

C/CAG VMT Estimation Tool: Quick Start Guide

Prepared for:

City/County Association of Governments of
San Mateo County (C/CAG)

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FEHR  PEERS

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Introduction

To support local jurisdictions in San Mateo County, City/County Association of Governments of San Mateo County (C/CAG) developed a web application to conduct baseline vehicle miles traveled (VMT) screening¹ and VMT reduction analysis for specific land use projects in San Mateo County. The C/CAG VMT Estimation Tool is publicly available: members of the public, technical analysts, other consultants, and staff can access this Tool and run it for different purposes. The C/CAG VMT Estimation Tool covers the following San Mateo County jurisdictions:

Atherton	Foster City	Redwood City
Belmont	Half Moon Bay	San Bruno
Brisbane	Hillsborough	San Carlos
Burlingame	Menlo Park	San Mateo
Colma	Millbrae	South San Francisco
Daly City	Pacifica	Woodside
East Palo Alto	Portola Valley	Unincorporated San Mateo County

The beta C/CAG VMT Estimation Tool can be accessed at https://devapps.fehrandpeers.com/CCAG_VMT_Beta. Because each jurisdiction has unique thresholds of significance, and the methods for VMT screening may vary slightly due to the different development patterns and geographic location of each community. User's of the C/CAG VMT Estimation Tool should coordinate with the appropriate jurisdiction when using the Tool for land use development projects.

¹ The concept of project screening is that some projects have characteristics that readily lead to the conclusion that they would not cause a VMT impact, and therefore could be screened out of doing a detailed VMT analysis. Some types of screening criteria include proximity to transit, site located in a low-VMT area, local-serving retail, transportation projects that do not add capacity, and projects with no net VMT increase.



What Does This Tool Do?

This C/CAG VMT Estimation Tool can perform multiple functions, including:

- Screening land use projects for further VMT analysis using project-generated VMT thresholds, transportation priority areas, or jurisdiction-specific screening criteria
- Estimating the project-generated VMT rate
- Estimating VMT reductions for land use projects in San Mateo County

The types of land use projects addressed by the C/CAG VMT Estimation Tool include the following:

- Residential, office, and industrial land uses
- The land uses above in combination with each other
- The land uses above with local-serving retail space (used for VMT reduction analysis only)²

The C/CAG VMT Estimation Tool also includes a local screening criterion feature that provides a jurisdiction the option to use its own screening criteria. Also, the tool can accept other VMT model data to provide an option for a jurisdiction to use its own travel model data. It is also scalable and can be used for a range of project sizes and locations within any jurisdiction in San Mateo County.

Three separate modules are contained in the C/CAG VMT Estimation Tool:

- **VMT Screening**—The location of the project is used to determine if the project site is within a low VMT-generating area, such as transit priority areas (TPA), and low VMT-generating traffic analysis zones (TAZ). Low VMT-generating TAZs are identified using estimates of VMT rates produced by the C/CAG-Santa Clara Valley Transportation Authority (VTA)-Bi-County Model (“C/CAG-VTA travel forecasting model”) in December of 2020 with adjustments made to include centroid connectors, and travel outside of the model area.
- **Project Generated VMT**—A combination of the project’s location and details are used to estimate VMT generated by the project, which is expressed as a VMT rate (i.e., VMT per the primary population generating the VMT). This process uses the C/CAG-VTA travel forecasting model TAZ level VMT generation rates to estimate the project’s VMT.

² Local-serving retail is unlikely to have a substantial influence on local VMT. Smaller retail uses such as grocery stores, dry cleaners, pharmacies, and convenience stores tend to attract visitors from nearby neighborhoods. As an example, consider the effect of a new grocery store in an area without one. Residents of a neighborhood without a grocery store have to travel a great distance to an existing grocery store. Adding the grocery store to that neighborhood will shorten many of the existing grocery shopping trips and reduce the VMT to/from the neighborhood, although it is unlikely to attract visitors who are already near an existing grocery store. The definition of local-serving retail is defined by the local jurisdiction for retail uses like a grocery store, pharmacy, or shopping center often less than 50,000 square feet of retail space.



- **VMT Reductions**—A series of VMT mitigation measures are applied to potentially reduce the project-generated VMT. The project VMT is compared to the applicable VMT threshold to determine whether it falls below the threshold at the start, or whether it is reduced below the threshold after applying additional VMT reduction measures. The VMT threshold used in this module is calculated in the VMT Screening module.

The backend of this web application is powered by ESRI's GIS architecture and includes a JavaScript-based interface. The C/CAG VMT Estimation Tool also allows the user to select a baseline year between 2015 and 2040. The values for interim baseline years are calculated as a straight-line interpolation: 2015 values are multiplied by a single 2015-2040 VMT change factor for the jurisdiction in which the project is located. This method effectively assumes that changes in land use and travel patterns occur at a constant yearly rate.

The results can be exported to PDF, which can be printed out and used as documentation of the results and may be attached to a technical memo, report, or contract.



Limitations of the VMT Estimation Tool

The C/CAG VMT Estimation Tool only covers some of the possible screening criteria established by a city or county for land use project VMT analysis per California Senate Bill 743. The C/CAG VMT Estimation Tool is limited to providing estimates based on data provided in the C/CAG-VTA travel forecasting model. If a proposed project is of a land use type that is not reflected in the Traffic Analysis Zone (TAZ) either now or in the future, the C/CAG VMT Estimation Tool is not capable of estimating the VMT efficiency rate for that land use type.

Other land use types, large, complex, and/or mixed-use projects, or long-range land use plans should be analyzed by running the C/CAG-VTA travel forecasting model under scenarios both with and without the project. Furthermore, the home-based VMT per capita and home-based work per employee only report a portion of VMT from select trip purposes and is limited to VMT to light-duty vehicles. Before making any decisions based on the information provided by the C/CAG VMT Estimation Tool, it is recommended that you contact the city in which the proposed development is located.



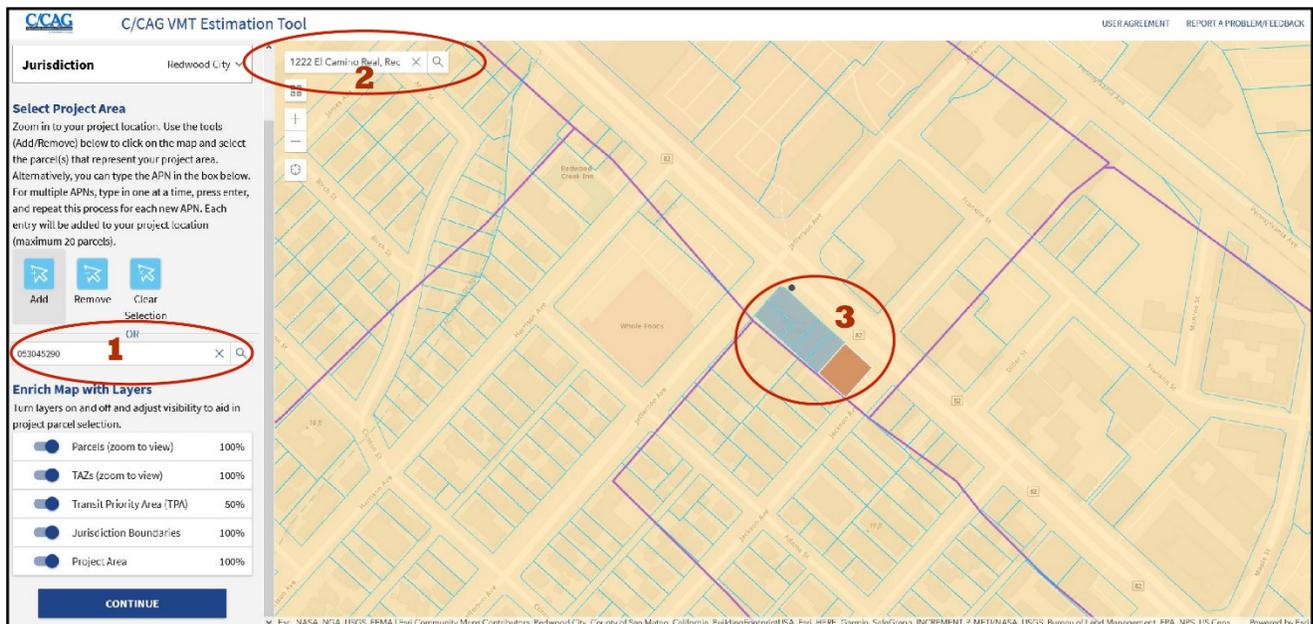
Running the VMT Estimation Tool

The following screens are involved in running the C/CAG VMT Estimation Tool:

Select Project Area Screen

Select Jurisdiction

1. Using the drop-down box, select the city where the project is located (or the city for which you wish to assess whether a project meets local screening criteria). This is required.
2. Select Project Area
3. There are three ways to locate the parcels associated with a proposed project:
 - a. Type in the Assessor Parcel Number(s) (APN). The APN does not require a dash between each grouping of numbers (XXXXXXXXXX).
 - b. Type in the Project Address.
 - c. Zoom into the map.
4. To select the parcel, click on "Add" and click the desired parcel.
5. To remove the parcel, click on "Remove" and click on the desired parcel.
6. To clear a selection, click on "Clear Selection" and all selected parcels will be cleared.



7. Select Project Area.
8. Turn layers on and off and adjust visibility to aid in project parcel selection. Layers include:
 - a. Parcels (zoom to view)
 - b. TAZs (zoom to view)



- c. Transit Priority Area (TPA)³
- d. Jurisdiction Boundaries
- e. Project Area

Determine Screening Inputs Screen

Project Information

1. Project Name: Must type in a project name (required field) – max 250 characters
2. Project Description: Required field – max 250 characters
3. APNs: Auto-populated from Page 1

Select Base Data: Select local travel model (advanced feature) or C/CAG Travel Model (auto-populated).

Analysis Methodology: Auto-populated to default to Traffic Analysis Zone (TAZ) Method.

Select Baseline Year: The C/CAG VMT Estimation Tool has the capability of providing baseline VMT between 2015 and 2040 pursuant to the C/CAG-VTA travel forecasting model. To select a baseline year, click on the timeline and slide the point to the preferred baseline year.

The screenshot shows the 'C/CAG VMT Estimation Tool' interface. At the top, there are links for 'C/CAG', 'USER AGREEMENT', and 'REPORT A PROBLEM/FEEDBACK'. Below these, there is a text input field for 'APN Number(s)' containing the value '053045290, 053045090, 053045280, 053045300, 053045230'. The 'Select Base Data' section has a dropdown menu for 'Data Version' set to 'C/CAG Travel Model'. The 'Analysis Methodology' section has a dropdown menu for 'Method' set to 'Traffic Analysis Zone (TAZ) Method'. The 'Select Baseline Year' section features a timeline slider for 'Baseline Year' ranging from 2015 to 2040, with the 'Selected Value' set to 2015.

VMT Metric Specification for Land Use 1-3: The Tool can evaluate up to three land use types per project. The Tool is also capable of evaluating different VMT Metrics for one land use type. For the latter, select the same land use type for Land Use 1 and Land Use 2 and select different VMT Metrics.

Land Use Type: Select 1) Residential, 2) Office, or 3) Industrial.

³ A Metropolitan Transportation Commission (MTC) transit priority areas (TPAs) screen layer from 2017. This is a 1/2-mile buffer around existing major transit corridor (along El Camino Real and the 120 and 130 bus stops) or a major transit stop (i.e., along Caltrain, BART and the South San Francisco ferry terminal). "Major transit stop" is defined in Public Resources Code 21064.3 as a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.



VMT Metric: Select Home-Based VMT per Resident, Home-Based Work VMT per Employee or Total Project Generated VMT per Service Population from the list (refer to the *SB 743 Implementations Decisions* for specific definitions).

Jurisdictional Average for Baseline:

Select City Average, County Average, or Bay Area Regional Average from the list.

The Jurisdictional Average for Baseline list could also be pre-set based on lead agency preferences. The final date to update this pre-set data is June 30, 2021.

Threshold: Select 0%, -14.3%, -15%, -16.8%, and -25% (refer to the *SB 743 Implementations Decisions* for additional information). The Threshold list could also be pre-set based on lead agency preferences.

Project Screening Only versus Continue to VMT Reduction Factors: Selecting the Project Screening Only button takes the analyst to the Results screen. By selecting Edit Inputs on the Results screen, the analyst can return to this page and continue to VMT Reductions Factors screen.

Project Screening Only Results (without VMT Reduction Analysis) Screen



VMT Screening Results Summary: By selecting the Project Screening Only button on the previous page, the screening results will be presented. Review the results of the screening analysis. From this page there is an option at the top left to “Edit Inputs.” Click this option to return to the Determining Screening Inputs screen; or save a PDF using the browser save or print function. An analyst can also export a CSV file by clicking the Export button. All the land use fields will be blank in this report because the VMT screening is not using project specific data; rather, the baseline VMT data is being used.

Land Use Info & VMT Reduction Screen

By clicking on the **Continue to VMT Reduction Strategies** button an analyst can enter project information and test VMT reduction strategies. Details about the VMT Reduction Strategies are provided in the information icons of the C/CAG VMT Estimation Tool.

The screenshot shows the 'Land Use Info & VMT Reduction Strategies' interface. On the left, under 'Project Land Use Information', there are input fields for Residential (Single-Family, Multi-Family), Residential Affordability (Extremely Low Income, Very Low Income, Low Income), Non-Residential (Office, Commercial, Industrial), and Proposed Parking (Vehicle, Bicycle). On the right, under 'VMT Reduction Strategies', there are dropdown menus for Tier 1 Project Characteristics, Tier 2 Multimodal Infrastructure, Tier 3 Parking, and Tier 4 TDM Programs. A 'CONTINUE TO VMT RESULTS' button is located at the bottom center.

Project Land Use Information: The analyst can add project-specific information for the residential, residential affordability (percent of all units), non-residential, and proposed parking fields. Click on the light blue “i” in a circle for additional information, as shown below.

The close-up shows the 'Residential Affordability (percent of all units)' section. It includes input fields for 'Extremely Low Income', 'Very Low Income', and 'Low Income'. A blue tooltip box is overlaid on the 'Extremely Low Income' field, containing the text: 'Residential Affordability (percent of all units) Enter the affordability levels of the residential units (if applicable) % Affordable'.



Project Land Use Information

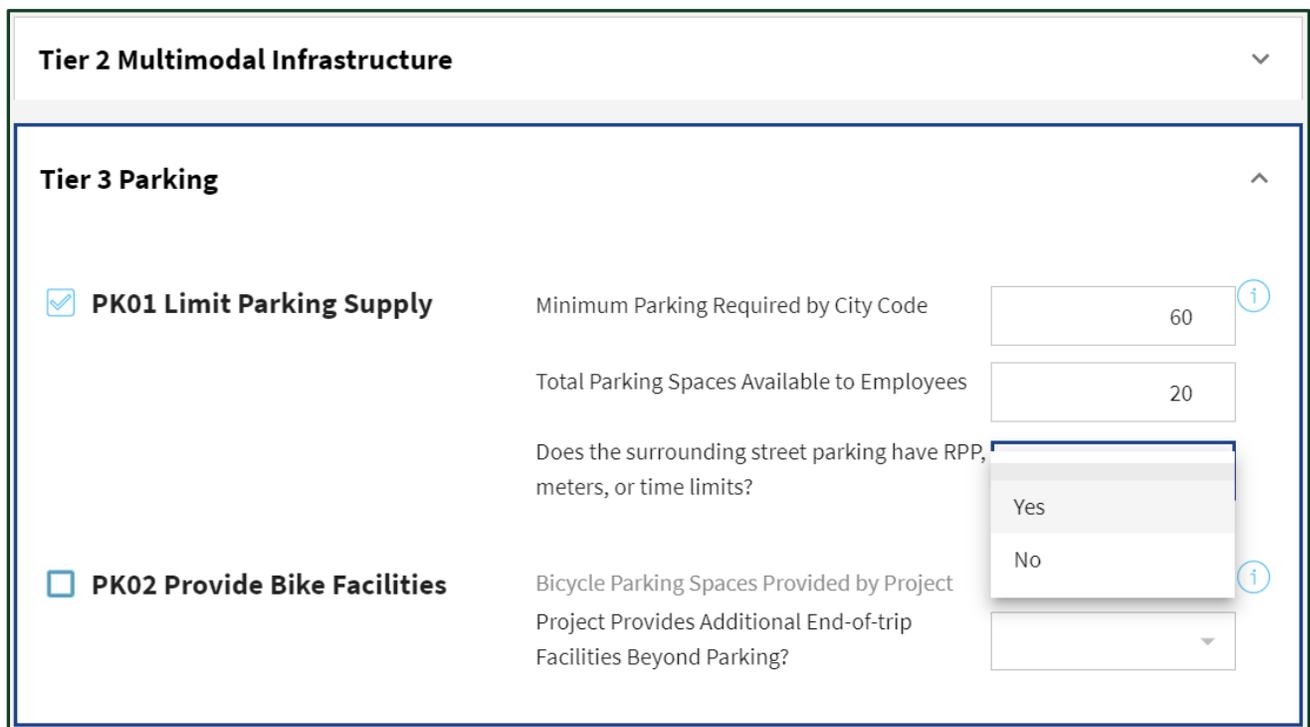
The entry boxes contain up/down arrows for increasing/decreasing values, but by clicking to the left of the up/down arrows, an analyst can type in a value, as shown below. Please note that all square-footage values are calculated in the C/CAG VMT Estimation Tool in terms of one thousand square feet (KSF), so for a 10,000 square-foot office, the field would be populated with a "10," as shown here.



Non-Residential	
Office	10 KSF

VMT Reduction Strategies

Select the desired VMT Reduction Strategies by first clicking the desired VMT reduction tier box. In some cases additional inputs will be required, such as the example below for Tier 3 Parking (PK01 Limit Parking Supply which applies to office uses only). Details and additional resources on what constitutes each measure are available by clicking the blue 'i' icon, similar to the example provided above for Project Land Use information.



Tier 2 Multimodal Infrastructure	
Tier 3 Parking	
<input checked="" type="checkbox"/> PK01 Limit Parking Supply	Minimum Parking Required by City Code: 60 Total Parking Spaces Available to Employees: 20 Does the surrounding street parking have RPP, meters, or time limits? Yes No
<input type="checkbox"/> PK02 Provide Bike Facilities	Bicycle Parking Spaces Provided by Project Project Provides Additional End-of-trip Facilities Beyond Parking?

Several reduction strategies overlap with each other: For instance, a strategy may consist of a basket of measures which may overlap with individual strategies. Therefore, the C/CAG VMT Estimation Tool logic has been coded to reflect these dependencies, so that if one measure is chosen, other overlapping measures are not allowed. The dependencies in the C/CAG VMT Estimation Tool are summarized below and reflected in the Tool by greying out certain reductions so they cannot be selected.



If this strategy is chosen...	This strategy is not allowed...
PK 02 Provide Bike Facilities	TP 05 Implement CTR Program
TP 04 CTR Marketing and Education	TP 05 Implement CTR Program TP 15 Travel behavior Change TP 18 Voluntary Travel Behavior Change Program
TP 05 Implement CTR Program	PK 02 Provide Bike Facilities TP 04 CTR Marketing and Education TP 08 Telecommuting and Alternative Work Schedules TP 13 Ride-Sharing Programs TP 15 Behavioral Intervention TP 17 Vanpool Incentives TP 18 Voluntary Travel Behavior Change Program
TP 06 Employee Parking Cash-Out	TP 10 Price Workplace Parking
TP 07 Subsidized Transit Program	TP 11 Alternative Transportation Benefits
TP 08 Telecommuting and Alternative Work Schedules	TP 05 Implement CTR Program
TP 09 Free Door-to-Door Transit Fleet	TP 13 Ride-Sharing Programs TP 17 Vanpool Incentives
TP 10 Price Workplace Parking	TP 06 Employee Parking Cash-Out
TP 11 Alternative Transportation Benefits	TP 07 Subsidized Transit Program
TP 13 Ride-Sharing Programs	TP 05 Implement CTR Program TP 09 Free Door-to-Door Transit Fleet TP 17 Vanpool Incentives
TP 15 Behavioral Intervention	TP 04 CTR Marketing and Education TP 05 Implement CTR Program TP 18 Voluntary Travel Behavior Change Program
TP 17 Vanpool Incentives	TP 05 Implement CTR Program TP 09 Free Door-to-Door Transit Fleet TP 13 Ride-Sharing Programs
TP 18 Voluntary Travel Behavior Change Program	TP 04 CTR Marketing and Education TP 05 Implement CTR Program TP 15 Behavioral Intervention

Project Screening Results (with VMT Reduction Strategies) Screen

The VMT screening results without and with VMT reductions are summarized in this report. This C/CAG VMT Estimation Tool screens projects based on their location within a TPA, a Low VMT Area, and/or a pre-screened jurisdiction specific criterion (pre-screen must be provided by the jurisdiction). The results provide the following information about these screening criteria.



Transit Priority Area (TPA): On page 1 of the C/CAG VMT Estimation Tool Report.

Project Location

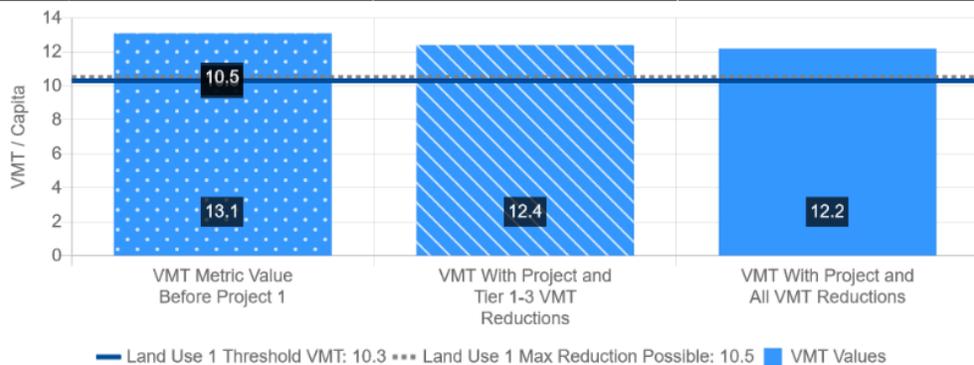
jurisdiction: San Mateo	apn	TAZ
	034381320	1980
Inside a TPA? Yes (Pass)	034381260	1980
	034381250	1980

Low VMT Area: Page 2 of the C/CAG VMT Estimation Tool Report provides details about the VMT generation near the proposed project. The table in the figure below indicates the Home-Based VMT per Resident Baseline (12.08), and the dark blue line traversing the bar chart (10.5) indicates the threshold of 14.3 percent below the Baseline. The gray dotted line in the bar chart indicates the maximum potential VMT reduction (10.3) that could be available through the VMT strategies in the Tool.

Residential Vehicle Miles Traveled (VMT) Screening Results

Land Use Type 1:	Residential
VMT Without Project 1:	Home-Based VMT per Resident
VMT Baseline Description 1:	City Average
VMT Baseline Value 1:	12.08
VMT Threshold Description 1:	-14.3%
Land Use 1 has been Pre-Screened by the Local Jurisdiction:	N/A

	Without Project	With Project & Tier 1-3 VMT Reductions	With Project & All VMT Reductions
Project Generated Vehicle Miles Traveled (VMT) Rate	13.1	12.4	12.2
Low VMT Screening Analysis	No (Fail)	No (Fail)	No (Fail)



Pre-Screened by the Local Jurisdiction: Page 2 of the C/CAG VMT Estimation Tool Report summarizes if a project is pre-screened by the local jurisdiction. This pre-screened value will only apply to jurisdictions that have identified pre-screened criteria and incorporated it into the C/CAG VMT Estimation Tool. The pre-screen criteria would be documented by the local jurisdiction.



Reading the Report and Export Files

The C/CAG VMT Estimation Tool produces two types of outputs: a formatted report, which shows up on the Results screen and can be downloaded as a PDF file using the appropriate browser functions, and data tables including all the user-provided inputs and the backend data which can be downloaded as CSV files.

Key things to look for in the report / PDF:

- **Whether the project falls in proximity to transit** (within ½ mile of a Major Transit Stop, or ½ mile of a stop along a High-Quality Transit Corridor as defined in state law): Look for the “Inside a TPA?” question on Page 1 of the report.
- **Whether the project falls in a low VMT area** (i.e., below the VMT threshold specified by the city/town/county): Look for the “Low VMT Screening Analysis” row on the Screening Results page(s) of the report, starting on page 2. There will be Low VMT Screening results for each land use you select.

Project Location

jurisdiction:
San Mateo

Inside a TPA?
Yes (Pass)

apn	TAZ
034381320	1980
034381260	1980
034381250	1980

	Without Project	With Project & Tier 1-3 VMT Reductions	With Project & All VMT Reductions
Project Generated Vehicle Miles Traveled (VMT) Rate	13.1	12.4	12.2
Low VMT Screening Analysis	No (Fail)	No (Fail)	No (Fail)

- **Whether the project is pre-screened:** Look for the “Land Use # has been Pre-Screened by the Local Jurisdiction” row on the Screening Results page(s) of the report, starting on page 2.

The CSV files are intended to help the user understand how the VMT reduction results were obtained; the data in the files, along with the formulas in a forthcoming *User Manual*, should help confirm the results.



Tips For Success

- Look for “Tool-  tips” throughout the Tool to help understand fields where inputs are required.
- The C/CAG VMT Estimation Tool may take up to 1-2 minutes to run a report; if it takes longer, the analyst should refresh and try again.
- If you are running variations on the same site and project, use the back arrows in the upper-left of the screen (such as ) to go back, vary some inputs, and run the report again.
- To start a completely new analysis while staying in the C/CAG VMT Estimation Tool, use the button in the upper-right of the Results screen. 
- The C/CAG VMT Estimation Tool is optimized for Chrome, Firefox, Edge or Safari on a Windows or Mac computer, although you may also access it from a tablet or another browser. If you encounter unexpected issues, try clearing your browser cache and cookies and running the C/CAG VMT Estimation Tool again.
- Please fill out the short feedback form by clicking on the link  in the upper-right corner of the C/CAG VMT Estimation Tool. You may report errors, rate the C/CAG VMT Estimation Tool, and offer suggestions for future improvements.



For More Information

If you have questions about the C/CAG VMT Estimation Tool, you may email Jeff Lacap at jlacap@smcgov.org.

For any inquiries about how the C/CAG VMT Estimation Tool may be applied in a land use review and approval process, please contact staff at the city/town/agency responsible for development review.

