00	12.41
Diesel Generators	19.04	0.00	0.00	19.11
Waste	10.36	0.61	0.00	25.66
Water	8.37	0.06	0.00	10.31
Amortized Construction Emissions	-	-	-	362.78
Total Project Emissions				**36,046.19**
Net Change in Emissions				**(8,198.51)**

Source: See Appendices B and C for complete results.
Notes: MT CO_2 = metric tons of carbon dioxide; MT CH_4 = metric tons of methane; MT N_2O = metric tons of nitrous oxide; MT CO_2E = metric tons of carbon dioxide equivalent

[5] The CalEEMod User's Guide does not provide emission factors for generator sets rated at 751 to 1,000 HP; however, the CO_2 emission factor for generator sets rated at 501–750 HP and greater than 1,000 HP are the same and the CH_4 factor for the larger HP range is slightly higher than that for the smaller HP range.

Implementation of the Project, as analyzed at the Project level of analysis, would result in a net decrease of approximately 8,199 MT CO_2E per year as a result of offsetting the need for imported water sources and grid energy demand.

5.6 Conflict with an Applicable Plan, Policy, or Regulation Adopted for the Purpose of Reducing the Emissions of Greenhouse Gases

For the purposes of discussing significance of GHG impacts, because the two alternatives are similar in how they apply to the City of San Diego's GHG significance criteria, they are discussed together in this section.

As discussed in Section 4.2, the City of San Diego evaluates GHG significance based on a project's consistency with the City's CAP using the CAP Consistency Checklist (see Appendix D). Step 1 of the checklist determines the project's consistency with the land use assumptions used in the CAP. As discussed in Section 6.1, Land Use, of the Draft EIR/Environmental Impact Statement (EIR/EIS), the Miramar Reservoir and San Vicente Reservoir components are anticipated to be in conformance with adopted land use designations of applicable community or general plans. See Section 6.1 for a description of the zoning and land use designations for the Project components. According to the SANDAG 2050 Regional Transportation Plan (RTP), the City of San Diego is projected to have 838,909 civilian jobs in 2020, 916,990 jobs in 2035, and 1,006,880 jobs in 2050 (SANDAG 2011). The North City Project is expected to add up to 60 jobs between several proposed facilities in 2022. The City of San Diego is expected to add 78,081 jobs between 2020 and 2035, or about 2,231 per year. As such, the additional 60 jobs the North City Project would create would be within SANDAG's growth projections for the City of San Diego within the specified time frame. Therefore, the North City Project would be consistent with the 2050 RTP, and the Alternatives would be consistent with Step 1 of the CAP Checklist.

Step 2 of the checklist is not applicable to development projects that would not require a certificate of occupancy from the Building Official; rather public projects are required to implement best management practices for construction activities as set forth in the GREENBOOK (for public projects). The City has created the WHITEBOOK, a supplement which takes precedence over the specification language contained in the GREENBOOK and addresses the unique conditions in the City that are not addressed in the GREENBOOK. Mitigation measure MM-PU-1, which can be found in Section 6.15, Public Utilities, of the Draft EIR/EIS, requires the Project to adhere to the requirements of Section 702 of the City's WHITEBOOK during construction with regards to the reduction of construction and demolition waste. Step 2 only applies to those parts of the Project that require a certificate of occupancy. Section 10-1 of the City's WHITEBOOK implements the City Council Green Building Policy

900-14, which requires new or significantly remodeled City facilities to be designed and constructed to achieve energy consumption levels at least 15% below the then current Title 24 standards. Also, it requires new construction projects over 5,000 square feet to obtain Leadership in Energy and Environmental Design (LEED) Silver Rating Certification from the U.S. Green Building Council. The following discussion outlines the North City Project's applicability to Step 2 of the CAP Consistency Checklist.

Strategy 1: Energy & Water Efficient Buildings.

1. Cool/Green Roofs

The North City Project would include a green roof on the NCPWF O&M building to help reduce energy consumption and stormwater runoff that would meet the minimum requirements of this section, weighing at least 25 pounds per square inch. The Project would answer Yes to this checklist question.

2. Plumbing Fixtures and Fittings

This item requires nonresidential buildings to have plumbing fixtures and fittings that meet the requirements under the CalGreen standard, Section A5.303.3. As the North City Project is committed to achieving the LEED Silver Certification, one of the main components to the projects design is water efficiency. The Project is designed to exceed the minimum flow rates in the CalGreen standard. The Project would comply with this standard and would answer Yes to the checklist question.

Strategy 2: Clean & Renewable Energy

3. Energy Performance Standard/Renewable Energy

This checklist question requires nonresidential projects to have an energy budget that exceeds Title 24 standards with indoor lighting, mechanical systems, or through on-site renewable energy generation. The North City Project includes a renewable energy facility that is powered by 90% renewable LFG and 10% natural gas. The Miramar WTP also includes a solar photovoltaic system that would completely cover its energy needs. The energy consumption for the Miramar Reservoir Alternative would be met completely by the renewable energy facility. The San Vicente Reservoir Alternative would still require approximately 4.6% of its power from SDG&E. The Project would exceed the minimum requirement for this checklist item and would answer Yes to the checklist question.

Strategy 3: Bicycling, Walking, Transit & Land Use

4. Electric Vehicle Charging

This checklist item requires nonresidential projects of a minimum size to install electric vehicle charging stations at the project site. According to Table 4 of Attachment A of the CAP Consistency Checklist, for industrial, manufacturing, or process plants or industrial parks, electric vehicle charging stations are required for projects with 1,000 or more employees, 40 acres or more of land, or 650,000 square feet or more of gross floor area. The North City Project does not meet any of those three criteria, so the answer to the checklist question would be N/A.

5. Bicycle Parking Spaces

This checklist question asks if the project would provide more short- and long-term bicycle parking spaces than is required in the City's Municipal Code (Chapter 14, Article 2, Division 5). The code requires nonresidential developments to have 5% of the required automobile parking available for bicycle parking spaces. As the North City Project is committed to achieving the LEED Silver Certification, one of the main components of the Project's design is centered around location and transportation. The Project is designed to include bike parking in excess of the City's Municipal Code and locker rooms with showers for employees. The Project would comply with this standard and would answer Yes to the checklist question.

6. Shower Facilities

This checklist question asks if the proposed development has over 10 employees and if a shower/changing facility is incorporated into the design. The North City Project includes 10 showers in the men's locker room and 8 showers in the women's locker room. For a project with 11–50 employees, it is required to have 1 shower stall and 2 lockers. The Project exceeds the requirement and would answer Yes to the checklist question.

7. Designated Parking Spaces

This checklist question asks if the project within a TPA provides designated parking for a combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles. The North City Project is not located within a TPA and thus this question does not apply to the Project. Therefore, the Project would answer N/A to this checklist question.

8. Transportation Demand Management Program

This checklist question asks if the project, if it accommodates over 50 employees includes a transportation demand management program. The North City Project would participate in the

City's Transportation Alternatives Program, which subsidizes vanpool, trolley, carpool, and coaster usage as a traffic demand management function. The Project would meet the requirements of this question and thus would answer Yes.

Step 3 of the checklist is only applicable if Step 1 is answered in the affirmative under option three, which is not the case for the Alternatives, which answered Step 1 in the affirmative under option one. Therefore, Step 3 is not applicable to the Alternatives.

The North City Project would be consistent with the City of San Diego's CAP Checklist Steps 1 and 2 as discussed above; Step 3 would not apply to the Project. Accordingly, the Project is consistent with the City's CAP. In addition, the Project would assist the City in achieving the CAP's GHG emissions reduction targets by reducing the City's reliance on imported water supplies through the provision of a locally produced water supply. The following discussion outlines the CAP strategies and how the project is consistent with them.

The City approved the CAP on December 15, 2015 (City of San Diego 2015a). The CAP includes the following five strategies developed to reduce citywide GHG emissions and to achieve reduction targets for the years 2020 and 2035:

1. Energy and Water Efficient Buildings
2. Clean and Renewable Energy
3. Bicycling, Walking, Transit & Land Use
4. Zero Waste (Gas & Waste Management)
5. Climate Resiliency

Each of the City's CAP strategies includes goals to identify ways to reduce GHG emissions. The Project's consistency with the applicable strategies is discussed below.

Strategy 1: Energy and Water Efficient Buildings

The CAP's first strategy is aimed at energy and water efficient buildings. The City's goals under strategy 1 include reducing residential building and municipal energy consumption, and reducing daily per-capita water consumption. Actions to reduce energy consumption include consideration of a residential Energy Conservation and Disclosure Ordinance and a Municipal Energy Strategy and Implementation Plan. Actions related to water efficiency include implementing new water rates and billing structure, consideration of a Water Conservation and Disclosure Ordinance, and implementation of an Outdoor Landscaping Ordinance requiring weather-based irrigation controllers. Strategy 1 actions are directed at City staff and City Council to adopt ordinances, plans, and supporting City requirements to achieve the City's targets.

The Project would support achievement of Strategy 1 by providing a less energy-intensive, domestic water supply source for the region. Electricity is consumed, and associated GHG emissions are generated, as a result of water supply, treatment, and distribution and treatment of wastewater generated. The Project's provision of a locally produced water supply would substantially reduce energy consumption currently required for the import, supply, and conveyance of traditional (imported) water sources. In addition, the Project would not conflict with the City's ability to implement the actions identified in the CAP related to energy- and water-efficient buildings. The Project would be consistent with the applicable CAP goals and actions identified in Strategy 1.

Strategy 2: Clean and Renewable Energy

Strategy 2 focuses on clean and renewable energy. Strategy 2 goals of transitioning to 100% renewable energy on the citywide electrical grid by 2035, increasing municipal zero-emissions vehicles, and converting existing diesel municipal solid waste collection trucks to compressed natural gas or other alternative low-emissions fuels would be implemented by the City and would not apply to implementation of the Project.

The Project would include a renewable energy facility that would use 90% renewable LFG and 10% natural gas. The Project would also include a solar photovoltaic system that would completely power the Miramar WTP. The North City Renewable Energy Facility power would completely offset the power consumption needs of the Miramar Reservoir Alternative and would cover 95.4% of the San Vicente Reservoir Alternative's power consumption needs. Therefore, the Project would support the City's goal to increase use of renewable energy. In addition, the Project would not conflict with the City's ability to implement the actions identified in the Strategy 2.

Strategy 3: Bicycling, Walking, Transit & Land Use

Strategy 3 outlines goals and actions related to bicycling, walking, transit, and land use. Strategy 3 goals include increasing the use of mass transit, increasing commuter walking and bicycling opportunities, reducing vehicle fuel consumption, and promoting effective land use to reduce vehicle miles traveled.

The North City Project would include bicycle parking, shower facilities, and locker rooms. The Project would also participate in the City's Transportation Alternatives Program, which subsidizes vanpool, trolley, carpool and coaster usage as a traffic demand management function. Therefore, the Project would support the City's strategy to reduce vehicle miles traveled. In addition, the Project would not conflict with the City's ability to implement the actions identified in the Strategy 3.

Strategy 4: Zero Waste (Gas & Waste Management)

Strategy 4, which focuses on zero waste, includes the goal of diverting solid waste, capturing landfill CH_4 gas emissions, and capturing CH_4 gas from wastewater treatment.

Both Strategy 4 goals would be implemented by various City departments, and the Project would not conflict with implementation of the actions required to meet the City's targets. In addition, the Project would capture CH_4 gas during wastewater treatment. Furthermore, the Project would comply with the goal of diverting 75% of the solid waste by 2020 consistent with statewide goals. The Project would be consistent with the applicable CAP goals and actions identified in Strategy 4.

Strategy 5: Climate Resiliency

The fifth and last strategy relates to climate resiliency and includes the goal of increasing tree canopy coverage. The action under this goal includes consideration of a citywide Urban Tree Planting Program, which would incorporate water conservation measures and prioritization of drought-tolerant and native trees and plantings in areas with recycled water.

The intent of the Project is to avoid or minimize all potential impacts to trees and sensitive vegetation communities where possible. However, minimal vegetation removal may occur during construction of the Project components. As discussed in Section 6.4, Biological Resources, of the Draft EIR/EIS, potential temporary and permanent impacts to sensitive upland vegetation communities will be mitigated per the mitigation ratios outlined in Chapter 10 of the Draft EIR/EIS. Based on the site plans, the Project does not include the specific removal of any trees and would avoid or minimize disturbance of existing trees to the extent feasible. The Project does include additional planting of canopy trees and other vegetation that would support this strategy. Moreover, the Project would not conflict with the City's actions to increase tree canopy coverage through a planting program and supporting measures. Strategy 5 of the CAP is not directly applicable to the Project; however, the Project would not conflict with the City's actions to implement Strategy 5.

The Project would not conflict with the CAP strategies applicable to the Project and would not impede the City's ability to implement the actions identified in the CAP to achieve the CAP's goals and targets and associated GHG emission reductions. As such, the Project would comply with, and support the goals and policies of, the City's CAP, as well as those of the General Plan (CE-A.2, CE-A.8, CE-A.9, CE-F.3, CE-I.4, and CE-I.5). Therefore, the Project would not have a significant impact.

The North City Project's GHG emissions would not have a significant cumulative impact on the environment.

5.7 NEPA Considerations

As shown in Tables 5.5-5 and 5.5-10, the estimated operational GHG emissions for the Miramar Reservoir and San Vicente Reservoir Alternatives do exceed the 25,000 MT CO_2E per year threshold, mainly due to the North City Renewable Energy Facility. The projects would be required to implement mitigation measures MM-AQ-1, MM-AQ-2, and MM-AQ-3 in addition to following applicable SDAPCD Rules and Regulations. For these reasons, the Miramar Reservoir and San Vicente Reservoir Alternative operational GHG emissions would result in a substantial adverse effect related to the generation of GHG emissions.

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APPENDIX A

CalEEMod Outputs and Estimated Emissions for the Miramar Reservoir Alternative

APPENDIX B

CalEEMod Outputs and Estimated Emissions for the San Vicente Reservoir Alternative

APPENDIX C

North City Renewable Energy Facility Air Modelling Analysis and Health Risk Assessment Report

APPENDIX D

City of San Diego Climate Action Plan Consistency Checklist Submittal Application