FEHR PEERS

Technical Memorandum

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Subject: VMT Analysis Methodology for Land Use Projects in Contra Costa, GMTF Review Draft

WC19-3664

This memorandum describes CCTA's recommended methodology for compliance with the requirements of Senate Bill 743 (SB 743) regarding analysis of vehicle miles traveled (VMT) for land use projects that are subject to the California Environmental Quality Act (CEQA). This guidance is intended to assist lead agencies in their CEQA VMT analysis consistent with new requirements of the CCTA Growth Management Program (GMP). The lead agency[1] will determine which projects are subject to CEQA and will oversee the VMT analysis. Figure 1 illustrates the CCTA CEQA VMT analysis process described in Sections 3, 4, and 5.

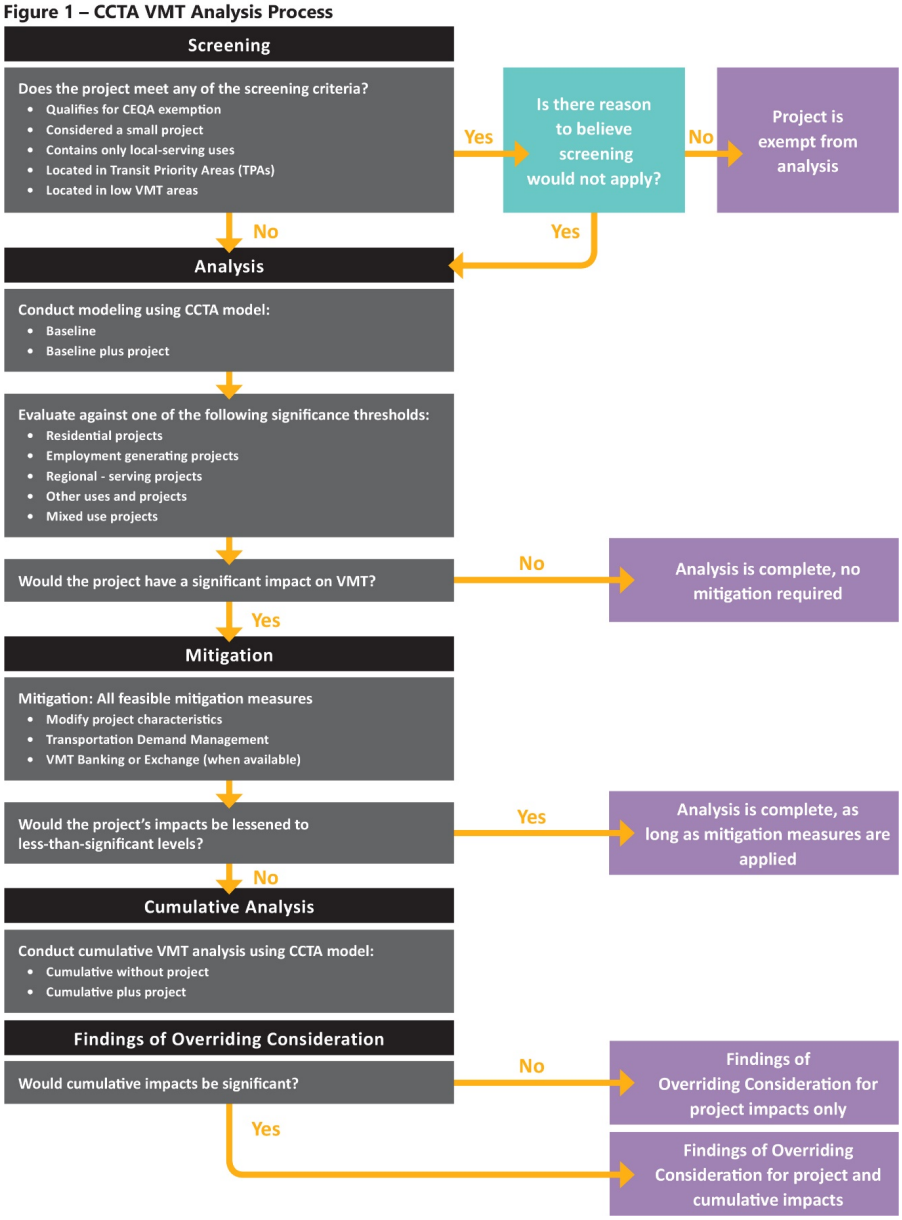
Compliance with the requirements of this document is mandatory as part of fulfillment of local jurisdictions' requirements under the CCTA GMP. Jurisdictions will be considered to be in compliance so long as they follow the procedures outlined here, regardless of whether these procedures result in exemption of a project from VMT analysis, a finding that a project would have no significant VMT impact, mitigation of a project to achieve less-than-significant levels of impact, or findings of significant unavoidable impacts accompanied by findings of overriding consideration.

Local jurisdictions may choose to apply methods and thresholds that are more stringent than those outlined in this document, and would still be considered to be in compliance with CCTA

[1] As explained in the definitions, Lead agency refers to the 19 incorporated jurisdictions in Contra Costa County, the County of Contra Costa, or any other agency overseeing and certifying a CEQA document.

GMP requirements. Lead agencies have the ultimate responsibility for determining the most appropriate way to comply with CEQA when conducting environmental review of their projects;

Figure 1 – CCTA VMT Analysis Process



nothing in this memorandum should be construed as legal advice nor should it take the place of consultation with the lead agency's CEQA experts.

The methodology and thresholds contained in this memorandum, including the Target VMT Reduction of 85% of baseline levels (which is the same as 15% below baseline levels), are based largely on guidance from the Governor's Office of Planning and Research (OPR) entitled *Technical Advisory on Evaluating Transportation Impacts in CEQA* (also referred to as the Technical Advisory), dated December 2018. CCTA staff may amend this methodology, including the Target VMT Reduction, if there is new guidance from OPR or other relevant agencies and/or if new substantial evidence indicates that a reduction of more than 15% of existing baseline is needed in order to achieve the State's greenhouse gas reduction goals. Analysts implementing this methodology for individual project assessments should clearly document the assumptions, procedures, and methods used to reach conclusions about the VMT analysis.

The methods outlined in this memorandum primarily rely on the CCTA travel demand forecasting model (referred to in this document as the "CCTA Model" and sometimes also referred to as "The Countywide Model") to generate estimates of trip length and VMT for different land use types in different locations. Simple single-use projects may not require a new application of the CCTA model and may only need to refer to maps and tables of model outputs available from CCTA. Most projects will require the application of the model to represent the proposed a project's land use and location characteristics and to prepare a robust analysis of a project's effect on VMT.

The guidance contained in this memorandum is intended to apply to the VMT evaluation of land use projects. Evaluating the VMT effects of land use plans should be directed by each lead agency, following the same concepts and principles outlined in this memorandum.

The evaluation of VMT impacts is also required as part of the CEQA review of transportation projects, which is not addressed in this memorandum. Each lead agency should develop methods and thresholds to apply to the environmental review of transportation projects for which that agency is responsible. The OPR Technical Advisory contains guidance (see pages 19-25 of the OPR Technical Advisory) on conducting environmental analysis of transportation projects, including a list of project types that are considered to be unlikely to lead to substantial or measurable increases in VMT. Another source of guidance for lead agencies will come from Caltrans, which is in the process of developing guidance to address the evaluation of VMT impacts of projects on the State Highway System (see *Draft Transportation Analysis Framework: Induced Travel Analysis*, dated March 2020, and *Draft Transportation Impacts Analysis under CEQA for Projects on the State Highway System*, dated March 2020).

1. Definitions

Analyst refers to the person conducting the VMT impact analysis, usually a lead agency staff person or a transportation or CEQA consultant.

Baseline year. The base year of the CCTA model that is used to represent existing conditions. Note that the model is not updated every year, so there may be a discrepancy between the base year of the model and the current year. CCTA may provide VMT metrics that are interpolated between different model years in order to match the current year more closely. In all cases, CEQA requires using the best data that is currently available.

CCTA Model. CCTA maintains a travel demand model for use in producing forecasts of future transportation system usage. The model is a four-step, trip-based model that encompasses the entire nine-county Bay Area region, with additional zonal and network detail within Contra Costa County. CCTA maintains a detailed database of land use and demographic data that is used in the model, based on census-tract-level forecasts prepared by the Association of Bay Area Governments (ABAG). Analysts should refer to Chapter 5 of the CCTA Technical Procedures for a complete description of the model and how to acquire and apply it. Analysts may also contact CCTA for additional guidance. A new script has recently been developed for the CCTA Model in order to extract the VMT metrics described in this document. In addition, adjustments have recently been made to account for the portion of trip length that occurs outside of the nine-county Bay Area region that is covered by the CCTA model. These adjustments were needed to comply with the OPR guidance to account for the full lengths of all trips and not truncate trips at the model boundary. Similar adjustments should continue to be applied whenever the CCTA model is updated or when other alternative methods are used to produce VMT estimates, to ensure that the full length of each trip is captured.

CEQA. The California Environmental Quality Act. This statute requires identification of any significant environmental impacts due to certain state or local actions including approval of new development or infrastructure projects. The process of identifying these impacts is typically referred to as the environmental review process.

Employment Generating Uses/Projects. Office, industrial, logistics or other land uses where most of the activity at the site is related to employment functions.[2]

Home-based VMT. VMT for trips that begin or end at a residence.

[2] Analysis of non-employee trips (such as those made by trucks) is not required for Employment-Based Uses since it is assumed that these trips are either 1) incidental compared to employee trips and/or 2) constitute trips to and from way points along a trip from a product's ultimate origin to its ultimate destination.

Home-work VMT. VMT associated with commute trips between a residence and an employment-generating use, also referred to as home-based-work trips.

Horizon year. The planning horizon year used for cumulative analysis. Currently, the horizon year of the CCTA model is 2040.

Lead Agency. The 19 incorporated Contra Costa jurisdictions in Contra Cost County, the County of Contra Costa, or another government agency responsible for preparing and certifying a given CEQA document.

Level of Service (LOS). A metric that assigns a letter grade to transportation network performance. The most common application of LOS in jurisdictions has been to measure the average amount of delay experienced by vehicle drivers along a roadway segment or at an intersection during the most congested time of day and to assign a rating that ranges from LOS A (fewer than 10 seconds of delay) to LOS F (more than 80 seconds of delay). Per the requirements of SB 743, LOS and other measures of vehicle delay are no longer to be used in determining significant impacts under CEQA.

Local-Serving Uses/Projects. Land uses that are expected to draw users from a local area, typically no more than a 2- to 3-mile radius. The definition of local-serving uses may vary by jurisdiction. These uses may generally include local-serving public facilities such as a branch library, a police or fire station, neighborhood-based schools, and local-serving retail businesses such as grocery stores, coffee shops or dry cleaners.

Low VMT Areas. Jurisdictions and unincorporated portions of the subregions that have existing VMT that is 85% or less of the countywide average (for home-based VMT) or of the Bay Area region-wide average (for work-based VMT). A list of these jurisdictions and areas is available on the CCTA website. The Analyst should confirm that these maps are up to date and represent the latest available information.

Mixed Use Projects/Uses: Projects that consist of a mix of uses otherwise described in this document.

Other Uses/Other Projects: Uses and projects which do not qualify as Residential, Employment-Generating, Local-Serving, or Regional-Serving (all of which are defined in this document).

Physical Design Measures. VMT reduction strategies that involve changes to the built environment. Examples include changes to the density or mixture of land uses, or the installation of new pedestrian or bicycle facilities.

Regional-Serving Uses/Projects. Land uses that are expected to draw users from a region that is larger than that for "local-serving uses," meaning a radius that is typically up to 3 miles ~~or more~~. The definition of regional-serving uses may vary by jurisdiction. These uses may generally include

regional-serving public facilities such as a regional library or museum, private schools and colleges, hospitals, movie theaters and other entertainment, and regional retailers such as furniture stores, shopping malls and big box retailers.

Residential Uses/Projects: Uses and projects consisting solely of residential units such as single-family and multi-family units.

Target VMT Reduction. The level of VMT reduction defined by the lead agency as being necessary to avoid a significant VMT impact. Consistent with OPR recommendations, the target reduction in this document is being set at 15% below the existing VMT (equivalent to 85% of existing VMT).

Total VMT. All of the VMT from all types of vehicles and for all trip purposes.

Traffic Analysis Zone (TAZ). A geographic polygon somewhat similar to a Census block group that is used in a travel model to represent an area of relatively homogenous travel behavior.

Transit Priority Area (TPA). An area of close proximity to a significant transit mode, defined as a one-half mile area around an existing major transit stop or an existing stop along a high-quality transit corridor. Public Resources Code, § 21064.3 defines major transit stop 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 15 minutes or less during the morning and afternoon peak commute periods. Public Resources Code, § 21155 defines a 'high-quality transit corridor' as a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours. Locations of the Transit Priority Areas (TPAs) in Contra Costa County can be found in maps available on the CCTA website.[3] The Analyst should confirm these maps are up to date and represent the latest available information.

Transportation Demand Management (TDM). Strategies that are intended to reduce vehicular travel through programs and projects that maximizes traveler choices through information, encouragement and incentives geared toward modifying travel behavior and choices.

Truck Trips. Trips made by heavy vehicles. Per the OPR recommendations and their interpretation of Public Resources Code, §15064.3, VMT analysis for transportation impact purposes can focus solely on automobile travel and can exclude truck trips. Truck trips are included in the analysis of other environmental topic areas, such as air quality, noise, and greenhouse gas.

Vehicle Miles Traveled (VMT). A metric that captures the total amount of vehicular travel through measuring the number of vehicle trips generated and the length or distance of those trips. For transportation impact analysis purposes, VMT is usually measured on a typical weekday,

[3] https://ccta1.maps.arcgis.com/apps/webappviewer/index.html?id=4135020bb272458f824152fedb78a088

and can be expressed in several ways, such as total VMT, total VMT per service population (residents plus employees), home-based VMT per resident, and home-based work VMT per employee.

VMT Reduction Strategies: Strategies intended to reduce VMT, including TDM and physical design measures.

VMT Study Area. A geographic area over which the project's effect on total VMT will be evaluated. The study area should be defined such that it captures the reasonably foreseeable VMT changes associated with the project, but not so large that the effects of the project get swamped by broader economic and land use changes. In many instances, a city boundary would be a reasonable study area; in cases where a project is located at the edge of a city or in an unincorporated area, or if the project is very large such that it is likely to affect travel patterns in neighboring cities, then a subregion of the County or even the entire County might be a more appropriate study area.

2. Project Screening

There are five screening criteria that lead agencies can apply to screen projects out of conducting project-level VMT analysis. Even if a project satisfies one or more of the screening criteria, lead agencies may still require a VMT analysis if there is evidence that the project has characteristics that might lead to a significant amount of VMT.

2.1: CEQA Exemption. Any project that is exempt from CEQA is not required to conduct a VMT analysis.

2.2: Small Projects. Small projects can be presumed to cause a less-than-significant VMT impact. Small projects are defined as having 10,000 square feet or less of non-residential space or 20 residential units or less, or otherwise generating less than 836 VMT per day.[4]

2.3: Local-Serving Uses. Projects that consist of Local-Serving Uses can generally be presumed to have a less-than-significant impact absent substantial evidence to the contrary, since these

[4] This threshold ties directly to the OPR Technical Advisory which notes that CEQA provides a categorical exemption for existing facilities, including additions to existing structures of up to 10,000 square feet, so long as the project is in an area where public infrastructure is available to allow for maximum planned development and the project is not in an environmentally sensitive area. (CEQA Guidelines, § 15301, subd. (e)(2).) Using statewide average data from the California Statewide Household Travel Survey (CHTS), the amount of daily VMT associated with 10,000 square feet of non-residential space is 836 VMT. Also using statewide average CHTS data, this level of VMT is associated with 20 housing units. Therefore, absent substantial evidence otherwise, it is reasonable to conclude that the addition of 20 housing units or 10,000 square feet of non-residential space could be considered not to lead to a significant impact.

types of projects will primarily draw users and customers from a relatively small geographic area that will lead to short-distance trips and trips that are linked to other destinations.

2.4: Projects Located in Transit Priority Areas (TPAs). Projects located within a TPA can be presumed to have a less-than-significant impact absent substantial evidence to the contrary. This exemption would not apply if the project:

1. Has a Floor Area Ratio (FAR) of less than 0.75;
2. Includes more parking for use by residents, customers, or employees than required by the lead agency (if the agency allows but does not require the project to supply a certain amount of parking);
3. Is inconsistent with the applicable Sustainable Communities Strategy (SCS) (as determined by the lead agency, with input from the Metropolitan Transportation Commission (MTC)); or
4. Results in a net reduction in multi-family housing units.

2.5: Projects Located in Low VMT Areas. Residential and employment-generating projects located within a low VMT-generating area can be presumed to have a less-than-significant impact absent substantial evidence to the contrary.

A low VMT area is defined as follows:

- For housing projects: Cities and unincorporated portions within CCTA's five subregions[5] that have existing home-based VMT per capita that is 85% or less of the existing County-wide average.

- For employment-generating projects: Cities and unincorporated portions of CCTA's five subregions that have existing home-work VMT per worker that is 85% or less of the existing regional average.

There is no definition of a low VMT area for Regional-Serving and Other Projects, since these projects always require a VMT Analysis as described in Section 3 of this memo (unless they are screened out under Criteria 2.1 through 2.4).

[5] The five CCTA subregions include SWAT Lamorinda (Lafayette, Moraga and Orinda), SWAT Tri-Valley (Danville, San Ramon, and the Tri-Valley area of Alameda County (note that Alameda County jurisdictions are not subject to the CCTA GMP requirements and thus are not subject to the VMT methods outlined in this document)), TRANSPAC (Clayton, Concord, Martinez, Pleasant Hill, and Walnut Creek), TRANSPLAN (Antioch, Brentwood, Oakley, and Pittsburg), and WCCTAC (El Cerrito, Hercules, Pinole, Richmond, and San Pablo).

Mixed-use projects may qualify for the use of this screening criterion if they include only housing, employment-generating uses and local-serving uses, and can reasonably be expected to generate VMT per resident and/or per worker that is similar to the existing land uses in the low VMT area.

3. Projects Requiring VMT Analysis

A project not excluded from VMT analysis through the screening process described above shall be subject to a VMT analysis to determine if it has a significant VMT impact.

Analysis Scenarios

The following scenarios should be addressed in the VMT analysis:

- Baseline conditions: The most current version of the baseline CCTA model should be used to determine the baseline VMT for the TAZ in which the project is to occur. This information is available from the VMT screening maps on the CCTA website.
- Baseline plus project: If the project is a simple, single-use project that is very similar to other developments that already exist in that TAZ, then the analyst may conclude that the project generated home-based VMT per capita or the home-work VMT per worker will be the same as the existing VMT per capita or per worker in that TAZ; in that instance, a separate Baseline plus project model run would not be required. However, if the project contains one or more uses, or a mix of uses, the does not exist in the TAZ, then a model run is required. In this case, the proposed land use(s) should be added to the baseline condition for the relevant TAZ, or a separate TAZ should be created in the CCTA model to contain the project land uses. A full baseline model run should then be performed. The analyst should review the model output to confirm reasonableness of the results and to check production and attraction balancing to ensure that the project's effect is being captured.

VMT Metrics and Significance Thresholds

The output from each model run will include total VMT per service population, home-based VMT per capita, and home-work VMT per worker, which should be analyzed as described below. In addition, to calculate the total study area VMT, the analyst would define a VMT study area and the VMT occurring on all network links inside that study area should be summed.

The following describes the specific VMT metrics and significance thresholds that should be used in evaluating different project types: [6]

Residential Projects should use the home-based VMT per capita metric to evaluate their project generated VMT. The project generated home-based VMT per resident constitutes a significant impact if it is higher than 85% of the home-based VMT per resident in the subject municipality or unincorporated CCTA subregion (for areas outside of municipalities) or 85% of the existing County-wide average home-based VMT per resident, whichever is less stringent.

Employment-Generating Projects should use the home-work VMT per worker metric for their project generated VMT estimates. The project generated home-work VMT per worker constitutes a significant impact if it is higher than 85% of the home-work VMT per worker in the subject municipality or unincorporated CCTA subregion (for areas outside of municipalities) or 85% of the existing Bay Area region-wide average home-work VMT per worker, ~~,~~ whichever is less stringent.

Regional-Serving Projects should use the metric of total study area VMT and should define a VMT study area over which to evaluate that metric. The project generated VMT constitutes a significant impact if the baseline project generated total VMT per service population is higher than 85% of the existing countywide average total VMT per service population.

Other Uses and Projects need to be analyzed using a methodology developed by the lead agency specifically for the project, prepared and documented based on available data and taking into account the specific methodologies and thresholds identified in this document.

Mixed-Use Projects may be analyzed using a combination of techniques described above, as follows:

- Mixed use projects that contain a combination of housing, employment-generating and regional-serving uses may choose to evaluate each use separately using the metrics and significance thresholds described above for those uses.
- Mixed use projects that include a local-serving component may ignore that component for analysis purposes, and analyze only the remaining uses. Note that it may be more beneficial to the project to conduct a full analysis that takes account of on-site local-

[6] The metrics of "home-based VMT per capita" and "home-work VMT per worker" are taken from the production-attraction trip matrices in the CCTA model, which is a stage of the modeling process in which trips are still categorized by purpose. This stage of the modeling process does not yet include truck trips so these VMT metrics do not include the VMT associated with trucks. This is consistent with the guidance from the OPR Technical Advisory, in which it interprets the Section 15064.3 language referring to automobile VMT as being focused on light-duty passenger vehicles. The "total VMT per service population" metric is taken from the final origin-destination trip matrices in the CCTA model and therefore it does include the VMT associated with trucks. Per the OPR guidance it is acceptable to include truck VMT when needed for modeling convenience, as long as the Analyst ensures there is an apples-to-apples comparison by using the same vehicle types in each step of the analysis process.

serving uses, since this analysis can take credit for reductions in trips resulting from the on-site mix.

In all cases, the *analyst should consider whether that approach will effectively capture the likely interactions between the different uses*. Other analytical options that would capture interactions between different uses are to analyze the project by conducting a full run of the CCTA model, or to use a sketch planning tool designed to estimate the trip generation effects of a mixed-use project.

4. VMT Mitigation Strategies

If the conclusion is that the project would have the potential to cause a significant VMT impact per one or more of the significance thresholds defined above, then mitigation is required. CEQA requires that all feasible measures be implemented to reduce identified impacts to less-than-significant levels.

Method of Calculating Mitigation Reductions

The analyst, working with the lead agency and applicant, shall specify a series of mitigation measures, each of which shall have a specific percent level of VMT reduction assigned to it. Reduction levels may be taken from the *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity* ~~document~~ published by the California Air Pollution Control Officers Association (CAPCOA) in 2021, which are summarized in Appendix 1 ~~(described further below)~~ or from other defensible sources. In each case, the analyst shall explain the basis for the reduction applied, and shall also consider any interactions among the mitigation measures that make them cumulatively less effective than they are by themselves.

Each reduction shall be applied to the overall VMT associated with the project, until the total VMT is reduced to a less-than-significant level or all feasible mitigation reductions have been applied.

Required Levels of Mitigation

In order to reduce impacts to less-than-significant levels, the proposed mitigation measures must reduce VMT to the relevant threshold as defined in Section 3 above.

Types of Mitigation

To mitigate VMT impacts, the following actions could be taken:

- Modify the project's characteristics to reduce VMT generated by the project. This might involve changing the density or mixture of land uses on the project site, or changing the project's location to one that is more accessible by transit or other travel modes. The effectiveness of such changes should be modeled using the analysis techniques described in Part 3, above.

- Implement transportation demand management (TDM) or physical design measures to reduce VMT generated by the project. A description of such options is included below.
- Participate in a CCTA-approved VMT impact fee program and/or VMT mitigation exchange/banking program. CCTA will be developing such a program in Contra Costa County in the near future.

VMT Reductions from TDM and Physical Design Measures

TDM and physical design measures that could potentially be applicable in Contra Costa County are outlined in the *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity* ~~document~~ published by the California Air Pollution Control Officers Association (CAPCOA) in 2021, which is summarized in Appendix 1. It should be noted that the understanding of the availability, applicability, and effectiveness of VMT mitigation measures is continuing to evolve and the evaluation of TDM measures should be updated periodically. Any evaluation of the effectiveness of VMT reduction measures should recognize that many TDM strategies are dependent on things that are likely to change over time, such as the level of priority a building tenant places on achieving trip reductions, or the frequency of nearby transit services. As such, actual real-time VMT reduction cannot be reliably predicted and ongoing monitoring should be considered to ensure that mitigation expectations are being met.

The effectiveness of each strategy shown in Appendix 1 will vary depending on the context in which it is implemented and the types of trips to which it applies. It is the analyst's responsibility to review the available research and suggest a level of VMT reduction that is reasonable to apply to the project being studied, taking into account the project's specific characteristics and the context in which it would be constructed.

It should also be noted that the incremental benefit of each VMT reduction strategy will diminish as strategies are combined together. Therefore, the analyst should carefully document how the interaction between TDM strategies is accounted for. The California Air Pollution Control Officers Association (CAPCOA) report *Quantifying Greenhouse Gas Mitigation Measures* provides guidance on how to account for combinations of strategies.

5. Significant and Unavoidable Impacts, Cumulative Analysis and Findings of Overriding Consideration

Findings of Overriding Consideration

If the lead agency includes all feasible measures described in Section 4 above and those measures are not sufficient to fully mitigate the impact, then the VMT impact will be classified as significant and unavoidable. The lead agency may still approve the project, as allowed by CEQA, by making a finding of overriding consideration.

Before making such a finding and approving the project, the lead agency must also conduct a cumulative VMT analysis for the project, as described below.[7]

Cumulative Analysis

Projects that are unable to mitigate their project-specific VMT impacts to less-than-significant levels require a Cumulative VMT analysis.

The cumulative analysis of a project involves understanding the project's effect on overall VMT within its study area. This analysis is needed to address circumstances where an individual project might affect travel patterns from other developments in the broader area; this might happen for a variety of reasons, such as that the project offers different housing, employment or other opportunities than would otherwise exist in the area and that causes other users to change their travel decisions, or because the drivers and transit users generated by the project take up available system capacity and cause other users to change their travel routes or modes.

The project's effect on VMT should be measured by defining a VMT study area and calculating the total VMT occurring on all network links inside that study area, in both the cumulative without project and cumulative with project scenarios. To allow for a reasonable comparison between those two scenarios, the total study area VMT should be normalized in some fashion to reflect that there are different numbers of people within the study area (i.e., because the project has added people to the study area as compared to the without project scenario). If the project adds residents to the study area, then it would be reasonable to present the VMT results as total study area VMT divided by number of study area residents. If the project adds employees to the study area, then it would be reasonable to use total study area VMT divided by number of study area employees. The exact method for normalizing the VMT number is not critical; what is essential is that the same method be used for both the cumulative without project and the cumulative with project scenarios, to allow for an apples-to-apples comparison between the two scenarios.

Specific steps in the process are defined below:

Model Runs. The Cumulative VMT analysis will be based on two CCTA Model runs:

- Cumulative without project: The most current version of the horizon year of the CCTA model. If development similar to that found in the proposed project is already foreseen in the subject TAZ in the "cumulative without project" model, this development should be subtracted from the "cumulative without project" scenario before this model run is conducted.

[7] As per OPR's guidance, cumulative VMT analysis is not necessary for projects that are found to have a less-than-significant impact on VMT at the project level.

- Cumulative plus project: Unless development similar to that found in the proposed project is already foreseen in the subject TAZ in the "cumulative without project" model, the proposed land use(s) should be added to the "cumulative without project" condition for the TAZ, or a separate TAZ should be created to contain the proposed land use(s). The Analyst should also consider whether it would be advisable to offset the addition of these proposed land uses by lessening projected increases in development in other TAZs, particularly if the proposed project is substantial in size such that it might change the distribution of future developments. This recognizes that individual land use projects will generally not change the regionwide totals for population and employment growth, but will influence localized land use and VMT impacts.

Cumulative Threshold. Cumulative VMT impacts should be considered significant if there is a net increase in the total study area VMT normalized to the number of people within the study area, when comparing cumulative no project to cumulative plus project conditions.

Additional Significant Impact and Findings of Overriding Consideration. If the Cumulative VMT Analysis finds a significant impact, this impact shall be considered to be significant and unavoidable, and must therefore be called out in the project's EIR and subject to the Finding of Overriding Consideration described earlier in this section.

Appendix 1. Summary of Potential VMT Reduction Strategies

The following table and the descriptions of strategies summarize GHG reduction strategies and the maximum GHG emissions that may result from them, as documented in the *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity* published by the California Air Pollution Control Officers Association (CAPCOA) in 2021. Analysts should refer to the *Handbook* for a more in-depth understanding of the strategies, and to learn more about how to estimate GHG emission reductions that may result from a specific set of strategies applied to a specific project. It is the analysts' responsibility to develop a set of reduction strategies, estimate resulting reductions, and justify the reduction levels based on information in the *Handbook* or other similar sources.

Strategy	Types of Trips Affected	~~Range of Potential VMT Reduction for Affected Trips~~Maximum Percent GHG ~~Mitigation Potential~~Reduction in Study Area
Project-Scale Strategies		
Provide transit-oriented development (TOD)	Primarily commute trips	~~6.9 to~~ 31%
~~Increase land use diversity through greater mix of uses on site~~Increase residential density	All trips	~~0% - 12%~~30%
~~Implement ride-sharing program~~Increase job density	Primarily commute trips	~~2.5% - 8.3%~~30%
Implement commute trip reduction program mandatory implementation and monitoring)	Commute trips	26%
Provide employer-sponsored vanpool	Commute trips	20.4%
Price workplace parking	Commute trips	20%
Unbundle residential parking costs from property cost	All trips	15.7%
Limit residential parking supply	All trips	13.7%
Implement employee parking cash-out	Commute trips	12%
Provide electric vehicle charging infrastructure	All trips	11.9%
Provide ridesharing program	Commute trips	8%
Implement subsidized or discounted transit program	Commute trips	5.5%
Provide end-of-trip bicycle facilities	Commute trips	4.4%

Implement commute trip reduction marketing		Commute trips	4%
~~Incentivize telework and alternative schedules~~Implement commute trip reduction program (voluntary)		Commute trips	~~0.2% - 4.5%~~4%
Provide community-based travel planning		Commute trips	2.3%
~~5~~	~~Price and manage parking~~	~~All~~	~~2% - 30%~~
~~ing supply from property cost~~**Community-Scale Strategies**			
~~6~~	~~Improve the pedestrian network~~	~~All~~	~~0.5% - 5.7%~~
~~7~~	~~Implement traffic calming and low-stress bicycle facilities~~	~~All~~	~~0% - 1.7%~~
~~8~~	~~Increase transit service frequency~~	~~All~~	~~0.3% - 6.3%~~
~~9~~	~~Implement neighborhood or community-wide car-sharing programs~~	~~All~~	~~0.3% - 1.6%~~
~~10~~	~~Coordinate school pools~~	~~School~~	~~7% - 15%~~
Use cleaner-fuel vehicles		All trips	100%
Improve street connectivity		All trips	30%
Implement market price public parking (on-street)		All trips	30%
Increase transit service frequency		All trips	11.3%
Provide pedestrian network improvement		All trips	6.4%
Extend transit network coverage or hours		All trips	4.6%
Provide community-based travel planning		All trips	2.3%
Reduce transit fares		All trips	1.2%
Implement transit-supportive roadway treatments		All trips	0.6%
Construct or improve bicycle facilities		All trips	0.8%
Construct or improve bicycle boulevard		All trips	0.2%
Expand~~ed~~ bikeway network		All trips	0.5%
Implement conventional carshare program		All trips	0.15%
Implement electric carshare program		All trips	0.18%
Implement pedal (non-electric) bikeshare program		All trips	0.02%
Implement electric bikeshare program		All trips	0.06%
Implement scootershare program		All trips	0.07%

Source: Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. CAPCOA, 2021.

Commented [RL1]: Added the missing strategy

Description of Project-Scale Strategies

- Provide transit-oriented development (TOD)– This strategy requires the project to be built in a compact and pedestrian-friendly location with good access to public transit. TOD

encourages higher public transit ridership and helps to reduce the need to own a vehicle or the number of vehicles owned by a household by incentivizing individuals to use transit.

- Increase ~~land use diversity~~residential density – This strategy focuses on ~~inclusion of mixed uses within projects or in consideration of the surrounding area~~increasing density of dwelling units ~~-~~to minimize vehicle travel in terms of both the number of trips and the length of those trips. Project density must exceed 9.1 dwelling units per acre (DUA) to achieve minimum GHG reduction[8].
-
- ~~Implement ride-sharing program~~Increase job density – This strategy focuses on ~~encouraging carpooling and vanpooling by project site/building tenants, which depends~~increasing density of jobs to minimize vehicle travel in terms of both the number of trips and the length of those trips. ~~on the ultimate building tenants; this should be a factor in considering the potential VMT reduction.~~ Job density must exceed 145 jobs per acre to achieve minimum GHG reduction.[9]
-
- ~~Subsidize or discount transit passes – This strategy reduces the need to own a vehicle or reduces the number of vehicles owned by a household by incentivizing individuals to use transit for their daily commute. This strategy depends on the ultimate building tenants and may require monitoring. This strategy also relies on local transit providers continuing to provide similar or better service throughout the County, in terms of frequency and speed.~~
- Commute trip reduction program (mandatory implementation and monitoring) – This strategy implements a mandatory employer program to discourage single-occupancy vehicle trips and incentivize alternative modes of travel. Employer can provide transit subsidies and bicycle infrastructure to incentivize transit and bicycle ridership, and deter vehicle use by limiting or charging for parking on site.
- Provide employer-sponsored vanpool – This strategy implements an employee vanpool service that provides flexible transportation for small groups (between 5 and 15 people). Vanpools can encourage mode shifts from single-occupancy vehicles to carpool trips, reducing commute VMT.
- Price workplace parking – This strategy will impose parking fees at workplaces. Charging parking fees discourages driving to work and can help reduce single-occupancy vehicle commute trips.

[8] Ewing, R., K. Bartholomew, S. Winkelman, J. Walters, and D. Chen. 2007. Growing Cooler: The Evidence on Urban Development and Climate Change. October. Available:

[9] Institute of Transportation Engineers (ITE). Trip Generation Manual. 10th Edition. Available: https://www.ite.org/technical-resources/topics/trip-and-parking-generation/trip-generation-10th-edition-formats/. Accessed: January 2021.

- Unbundle residential parking costs from property cost – This strategy separates the costs associated with parking from the property costs at a residential site and requires residents to pay for parking spaces they use. This strategy discourages and reduces automobile ownership by making it more expensive. As a result, unbundled parking costs can result in reduced VMT and associated greenhouse gas emissions.
- Limit residential parking supply – This strategy reduces total parking space available at a residential site. Scarcity of parking space makes driving less convenient and disincentivizes reliance upon an automobile, encouraging a shift to other modes of transportation. As a result, limiting parking supply can result in reduced VMT and associated greenhouse gas emissions.
- Implement employee parking cash-out – This strategy will require employers to provide employees with a choice to pay for parking or forgo their parking spot in exchange for a cash subsidy equal to the price of the parking space. This cash incentive can help encourage riders to use alternative modes of travel and reduce commute VMT.
- Provide electric vehicle charging infrastructure – This strategy involves installation of electric vehicle charging stations, a requirement of the 2019 California Green Building Standards. Electric vehicle use reduces greenhouse gas emissions from trips because it replaces fuel with electricity. Compared with fuel, electricity has a lower carbon intensity and thus produces fewer emissions per mile than gasoline.
- Provide ridesharing program – This strategy will implement an employer ridershare program that includes a permanent transportation management association. Successful implementation requires designating parking spaces for rideshare vehicles and providing an app or website to coordinate ridesharing. Rideshare programs can encourage mode shifts from single-occupancy vehicles to carpool trips, reducing commute VMT.
- Implement subsidized or discounted transit program – This strategy is an employer program that provides subsidized or discounted transit passes to employees to incentivize transit use.
- Provide end-of-trip bicycle facilities – This strategy requires employer funded installation of bicycle facilities, including parking, lockers, and showers. These facilities make bicycle use more convenient for employees and can encourage bicycle commuting.
- Implement commute trip reduction marketing – This strategy will implement an employer program to promote and educate employees on travel choices for their commute, including public transit routes, bicycle routes, and carpooling programs.
- Implement commute trip reduction program (voluntary) – This strategy implements a voluntary employer program to reduce vehicle travel by encouraging employees to carpool, bike, walk, and take public transit.
- Community-based travel planning – This strategy provides outreach and customized support to residences in the community to encourage the use of alternative transportation modes to reduce VMT and associated GHG emissions.

~~**Price and manage parking – Parking management strategies focus on the management of parking to influence vehicle travel. Free and ubiquitous parking supply tends to increase vehicle use while reducing parking supply and pricing spaces can help reduce vehicle travel. A reduction in parking supply can also be used to incentivize infill development and higher density development by reducing the cost of building parking spaces. This strategy may be less effective in suburban settings such as Contra Costa County but will depend on the specific project site and the surrounding parking supply.~~~~ing~~**Description of Community-Scale Strategies**

- Use cleaner fuel vehicles – This strategy replaces combustion-engine vehicles with clean-fuel vehicles, such as natural gas, electric, and hydrogen powered vehicles, reducing greenhouse gas emissions associated with vehicle travel. The impact of the reduction in emissions depends on the carbon intensity of the fuel used.
- Improve street connectivity – This strategy considers the design of a road network and its impacts on trip length and VMT. Projects would need to increase intersection density (i.e. by converting culs-de sacs or dead-end streets to grid streets) to promote improved connectivity to facilitate shorter trips, encourage more walking and biking, and reduced greenhouse gas emissions.
- Implement market price public parking (on-street) – This strategy establishes a pricing scheme for on-street parking in a community, especially in areas with a high concentration of retail and employment. Increasing the cost of parking disincentivizes vehicle use and encourages mode shifts, reducing VMT and greenhouse gas emissions.
- Increase transit service frequency – This strategy increases transit service, improving the rider experience by reducing waiting times and travel times. Improved transit service makes transit more convenient, encouraging mode shifts from vehicles to transit, thereby reducing VMT and greenhouse gas emission.
- Provide pedestrian network improvement – This strategy involves enhancing pedestrian sidewalk networks by expanding sidewalk coverage and repairing substandard sidewalks. This strategy can enhance pedestrian access and encourage higher rates of walking, reducing VMT and greenhouse gas emissions by displacing vehicle trips.
- Extend transit network coverage or hours – This strategy expands transit network through geographic range or operation hours to encompass service to the project site. Enhanced transit networks or schedules can make transit more convenient and accessible for users,

especially those who work alternate shifts. This strategy encourages mode shifts from vehicles to transit, thereby reducing VMT and greenhouse gas emission.

- Provide community-based travel planning (CBTP) – This strategy provides travel planning assistance for targeted residences in a multi-family residential community. Travel plans provide customized information and incentives to encourage mode shifts and reduced vehicle trips, reducing VMT and greenhouse gas emissions.
- Reduce transit fares – This strategy reduces transit fares for transit services for a particular site or community. Reducing the cost of transit can encourage higher ridership and outweigh the revenue benefits of a higher fare. Reducing transit fares can encourage mode shifts from vehicles to transit, thereby reducing VMT and greenhouse gas emission.
- Implement transit-supportive roadway treatments – This strategy implements improvements to transit routes serving the community with a combination of roadway infrastructure improvements and traffic signal modifications that can reduce travel time. Examples include dedicated bus lanes, transit signal priority, and curb extensions for passenger boarding. Transit-supportive roadway treatments can improve the rider experience, encouraging mode shifts from vehicles to transit, thereby reducing VMT and greenhouse gas emission.
- Construct or improve a bicycle facility – This strategy involves the construction or improvement of a bicycle lane that connects to a larger bikeway network. Improved bicycle infrastructure increases connectivity and encourages a mode shift from vehicles to bicycles, reducing VMT and greenhouse gas emissions by displacing vehicle trips.
- Construct or improve bicycle boulevard - This strategy involves the construction or improvement of a bicycle boulevard, a Class III facility or shared on-street bicycle lane, that connects to a larger bikeway network. Improved bicycle infrastructure increases connectivity and encourages a mode shift from vehicles to bicycles, reducing VMT and greenhouse gas emissions by displacing vehicle trips.
- Expand bikeway network – This strategy increases the mileage of bicycle facilities within a bikeway network, while improving the visibility, signage, and comfort levels of the bicycle facilities. An expanded bikeway network increases connectivity and, especially when connected with transit hubs, encourages a mode shift from vehicles to bicycles, reducing VMT and greenhouse gas emissions by displacing vehicle trips.
- Implement conventional carshare program – This strategy promotes carsharing by increasing access to carshare vehicles in the community. These carshares are convenient and can be accessed by a mobile app for personal or commuting trips, encouraging reduced reliance upon private vehicles and can help reduce VMT and greenhouse gas emissions.
- Implement electric carshare program – This strategy increases access to electric carshare vehicles in the community. In addition to encouraging reduced vehicle ownership, the electric carshare displaces internal combustion vehicles with electric vehicles. By reducing

the number of trips and replacing fuel with electricity, a lower carbon intensity energy source, this strategy can reduce VMT and greenhouse gas emissions.

- Implement pedal (non-electric) bikeshare program – This strategy establishes a bikeshare program, which provides the public with easy access to short-term bicycle rentals. Bikeshare programs can reduce VMT and greenhouse gas emissions by encouraging mode shifts from vehicles to bicycles.
- Implement electric bikeshare program - This strategy establishes an electric bikeshare program, which provides the public with easy access to electric pedal assist bicycles for short-term rentals. Electric bikeshare programs can reduce VMT and greenhouse gas emissions by encouraging mode shifts from vehicles to bicycles~~. This strategy assumes that implementation will replace vehicle trips with bicycle trips at a rate of 19.6 percent[10]~~.
- Implement scootershare program – This strategy establishes an electric scootershare program, which provides the public with easy access to electric scooters for rentals. Electric scootershare programs can reduce VMT and greenhouse gas emissions by encouraging mode shifts from vehicles to scooters.

~~[10] McQueen, M., G. Abou-Zeid, J. MacArthur, and K. Clifton. 2020. Transportation Transformation: Is Micromobility Making a Macro Impact on Sustainability? Journal of Planning Literature. November. Available: https://doi.org/10.1177/0885412220972696. Accessed: March 2021~~