

# Memorandum

Date: November 2, 2020  
To: Derek McGill, Transportation Authority of Marin  
From: Kevin Johnson, Fehr & Peers  
**Subject: 2015 & 2040 TAMDM Marin County VMT Estimates**

WC16-3330

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California Senate Bill 743 (SB 743) started the shift from LOS-based thresholds to vehicle miles travelled (VMT)-based thresholds for traffic impact studies. OPR's guidance describes thresholds based on a project's daily residential VMT per capita and daily office VMT per employee with a goal of capturing all daily light- and medium-duty (no commercial or heavy-duty) vehicle miles travelled generated by the project land use.

OPR's guidance states that using a travel forecasting model is preferred over other methods such as using sketch models/spreadsheets and average trip length data because developing VMT with a travel model will better account for both 'project generated VMT' and the 'project effect on VMT' including the effect on operating speeds that will influence VMT by speed bin estimates used in a project's air quality and GHG analysis. Further, if VMT thresholds are tied to citywide or region wide averages, then a travel forecasting model creates a strong consistency between the threshold setting and project analysis.

The Technical Advisory indicates that the use of tour- and trip-based approaches offers the best methods for assessing residential and office VMT but also recognizes that lead agencies have the discretion to choose their methodology as outlined in the CEQA Guidelines Section 15064.3. The Technical Advisory also indicates that a tour-based assessment, such as produced by the Transportation Authority of Marin Demand Model (TAMDM), is ideal for residential and office VMT because it captures travel behavior more comprehensively.



The Technical Advisory also states that when using a travel forecasting model, the analysts should verify that it is accurate within the project study area and contains sufficient sensitivity to project-scale changes. Regional models, such as the MTC Model, off the shelf do not usually contain this level of accuracy and sensitivity for local area applications and should be calibrated and validated within the study area. This process is usually referred to as a sub-area validation. A sub-area validation was conducted for Marin County as part of the TAMDM model development process.

## **VMT Quantification**

The new CEQA Guidelines Section 15064.3(b)(4) establishes that the lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure. A lead agency may use models to estimate a project's vehicle miles traveled, and may revise those estimates to reflect professional judgment based on substantial evidence. Any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project. The standard of adequacy in Section 15151 shall apply to the analysis described in this section.

The guidelines cover residential, office, and retail land uses. Lead agencies, using more location-specific information, may develop their own methodology and thresholds for other land use types. For all VMT estimates, the method should capture the full trip length to the extent feasible and reasonable.

- For residential land uses, the guidelines recommend using automobile VMT per capita for home-based trips. In this form, the VMT per capita represents the VMT generated by household residents for only trips with one trip end at the household.
- For office land uses, the guidelines recommend using automobile VMT per worker for work-related trips only. In this form, the VMT per capita represents the VMT generated by workers for only trips with one trip end at the work location.
- For retail land uses, the guidelines recommend using total automobile VMT.

The following VMT estimates were produced using the 2015 and 2040 TAMDM models for all 1,400 analysis zones within Marin County as well as for the entire Bay Area. Fehr & Peers has developed three different TAMDM VMT quantification methodologies and post-processors to produce three different measures of VMT to provide lead agencies with a range of VMT quantification options to choose from.



## Residential Land Uses

**Table 1** provides a summary of total VMT, residents, and VMT per resident for all the Bay Area, Marin County, and all Marin County jurisdictions under 2015 and 2040 conditions. The residential VMT per capita includes all home-based trip purposes (work, discretionary, eating out, escort, maintenance, school, shopping, university, and visiting) included in the TAMDM model but does not include work-based trips such as going out for lunch or running an errand where work location is the origin of the trip.

**Table 1: Marin County Residential VMT Per Capita**

Jurisdiction	2015 VMT	2015 Residents	2015 VMT Per Resident	2040 VMT	2040 Residents	2040 VMT Per Resident
Bay Area	100,392,495	7,532,524	13.3	118,859,960	9,352,613	12.7
Marin County	4,091,984	259,376	15.8	4,105,648	273,626	15.0
Belvedere	50,457	2,023	24.9	34,834	2,023	17.2
Corte Madera	150,134	9,555	15.7	126,300	10,143	12.5
Fairfax	119,502	7,361	16.2	150,760	8,327	18.1
Larkspur	193,775	12,400	15.6	185,010	13,604	13.6
Marin Unincorporated	1,262,744	68,411	18.5	1,309,315	71,522	18.3
Mill Valley	225,215	14,266	15.8	184,049	14,266	12.9
Novato	938,839	55,344	17.0	904,489	57,953	15.6
Ross	33,664	2,385	14.1	28,525	2,385	12.0
San Anselmo	168,940	12,366	13.7	206,294	13,468	15.3
San Rafael	696,732	58,820	11.8	721,791	63,284	11.4
Sausalito	105,783	7,265	14.6	105,953	7,471	14.2
Tiburon	146,199	9,180	15.9	148,328	9,180	16.2

Source: 2015 and 2040 TAMDM.

## Office Land Uses

**Table 2** provides a summary of total VMT, workers, and VMT per worker for all the Bay Area, Marin County, and all Marin County jurisdictions under 2015 and 2040 conditions. The office VMT per capita includes all work-related trip purposes including home-based work and work-based but does not include other home-based trip purposes.



**Table 2: Marin County Office VMT Per Capita**

Jurisdiction	2015 VMT	2015 Workers	2015 VMT Per Worker	2040 VMT	2040 Workers	2040 VMT Per Worker
Bay Area	60,395,277	3,685,114	16.4	69,650,054	4,691,492	14.8
Marin County	2,631,995	127,205	20.7	2,666,048	135,773	19.6
Belvedere	15,672	493	31.8	17,825	489	36.5
Corte Madera	143,497	8,111	17.7	138,761	8,745	15.9
Fairfax	26,397	1,575	16.8	47,541	1,764	27.0
Larkspur	134,462	7,009	19.2	147,389	7,233	20.4
Marin Unincorporated	519,535	20,627	25.2	479,546	20,476	23.4
Mill Valley	162,115	7,179	22.6	150,187	7,237	20.8
Novato	501,075	24,783	20.2	499,615	26,965	18.5
Ross	14,087	613	23.0	5,753	449	12.8
San Anselmo	69,994	3,474	20.1	68,844	3,518	19.6
San Rafael	806,236	43,488	18.5	841,869	48,105	17.5
Sausalito	164,087	6,778	24.2	174,448	7,498	23.3
Tiburon	74,838	3,075	24.3	94,269	3,294	28.6

Source: 2015 and 2040 TAMDM

### Total VMT

CEQA impact analysis should strive to provide a complete picture of the VMT effects on the environment. Current practice relies on estimates of total weekday VMT. Both 'project generated VMT' and the 'project effect on VMT' are recommended to fully account for VMT effects that may include changes to VMT generation from neighboring land uses. Total weekday VMT includes all vehicle trips, vehicle types, project land uses, and trip purposes. This contrasts with the OPR Technical Advisory recommendation to use partial VMT for individual land uses such as residential and office.

While separating land uses within a project deviates from the conventional CEQA practice of identifying 'project' impacts, it may prove useful for streamlining environmental review related to VMT especially when relying on map-based screening. Understanding where built environment conditions create low residential and worker VMT is substantial evidence that could help support conclusions that adding similar land uses to those areas would create similar outcomes. For projects that may be subject to further scrutiny from neighbors or opposition groups, only reporting



a portion of VMT from select trip purposes or tours and limiting the VMT to light-duty vehicles could be considered an incomplete analysis of VMT.

Project applicants may also have concerns with the separation of land uses because it may produce VMT forecasts that dilute the benefits of their projects. For example, mixed-use projects help reduce VMT by shortening vehicle trip lengths or reducing vehicle trips because of the convenience of walking, bicycling, or using transit between project destinations. To quantify these effects with models used in current practice requires analyzing the project as whole.

For these reasons, lead agencies should consider including total VMT in their analysis and express it as total VMT per service population (i.e., population plus employment, population plus employment plus students, population plus employment plus visitors) if using an efficiency metric form. If reporting individual components of total VMT is meaningful for impact analysis, then separate processing can usually be done to isolate light-duty vehicle VMT from heavy-duty vehicle VMT as well as to provide VMT by trip tours or purposes. Producing land use specific VMT is the most difficult when using local and regional travel forecasting models because trip generation estimates are largely based on population and employment instead of land uses or the trip assignment step in the model does not retain the original land use generator of the trips in the final origin-destination trip tables.

**Table 3** provides a summary of Total VMT, service population (population plus employment), and Total VMT per service population for all the Bay Area, Marin County, and all Marin County jurisdictions under 2015 and 2040 conditions. The VMT quantification includes VMT from all vehicle types and trip purposes included in TAMDM.



**Table 3: Marin County Total VMT Per Service Population**

Jurisdiction	2015 Total VMT	2015 Service Population (Pop + Emp)	2015 Total VMT Per Service Population	2040 Total VMT	2040 Service Population (Pop + Emp)	2040 Total VMT Per Service Population
Bay Area	304,378,545	11,217,638	27.1	335,265,546	14,044,105	23.9
Marin County	12,805,470	386,581	33.1	13,335,510	409,399	32.6
Belvedere	71,475	2,516	28.4	65,533	2,512	26.1
Corte Madera	719,988	18,615	38.7	785,926	19,861	39.6
Fairfax	282,349	10,086	28.0	322,727	11,193	28.8
Larkspur	499,612	16,696	29.9	568,838	17,951	31.7
Marin Unincorporated	2,967,244	80,655	36.8	3,050,251	83,008	36.7
Mill Valley	966,204	23,633	40.9	914,002	23,688	38.6
Novato	2,599,136	81,575	31.9	2,636,826	86,718	30.4
Ross	86,913	2,998	29.0	74,252	2,834	26.2
San Anselmo	490,798	17,057	28.8	527,964	18,308	28.8
San Rafael	3,211,923	103,042	31.2	3,417,522	112,286	30.4
Sausalito	467,397	14,758	31.7	488,488	15,809	30.9
Tiburon	442,431	14,950	29.6	483,181	15,231	31.7

Source: 2015 and 2040 TAMDM