



San Rafael Rock Quarry
Greenhouse Gas Reduction Plan
The Dutra Group

Prepared for:
San Rafael Rock Quarry
San Rafael, California

On behalf of:
The Dutra Group
San Rafael, California

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Date:
May 2014

Project Number:
03-31101A

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Acronyms and Abbreviations

AQP:	Amended Surface Mining and Quarrying Permit
ARP:	Amended Reclamation Plan
BAAQMD:	Bay Area Air Quality Management District
CARB:	California Air Resources Board
CCP:	Cities for Climate Protection
CH ₄ :	Methane
COA:	Conditions of Approval
CO ₂ :	Carbon Dioxide
CO ₂ e:	Carbon Dioxide Equivalent
EIR:	Environmental Impact Report
GHG:	Greenhouse Gas
ICLEI:	International Council for Local Environmental Initiatives
LCFS:	Low Carbon Fuel Standard
N ₂ O:	Nitrous Oxide
TCR:	The Climate Registry

1 Introduction

ENVIRON is preparing this Greenhouse Gas (GHG) Reduction Plan on behalf of The Dutra Group's (Dutra's) San Rafael Rock Quarry (herein referred to as "Quarry" or "SRRQ") operations. This Greenhouse Gas Reduction Plan is required by Marin County Surface Mining and Quarrying Permit Conditions of Approval (COA).¹ ENVIRON incorporates knowledge of California Air Resources Board (CARB) regulations and greenhouse gas mitigation measures into the development of this Plan. ENVIRON worked with Quarry staff to ensure the GHG Reduction Plan is practical for implementation at the San Rafael facility.

1.1 Overview

On September 28th, 2010 the Marin County Board of Supervisors approved the Amended Surface Mining and Quarrying Permit, Q-72-03. As part of the Conditions of Approval (COA), Item 53, the quarry is required to submit a Greenhouse Gas Reduction Plan. The plan will then be reviewed by the County and its consultants prior to approval. Upon approval, the plan will be implemented to ensure the Quarry will reduce or offset un-mitigated GHG emissions identified in the Combined Environmental Impact Report (EIR). The Draft EIR was published in January 2008. The Final EIR (FEIR) incorporates revisions to the Draft EIR as well as responses to comments. As a result, a Combined EIR was published, which applies to both Operations and Reclamation at the SRRQ Facility; more specifically the SRRQ Amended Reclamation Plan (ARP) and Amended Surface Mining and Quarrying Permit (AQP). The Combined EIR Response to Comments was published in August 2009.²

1.1.1 San Rafael Rock Quarry

The SRRQ has been operating for over 100 years.³ SRRQ is a state-designated resource and the only waterfront quarry in Northern California that can transport materials via barge to specific project destinations. The Dutra Group purchased the Quarry in 1986, and since then SRRQ has contributed materials to countless local public works and private development projects. The Quarry is located in the county of Marin just outside the city limits of San Rafael and supplies materials and resources to an extensive list of clients and projects throughout the region. Building materials from the San Rafael Rock Quarry have a role in approximately 90 percent of Marin County projects.

As discussed in more detail below, SRRQ currently has three plants on-site consisting of a primary, asphalt, and portable plant. See **Figure 1** for the Plant Location and **Figure 2** for Existing Conditions on-site, per the Draft EIR.

Plant Operations

¹ Marin County Board of Supervisors, Amended Surface Mining and Quarrying Permit, Q-72-03.

² ESA, San Rafael Rock Quarry Combined Final Environmental Impact Report, August 2009. Available online: <http://www.marincounty.org/depts/pw/divisions/land-use/~media/Files/Departments/PW/land%20use/FEIR%20Response%20to%20Comments%20Amendment.pdf>

³ Information from: <http://www.sanrafaelrockquarry.com/>

Typical operations consist of hauling shot rock harvested onsite to the primary plant where it is dumped into a feeder.⁴ From the feeder the material is processed through a jaw crusher and conveyed to a three deck deister screen. Once the material has been screened, it is conveyed to the stockpiles. These stockpiles sit over feeders which feed the rock to the asphalt plant. In addition, the asphalt plant has an additional feeder and conveyor to add sand to the mix. The combined rock/sand mixture is then run through a scalping screen and conveyed to the drier drum. The aggregate is then heated to approximately 300 degrees Fahrenheit and as the material reaches the end of the drier drum, hot asphalt oil is sprayed onto the mix. The hot asphalt is then conveyed via a slat conveyor to 3 loadout silos.

The portable plant is comprised of the following five self-contained units: Portable Jaw, Portable Cone, Portable Cone, Portable 2-Deck Screen, Portable 3-Deck Screen and Portable Tracked Telestacker. Because each individual piece is self-contained the plant can be configured many different ways to meet specific production needs. Typically all five units are used to produce asphalt feed. Material flow is as follows: Jaw to cone to 2-deck screen, oversized recirculated through second cone back to 2-deck feed hopper; undersized is screened then fed to the 3-deck screen where it is screened and stockpiled. The undersized material, dust, is stockpiled using the tracked telestacker.

1.1.2 Marin County Greenhouse Gas Reduction Plan

In 2006, the Marin County Community Development Agency constructed the “Marin County Greenhouse Gas Reduction Plan”.⁵ The Marin County GHG Reduction Plan was created in conjunction with the Marin County Board of Supervisors’ membership in the Cities for Climate Protection Campaign (CCP). This campaign is administered under the International Council for Local Environmental Initiatives (ICLEI) and attempts to reduce international greenhouse emissions through actions by local governments. Marin County has conducted an emissions inventory and has developed a GHG reduction target.

Marin County set a target to reduce GHG emissions 15-20% below 2000 levels by the year 2020: 15-20% for internal government operations, and 15% countywide. The Marin County GHG Reduction Plan identifies measures to achieve these goals. These activities and measures are further discussed in the Marin Countywide Plan (published in November 2007), as discussed below.⁶

1.1.3 Marin Countywide Plan

The Marin Countywide Plan guides the conservation and development of Marin County. The Marin Countywide Plan is used along with the GHG Reduction Plan to guide Marin County in environmental planning and development in the 21st Century.

⁴ Information from Ross Campbell of The Dutra Group, via email. July 2013.

⁵ Marin County Community Development Agency, October 2006. “Marin County Greenhouse Gas Reduction Plan”. Available online: http://www.co.marin.ca.us/comdev/pdf/final_ghg_red_plan.pdf

⁶ Marin County Board of Supervisors, “Marin Countywide Plan”, adopted November 6, 2007. Available online: http://www.co.marin.ca.us/depts/cd/main/fm/cwpcodes/CWP_CD2.pdf

1.1.4 Summary of GHG Reduction Plan Requirements from Permit

As previously discussed, the San Rafael Rock Quarry's GHG reduction plan's conception stems from the Marin County Surface Mining and Quarrying Permit Conditions of Approval. On September 28th, 2010, the Marin County Board of Supervisors approved the Amended Surface Mining and Quarrying Permit, Q-72-03. As part of the Conditions of Approval, COA 53, the quarry is required to submit a GHG Reduction Plan:

“The plan will include a complete inventory of reclamation-related GHG emissions and will demonstrate how the Quarry will reduce or offset remaining un-mitigated GHG emissions as identified in the Combined EIR. The plan will prioritize emission reduction through energy conservation and other measures; and for those emissions that cannot be reduced, the plan shall specify how emissions will be offset. Offsets may take the form of installation of on-site alternative energy generation facilities (such as solar power) or off-site compensation, such as monetary contribution to a project that sequesters carbon. Examples of such projects include wetland restoration, purchase of carbon credits verified by the California Climate Action Registry, and reforestation. On-site offsets will be given higher priority than off-site offsets, and offsets with co-benefits, such as reduction of particulate emissions within the vicinity of the Quarry, and restoration of habitat for special status species, will be given higher priority. The plan must demonstrate how, at a minimum, the Quarry will reduce reclamation-related, non-biogenic GHG emissions consistent with the Marin County Greenhouse Gas Reduction Plan and Countywide Plan Update policies: the plan must demonstrate how reclamation-related emissions are reduced or offset, such that total emissions are 15% below the emissions associated with Amended Reclamation Plan 1982 (ARP82), or no more than 2,489 tons of eCO₂. The plan will include an implementation schedule. The plan will be submitted to the Marin County Public Works Department for review and approval. The Greenhouse Gas Reduction (GHG) Plan shall also include an inventory of operations-related GHG emissions and a plan to reduce these emissions by 15 percent. In addition, the initial emissions inventory prepared as part of the plan will be reported to the California Climate Action Registry or a successor organization as a baseline inventory, and the Quarry will conduct and report additional inventories annually.”

The San Rafael Rock Quarry plans to implement all of the stated requirements listed above. Table 1 provides a summary of these requirements as well as a reference to each applicable section in the GHG Reduction Plan.

Table 1. Summary of Marin County Surface Mining and Quarrying Permit, Conditions of Approval # 53

Requirement	Plan Section
Inventory of reclamation-related GHG emissions	Section 2
<ul style="list-style-type: none"> Demonstrate how reclamation-related emissions are no more than 2,489 tons of carbon dioxide equivalents (CO₂e). 	Section 2
<ul style="list-style-type: none"> Demonstrate how the Quarry will reduce or offset remaining unmitigated GHG emissions as identified in the Combined EIR 	Section 4
<ul style="list-style-type: none"> Prioritize emission reduction through energy conservation and other measures 	Section 4
<ul style="list-style-type: none"> For those emissions that cannot be reduced, specify how emissions will be offset. 	Section 4
Inventory of operations-related GHG emissions	Section 3
<ul style="list-style-type: none"> Plan to reduce operational GHG emissions by 15 percent. 	Section 4
<ul style="list-style-type: none"> Reported initial inventory to the California Climate Action Registry (or a successor organization) as a baseline inventory 	Section 3
<ul style="list-style-type: none"> Report additional inventories annually 	Section 3
Include Implementation Schedule	Section 5
Submit the Plan to the Marin County Public Works Department for review and approval.	Section 5

As part of this GHG Reduction Plan, the San Rafael Rock Quarry completed inventories of both reclamation and operational emissions. These two types of emissions are distinguished below:

- Reclamation Emissions:** Reclamation emissions include emissions from reclamation-related activities only. These emissions include emissions from off-road equipment utilized during reclamation as well as worker trips.
- Operational Emissions:** Operational emissions include emissions from SRRQ operations. These GHG emissions include emissions from natural-gas fired boilers at the asphalt plant, purchased electricity, refrigerants, and mobile off-road equipment. Note

the operational emissions do not include any docked tugs. While the Dutra Group owns a tug (Sara Reed), this boat is registered in San Francisco and spends the majority of its time servicing construction projects within the Sacramento River delta. The Dutra Group estimates that the Sara Reed spends less than 5 percent of its time at the San Rafael Rock Quarry. According to The Climate Registry General Reporting Protocol, mobile source emissions must be assigned to a geographic location. Although this tug infrequently visits San Rafael Rock Quarry, it is not included or required to report as a source at the Facility.

2 Summary of Reclamation Emissions

ENVIRON calculated SRRQ's reclamation emissions based on the methods used in the DEIR as well as updated information from Dutra. Per information from Dutra, reclamation is tentatively scheduled to begin in 2015. Reclamation will occur between April 15th and October 15th each year, for up to a total of 10 weeks per year. The final phase of reclamation (Phase 4) is currently scheduled to be complete by end of 2024, which is subject to change. Based on this information, ENVIRON estimates 10 years of total reclamation activities.

Reclamation equipment are used to perform cut and fill activities on site. Table 2 gives a summary of Cut and Fill amounts by Reclamation phase. Similar to the FEIR, ENVIRON assumes reclamation occurs for 8 -10 weeks each year. The grading quantities in Table 2 were provided directly by San Rafael Rock Quarry; these quantities were not published in Chapter 4.2 (Air Quality) of the FEIR.

Table 2. Summary of Grading Quantities by Reclamation Phase

Phase	Cut (cubic yards)	Fill (cubic yards)
Phase 1	350,600	350,600
Phase 2	341,420	341,420
Phase 3	476,790	476,790
Phase 4	907,550	907,550
Summary Totals	2,076,360	2,076,360

2.1 Discussion of Reclamation Emissions

The proposed Amended Reclamation Plan would result in GHG emissions, primarily carbon dioxide (CO₂), emitted by trucks and earthmoving equipment associated with planned reclamation activities. Operation of diesel-powered equipment proposed to be used for reclamation activities (including five scrapers, four bulldozers, one front-end loader, one backhoe, a road grader, a water truck, and three light-duty trucks) over the 10 year phased reclamation period (2015 - 2024) may result in considerable daily CO₂ emissions during each year's 8-10 week reclamation grading period. As shown in the Final EIR (Table 4.2-12), a small amount of GHGs would also be generated by employee vehicle trips.⁷

2.1.1 Total Emissions

Based on ENVIRON's updated calculations, the total projected GHG emissions from reclamation activities are 2,105 tons of CO₂e (with a total petroleum based B-40 diesel fuel consumption of 375,266 gallons over 10 years in the on-site equipment). This is below the 2,489

⁷ ESA, "San Rafael Rock Quarry Amended Reclamation Plan and Amended Surface Mining and Quarrying Permit: FEIR Volume I: Revisions to the Draft EIR Text", Section 4.2. January 2009. Available Online: http://www.co.marin.ca.us/depts/CD/main/pdf/eir/SRRQ_FEIR/FEIR%20Volume%20I_Revised%20DEIR.pdf

tons of CO₂e limit, which is 15% lower from what is presented in the SRRQ Amended Reclamation Plan of 1982 and thus meets the permit requirements. SRRQ will fall within the permit limit if the total B-40 or higher biodiesel fuel usage in on-site equipment is maintained below 445,107 gallons over 10 years in the on-site equipment. In comparison to the Final EIR (Table 4.2-12), this analysis uses the latest versions of OFFROAD⁸ and EMFAC (OFFROAD2011, EMFAC2011) available at the time of this analysis, and predicts emissions for 2015-2024 only, covering 10 years, as opposed to 20 years in the FEIR.

Table 3 shows the estimated emissions for the reclamation period, based on assumptions provided by ESA in the FEIR.⁹ Note ESA utilized EMFAC2007 and OFFROAD 2007 in their approach, which have since been updated.

ENVIRON used CARB's Mobile Source Emission Inventory Database ("OFFROAD2011") to determine the emissions from offroad equipment, taking into account the usage of 40% biodiesel blend fuel (B40) for this equipment. The emission factors for CO₂ emissions per fuel usage rate were adjusted to include 40% biodiesel and 60% diesel blend. SRRQ is currently using 20% biodiesel (B20) in their rolling stock; however, may be able to increase the biodiesel percentage as necessary to meet the GHG threshold requirement.¹⁰ Note Condition of Approval (COA) #50 mentions biodiesel blends, but does not apply to the GHG Reduction Plan specifically. San Rafael Rock Quarry is committed to meeting all COA via relevant measures (e.g. Air Quality, Greenhouse Gas). Per COA #50, San Rafael Rock Quarry may elect to achieve the same reduction of PM₁₀ emissions via an alternate measure (e.g. alternate equipment or fuel).

Only the non-biogenic CO₂ emissions are presented in the table below because based on the BAAQMD CEQA Guidance, biogenic CO₂ emissions should not be included in the quantification of GHG emissions for a project.¹¹ Methane (CH₄) and Nitrous Oxide (N₂O) emissions from offroad equipment calculated using diesel emission factors as a more conservative estimate.

ENVIRON used EMFAC2011 to determine the CO₂ emissions from worker trips. The CH₄ and N₂O emissions from worker trips were based on the emission factors per fuel usage from the California Climate Action Registry Protocol for light-duty trucks, as per the EIR.

⁸ CARB, Mobile Source Emission Inventory. Available online:
http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

⁹ ESA, "San Rafael Rock Quarry Amended Reclamation Plan and Amended Surface Mining and Quarrying Permit: FEIR Volume I: Revisions to the Draft EIR Text", Section 4.2. January 2009. Available Online:
http://www.co.marin.ca.us/depts/CD/main/pdf/eir/SRRQ_FEIR/FEIR%20Volume%20I_Revised%20DEIR.pdf

¹⁰ Note manufacturer warranties for mobile equipment currently at the Quarry are not applicable when using biodiesel blends with greater than 20% biofuel.

¹¹ BAAQMD, CEQA Guidelines. May 2012. Available online at:
http://www.baaqmd.gov/~/_media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines_Final_May%202012.ashx?la=en

Table 3. Summary of Greenhouse Gas Emissions (tons CO₂e) from Proposed Reclamation Activities^{12,13}

Emission Source	CO ₂ (tons)	CH ₄ (tons)	N ₂ O (tons)	TOTAL (tons CO ₂ e) ⁷
Exhaust Emissions from On-Site Excavation and Transport Equipment ^{1,2,3,4}	203	0.02	0.01	206
Worker Vehicle Trips ^{5,6}	4.0	7.8E-04	9.4E-04	4.3
Annual Average Reclamation GHG Emissions	207	0.02	0.01	211
Total Reclamation Emissions (10 years)	2,071	0.20	0.10	2,105

Notes:

1. On-Site Excavation and Transport Equipment were assumed to use an 40% biodiesel blend (B40). Only the non-biogenic CO₂ emissions were included based on the BAAQMD CEQA Guidance.
2. Emissions were calculated using fuel consumption rate based on OFFROAD 2011¹⁴ and emission factors from 2013 Climate Registry.
3. Emission factor for pure diesel was used to calculate total CO₂ emissions; non-biogenic CO₂ emissions were calculated as 60% of total CO₂ emissions.
4. Pure diesel emission factors were conservatively used for CH₄ and N₂O.
5. CO₂ emissions were calculated using emission factors from EMFAC 2011 (Pavley¹⁵ + Low Carbon Fuel Standards (LCFS) included).
6. Emission factors of 0.05 g CH₄/mile and 0.06 g N₂O/mile were used based on the California Climate Action Registry Protocol for light-duty trucks, as per the previous EIR.
7. Global warming potential values from 40 CFR Part 98 Table A-1 were used to convert emissions to tons of carbon dioxide equivalents (CO₂e) in accordance with 40 CFR Part 98.2.

¹² The Climate Registry, 2013 Default Emission Factors: <http://www.theclimater registry.org/downloads/2012/01/2012-Clim ate-Registry-Default-Emissions-Factors.pdf>

¹³ CARB, EMFAC, <http://www.arb.ca.gov/emfac/>

¹⁴ CARB, Off-road Diesel Equipment. Available online: http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

¹⁵ CARB, Clean Car Standards – Pavley, Assembly Bill 1493. Available online: <http://www.arb.ca.gov/cc/ccms/ccms.htm>

3 Summary of Operational Emissions

Per the SRRQ Permit Conditions of Approval, ENVIRON calculated operational emissions for San Rafael Rock Quarry for both 2007 and 2012, which represent baseline at the time of the EIR and current facility operations. These inventories were constructed based on information received from client (utility bills, fuel logs, etc.). These inventories are summarized below. The 2012 inventory was reported to The Climate Registry¹⁶ (TCR), in June 2013, as required by the SRRQ Permit Conditions of Approval.¹⁷

3.1 Summary of Baseline GHG Emissions (2007 Inventory)

According to Dutra personnel, the 2007 GHG Inventory is representative of Baseline activity at the Facility when the EIR was completed.¹⁸

Furthermore, per COA 1g, 2007 is representative of the Baseline conditions at the Site. Condition 1g states that the Permit is granted for the surface mining and quarrying operations, and reclamation activities, consisting of the following:

“Structures, facilities, equipment and other accessory uses and appurtenances including, but not limited to rock crushers, conveyor belts, asphalt batch plant, barging facilities, water supply ponds, water recycling ponds, scale house, truck wash racks, above ground fuel tanks, air pollution control equipment, administration offices, maintenance buildings and sheds as shown in the 2006 existing conditions aerial topography and map dated December 19, 2006, on record at the Marin County Department of Public Works. This is the last County required aerial map submittal prior to publishing the Notice of Preparation for the amended quarry permit EIR.”

Note the baseline year was not specifically identified in COA#53.

Table 4 presents 2007 GHG emissions generated from SRRQ operations. A total of 4,346 metric tons of CO₂e (3,959 metric tons of CO₂e non-biomass) were emitted from the 2007 operational activities involving several different source categories.

Stationary combustion emissions constitute about 30% of the total 2007 GHG emissions (1,426 tons of CO₂e). Mobile off-road sources constitute about 50% of the total 2007 GHG emissions (2,407 tons of CO₂e); 82% of mobile emissions are non-biomass based (1,981 tons CO₂e) while 18% of mobile emissions are biomass-based (426 tons of CO₂e). Indirect emissions from purchased electricity account for 18% of the total 2007 GHG emissions (853 tons of CO₂e). The remaining 2% of the inventory come from the TCR refrigerants (105 tons of CO₂e) using in cooling/refrigeration equipment. Though all biomass and non-biomass emissions were reported

¹⁶ The Climate Registry is a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify and publicly report greenhouse gas emissions into a single registry. The Registry supports both voluntary and mandatory reporting programs and provides comprehensive, accurate data to reduce greenhouse gas emissions.

¹⁷ Emissions are reported to The Climate Registry in metric tons CO₂e, per The Climate Registry General Reporting Protocol. However, emissions here are presented in tons CO₂e, which is consistent with the units presented in the DEIR and Operating Permit.

¹⁸ Emails from Ross Campbell, The Dutra Group.

to TCR, as shown below, BAAQMD only requires reporting of non-biomass emissions. Per BAAQMD's 2012 CEQA Guidelines, biogenic CO₂ emissions should not be included in the quantification of GHG emissions for a project.¹⁹ Biogenic CO₂ emissions result from materials that are derived from living cells, as opposed to CO₂ emissions derived from fossil fuels, limestone and other materials that have been transformed by geological processes. Biogenic CO₂ contains carbon that is present in organic materials that include, but are not limited to, wood, paper, vegetable oils, animal fat, and food, animal and yard waste.

Table 4. Summary of Baseline Greenhouse Gas Emissions (tons CO₂e), 2007 Inventory

Source Category	Amount (tons of CO ₂ e)
Stationary Combustion	1,426
Mobile Combustion- On/Off-Road	1,981
Mobile Combustion- On/Off-Road (Biomass) ²⁰	426
Purchased Electricity	853
Refrigerants (TCR)	105
Refrigerants (Other)	0
Total (Non-Biomass)	4,364
Total (All)	4,791

3.2 Summary of Current GHG Emissions (2012 Inventory)

The San Rafael Rock Quarry also calculated the operational emissions from 2012, which represents the most recent year with available data. Table 5 shows GHG emissions from SRRQ operations for 2012²¹. A total of 2,431 tons of CO₂e were emitted from the 2012 operational activities across five different source categories: stationary combustion, mobile off-road, mobile on-road, purchased electricity, and refrigerants.

Stationary combustion sources constitute about 48% of the total 2012 GHG inventory (1,161 tons of CO₂e). Mobile off-road equipment accounted for 32% of the total GHG inventory (788 tons of CO₂e), 83% of which are non-biomass based emissions (653 tons CO₂e) and remaining 17% are biomass based emissions, from burning of biodiesel blends (135 tons of CO₂e). Mobile

¹⁹ Bay Area Air Quality Management District, 2012 CEQA Guidelines, Page 4-5. Available online: http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines_Final_May%202012.ashx?la=en

²⁰ Note TCR requires reporting of biomass emissions so they are shown here. However, biomass emissions are not required for BAAQMD tracking. Thus the totals are reported separately.

²¹ Emissions were reported to The Climate Registry in metric tons CO₂e, per The Climate Registry General Reporting Protocol. However, emissions here are presented in tons CO₂e, which is consistent with the units presented in the DEIR and Operating Permit.

on-road sources accounted for 4% of the total GHG inventory (89 tons of CO₂e), 82% of which are non-biomass based emissions (73 tons CO₂e) and remaining 18% are biomass based emissions (16 tons of CO₂e). GHG emissions from electricity purchased offsite constitute about 12% of the total GHG inventory (287 tons of CO₂e) and the remaining 4% of the inventory come from the TCR refrigerants (105 tons of CO₂e).

Table 5. Summary of Current Greenhouse Gas Emissions (tons CO₂e), 2012 Inventory

Source Category	Amount (tons of CO ₂ e)
Stationary Combustion	1,161
Mobile Combustion- On-Road	73
Mobile Combustion- On-Road (Biomass)	16
Mobile Combustion- Off-Road	653
Mobile Combustion- Off-Road (Biomass)	135
Purchased Electricity	287
Refrigerants (TCR)	105
Refrigerants (Other)	0
Total (Non-Biomass)	2,280
Total (All)	2,431

3.3 Plans for Future Reporting

San Rafael Rock Quarry plans to submit annual operational inventories to The Climate Registry in an ongoing basis.

4 Summary of Proposed GHG Reduction Measures

The Marin County Conditional Use Permit Conditions of Approval (COA#53) require the GHG Reduction Plan to demonstrate how the Quarry will reduce or offset remaining un-mitigated emissions as identified in the Combined EIR. Below ENVIRON shows mitigation measures in use, as well as proposed, that may be used to achieve emissions reductions. Per above, the emission reduction requirements have already been met, based on the current mitigation measures presented in Section 4.1 below.

4.1 Current GHG Mitigation Measures

Dutra currently incorporates several mitigation measures at the San Rafael Rock Quarry. These include the following:

- Mobile Combustion:
 - Dutra currently uses B20 biodiesel blend for its mobile equipment
 - Limit offroad equipment idling to CARB limit of 5 minutes
- Purchased Electricity:
 - Dutra currently participates in the Light Green Energy program through Marin Clean Energy, which incorporates 50% renewables to the purchased energy mix.²²

4.2 Proposed GHG Mitigation Measures

ENVIRON worked with Dutra to outline several GHG mitigation measures that are applicable to SRRQ. The mitigation measures are listed below, by source category:

- Purchased Electricity
 - Electric Equipment
 - Use solar power instead of grid electricity
 - Convert to Deep Green program under Marin Clean Energy²³ (100% Renewables)
 - Building Energy Use
 - Multiple mitigation measures available (exceed Title 24, use local building materials, install thermostat timers)
 - Area Lighting
 - Install high efficiency area lighting (e.g. for night operations)
- Mobile Combustion
 - Offroad diesel equipment
 - Use biodiesel instead of petroleum diesel. Currently using B20 (20% biodiesel), should emissions near thresholds increase biodiesel usage up, to B80 (80% biodiesel)
 - Use hybrid offroad equipment instead of petroleum diesel based equipment, to reduce fuel consumption and associated emissions

²² Marine Clean Energy, Light Green program: <https://mcecleanenergy.com/lightgreen>

²³ Marin Clean Energy <https://mcecleanenergy.com/>

- Limit offroad equipment idling beyond CARB limit of 5 minutes
- On-road mobile sources
 - Use biofuel (ethanol) instead of gasoline (SRRQ already uses 10% ethanol blend for on-road mobile sources)
- Offsets
 - Purchase offsite mitigation credits

4.3 Prioritizing GHG Reduction Measures

Per the County of Marin, the San Rafael Rock Quarry plans to prioritize energy reduction measures above other means of emission reduction. Thereafter, SRRQ is primarily investigating mitigation measures that will help achieve emission reductions via energy conservation.

4.3.1 Energy Reduction Measures

The following list of GHG reduction measures provides a subset of the proposed mitigation measures listed in Section 4.1, and are specifically related to energy use reduction. San Rafael Rock Quarry is considering each of these energy reduction measures:

- Use solar energy for the electric equipment in the SRRQ instead of the grid electricity, which would potentially results in a low level of GHG reduction but at low cost too.
- Convert to the Deep Green program under Marin Clean Energy, with 100% Renewables.
- Reduce building energy consumption, by adopting various mitigation measures, such as exceeding Title 24, using local building materials, installing thermostat timers, etc.
- Install high efficiency area lighting to reduce energy consumption, e.g. for night operations.

4.3.2 Other Reduction Measures

The following list of GHG reduction measures are the remaining subset of the proposed mitigation measures listed in Section 4.1; these other reduction measures are not specifically related to reduction in energy usage:

- Use hybrid offroad equipment instead of petroleum diesel based equipment.
- Use biodiesel for the offroad equipment instead of petroleum diesel. SRRQ already uses B20 (20% biodiesel) but may be able to expand the use of biodiesel up to B80 (80% biodiesel), as requested necessary to meet requirements;
- Limit the idle time of offroad equipment beyond CARB limit of 5 minutes. SRRQ already implements this measure.
- Use biofuel (ethanol) in on-road equipment instead of gasoline. SRRQ already applies this mitigation measure by using 10% ethanol blend in its on-road equipment.

4.3.3 Offsets

San Rafael Rock Quarry does not have plans to use emissions offsets at this time. If emissions offsets are needed for San Rafael Rock Quarry to meet their emission reduction goals, San Rafael Rock Quarry will revisit this option at that time.

4.4 Summary of Quantified Emission Reductions

4.4.1 Reclamation Emissions

As discussed above, ENVIRON calculated reclamation emissions for the San Rafael Rock Quarry, following the principles outlined in the DEIR, using latest available software and emission factors. The SRRQ GHG emissions from reclamation activities are reduced significantly below the 2,489 ton CO₂e threshold due primarily to the three factors listed below:

- *Biodiesel Fuel Blend*: In order to meet the emissions requirement of the Quarry Permit, SRRQ plans to use B40 biodiesel blend instead of B20 biodiesel blend for the On-Site Excavation and Transport Equipment, which reduces CO₂ emissions from reclamation activities significantly. However, as reclamation proceeds, SRRQ may change the percentage of biodiesel used as necessary to meet the emissions requirements as well as maintain equipment in proper working order.
- *Reduced Worker Vehicle Trips*: Reduction in the number of worker vehicle trips also reduced the GHG emissions.
- *Reduction in Equipment Activity*: In addition, reduction in the equipment count and operating hours further reduced the GHG emissions below the permit limit.

4.4.2 Operational Emissions

As shown in Tables 4 and 5 above, San Rafael Rock Quarry reduces (non-biomass) operational emissions from Baseline (2007) to Current year (2012), from 4,364 tons CO₂e to 2,280 tons CO₂e. This is a 48% reduction of GHG emissions, which is well above the 15% reduction requirement specified in the Conditional Use Permit.

5 Implementation Schedule

Table 6 provides an implementation schedule for required items in the GHG Reduction Plan, as required by the Conditional Use Permit.

Table 6. Implementation Schedule: Reclamation Activities

Requirement	Reference	Documentation and Co-Benefits	Implementation Schedule
<i>Tier 1: GHG Reduction Measures Currently and Continuously Implemented</i>			
Inventory of reclamation-related GHG emissions	Section 2	ENVIRON completed a reclamation GHG Inventory (Table 3).	Complete
<ul style="list-style-type: none"> Demonstrate how reclamation-related emissions are no more than 2,489 tons of CO₂e. 	Section 2	ENVIRON demonstrates the emissions are below 2,489 tons of CO ₂ e in Table 3. The limits to GHG emissions also reduce NO _x and PM ₁₀ emissions that would result from these activities.	Complete
<ul style="list-style-type: none"> Include Implementation Schedule 	Section 5	The implementation schedule is presented in this section.	Complete
<ul style="list-style-type: none"> Submit the Plan to the Marin County Public Works Department for review and approval. 	Section 5	The Final Draft GHG Reduction Plan will be submitted to the Marin County Public Works Department by June 1, 2014.	Planned, June 2014
<i>Tier 2: GHG Reduction Measures to be Implemented</i>			
<ul style="list-style-type: none"> Demonstrate how the Quarry will reduce or offset remaining unmitigated GHG emissions as identified in the Combined EIR 	Section 2	The Quarry does not exceed the emissions limits identified in COA#53. However, as an alternative to achieving the emission limit in the future, the Quarry proposes a fuel consumption limit on all diesel-powered equipment. The Quarry lists additional ongoing and proposed GHG reduction measures in Section 4.	Complete

Requirement	Reference	Documentation and Co-Benefits	Implementation Schedule
<ul style="list-style-type: none"> Prioritize emission reduction through energy conservation and other measures 	Section 4	As discussed in Section 4, the Quarry plans to prioritize emission reduction through energy conservation and other measures.	Ongoing
<ul style="list-style-type: none"> For those emissions that cannot be reduced, specify how emissions will be offset. 	Section 4	As discussed in Section 4, if further emissions reductions are needed, offsets will be investigated at that time. Per the inventory work to date, the Quarry does not anticipate that offsets will be required.	Complete

Table 7. Implementation Schedule: Operational Emissions

Requirement	Reference	Documentation and Co-Benefits	Implementation Schedule
<i>Tier 1: GHG Reduction Measures Currently and Continuously Implemented</i>			
Inventory of operations-related GHG emissions	Section 3	ENVIRON completed operational GHG inventories for 2007 (Baseline) and 2012 (Current), as shown in Tables 4 and 5.	Complete
<ul style="list-style-type: none"> Plan to reduce operational GHG emissions by 15 percent. 	Section 4	As discussed in Section 3 and 4, the Quarry has already met the operational GHG reduction goals. Additional reduction measures are discussed in Section 4, since reductions may be required in the future.	Complete
<ul style="list-style-type: none"> Demonstrate how the Quarry will reduce or offset remaining unmitigated GHG emissions as identified in the Combined EIR 	Section 2	As discussed in Section 3 and 4, the Quarry has already met the operational GHG reduction goals. Additional reduction measures are discussed in Section 4, since reductions may be required in the	Complete

Requirement	Reference	Documentation and Co-Benefits	Implementation Schedule
		future.	
<ul style="list-style-type: none"> Prioritize emission reduction through energy conservation and other measures 	Section 4	As discussed in Section 4, the Quarry will prioritize future emission reduction through energy conservation and other measures.	Complete
<ul style="list-style-type: none"> For those emissions that cannot be reduced, specify how emissions will be offset. 	Section 4	As discussed in Section 4, if further emissions reductions are needed, offsets will be investigated at that time. Per the inventory work to date, the Quarry does not anticipate that offsets will be required.	Complete
<ul style="list-style-type: none"> Reported initial inventory to the California Climate Action Registry (or a successor organization) as a baseline inventory 	Section 3	The Dutra Group reported the San Rafael Rock Quarry 2012 GHG Inventory to The Climate Registry.	Complete ²⁴
<ul style="list-style-type: none"> Include Implementation Schedule 	Section 5	The implementation schedule is presented in this section.	Complete
<ul style="list-style-type: none"> Submit the Plan to the Marin County Public Works Department for review and approval. 	Section 5	The Final Draft GHG Reduction Plan will be submitted to the Marin County Public Works Department by June 1, 2014.	Planned, June 2014
<i>Tier 2: GHG Reduction Measures to be Implemented</i>			
<ul style="list-style-type: none"> Report additional inventories annually 	Section 6	As discussed in Section 6, San Rafael Rock Quarry plans to report GHG inventory annually to TCR.	Ongoing, Annually

²⁴ The Dutra Group reported SRRQ 2012 emissions inventory to The Climate Registry, which is the successor organization to the California Climate Action Registry.

6 Annual Reporting Procedures

According to COA#53, the San Rafael Rock Quarry must conduct and report additional inventories annually. The San Rafael Rock Quarry plans to report to The Climate Registry on an annual basis.²⁵ As part of this annual reporting, SRRQ will strive to evaluate emissions in comparison to the operational limits outlined in COA#53, namely a 15% reduction in GHG emissions below baseline in future operational years. In the event SRRQ emissions exceed the 15% reduction from baseline, SRRQ will consider additional GHG reduction measures (such as those outlined in this Plan) aimed at reducing emissions created that year in excess of the requirements to zero. Furthermore, SRRQ will work to maintain ongoing GHG reduction measures in future years in order to prevent emissions in excess of the requirements.

Note GHG reductions can also occur due to low facility production, these procedures will consider reduced production when evaluating implementation of GHG reduction measures while ensuring that future increases in production initiate the use of further GHG reduction measures and compliance with the requirements.

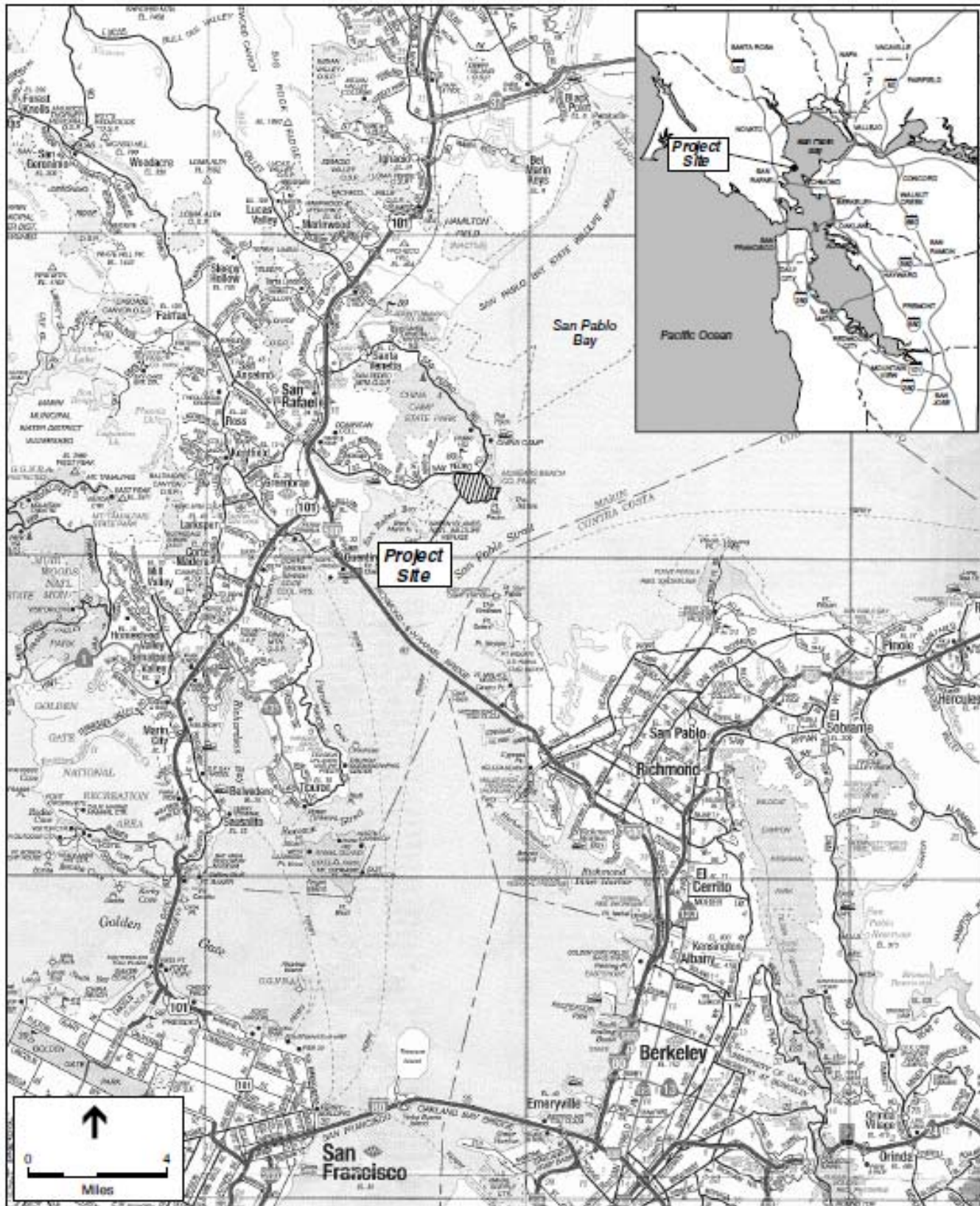
²⁵ The Climate Registry. 2013. "General Reporting Protocol 2.0". March. Available online: <http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/>

Note, per The Climate Registry General Reporting Protocol 2.0, members are allowed to use rough, upper-bound, Simplified Estimation Methods (SEMs) for any combination of individual emission sources and/or gases, provided that the emissions from these sources and/or gases are less than or equal to five percent of the sum of reported scope 1, scope 2, and direct biogenic emissions aggregated on a CO₂e basis.

7 Summary

This GHG reduction plan demonstrates San Rafael Rock Quarry's ongoing compliance with the Marin County Conditional Use Permit, Condition #53. San Rafael Rock Quarry will review and update this plan as necessary in future years.

Figures



SOURCE: California State Automobile Association; ESA

San Rafael Rock Quarry ARP and AQP EIR . 205145

Figure 1
Project Location

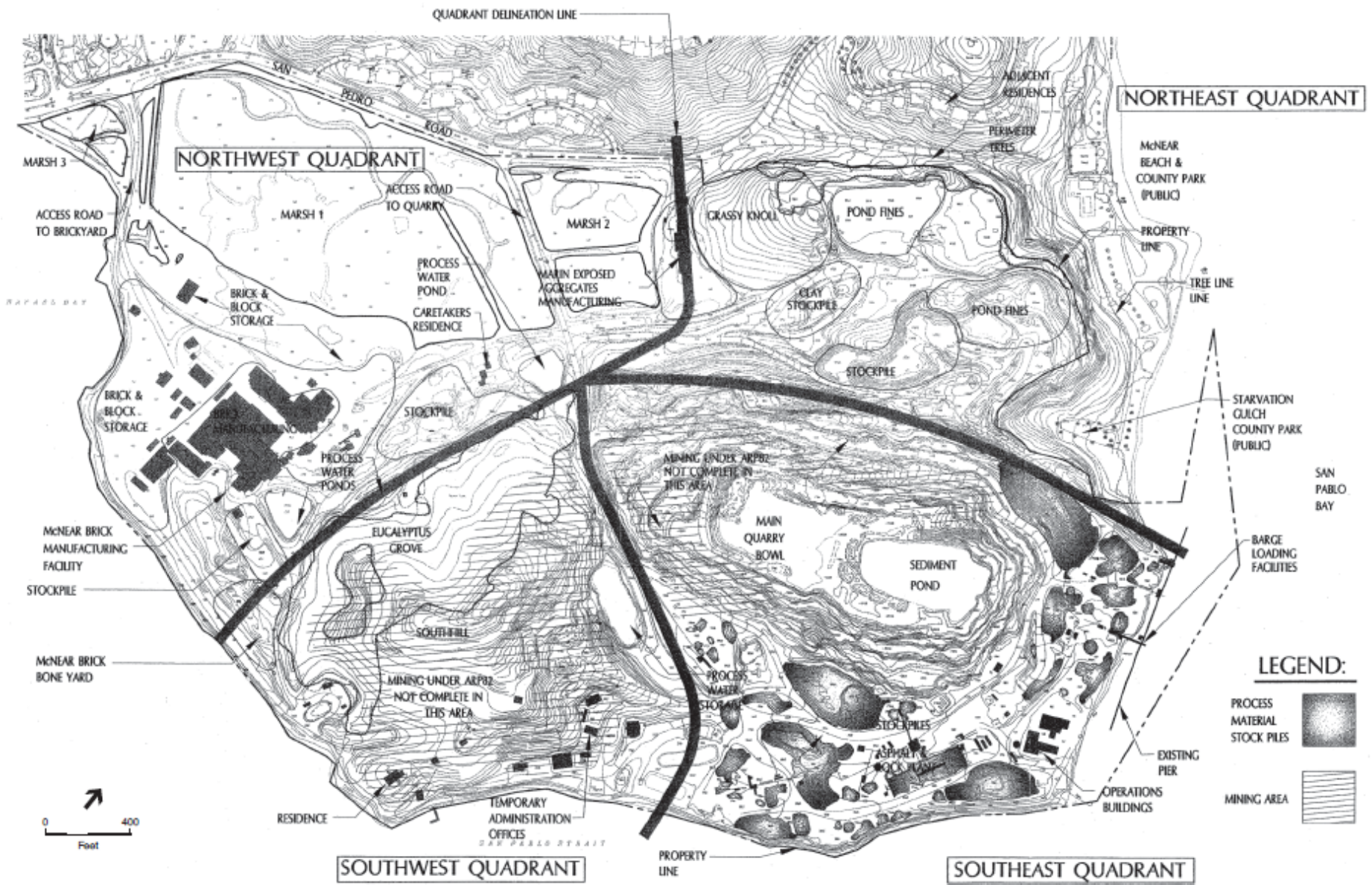


Figure 2
Existing Conditions