

## TECHNICAL MEMORANDUM

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**From:** Ronald T. Milam, AICP, PTP and Jason Pack, PE

**Subject:** VMT Impact Analysis Methodologies and Case Studies

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This technical memorandum presents recommended SB 743 VMT analysis methodologies for lead agencies in the WRCOG area. Methodologies are included for VMT impact screening and for full impact analysis. In addition, land use project case studies are presented to evaluate the methodologies and to test the outcomes associated with different threshold options. Lead agencies have the discretion to select their own thresholds presuming they provide substantial evidence to support their selection (see the Thresholds Evaluation Technical Memorandum for more details). The following previously approved land use projects were evaluated as case studies in this effort.

- Eastvale Crossings – A commercial and retail development in Eastvale
- Nandina Distribution Center (Moreno Valley) – A logistics center in Moreno Valley
- A 136 Unit Single Family Residential Development in northeast Temecula
- Mission Lofts – A transit-oriented development in Riverside

The remainder of this memo is organized as follows.

- Project Threshold Analysis Methodology for Land Use Projects
- Land Use Project Case Study Tests
- Cumulative Threshold Analysis Methodology for Land Use Projects
- Analysis Methodology for Land Use Plans
- Analysis Methodology for Transportation Projects

### **Project Threshold Analysis Methodology for Land Use Projects**

Lead agencies may choose to use an impact screening method to streamline land use project review for VMT impacts. WRCOG has created a web-based screening tool for this purpose available at <http://gis.fehrandpeers.com/WRCOGVMT/>. If a project does not pass an initial screening test, then a full impact analysis is warranted. In all, the process may include up to four steps as outlined below.

### **Step 1: Transit Priority Area (TPA) Screening**

Projects located within a TPA<sup>1</sup> may be presumed to have a less than significant impact absent substantial evidence to the contrary. This presumption may not be appropriate 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 of the project than required by the jurisdiction (if the jurisdiction requires the project to supply parking);
3. Is inconsistent with the applicable Sustainable Communities Strategy (as determined by the lead agency, with input from the Metropolitan Planning Organization); or
4. Replaces affordable residential units with a smaller number of moderate- or high-income residential units.

### **Step 2: Low VMT Area Screening**

Residential and office projects located within a low VMT generating area may be presumed to have a less than significant impact absent substantial evidence to the contrary. In addition, other employment-related and mixed-use land use projects may qualify for the use of screening if the project can reasonably be expected to generate VMT per resident, per worker, or per service population that is similar to the existing land uses in the low VMT area. For this screening in the WRCOG area, the RIVTAM travel forecasting model was used to measure VMT performance for individual jurisdictions and for individual traffic analysis zones (TAZs). TAZs are geographic polygons similar to Census block groups used to represent areas of homogenous travel behavior. Total daily VMT per service population (population plus employment) was estimated for each TAZ. Those TAZs that perform at or below the jurisdictional average of total VMT per service population under base year (2012) conditions are considered low VMT areas for purposes of this memo. Individual lead agencies may choose a different baseline threshold to define their low VMT areas. This presumption may not be appropriate if the project land uses would alter the existing built environment in such a way as to increase the rate or length of vehicle trips.

### **Step 3: Project Type Screening**

Local serving retail projects less than 50,000 square feet may be presumed to have a less than significant impact absent substantial evidence to the contrary. Local serving retail generally improves the convenience of shopping close to home and has the effect of reducing vehicle travel.

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<sup>1</sup> A TPA is defined as a half mile area around an existing major transit stop or an existing stop along a high quality transit corridor per the definitions below.

Pub. Resources Code, § 21064.3 - 'Major transit stop' means 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.

Pub. Resources Code, § 21155 - For purposes of this section, a 'high-quality transit corridor' means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.

#### **Step 4: VMT analysis using RIVTAM**

Projects not screened through the steps above should complete VMT analysis and forecasting through the RIVTAM model to determine if they have a significant VMT impact. This analysis should include 'project generated VMT' and 'project effect on VMT' estimates for the project TAZ (or TAZs) under the following scenarios.

- Baseline conditions - This data is already available in the web map.
- Baseline plus project for the project - The project land use would be added to the project TAZ or a separate TAZ would be created to contain the project land uses. A full model run would be performed and VMT changes would be isolated for the project TAZ and across the full model network. The model output must include reasonableness checks of the production and attraction balancing to ensure the project effect is accurately captured. If this scenario results in a less-than-significant impact, then additional cumulative scenario analysis may not be required (more information about this outcome can be found in the Thresholds Evaluation memo).
- Cumulative no project - This data is available from WRCOG.
- Cumulative plus project - The project land use would either be added to the project TAZ or a separate TAZ would be created to contain the project land uses. The addition of project land uses should be accompanied by a reallocation of a similar amount of land use from other TAZs. Land use projects will generally not change the cumulative no project control totals for population and employment growth. Instead, they will influence the land use supply through changes in general plan land use designations and zoning. If project land uses are simply added to the cumulative no project scenario, then the analysis should reflect this limitation in the methodology and acknowledge that the analysis may overestimate the project's effect on VMT.

The model output should include total VMT, which includes all vehicle trips and trip purposes, and VMT per service population (population plus employment). Total VMT is needed as an input for air quality, greenhouse gas (GHG), and energy impact analysis while total VMT per service population is recommended for transportation impact analysis.

#### **Land Use Project Case Study Tests**

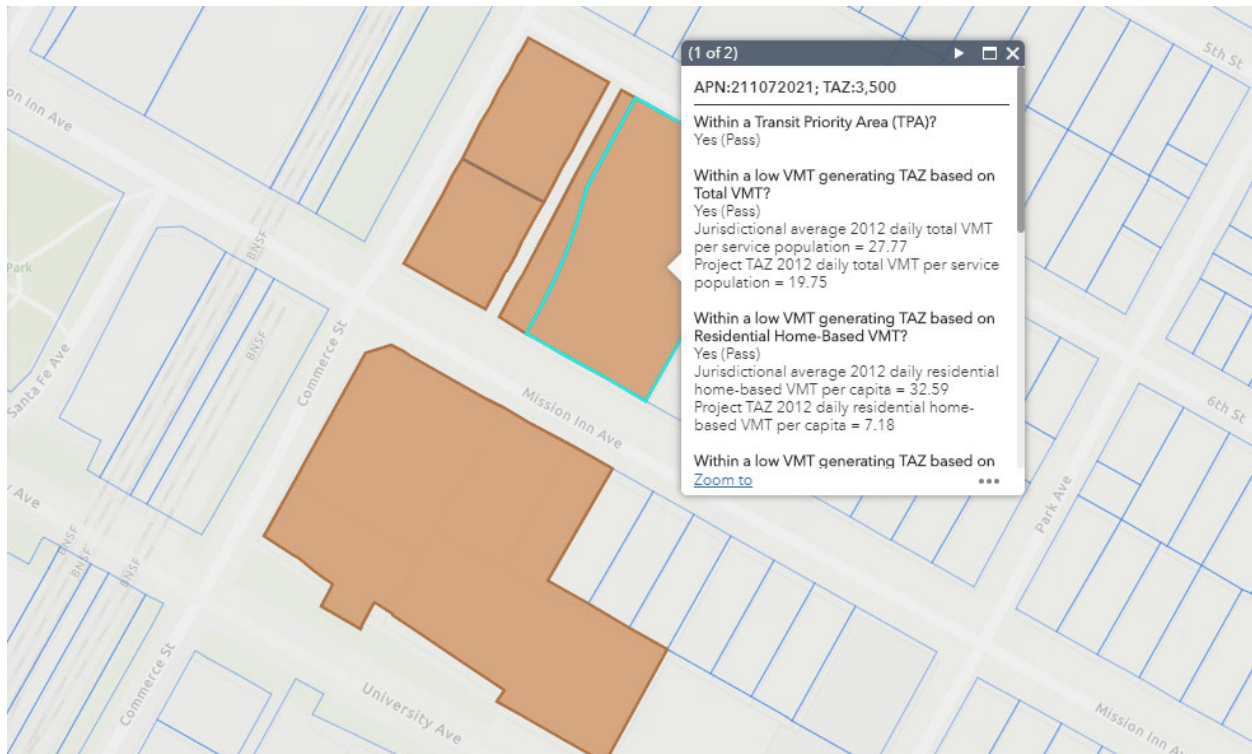
For the case studies, three threshold options were tested to determine if the land use projects would cause a significant impact under baseline plus project conditions. Normally, baseline will represent the year in which the notice of preparation (NOP) is published for the project. Since all of the case studies are completed projects, the baseline year has simply been set to 2012, the base year of the RIVTAM model. Future projects may need to create specific baseline years and should consider methods such as interpolating VMT results between the 2012 base year output from RIVTAM and 2040 horizon year output. This data is available from WRCOG.

- Option 1 – A significant impact would occur if addition of a project to the base year model causes its corresponding TAZ to generate total daily VMT per service population above the baseline level for the TAZ.
- Option 2 – A significant impact would occur if addition of a project to the base year model causes its corresponding TAZ to generate total daily VMT per service population above the applicable jurisdictional average under baseline conditions.
- Option 3 – A significant impact would occur if addition of the project to the base year model causes the jurisdiction’s average VMT per service population to increase.

These options rely on the VMT threshold being set at the baseline level for either the TAZ or jurisdiction. Lead agencies have discretion to set their own thresholds as explained in the Thresholds Evaluation memo. The locally adopted threshold can be substituted into any of these threshold statements.

**Mission Lofts (TPA and Low VMT Screening Example)**

Mission Lofts is an under-construction apartment complex near Downtown Riverside and the Riverside Metrolink Station. It is located both within a transit priority area and within a low VMT generating TAZ. It is therefore considered to have less than significant VMT impact, as it satisfies both screening criteria (although satisfaction of one criterion would have been sufficient).



**Figure 1: Mission Lofts Screening Results from the WRCOG VMT Screening Tool**

### Eastvale Crossings (Low VMT Screening Example)

Eastvale Crossings is an under-construction primarily retail commercial development located in the City of Eastvale. The project is too large to qualify as a local serving retail project for screening purposes and is not located in a TPA. However, the project is located in a low VMT generating TAZ based on the threshold where the baseline VMT per service population for the TAZ is lower than the citywide average for Eastvale. The OPR Technical Advisory reserves the use of low VMT generating area screening for residential and office projects. However, other land use projects may also qualify if evidence supports the conclusion that the project approval would not alter the low VMT generation of the area. Under this circumstance, it may be appropriate to presume that the project would have a less than significant VMT impact. To validate this conclusion, a full VMT impact analysis was performed for the project under baseline plus project conditions. Under this scenario, the project was modeled in RIVTAM as outlined above. Table 1 shows the baseline VMT and baseline plus project VMT for the project’s TAZ and the City of Eastvale.

**Table 1: Eastvale Crossings VMT Comparison**

Scenario	Total Daily VMT/Service Population	
	Eastvale	TAZ 3149
Baseline	27.0	23.4
Baseline Plus Project	27.3	26.8
Change	+0.3	+3.4

The impact conclusions vary depending on the specific threshold option used.

- Under Option 1, the project would have a **significant** impact because it increases the TAZ’s VMT per service population above the baseline average.
- Under Option 2, the project would have a **less than a significant** impact because it does not increase the VMT per service population of the TAZ above the city’s average under baseline plus project conditions.
- Under Option 3, the project would have a **significant** impact because it increases the city’s average VMT per service population under baseline plus project conditions.

These findings help explain why the OPR Technical Advisory reserves the general use of low VMT generating area screening. Larger retail projects may not result in VMT reductions similar to that of local serving retail so use of screening for these types of projects requires careful consideration.

## Temecula Residential Development

A 136-unit residential development representative of typical development in Temecula was considered for case study testing. The theoretical project was presumed to be located in the northeast corner of the city. This location is not in a TPA and or a low VMT generating TAZ, so it must be modeled in RIVTAM to determine if it causes significant VMT impacts.

The specific project TAZ, 4105, is located partially within the City of Temecula and partially within unincorporated Riverside County. For WRCOG’s SB743 implementation guidance, jurisdictional VMT averages have been calculated using VMT results for TAZs with all or the majority of their land area within the jurisdictional boundaries. While the project is located within city limits, the majority of the TAZ falls within unincorporated Riverside County, so the TAZ does not contribute to the City of Temecula’s total VMT per service population average. While it was not done for the purposes of this test, a TAZ could be added to the model to more accurately represent the project within the appropriate jurisdiction if the majority of its TAZ does not fall within that jurisdiction. Table 2 shows the baseline VMT and baseline plus project VMT for the project’s TAZ and the City of Temecula.

**Table 2: Temecula Residential Development VMT Comparison**

Scenario	Total Daily VMT/Service Population	
	Temecula	TAZ 4105
Baseline	26.2	40.2
Baseline Plus Project	26.2	34.5
Change	0.0	-5.7

For this case study test, the threshold option does not influence the impact finding.

- Under Option 1, the project would have a **less than significant** impact because it reduces the TAZ’s VMT per service population under baseline plus project conditions.
- Under Option 2, the project would have a **less than significant** impact because it does not increase the total daily VMT per service population of the TAZ above that of the city’s average under baseline plus project conditions.
- Under Option 3, the project would have a **less than significant** impact because it does not change the citywide average total VMT per service population under existing plus project conditions.

Analysts should note that the model underestimates VMT for projects at the edge of the model area because trip lengths for trips leaving the model area are truncated and only the portion of the trip length within the model area is accounted for. A more detailed analysis would require calculating the trip length outside of the model area for project trips leaving the model area. This can potentially be done using

California Statewide Travel Demand Model trip length information as well as trip length information from big data sources. VMT per service population for Temecula and TAZ 4105 would both be higher as a result.

### Nandina Distribution Center

Nandina Distribution Center is a recently completed 740,000 square foot facility located in the southern part of Moreno Valley east of March Air Force Base. The project does not meet any of the screening criteria and therefore must be modeled in RIVTAM to determine if there are any significant VMT impacts.

Tenants of logistics centers and warehouses in the Inland Empire tend to operate as high cube warehouse facilities. RIVTAM does not have a specific land use type for high cube warehouse facilities, so any of these facilities must be considered as the next most appropriate land use type. High cube warehouse facilities tend to generate more trips than other logistics centers so model results for these types of projects may underestimate the total trips generated by the project if modifications aren't made to model inputs. For a more detailed analysis of high cube warehouse projects, inputs should be modified to better match independent trip generation estimates, or the model itself should be modified to include high cube warehouses as a land use type. These changes were not made for the purposes of this methodology test but are advisable for any project to ensure that RIVTAM trip generation estimates accurately represent the project.

**Table 3: Nandina Distribution VMT Comparison**

Scenario	Total Daily VMT/Service Population	
	Moreno Valley	TAZ 3771
Baseline	24.5	105.4
Baseline Plus Project	24.5	52.3
Change	0.0	-53.2

Similar to the previous case study test, the threshold option does not influence the impact finding.

- Under Option 1, the project would have a **less than significant** impact because it reduces the TAZ's VMT per service population under baseline plus project conditions.
- Under Option 2, the project would have a **less than significant** impact because it does not increase the total daily VMT per service population of the TAZ above that of the city's average under baseline plus project conditions.
- Under Option 3, the project would have a **less than significant** impact because it does not change the citywide average total VMT per service population under baseline plus project conditions.

## **Cumulative Threshold Analysis Methodology for Land Use Projects**

Projects located in low VMT generating TAZs, projects located in TPAs, and local retail projects less than 50,000 square feet can all be screened from cumulative analysis. The project level analysis presumption applies under cumulative conditions for these projects.

For projects which are not screened, the project land use must either be added to the project TAZ or a separate TAZ must be created to contain the project land uses. The addition of project land uses should be accompanied by a reallocation of a similar amount of land use from other TAZs. Land use projects will generally not change the cumulative no project control totals for population and employment growth. Instead, they will influence the land use supply through changes in general plan land use designations and zoning. If project land uses are simply added to the cumulative no project scenario, then the analysis should reflect this limitation in the methodology and acknowledge that the analysis may overestimate the project's effect on VMT.

Under cumulative conditions, projects may have a significant impact as follows.

- A significant impact would occur if the project increased the jurisdiction's total daily VMT per service population above the baseline level (or locally adopted threshold).
- A significant impact would occur if the project is inconsistent with the applicable regional transportation plan/sustainable communities strategy (RTP/SCS). Inconsistencies could include increasing land supply beyond areas designated for growth in the RTP/SCS, proposing land use densities and intensities below those identified in the RTP/SCS for the project site, or other actions that would result in higher levels of VMT growth compared to the cumulative no project scenario.

The model output should include total VMT, which includes all vehicle trips and trip purposes, and total VMT per service population (population plus employment).

## **Analysis Methodology for Land Use Plans**

Land use plans are not subject to screening and require specific VMT analysis. Land use plans can be tested for significant impacts under cumulative conditions using the same cumulative threshold options (or lead agency thresholds) above. These thresholds require modeling the land use plan changes in the RIVTAM model to determine VMT impacts. To capture the project effect, the same cumulative year population and employment growth totals should be used model wide. The land use plan only influences land use allocation, so land use in other areas of the model should be adjusted such that the growth totals model-wide remain the same between the cumulative year no project and plus project scenarios.



## **Analysis Methodology for Transportation Projects**

Use of VMT as an environmental impact metric for transportation projects is discretionary under the Section 15064.3(b)(2) of the updated CEQA Guidelines.

**(2) Transportation Projects. Transportation projects that reduce, or have no impact on, vehicle miles traveled should be presumed to cause a less than significant transportation impact. For roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements. To the extent that such impacts have already been adequately addressed at a programmatic level, such as in a regional transportation plan EIR, a lead agency may tier from that analysis as provided in Section 15152 .**

Source: [http://resources.ca.gov/ceqa/docs/2018\\_CEQA\\_FINAL\\_TEXT\\_122818.pdf](http://resources.ca.gov/ceqa/docs/2018_CEQA_FINAL_TEXT_122818.pdf)

If a lead agency wants to use VMT, it is important that the analysis methodology and the forecasting account for any induced vehicle travel effects. The RIVTAM model can be used to perform this analysis but it should be tested for induced vehicle travel sensitivity. The analysis should also account for potential increases in trip generation and changes in long-term land use patterns that may occur due to induced vehicle travel. These effects are not directly included in the RIVTAM model, but its inputs and parameters can be modified to include additional sensitivity, or off-model analysis methods such as the use of research-based elasticities can be used to measure regional VMT changes associated with changes in lane-miles associated with proposed projects. The following resources should be consulted for induced vehicle travel recommended analysis practices.

- OPR Technical Advisory ([http://opr.ca.gov/docs/20190122-743\\_Technical\\_Advisory.pdf](http://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf))
- Closing the Induced Vehicle Travel Gap Between Research and Practice, Transportation Research Record: Journal of the Transportation Research Board, Volume 2653, 2017 (<https://trrjournalonline.trb.org/doi/pdf/10.3141/2653-02>)

Using VMT as a transportation project impact metric would allow for a variety of transit, bicycle, and pedestrian projects to be presumed to have a less than significant impact. Smaller roadway network modifications such as intersection restriping could also be presumed to have a less than significant impact. Roadway capacity expansion projects are the types of projects that can increase vehicle travel and VMT by changing people's travel behavior including making new vehicle trips and making longer vehicle trips. If a lead agency treated transportation projects similar to land use projects in the above case studies, then a potential threshold option would be to consider any increase in baseline (or cumulative no project) total VMT per service population within the jurisdiction or region as a significant impact.