Otay Hills Construction Aggregate and Inert Debris Engineered Fill Operation Project

Appendix P

Vehicle Miles Traveled Analysis and Market Study

for the

Public Review Draft Environmental Impact Report

PDS2004-3300-04-004 (MUP);
PDS2004-3310-04-001 (RP);
PDS2010-3813-10-002 (SPA);
Log No. 04-190-04

June 2020

Prepared for:

County of San Diego
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MEMORANDUM

To:	Mr. Arnold Veldkamp Superior Ready Mix Concrete L.P.	Date:	May 27, 2020
From:	Shankar Ramakrishnan / Charlene Sadiarin LLG, Engineers	LLG Ref:	3-20-3206
Subject:	Otay Hills Quarry – Revised VMT Analysis		

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This memo presents the Vehicle Miles Traveled (VMT) Analysis for the Otay Hills Quarry Project. The memo presents an outline of the project description, the Senate Bill SB743 Vehicle Miles Traveled (VMT) requirements, the project-specific technical guidance, analysis approach, methodology and findings.

PROJECT DESCRIPTION

The Otay Hills project site is located in the unincorporated community of East Otay Mesa within the Otay Subregional Planning Area in the southernmost portion of San Diego County. The project impact footprint is located 8.5 miles east of the Interstate 805 (I-805) / State Route 905 (SR 905) interchange and 0.5 miles east of the intersection of Otay Mesa Road and Alta Road.

The proposed project would include a hard rock extraction operation that would extract and process rock for construction aggregate purposes. Rock that has been processed for use in manufacturing other products (such as concrete or asphaltic concrete) is typically referred to as aggregate.

SENATE BILL SB 743

In September 2013, the Governor's Office signed SB 743 into law, starting a process that fundamentally changed the way transportation impact analysis is conducted under CEQA. Within the State's CEQA Guidelines, these changes include the elimination of Auto Delay, level of service (LOS), and similar measurements of vehicular roadway capacity and traffic congestion as the basis for determining significant impacts. The guidance identifies VMT as the most appropriate CEQA transportation metric, along with the elimination of Auto Delay/LOS for CEQA purposes statewide. The justification for this paradigm shift is that Auto Delay/LOS impacts lead to improvements that increase roadway capacity and therefore induce more traffic and greenhouse gas emissions.

COUNTY OF SAN DIEGO SB 743 IMPLEMENTATION

Based on our recent discussion with County staff, we understand that the County of San Diego is still in the process of developing its SB 743 guidelines and significance thresholds for land development projects. As of the writing of this report, the draft guidelines are still in development with final adoption by the Board of Supervisors expected before July 1, 2020. Therefore, based on discussions with County staff, the VMT analysis presented herein is for informational purposes only. The CEQA significance determination for the proposed project is based only on LOS and not on VMT.

VMT BACKGROUND AND INDUCED TRAVEL

VMT is defined as a measurement of miles traveled by vehicles within a specified region and for a specified time period. VMT is a measure of the use and efficiency of the transportation network. VMT is calculated based on individual vehicle trips generated and their associated trip lengths.

PROPOSED TECHNICAL GUIDANCE FOR A PROJECT-SPECIFIC VMT ANALYSIS

VMT metrics for typical land use projects such as *residential, office, and retail projects* include analyzing VMT per capita or VMT per employee. When dealing with other project types such as the proposed project (atypical use within the Industrial category of crushed rock extraction), using location-specific and project-specific information is more applicable especially when a project replaces existing VMT-generating land uses and if the replacement leads to a net overall decrease in VMT. This type of VMT analysis specifically includes evaluating "change in total VMT" as an appropriate method for evaluating projects with atypical trip generators, like this proposed project. When assessing total change in VMT, the *net change in total VMT* without the project and with the project is estimated. This analyzes the vehicle miles traveled to and from the project site in the context of how the project is likely to divert existing trips, and what the implications of those diversions will be on total VMT.

Therefore, for the purposes of this project-specific analysis and based on discussions with County staff, the total change in VMT without and with the proposed project has been analyzed and calculated. To that end, the following is a brief description of the project-specific analysis approach, methodology and calculations.

DE MINIMIS SCREENING

In the Technical Advisory, OPR notes that many agencies use "screening criteria" as a first step in conducting a VMT analysis. Per OPR, projects that generate or attract fewer than 110 trips per day generally may be screened out from conducting a detailed VMT analysis. While the CEQA significance determination for the proposed project is based only on LOS and not on VMT, the 110 trips per day de minimis screening criteria was reviewed if a VMT analysis is warranted for the proposed project based on the number of employees.

The proposed project includes 35 employees, which would translate to 70 ADT (2 trips per employee), which is less than the 110 ADT de minimis screening criteria for non-residential projects in the County. Although the De minimis Screening criteria alone is adequate to conclude that a VMT analysis is not required, out of an abundance of caution, the Project's VMT analysis was conducted. The VMT analysis combines the project's car and light truck VMT with the project's operational heavy truck trip VMT. The analysis was conducted under a project-specific approach and methodology as discussed below.

PROJECT-SPECIFIC ANALYSIS APPROACH AND METHODOLOGY

The project-specific analysis approach and methodology that has been developed to evaluate the VMT for the proposed project is based on the existing crushed rock demand and identifying a Market Area for the Otay Hills Quarry, locations of existing quarries within and outside the Market Area and other pertinent information outlined in the "San Diego County Construction Aggregate Market Study" (*Enviromine, April 2020*).

The proposed VMT analysis was conducted for the project proposed production level of 1,000,000 tons per year:

- ***Step 1:*** The Market Study concludes that the demand and distribution of crushed rock is closely correlated with population. The market area for the Otay Hills project site was identified (hereafter referred to as "Market Area"), which was calculated as 2.2 million tons of crushed rock demand. Identify a midpoint of the Market Area, which was selected from a geographic information systems analysis and represents an adequate, complete and good faith effort at full disclosure.

- ***Step 2:*** It is assumed that the demand in the Market Area is first fulfilled by the closest quarry at its full production level (i.e. 1.2

million tons). This represents a conservative assumption given the shorter trip length and that the closest quarry's production remains within the Market Area with no outside export. The closest quarry to the Market Area is the Chula Vista quarry with its maximum production at 1.2 million tons.

The balance of the crushed rock demand (i.e. 1 million tons) in the Market Area Map is anticipated to be fulfilled by other major quarries in the San Diego County. While there are crushed rock sources further north, it is assumed their product would not be delivered to the Market Area because the identified crushed rock sources are closer and capable of meeting the demand.

- ***Step 3:*** Given that there are no publicly available data on how much crushed rock is being exported from each quarry outside the Market area, an average total trip length (i.e. 57 miles) from these quarries to the Market Area midpoint was identified.

- ***Step 4*****:** Because each truck typically carries 25 tons of crushed rock, the total volume of crushed rock estimated in Steps 1 and 2 was divided by 25 to estimate the number of trucks/vehicles (185 trucks to serve the 1.2 million tons and 154 trucks to serve the 1 million tons) used to transport the crushed rock.

- ***Step 5*****:** Multiply the number of trucks per day from Step 4 by the approximately 260 working days in a year and by the trip lengths calculated in Steps 2 and 3 to determine the total baseline VMT of crushed rock exported from the closest quarry and outside Market Area quarries.

- ***Step 6*****:** Calculate the VMT associated with 1,000,000 tons of crushed rock under the without project scenario. This would represent the annual total VMT under the "without project" scenario (VMT associated with exporting 1,000,000 tons of crushed rock without the proposed project).

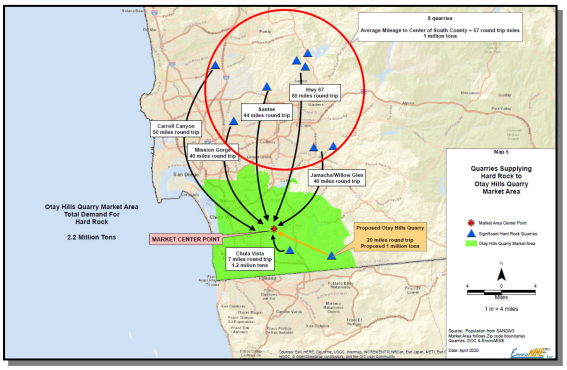
- ***Step 7:*** With crushed rock demand remaining constant, repeat Steps 1 to 6 with the Otay Hills Quarry in place. This would represent the total VMT for the "with project" scenario (i.e. VMT associated with not importing 1,000,000 tons of crushed rock). In addition, under the with project scenario, include the VMT associated with the employees that are expected to access the project site on a typical day.

- ***Step 8*:** Using the numbers in Step 6 and Step 7, determine the total change in annual VMT between the without project and with project scenario (1,000,000 tonnage production) (annual Total Change in VMT).

PROJECT VMT ANALYSIS

The following is a description of the VMT analysis:

- ***Steps 1 through 3:*** Per the Market Study, the figure below shows the Market Area for the proposed project based on population. The total crushed rock demand in the Market Area was calculated as 2.2 million tons annually. The figure also shows the closest quarry to the Market Area, which was identified as the Chula Vista quarry. The Chula Vista quarry's maximum production level was reviewed and identified to be 1.2 million tons. Therefore, to fulfill the balance of the Market Area production, the locations of the remaining quarries outside the Market Area were also identified. The round-trip distances (7 miles from the Chula Vista Quarry and 57 miles from outside quarries) between the midpoint of the Market Area and quarries were also calculated.



- ***Steps 4 through 6: VMT without the Project:*** The number of trucks per day used to transport crushed rock from each quarry was determined by dividing the total volume of crushed rock exported by the closest quarry and quarries outside Market Area per year estimated in Steps 1 through 3 by 6,500 (= 25 tons of crushed rock per vehicle x 260 working days per year). ***Table 1*** summarizes the number of trucks used by the quarries per day. To determine the daily VMT associated with crushed rock export, the number of trucks used by the quarries per day was multiplied by the average trip length calculated in Step 2 and summed together.

  As seen in *Table 1*, the total daily VMT associated with 1,000,000 tons of crushed rock demand in the without project scenario is 8,769.23.

- ***Steps 7 and 8: VMT with the Project:*** Steps 1 through 7 were completed with the project in place. As shown in *Table 1*, with the addition of the project, less crushed rock would need to be transported from the quarries outside the Market Area. The VMT associated with obtaining 1,000,000 tons of crushed rock from the project site rather than being imported from outside the Market Area is 3,986.92, which is a reduction of 4,782.31 from the without project scenario.

  This corresponds to a 55% reduction in Vehicle Miles Traveled

.

TABLE 1
VMT CALCULATIONS

Total Crushed rock Demand (tons)	2,200,000					
Scenario	Without Project		With Project			
Number of sources	2		2			
Calculations	***Quarry 1***	***Quarry 2***	***Quarry 1***	***Quarry 2***	***Proposed Project***	***Employees***
Tonnage split	55%	45%	55%	–	45%	–
Tonnage #	1,200,000	1,000,000	1,200,000	–	1,000,000	–
Tonnage per truck	25	25	25	–	25	–
Number of working days in a year	260	260	260	–	260	–
Number of trucks per day	185	154	185	–	154	–
Average Trip Length to midpoint (miles, roundtrip)	7	57	7	–	20	–
Total Baseline VMT	1,292.31	8,769.23	1,292.31	–	3,076.92	910[a]
Grand Total VMT for 1.0M tonnage production	8,769.23		3,986.92			
VMT Reduction (#) for proposed project production	4,782.31					
VMT Reduction (%) for proposed project production	55%					

Footnotes:

a. A total of 35 employees are anticipated to access the project site every day. The SANDAG regional average trip length per employee of 26 miles was used to calculate the employee VMT.

General Notes:

1. Quarry 1 refers to the Chula Vista Quarry, which is located within the Market Area.
2. Quarry 2 refers to the quarries outside the Market Area.

SUMMARY

A project-specific analysis approach and methodology was developed to evaluate the VMT for the proposed project relying on existing crushed rock demand and identifying a Market Area, locations of existing quarries within and outside the Market Area and other pertinent information outlined in the "San Diego County Construction Aggregate Market Study" (*Enviromine, April 2020*). The VMT analysis was conducted for the project proposed production level of 1,000,000 tons.

As shown in *Table 1*, with the addition of the project, less crushed rock would need to be transported from the quarries outside the Market area and therefore, the VMT associated with obtaining 1,000,000 tons of crushed rock from the project site rather than being imported from outside the Market area is 3,986.92, which is a reduction of 4,782.31 from the without project scenario. This equates to a VMT reduction of 55%.

May 2020

San Diego County Construction Aggregate Market Study

Prepared for the proposed Otay Hills Quarry

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1 Introduction

This report illustrates the market environment for the construction aggregates industry in San Diego County as of 2018 and identifies projected demand for aggregate through 2050. This information has been developed from published reports and from personal communication with various sources operating in the construction aggregates industry. Using this information within a geographic context helps to identify the Vehicle Miles Traveled (VMT) for delivery of construction aggregates from the point of production to the point of use.

It is useful to understand construction aggregate terms to avoid confusion throughout the report. Construction aggregate is a term used for raw materials used in construction, i.e., crushed rock, sand and gravel. The raw material is used as the primary constituent of products like concrete, stucco, and asphalt, and it is also used as base material beneath rail and transit lines, roads, pipelines, building foundations etc. Construction aggregate is an essential constituent for community infrastructure (e.g. roads, bridges, and utilities) and for buildings (e.g. residences, hospitals, schools, and commercial, industrial and retail centers).

Construction aggregate products are divided into two primary categories: fine and coarse. Fine aggregates have a size of less than 3/8", and coarse aggregates are 3/8" and larger. Fine aggregates are typically sand sized particles that normally originate from alluvial deposits, although sand can be manufactured by crushing coarse aggregate to a smaller size. This manufactured sand must be blended with natural sand to meet specifications for concrete. Coarse aggregates typically refer to crushed rock produced from hard rock or cobble deposits. Fine aggregates from alluvial sources are used in concrete manufacturing and make up about 35% of the total volume of the concrete. The method of extraction of alluvial sand and processing does not require crushing. Coarse aggregates generally require crushing and screening to process the material into different sizes and make up about 45% of the total volume of concrete. In this report, aggregate is used as a general term and includes both fine and coarse aggregates. When the discussion is narrowed to fine aggregate (sand) or coarse aggregate (crushed rock) it will be indicated.

2 Background - San Diego County Aggregate Consumption

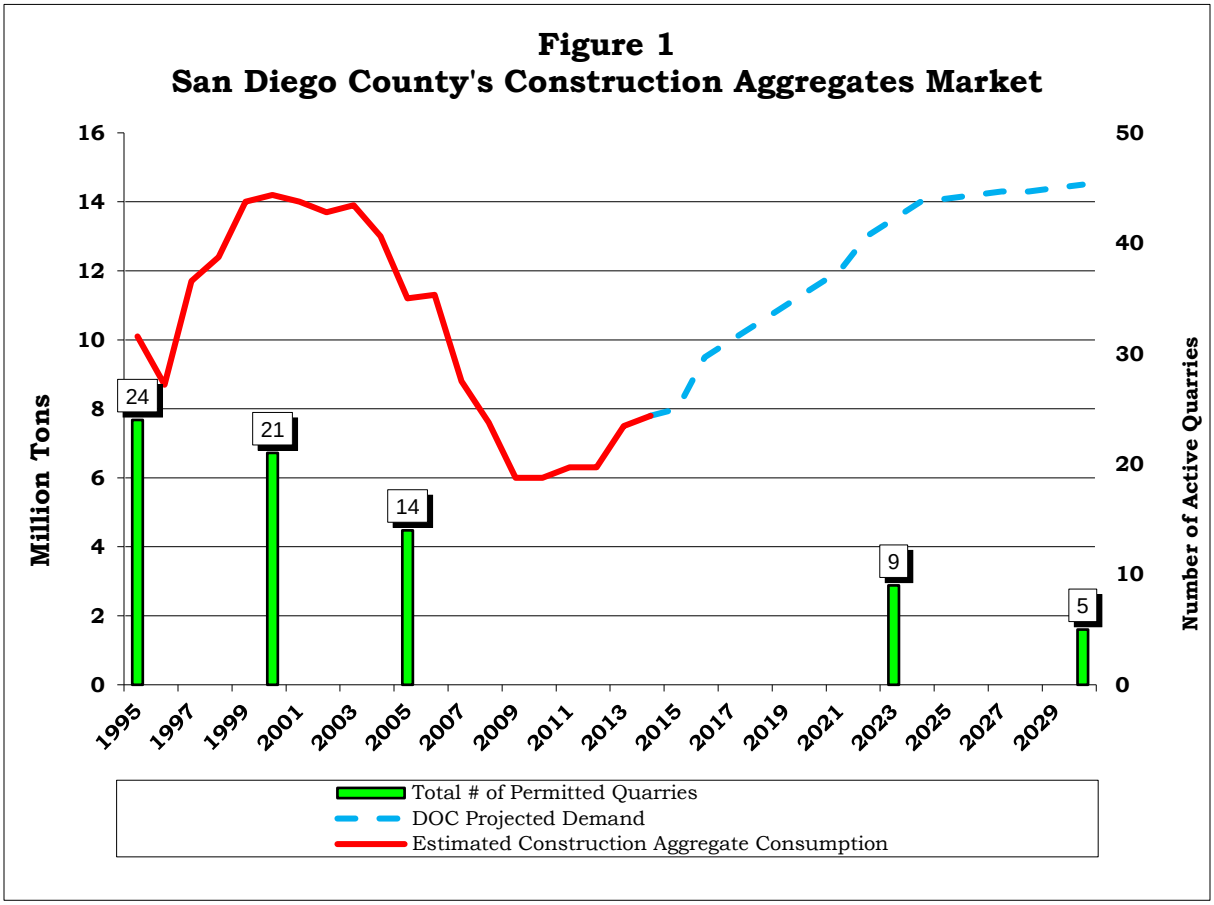
Similar to statewide trends, San Diego County experienced peak production in 2006 and saw a reduction in construction aggregate demand during the recession, with a 57 percent drop from 2006 to 2011. Aggregate production fluctuated between 2009 and 2012 but did not consistently increase until 2013 (Figure 1).

Aggregate consumption in the County (column 3 of Table 1) is the sum of all aggregates produced within the County plus imports. San Diego County aggregate production predominantly consists of coarse aggregates. A number of rock quarries dispersed around the County produce coarse aggregates. Only one source of fine aggregates is permitted to operate within the County. This has resulted in the need to import substantial quantities of fine aggregates from production sources located outside of the County. The absence of local San Diego sand mines is well documented. Starting in approximately 1990, San Diego County Quarries were unable to meet local demand for fine aggregates and imports were relied upon to satisfy production

shortfalls, although some facilities crush coarse aggregate to make manufactured sand. While some coarse aggregate imports are known to occur, local sources are generally available to satisfy demand. The information discussed in this section is supported by the California Department of Conservation (DOC) which reported that between 1980 and 1995, the number of sand mines was reduced from 25 to 8 and permitted reserves fell from 121-million tons to 55-million tons[1]. The DOC updated the Mineral Land Classification report for Western San Diego County in 2017 and assessed industry activity through 2014.

In total, the 2017 DOC report indicates that there were 18 active crushed rock and sand operations in 2014. However, since the publication of that report, four sand sources have ceased operation, and 1 hard rock facility has closed in San Diego County. Only one new sand operation has been permitted[2]; however, the sand production from this site is small in scale and imports are necessary to satisfy the demand for sand in San Diego County.

Figure 1
San Diego County's Construction Aggregates Market



[1] Miller, Davis, James F. "Update of Mineral Land Classification: Aggregate Materials in the Western San Diego County Production-Consumption Region." California Department of Conservation, DMG Open-File Report 96-04, 1996.
[2] Gius, F.W., L.L. Busch & R.V. Miller. "Update of Mineral Land Classification: Portland Cement Concrete-Grade Aggregate in the Western San Diego County Production-Consumption Region, CA." California Geological Survey. Special Report 240. 2017.

3 Future San Diego Aggregate Supply

San Diego County is facing a severe shortage of permitted construction aggregate reserves. Permitted reserves are 35% of the estimated 50-year demand[3]. If no new reserves are permitted and the remaining quarries produced enough to satisfy demand (no imports), the existing permitted reserves would be exhausted within 11-20 years. It is important to note that this shortage covers both coarse and fine aggregate products over the long term. As shown in Figure 1, the red line represents the estimated construction aggregate consumption within San Diego County and is followed by the dashed blue line that represents the projected demand for aggregate as estimated by the Department of Conservation (DOC).[4], [5] Figure 1 also illustrates that the number of permitted quarries within San Diego County is expected to decline (green bars), while demand is projected to increase. As a result, imports and or additional permitted sources within the County will be needed to satisfy demand.

3.1 Existing and Proposed Mines Supplying Construction Aggregate to San Diego

3.1.1 Existing Mines in San Diego County

San Diego County currently has 13 active production sites and 2 idle operations and one newly permitted, sand mining site – the East County Sand Mine. There has only been one new quarry of significant size permitted in the last 30 years -- Rosemary's Mountain. This site was in the permitting process for 18 years before finally gaining approval in 2003.

Table 2 lists the status of each production site in the County, including the permit expiration date and whether the site is a crushed rock or sand source. Map 1 illustrates the location of each quarry. The number next to each symbol on the map correlates with the number in the first column in Table 1.

Currently, with an estimated 260 to 308 million tons of reserves, crushed rock is adequately supplied by existing operations located within the County. However, there are specific market areas within the county that may not be well served by existing sources, resulting in material being transported long distances. Although San Diego County is host to significant fine aggregate resources, only 1 million tons are approved for production. The “East County Sand Mine” was approved in 2018 with an estimated reserve of 1 million tons.

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[3] Clinkenbeard, J.P. & F.W. Gius, "Aggregate Sustainability in California." California Geological Survey, Map Sheet 52. 2018.

[4] Miller, Russ. “Update of Mineral Land Classification: Aggregate Material in the Western San Diego County Production-Consumption Region.” California Department of Conservation, Division of Mines and Geology. Open File Report 96-04. 1996.

[5] Gius, F.W., L.L. Busch & R.V. Miller. “Update of Mineral Land Classification: Portland Cement Concrete-Grade Aggregate in the Western San Diego County Production-Consumption Region, CA.” California Geological Survey. Special Report 240. 2017.

Table 1: Existing San Diego County Permitted Aggregate Mines

Map #	Quarry Name	Commodity	Permit Exp Date	Status
Crushed Rock Quarries in San Diego				
1	Rosemary's Mountain	Crushed Rock	2040	Active
2	Twin Oaks Quarry	Crushed Rock	Vested	Active
3	JEB	Crushed Rock	Vested	Active
4	Inland Valley	Crushed Rock	Vested	Active
5	Carroll Canyon	Crushed Rock	Expired - application to extend	Active
6	Poway	Crushed Rock	2031	Idle
7	Sycamore Landfill	Crushed Rock	2025	Active
8	Mission Gorge Pit	Crushed Rock	2033	Active
9	TTT Quarry	Crushed Rock	Vested	Active
10	Vigilante Quarry	Crushed Rock	2030	Active
11	Slaughterhouse Canyon	Crushed Rock	2020	Idle
12	Jamacha	Crushed Rock	Vested	Active
13	Hester's Granite Quarry	Crushed Rock	Vested	Active
14	Turvey DG Pit	Decomposed Granite	2020	Active
15	Chula Vista Quarry	Crushed Rock	Vested	Active
2019 Estimated Crushed Rock Permitted Reserves in San Diego County 265-308 million tons				
Map #	**Quarry Name**	**Commodity**	**Permit Exp Date**	**Status**
Sand Sources in San Diego County				
16	East County Sand Mine	Sand	2023	Newly Permitted
2019 Estimated Permitted Sand Reserves in San Diego County Approximately 1 million tons				

3.1.2 Proposed Mines in San Diego County

As listed in Table 2, there are three proposed aggregate projects in the permitting process -- Otay Hills in South County, El Monte Sand Mine, and the Cottonwood Sand Mine. Map 1 also illustrates the locations of these proposed projects. Otay Hills is proposed as a coarse aggregate quarry and the remaining two are proposed as fine aggregate operations.

Table 2: Proposed San Diego County Aggregate Mines

Map #	Quarry Name	Operator	Commodity	Proposed Annual Production (mil tons)	Proposed Permitted Reserves (mil tons)
17	Otay Hills Quarry	Superior	Crushed Rock	1	75
18	El Monte Sand Mine	TBD	Sand	1	12.5
19	Cottonwood Sand Mine	TBD	Sand	0.5	5

3.1.3 Mines Importing Sand to San Diego County

Table 3 lists each of the sites that are known to import sand into San Diego County and their locations are also indicated on Map 2. From the south, sand is imported from Mexico by Associated Ready Mix from the Las Palmas Valley site located approximately 30 miles southeast of Tijuana. Personal interviews with employees from Associated indicated that the Las Palmas Valley site is consistently the largest exporter of sand to San Diego County.[6]

From the north, sand imports generally originate from Pacific Aggregates and Werner Corporation located in Lake Elsinore/Temescal Valley/Corona. Limited and inconsistent amounts are also imported from sites located in Riverside and San Bernardino Counties operated by Robertson's and Cemex (Table 3), the Ocotillo area of Imperial County, and Irwindale in Los Angeles County.

Table 3: San Diego Sand Imports

Operator	Site	Location
Associated Ready Mix	Otay Mesa Yard	Otay Mesa: Las Palmas Valley Mexico
Pacific Aggregates	Pacific Aggregates	Lake Elsinore, Riverside County
Chandler/Werner Aggregates	Temescal Valley Operations/Corona	Riverside County
FST	Corona	Riverside County
Robertson's	Banning or Cabazon	Riverside County
Cemex	Lytle Creek	Redlands, Santa Ana Wash
Various	Ocotillo Operations	Imperial County
Various	Irwindale Operations	Los Angeles County

[6] Personal interview with confidential employee, October 2018.

4 Future San Diego Aggregate Demand

Forecasters use population growth to project demand for construction aggregate resources.[7, 8, 9] Map 3 illustrates the expected percentage growth in population within the various regions of San Diego County from 2020-2050. In addition, the total projected population for 2050 is shown. The southern part of the County is expected to grow by the greatest percentage, followed by central or downtown area of the City of San Diego.

The projected total construction aggregate demand for San Diego County was estimated by the DOC and is summarized in Table 4.[10] Table 4 also includes the estimated projections for fine aggregate or sand. The demand for sand is estimated at about 27% of the total construction aggregate demand.[11] The demand for sand is highlighted because it accounts for a significant amount of truck traffic from outside the County. Permitting of new sources of aggregate is necessary to reduce the County's dependence on imports and, as a consequence, reducing vehicle miles traveled.

Although the Otay Hills Quarry will primarily produce coarse aggregate, the site plans to produce some amount of manufactured sand (made by crushing rock down to sand sized particles). This manufactured sand will be used in the production of ready-mix concrete and asphalt. Manufactured sand can substitute up to 50% of the fine aggregate in ready mix concrete, and approximately 25% of the fine aggregate in asphalt. The manufactured sand will reduce the need for fine aggregate imports.

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7 Robinson, Gilpin R. & William M. Brown. "Sociocultural Dimensions of Supply and Demand for Natural Aggregate – Examples from the Mid-Atlantic Region, United States." U.S. Geological Survey Open-File Report 02-350. 2002.

8 Davis, James F. "Update of Mineral Land Classification: Aggregate Materials in the Western San Diego County Production-Consumption Region." California Department of Conservation, DMG Open-File Report 96-04, 1996.

9 Gius, F.W., L.L. Busch & R.V. Miller. "Update of Mineral Land Classification: Portland Cement Concrete-Grade Aggregate in the Western San Diego County Production-Consumption Region, CA." California Geological Survey. Special Report 240. 2017.

10 Davis, James F. "Update of Mineral Land Classification: Aggregate Materials in the Western San Diego County Production-Consumption Region." California Department of Conservation, DMG Open-File Report 96-04, 1996.

11 Gius, F.W., L.L. Busch & R.V. Miller. "Update of Mineral Land Classification: Portland Cement Concrete-Grade Aggregate in the Western San Diego County Production-Consumption Region, CA." California Geological Survey. Special Report 240. 2017.

Table 4: San Diego County Projected Construction Aggregate Demand[12]

Year	Total Aggregate/Sand Demand (million tons)	Year	Total Aggregate /Sand Demand (million tons)	Year	Total Aggregate/Sand Demand (million tons)
2022	13.8/3.5	2032	14.7/4.0	2042	15.4/4.2
2023	13.9/3.8	2033	14.8/4.0	2043	15.5/4.2
2024	14.0/3.8	2034	14.8/4.0	2044	15.6/4.2
2025	14.1/3.8	2035	14.94.0	2045	15.6/4.2
2026	14.2/3.8	2036	15.0/4.1	2046	15.7/4.2
2027	14.3/3.9	2037	15.1/4.1	2047	15.8/4.3
2028	14.3/3.9	2038	15.1/4.1	2048	15.8/4.3
2029	14.4/3.9	2039	15.2/4.1	2049	15.94.3
2030	14.5/3.9	2040	15.3/4.1	2050	16.0/4.3
2031	14.6/3.9	2041	15.4/4.2		

5 Estimating VMT for Roundtrip Deliveries of Crushed Rock to the Otay Hills Quarry Market

This section of the construction aggregate market report illustrates the change in Vehicle Miles Traveled that can be expected from transporting crushed rock to satisfy demand within the Otay Hills Quarry Market Area.

The proposed Otay Hills Quarry is located in southern San Diego County within an unincorporated area of East Otay Mesa. The proposed project is located 8.5 miles east of Interstate 805 (I-805)/State Route 905 (SR 905) interchange and 0.5 mile east of the intersection of Otay Mesa Road and Alta Road. The average annual production of crushed rock from the quarry is anticipated to be 1 million tons per year. The project also proposes to locate a ready-mix concrete and asphalt plant at the quarry. The VMT analysis highlights crushed rock as the primary material extracted from the quarry. The focus of VMT is on the supply of crushed rock because it represents the largest volume of materials used in the production of concrete and asphalt. Therefore, distance between the proposed Otay Hills Quarry and the locations that would consume its crushed rock are used to calculate the true impact of VMT.

The concrete plant and asphalt plant to be located at Otay Hills will supply concrete and asphalt to the Otay Hills market. These plants will require the import of cement, asphalt oil and sand to make the concrete and asphalt. The addition of these plants will not change the demand for concrete or asphalt within the market. Thus, the quantity of cement and asphalt oil to be imported or delivered to the market is not

[12] Gius, F.W., L.L. Busch & R.V. Miller. "Update of Mineral Land Classification: Portland Cement Concrete-Grade Aggregate in the Western San Diego County Production-Consumption Region, CA." California Geological Survey. Special Report 240. 2017.

expected to change, and the quantity of cement and asphalt oil in concrete and asphalt is relatively small (approximately 10-15% for concrete and approximately 5% for asphalt). Therefore, this study does not quantify a change in VMT for deliveries of asphalt oil or cement. Additionally, this study does not quantify a change in VMT for sand imported to the concrete and asphalt plants to be located at Otay Hills for the following reasons. First, the Otay Hills concrete plant will source approximately 50% of its fine aggregate from aggregate produced on-site (manufactured sand), and the asphalt plant will source approximately 25% of its fine aggregate from manufacture sand produced on-site. Thus, the VMT for that portion of those materials are reduced. Second, the sand imported for use in the southern portion of San Diego County is imported from Mexico at the Otay Mesa and Tecate border crossings. The concrete plant and asphalt plant at Otay Hills will be closer to the import sites than other concrete or asphalt plants further north, and the VMT for those imports would be reduced. Thus, this study assumes, conservatively, that the change in VMT for the import of sand, cement or asphalt oil to the concrete and asphalt plants to be located at Otay Hills is immaterial or will not change.

Map 4 illustrates the area included in the Otay Hills Quarry Market area. The map shows the location of existing crushed rock quarries, the center point to the market and the location of the proposed Otay Hills Quarry. The round-trip distances from each crushed rock source to the center of the market is also provided. To support the estimate of a VMT analysis for the Otay Hills Quarry, the following assumptions are used:

1. As mentioned in Section 4, population drives the demand for construction aggregate. According to the 2017 DOC Mineral Classification Report referenced earlier, the demand for construction aggregate is 4.3 tons per capita. Using population projection data by Zip Code from the San Diego Association of Governments (SANDAG)[13], the projected demand for materials within the Otay Hills Quarry Market is provided in Table 5. The total construction aggregate demand is estimated using 4.3 tons per capita, then the demand for sand is removed to calculate the total crushed rock demand[14]. The Otay Hills Quarry is a proposed crushed rock source; therefore, the VMT analysis only references truck trips associated with satisfying the crushed rock demand in the market.

[13] http://datasurfer.sandag.org/

[14] The 2017 DOC report estimated sand was 27% of the total aggregate demand in San Diego County. Gius, F.W., L.L. Busch & R.V. Miller. "Update of Mineral Land Classification: Portland Cement Concrete-Grade Aggregate in the Western San Diego County Production-Consumption Region, CA." California Geological Survey. Special Report 240. 2017.

Table 5: Otay Hills Quarry Market Area Construction Aggregate Demand

2020	2025	2030	2035	2040	2045	2050
Population of Otay Hills Quarry Market Area						
698,221	728,696	759,061	789,580	822,717	849,423	878,220
Estimated Annual Demand for Sand/Fine Aggregate (million tons)						
0.8	0.8	0.9	0.9	1.0	1.0	1.0
Estimated Annual Demand for Crushed Rock/Coarse Aggregate (million tons)						
2.2	**2.3**	**2.4**	**2.5**	**2.6**	**2.7**	**2.8**
Estimated Annual Demand for Total Construction Aggregate (million tons)						
3.0	3.1	3.3	3.4	3.5	3.7	3.8

2. Transportation and the distance aggregate is delivered drives the determination of the market area for a construction aggregate quarry. [15] Construction aggregate is a high bulk-low valued commodity and the cost of the aggregate rises in proportion to the distance it is transported. A general rule of thumb is that the delivered cost of aggregates is doubled at 30 miles away from the quarry. The costs of producing aggregate generally are the same from quarry to quarry. If the production from the closest quarry is unable to satisfy 100% of the demand, the quarries located further away will be relied upon to satisfy the remaining demand.

3. Referring to Table 5, the 2020 market for crushed rock within the Otay Hills Quarry Market area is estimated to be 2.2-million tons. It is assumed that the production from the existing quarry located in Chula Vista would supply a portion of this demand. According to the Environmental Impact Report for the project, annual production from the Chula Vista Quarry is estimated at 1.2 million tons a year.[16] Without the Otay Hills Quarry, the remaining demand of 1 million tons will be satisfied by a combination of the quarries located within the red circle (Map 4).

4. Map 4 illustrates the location of each rock quarry that supplies crushed rock to the Otay Hills Quarry Market Area. The round-trip distance to the center of the market from each quarry is illustrated. This reflects the average miles crushed rock is transported to satisfy the 2.2-million tons of demand. The VMT analysis considers the average distance of 57 round-trip miles[17] from all quarries within the red circle to supply 1 million tons of crushed rock. The quarries in the red circle were selected because each site produces at different rates and their production will be used to satisfy demand in other areas of the County. Therefore, the next closest quarry at Jamacha or Mission Gorge may have annual production of less than 1 million tons annually and or their full

[15] Berk, P. "A note on environmental costs of aggregates." Department of Agricultural and Resource Economics, University of California, Berkeley. Paper 994, 2005.

[16] **https://www.chulavistaca.gov/home/showdocument?id=17703**

[17] the average distance of 57 round-trip miles from the eight quarries within the red circle was calculated by adding the round-trip distance for each of the eight quarries and dividing by eight.

production must be dispersed in other areas of the County. Thus, on an average annual basis, the 1million tons would be satisfied by more than one of the quarries within the red circle. The Chula Vista Quarry is assumed to deliver 1.2 million tons at an average of 7 round-trip miles to the center of the market.

5. With the approval of the Otay Hills Quarry, the annual production of 1 million tons of crushed rock would be an average of 20 round-trip miles to supply the market; a reduction of an average of 37 miles from quarries presumed to be delivering material from outside the market.

   It is important to note that the location of crushed rock sources are known; however, the volume of material supplied by each site varies from month-to-month. Actual production is driven by economic activity and company specific demands. This information is considered to be proprietary by the mine operators. As a result, it is difficult to estimate with certainty the exact VMT from each location. To overcome this gap in available information, a good faith analysis of estimated VMT is used to determine the average distance from sources outside the market area and assumes that full production from the quarry does not leave the market.

6 Conclusion

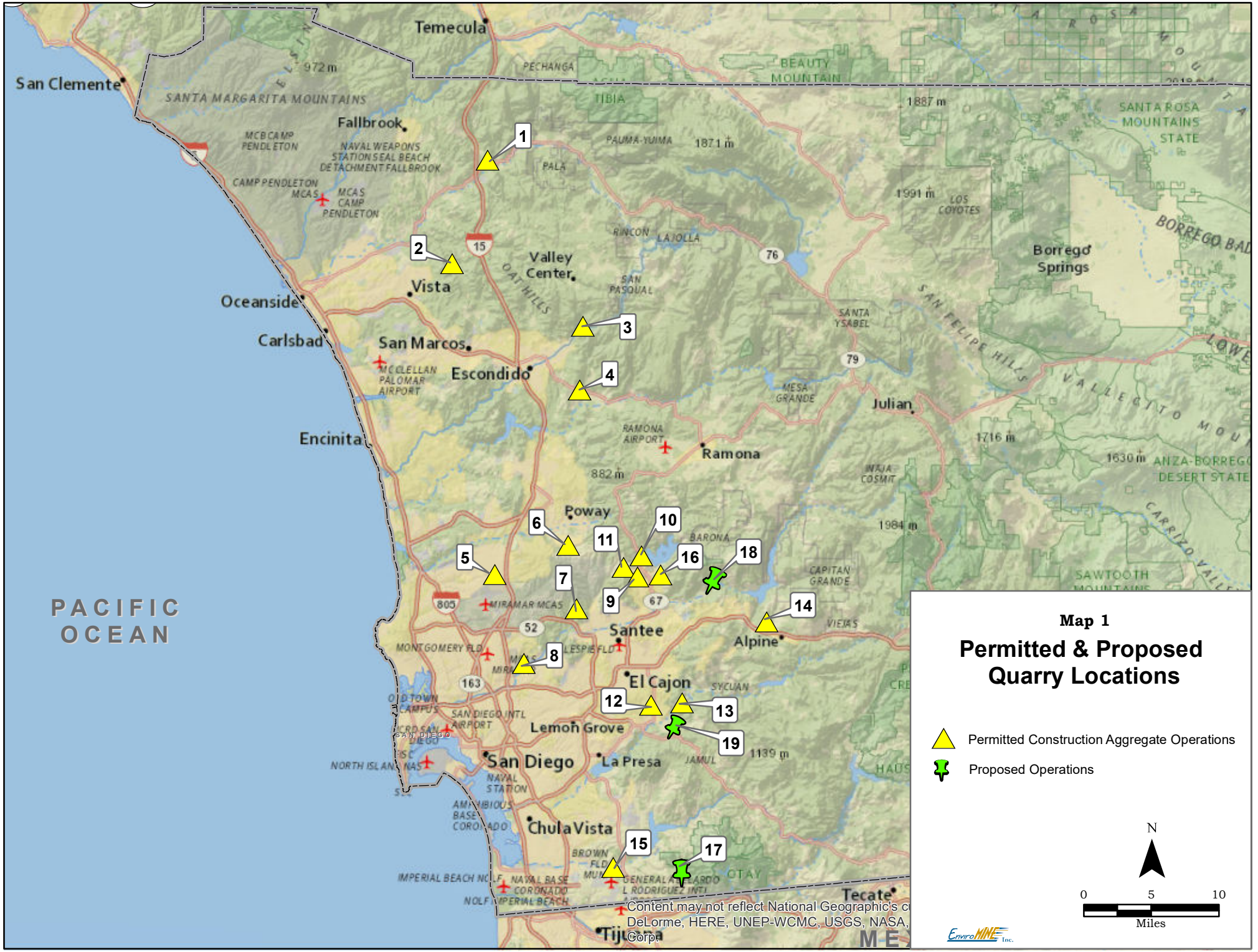
San Diego County is currently experiencing a shortage of permitted aggregate resources. Within the southern region of San Diego County, the demand for aggregate is expected to grow faster than other areas of the County. However, there is only one source of crushed rock in this region. There is an opportunity to reduce the VMT to transport crushed rock resources to the southern region of the County with the proposed Otay Hills Quarry. As a result, San Diego County must permit additional aggregate resources to ensure future demand is met, while at the same time reducing VMT that results from the delivery of aggregate.

Approval of a permit to allow operation of the Otay Hills Quarry is calculated with a 55% VMT reduction from the existing total VMT. This conclusion is provided in the VMT Analysis Memo prepared for the project.[18] To estimate the percent reduction, the analysis compared the existing total VMT to supply 1 million tons of crushed rock to the identified market area with and without the Otay Hills Quarry project.

[18] "Otay Hills VMT Analysis Memo", prepared by Linscott, Law & Greenspan, Engineers

Appendix

Maps


Temecula
San Clemente
Fallbrook
Vista
Oceanside
Carlsbad
San Marcos
Escondido
Valley Center
Encinitas
Poway
Ramona
Julian
Borrego Springs
Santee
El Cajon
Alpine
Lemon Grove
San Diego
La Presa
Chula Vista
Tecate
PACIFIC OCEAN
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
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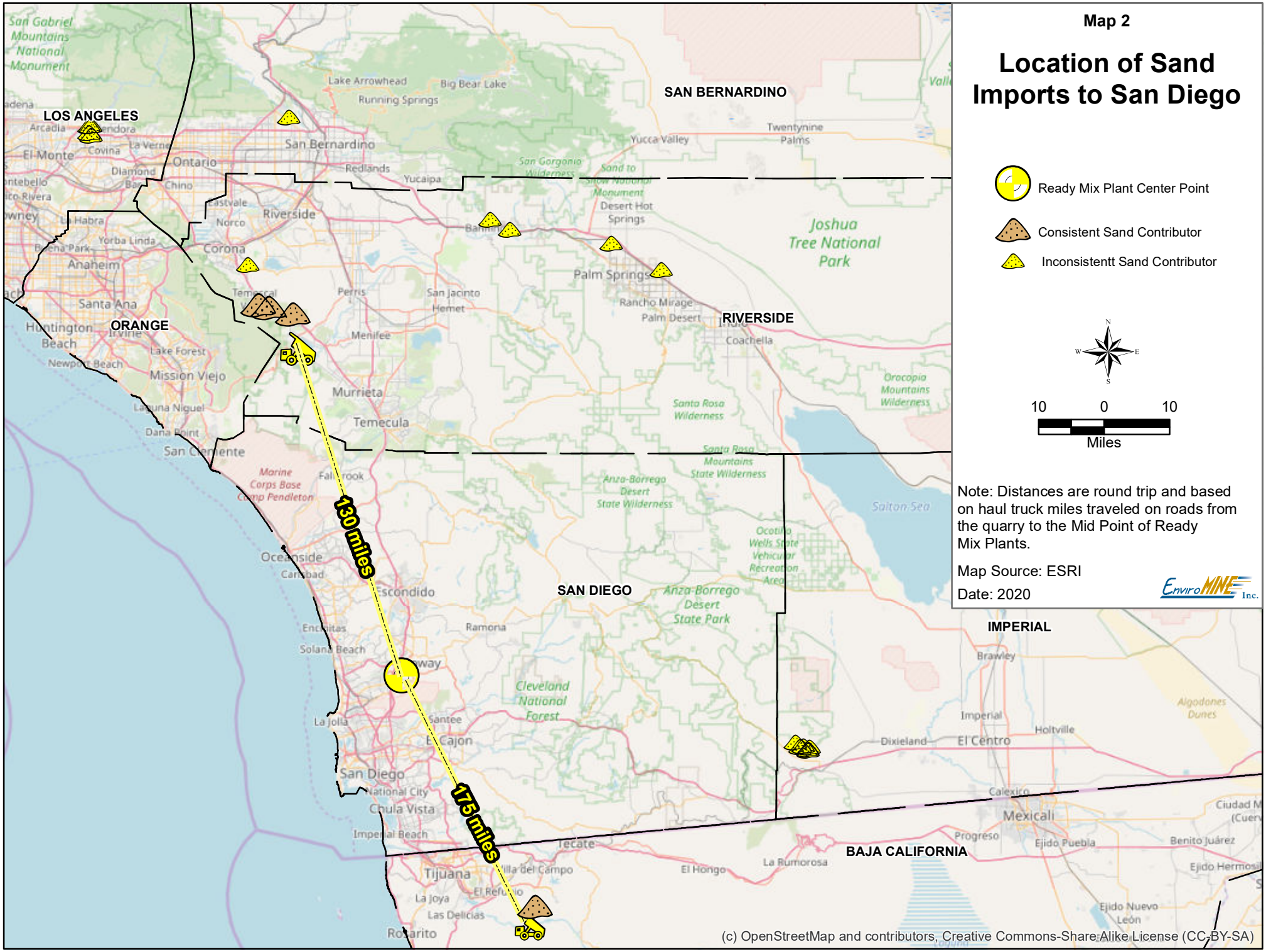
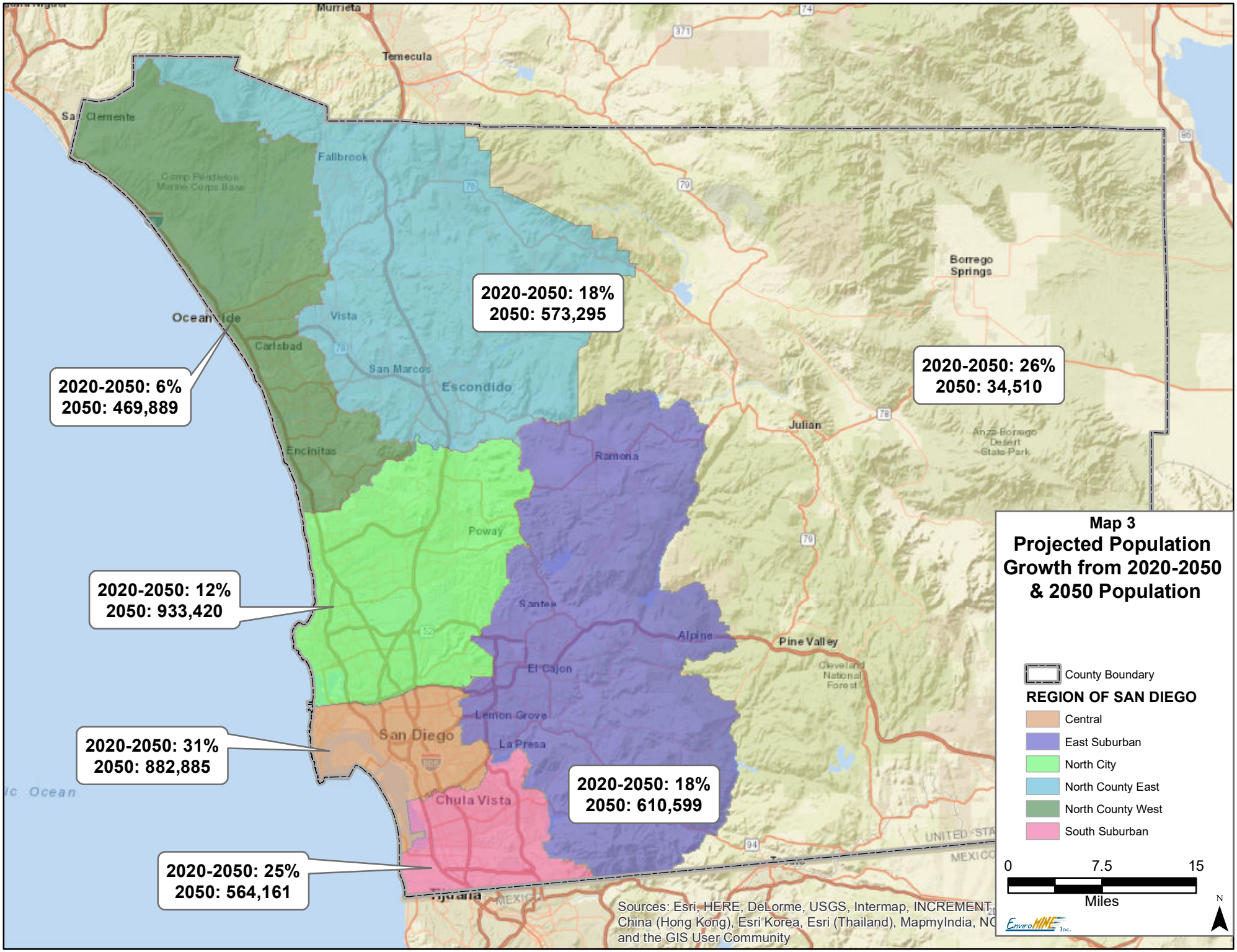
18
19
Map 1
Permitted & Proposed Quarry Locations
Permitted Construction Aggregate Operations
Proposed Operations
N
0
5
10
Miles
Content may not reflect National Geographic's c
DeLorme, HERE, UNEP-WCMC, USGS, NASA,
Corp.
EnviroMINE Inc.


Map 2
Location of Sand Imports to San Diego
Ready Mix Plant Center Point
Consistent Sand Contributor
Inconsistentt Sand Contributor
N
W
E
S
10 0 10
Miles
Note: Distances are round trip and based on haul truck miles traveled on roads from the quarry to the Mid Point of Ready Mix Plants.
Map Source: ESRI
Date: 2020
EnviroMINE Inc.
130 miles
175 miles
LOS ANGELES
ORANGE
SAN BERNARDINO
RIVERSIDE
SAN DIEGO
IMPERIAL
BAJA CALIFORNIA
Joshua Tree National Park
Cleveland National Forest
Anza-Borrego Desert State Park
Salton Sea
(c) OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA)


2020-2050: 6%
2050: 469,889
2020-2050: 18%
2050: 573,295
2020-2050: 26%
2050: 34,510
2020-2050: 12%
2050: 933,420
2020-2050: 31%
2050: 882,885
2020-2050: 18%
2050: 610,599
2020-2050: 25%
2050: 564,161
Map 3
Projected Population Growth from 2020-2050 & 2050 Population
County Boundary
REGION OF SAN DIEGO
Central
East Suburban
North City
North County East
North County West
South Suburban
0
7.5
15
Miles
N
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT
China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NC
and the GIS User Community
Murrieta
Temecula
Fallbrook
Vista
Carlsbad
San Marcos
Escondido
Encinitas
Ramona
Poway
Santee
El Cajon
Alpine
Pine Valley
Julian
Borrego Springs
Lemon Grove
La Presa
San Diego
Chula Vista
Tijuana
MEXICO

8 quarries

Average Mileage to Center of South County = 57 round trip miles
1 million tons

Hwy 67
80 miles round trip

Santee
44 miles round trip

Carroll Canyon
50 miles round trip

Mission Gorge
40 miles round trip

Jamacha/Willow Glen
40 miles round trip

MARKET CENTER POINT

Proposed Otay Hills Quarry

20 miles round trip
Proposed 1 million tons

Chula Vista
7 miles round trip
1.2 milion tons

Otay Hills Quarry Market Area
Total Demand For
Hard Rock

2.2 Million Tons

Map 4

Quarries Supplying Hard Rock to Otay Hills Quarry Market Area

Market Area Center Point

Significant Hard Rock Quarries

Otay Hills Quarry Market Area

N

4 0 4

Miles

1 in = 4 miles

Source: Population from SANDAG
Market Area follows Zip code boundaries
Quarries, DOC & EnviroMINE

Date: April 2020

EnviroMINE Inc.