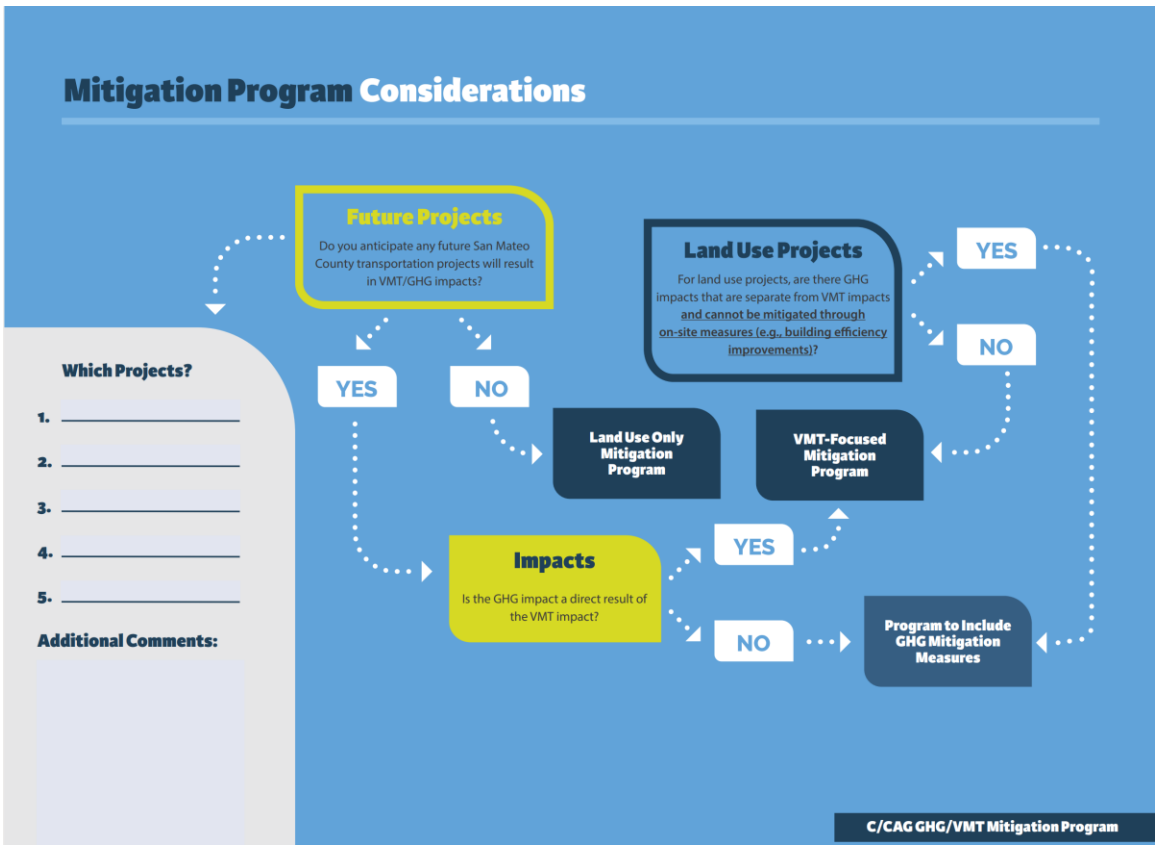
Appendix D.
GHG Mitigation Memo

The following flow chart presents the use for this Program in addressing GHG and VMT impacts for transportation or land use projects. The attached memorandum *C/CAG VMT/GHG Mitigation Program – GHG Mitigation Memo* by ICF (September 2024) presents guidance relating to the mitigation of GHG using this Program.



Memorandum

To:	Kim Springer, C/CAG
CC:	Matt Goyne, Fehr & Peers
From:	Rich Walter, ICF
Date:	September 27, 2024
Re:	**C/CAG VMT/GHG Mitigation Program – GHG Mitigation Memo**

The City/County Association of Governments of San Mateo County ("C/CAG") is developing a Vehicle Miles Traveled ("VMT")/Greenhouse Gas ("GHG") Model Mitigation Program (the "Program") to identify options for mitigating the VMT and GHG emission impacts of land use and VMT-inducing transportation projects in San Mateo County. The Program will allow project sponsors to fund off-site VMT/GHG-reducing transportation improvements and programs to mitigate VMT/GHG impacts identified through California Environmental Quality Act (CEQA) studies. The Program will include a mitigation exchange program at the countywide level for use by countywide agencies and a mitigation exchange model program that local agencies could adopt. This memo describes the following topics relative to GHG Mitigation for the VMT/GHG Mitigation Program:

- Statutory and Administrative Considerations for GHG Mitigation
- Geography and Scale Considerations for GHG Mitigation
- GHG Considerations for Recommended Mitigation
- GHG Mitigation Quantification Considerations
- EV Charging Program Implementation Considerations

This memo does not constitute legal advice as ICF is not a law firm; one should consult with CEQA counsel when making any decision about CEQA determinations and compliance with other environmental laws and regulations.

Statutory and Administrative Considerations for GHG Mitigation

Statutory Considerations for GHG Mitigation

This section discusses regulatory drivers for GHG mitigation, including drivers for VMT mitigation. While VMT mitigation will nearly always reduce GHG emissions, as discussed below, VMT impact analysis is considered separate from GHG impact analysis under CEQA and thus the need for VMT mitigation and the need for GHG mitigation are not always the same.

U.S. Constitution

Per the U.S. Supreme Court rulings in the *Nollan vs. California Coastal Commission* and *Dolan v. City of Tigard* cases, there are limits as to the government's ability to impose mitigation on private parties. Under those decisions, there must be a "nexus" and "rough proportionality" between the government's demand and the effects of a proposed private action. Mitigation imposed as a condition of project approval must be related to the impacts of the project and the amount of mitigation must be roughly proportional to the scale of the impacts. For VMT mitigation, this means that the mitigation must address VMT (nexus) and must be proportional to the amount of the VMT impact (proportionality). For GHG mitigation, this means that the mitigation must address GHG emissions (nexus) and must be proportional to the amount of the GHG impact (proportionality). GHG mitigation measures that do not reduce VMT, such as providing for electric vehicle charging, cannot be imposed for VMT impacts. VMT reduction measures, in nearly all cases, are likely to reduce GHG emissions and thus can usually be used for GHG mitigation.

Mitigation Fee Act

The Mitigation Fee Act authorizes a local government agency to impose fees on specific development projects to offset the cost of new or additional public facilities that are needed to serve those developments. Common types of fee programs provide funding for parks, water and sewer infrastructure, public safety facilities, transportation facilities, and schools, among other uses. The Mitigation Fee Act establishes a variety of requirements to ensure agencies use the fees in a timely way to pay for public facilities that serve the demands from new residents and employees. The Mitigation Fee Act prohibits agencies from levying, collecting, or imposing development mitigation fees for general revenue purposes.

The "nexus" findings required by the Mitigation Fee Act state that in order to assess a fee, the agency must do all of the following:

(A) Identify the purpose of the fee.

(B) Identify what the fee will be used for.

(C) Determine how there is a reasonable relationship between the fee's use and the type of development project on which the fee is imposed.

(D) Determine how there is a reasonable relationship between the need for the public facility and the type of development project on which the fee is imposed.

E) Determine how there is a reasonable relationship between the amount of the fee and the cost of the public facility attributable to the development on which the fee is imposed.

CEQA

CEQA requires that CEQA lead agencies identify and adopt mitigation to address any identified significant impacts of a discretionary project unless there are specified overriding considerations. This mitigation is identified in either an Initial Study/Mitigated Negative Declaration (IS/MND) or an Environmental Impact Report (EIR) and must be included in an adopted Mitigation Monitoring and Reporting Program (MMRP).

CEQA leaves it to the discretion of the lead agency to determine when an impact, such as VMT or GHG emissions, is significant or not. In San Mateo County, many new projects have the potential to generate significant amounts of VMT or GHG emissions and thus the potential to generate a need for VMT and/or GHG mitigation. VMT/GHG mitigation provided by a regional program thus needs to meet CEQA requirements for mitigation if it is to be utilized by lead agencies to mitigate a project's significant impacts under CEQA.

Under CEQA (CCR Title 14 Section 15370), mitigation is defined as:

- Avoiding the impact altogether,
- Minimizing the impact by limiting its degree or magnitude,
- Rectifying the impact by repairing, rehabilitating, or restoring the impacted environmental resource,
- Reducing or eliminating the impact over time, through actions that preserve or maintain the resource, and
- Compensating for the impact by replacing or providing substitute resources or environmental conditions, including through permanent protection of such resources in the form of conservation easements.

The following are recommended rules for CEQA mitigation measures (List from *AEP CEQA Portal Topic Paper: Mitigation Measures)*:

- Ensure that mitigation measures are fully enforceable through legally binding instruments (CEQA Guidelines § 15126.4(a)(2))
- Ensure that mitigation measures are consistent with all applicable constitutional requirements such as having a nexus to a legitimate governmental interest and being roughly proportional to the impact. (CEQA Guidelines § 15126.4(a)(4))
- Mitigation measures can only be imposed to address a significant environmental impact identified in the analysis.
- Mitigation measures can only address impacts associated with the proposed project and not preexisting environmental conditions.
- Mitigation measures must be within the powers of the lead and responsible agencies to impose and enforce to ensure that they are carried out during project implementation. CEQA does not give an agency new power. (CEQA Guidelines § 15040(b))

SB 743

SB 743 (2013) required the California Office of Planning and Research (OPR) to identify alternative metrics for evaluating transportation impacts to the prior use of measures of congestion such as level of service. OPR's Technical Advisory ultimately identified VMT as the recommended transportation metric in the adopted CEQA Guidelines pursuant to SB 743[1], which came into effect in mid-2020. While VMT is the adopted metric for most projects, including land use projects, CEQA Guidelines Section 15064.3 (b)(2), for roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impacts. Lead agencies must establish their own thresholds of significance for what constitutes an impact on the environment. All jurisdictions in San Mateo County rely on OPR's recommendations (or have adopted their own) for a threshold of 15 percent below baseline levels of VMT for land use projects.

Importantly, SB 743 established multiple purposes for VMT reductions including "reducing greenhouse gas emissions and traffic-related air pollution, promoting the development of a multimodal transportation system, and providing clean, efficient access to destinations" indicating that VMT mitigation under CEQA is not only related to GHG emissions. This means that VMT impact analysis is fundamentally separate and distinct from GHG impact analysis, although many VMT mitigation measures will also reduce GHG emissions and can be used as GHG mitigation measures.

Local Climate Action Plans

Per the California Climate Action Portal Map[2], all jurisdictions in San Mateo County have local climate action plans (CAPs), in great part due to the countywide program, Regionally Integrated Climate Action Planning Suite (RICAPS), supported by C/CAG. Nearly all CAPs include measures to reduce VMT-related GHG emissions which could be supported by regional VMT/GHG mitigation programs. Furthermore, some of the jurisdictions likely use their CAP for CEQA tiering, which requires new projects going through CEQA to be consistent with the local CAP measures, which usually include VMT reduction measures. A regional VMT/GHG mitigation program can further the implementation of local CAPs.

Local jurisdictional CAPs usually address broad sectors of GHG emissions, including building energy, onroad emissions, offroad emissions, waste-related emissions, and emissions associated with water and wastewater, among others. Local jurisdictions have direct authority to impose VMT and GHG mitigation associated with new development VMT and GHG emissions through local permitting and CEQA review. Those mitigation strategies associated most directly with local land use permitting, including building energy efficiency and renewable energy, water conservation, waste management, and offroad emissions are likely best addressed at a local level. Onroad GHG emissions are a unique opportunity for a regional program, by providing greater options for reducing VMT and VMT-related GHG emissions across the County, as local VMT and VMT-related GHG emissions reductions are often difficult to mitigate on a project-specific or local scale.

California Air Resources Board Scoping Plan (2022)

The California Air Resource Board (CARB) 2022 Scoping Plan notes that VMT per capita will need to be reduced by 25% below 2019 levels by 2030 and 30% below 2019 levels by 2045 to achieve the State of

[1] OPR Technical Advisory on Evaluating Transportation Impacts in CEQA

[2] https://webmaps.arb.ca.gov/capmap/

California's goal to be carbon neutral by 2045.[3] The Bay Area Air Quality Management District (BAAQMD) also cites the current CARB Scoping Plan in their recommendations for VMT reductions to fulfill regional air quality and GHG reduction goals.[4] These levels of VMT reduction are greater than those recommended by OPR in 2019 but are not specific to individual land use types nor jurisdictions. Although San Mateo County jurisdictions are not currently seeking to reduce VMT by 25% or 30% in existing VMT thresholds or CAPs, they will need to consider the information from CARB in future updates and determine what levels of VMT reduction are reasonably achievable, align with local values, and balance the objectives of SB 743, including GHG reduction, provision of adequate housing, and support for multi-modal transportation networks. Therefore, local agencies may have an even greater need to address VMT and associated GHG reductions in the future.

Administrative Considerations for GHG Mitigation

From a GHG mitigation perspective, the key administrative consideration for a regional program is that the VMT/GHG emissions reductions meet all the requirements of CEQA including that they reduce GHG emissions and that they are enforceable. VMT/GHG emissions reductions not done directly related to a project's VMT and GHG emissions can reduce a project's VMT/GHG emissions. There are GHG credits, sometimes commonly called carbon credits, that consist of GHG emissions reduction efforts by othera that generate mitigation credits that can then be purchased to reduce a project or organization's GHG emissions. There are two methods currently used in determining credits: 1) Ex-Post basis: GHG reduction credit is determined after the reduction project has been implemented. These are commonly called GHG "offsets"; and 2) Ex-Ante basis; GHG reduction credit determined before the reduction project has been implemented, based on the estimated reductions to occur. These are referred to as "Forward mitigation Units" or "future credits".

All GHG credit registries, including those used as part of the California Cap and Trade system, use similar criteria to determine if a GHG credit is "valid". The following criteria (similar to those in 17 California Code of Regulations §95802) are most commonly used for GHG credits:

1. **Real/Quantifiable**: GHG emissions reductions are estimated using conservative, comprehensive, and scientifically valid accounting. Unintended effects, known as "leakage," must be accounted for.
2. **Additional**: GHG emissions reductions must be additional to any that would have occurred in the absence of the credit market, and must not be a result of existing laws or regulations.
3. **Permanent**: GHG emissions reductions must persist for a defined length of time (often 40 to 100 years) and account for expected reversals.
4. **Verifiable**: For GHG offsets, GHG emissions reductions must result from activities that have been verified on an "ex-post" basis – they have already occurred. For forward mitigation units are verified on an "ex ante" basis. Verification requires third-party review of monitoring data for a project to ensure the data are complete and accurate.

[3] California Air Resources Board 2022 Scoping Plan.
[4] Table 3-2, item A.2 of Bay Area Air Quality Management District's 2022 CEQA Guidelines: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-3-thresholds_final_v2-pdf.pdf?la=en

5. **Enforceable**: GHG emissions reductions must be owned by a single entity and be backed by a legal instrument or contract that defines exclusive ownership.

For the regional VMT/GHG program, the above criteria could be utilized to determine if VMT/GHG emissions reduction measures meet the CEQA requirements that mitigation must be real, effective, and enforceable. The criteria for real/quantifiable, additional, permanent, and enforceable would be needed to meet CEQA requirements. Third-party verification is not mandatory for CEQA mitigation. The program should elaborate on the criteria with appropriate methods to determine that VMT reductions and GHG emissions reductions will occur or are occurring due to the program measures and to validate the amount of reductions. An Ex-Ante crediting basis, that is determining credit before a VMT measure is implemented is useful for a VMT mitigation program because it allows the program to collect funds from multiple sources to then fund larger measures that would not be fundable by a single project's mitigation.

Geography, Scale and Timing Considerations for GHG Mitigation

Geography

Climate change has a global impact. GHGs emitted in San Mateo County are dispersed into the atmosphere and are mixed globally, but that does not lessen their impact like it would with local pollution. Instead GHGs are resident in the atmosphere for many decades. GHG emissions here contribute to global warming globally and the global effects of climate change. Consequently, GHG mitigation can occur virtually in any location and still result in a reduction of the global warming effect from a project's emissions. Thus, the location of a GHG emissions reduction measure is irrelevant as far as climate science is concerned.

However, there has been a long debate about the location of GHG mitigation relative to the co-benefits that can occur with different GHG mitigation measures in relation to both economic benefits and equity. GHG emissions usually occur in combination with emissions of air pollutants that negatively affect local and regional air quality. Thus, some argue that GHG mitigation should occur locally so that the local community benefits from the co-benefits of reducing air pollution. A second concern is that the economic co-benefits of investment in the location represented by GHG mitigation should be kept within the affected community. These are important equity considerations but are not CEQA concerns. CEQA guidelines and case law specify that social and economic effects separate from physical impacts are not significant impacts under CEQA. As a result, equity considerations are not mandatory under CEQA. A further consideration is that under CEQA, air pollution is analyzed separately from GHG emissions, and if significant, mitigation is adopted to address those impacts. Consequently, GHG mitigation does not have to provide local/regional air quality benefits unless it is not only adopted to reduce GHG emissions but also to address air quality impacts.

There has been one CEQA appellate court ruling (*Golden Door Properties, LLC, v. County of San Diego*) that questioned the validity of GHG offsets that originate out-of-county, out-of-state and internationally, asserting that such offsets may lack rigor or enforceability. The ruling did not eliminate the use of GHG offsets as CEQA mitigation if they are not local; rather, the import of the ruling is that there must be substantial evidence as to why offsets will result in real GHG emissions reductions and be assured. Rigor

or enforceability are a concern for any GHG offset, whether local, regional, in-state, out of state or international. But, as long as the criteria noted above are met, the location itself is not a concern for GHG mitigation.

Thus, for the regional VMT/GHG mitigation program, CEQA does not dictate the location of GHG mitigation. C/CAG or local lead agencies may use their own discretion to consider the location of GHG mitigation for purposes of local economic benefit or equity.

Scale

The scale of a particular GHG mitigation program, such as at the county level, in mobility zones, in TOD areas or not, along the coast or bayside or at the local level only, does not matter in terms of the validity of GHG emissions reductions as long as they meet the basic criteria above. However, from a cost and availability perspective, experience shows that a larger geography can often result in a lower average cost and a higher availability of GHG mitigation opportunities compared to a smaller geography. There is nothing to preclude designing a program that only provides GHG mitigation within a smaller geography such as local GHG mitigation only for local GHG emissions, but it is not required from a CEQA GHG mitigation perspective.

Timing

As noted above, in the GHG credit context there are GHG credits that are issued after a GHG reduction action is done ("Ex-post") as well as before a GHG reduction action is done ("Ex-Ante"). It is optimal to have GHG mitigation that occurs before or no later than the time a project results in emissions. If there are advance funding options, then GHG mitigation could be implemented earlier and the advanced funding could be reimbursed over time as mitigation fees are collected. However, if there are no advance funding options, then a program would need to collect mitigation fees first before implementing GHG reduction measures, resulting in some lag between project GHG emissions and GHG mitigation. The climate change reduction effort is a long-term effort to reduce anthropogenic emissions to 40 percent below 1990 levels by 2030 and 85 percent below 1990 levels by 2045. As a result, GHG mitigation that starts after project GHG emissions will still help in the overall effort to meet these long-term targets, but will result in some project emissions to occur before the mitigation takes effect. As the overall goal is to meet the milestones noted above by 2030 and 2045, the lag in implementing mitigation should not be so long that it would not contribute to meeting these milestones. There is no hard and fast rule about how long the lag can be and still be considered effective mitigation, but it is recommended that the lag be minimized and less than 5 years at most, to ensure that project emissions are being mitigated within a reasonable timeframe.

GHG Considerations about Recommended Mitigation

GHG Considerations Regarding VMT Mitigation

Table 1 below provides GHG considerations regarding the 14 mitigation actions selected based on discussions with the TATF and C/CAG.

Table 1: GHG Considerations Regarding TATF Suggested VMT/GHG Mitigation Actions

Type of Mitigation Action	Description	VMT/GHG emissions reduction Efficacy[1]	GHG Considerations
Regional Program – Mitigation actions that would address the impacts of regional transportation projects			
	Caltrain Service Expansion	Low to High	Caltrain service expansion will likely be funded by local, regional, state, and federal sources. Need to ensure that credit derived is proportional to the share of overall funding. From a GHG perspective, GHG emissions reductions anywhere along the Caltrain corridor, not just those in San Mateo County can count.
	Enhance Local Transit Operations (Frequency, Capacity, and Reliability)	Low to High	Credit should be proportional to share of funding. Credit need not be limited to San Mateo County.
	Capital Transit Priority Projects on Major Corridors	Low to High	Credit should be proportional to share of funding. Credit need not be limited to San Mateo County.
Regional or Local Programs – Mitigation actions that could be funded through regional or local programs			
	Fund the development of affordable housing	High	Two theories on credit: (1) Take full credit for the project's reduction of GHGs (relative to average development) if program provides the "gap" funding without which the project would not be built. (2) Take partial credit based on the share of overall funding.
	Subsidize regional transit passes through Clipper Start / Bay Pass programs	High	GHG emissions reductions can be scaled based on expected participation levels with funding.
	Countywide E-Bike Rebate Program	*TBD*	GHG emissions reductions can be scaled based on expected participation levels with funding.
	Provide TDM and travel planning services for existing residents	*TBD*	GHG emissions reductions can be scaled based on expected participation levels with funding.

Type of Mitigation Action	Description	VMT/GHG emissions reduction Efficacy[1]	GHG Considerations
	Implementation of MTC's Mobility Hub program	*TBD*	GHG emissions reductions can be scaled based on expected participation levels with funding.
	First/Last Mile Micromobility Service	Low	GHG emissions reductions can be scaled based on expected participation levels with funding.
	Microtransit and Shuttle Services	Low	Same as micromobility service.
	EV charging facilities	TBD	GHG measure only as this does not reduce VMT. EV charging facilities can be given credit for GHG emissions reductions by accounting several different ways: 1) Based on trips connected to the charging location; 2) based on EV charging activity (kwH). Santa Clara County Driving to Net Zero Tool can be adapted to use for San Mateo County to calculate GHG emissions reductions. See further discussion below under GHG Mitigation Quantification Considerations.
Local Programs – Mitigation Actions that would address impacts associated with local land use projects, which will require adoption of a program by a local jurisdiction			
	Construction of new bicycle lanes and pathways	Low	Credit should be proportional to share of funding.
	Construction of sidewalks or other pedestrian safety projects	Low	Credit should be proportional to share of funding.

	Paid parking and curb management programs reduce circling for parking and allow for managing parking supply	High	Largest source of reductions is in reducing vehicle trips and associated GHG emissions. Circling is a minimal source of GHG emissions by comparison to facilitating a mode shift.

Notes:
1. Based on the CAPCOA 2021 Handbook or other resources.
2. For additional details on the scope of the measures that are being calculated, see Task 3 - Mitigation Action Locations.pptx.

Source: Fehr & Peers

GHG Considerations for Non-VMT GHG Mitigation

In concept, a VMT/GHG program could include GHG emissions reduction measures that do not reduce VMT. In that case, the GHG-only emissions reduction measures could only be used to address GHG impacts under CEQA. There are a myriad of GHG emissions reduction programs that could be implemented. Potential programs that could be implemented by a regional agency with participation from local agencies could include, but are not limited to the following:

- **Building Energy Efficiency Retrofits:** Building energy emissions are one of the two largest sectors of GHG emissions in San Mateo County. The San Mateo County Energy Watch, a local government partnership between C/CAG and PG&E helps to facilitate energy efficiency retrofits for existing buildings. The BAYREN program also provides a regional collaborative serving all Bay Area counties with outreach, training, technical assistance, funding and resources for energy efficiency retrofits. C/CAG collaborates with the County of San Mateo Sustainability Department, with PG&E, and other local and regional partners to offer incentives, programs, and resources. In concept, GHG emissions from energy efficiency retrofits of existing buildings could provide CEQA mitigation credits. However, new development is required to meet strict Title 24 mandates that include high efficiency standards, building electrification and renewable energy and thus there will not be a large demand for additional CEQA GHG mitigation for new projects concerning building energy emissions. In addition, energy-efficiency retrofit programs require extensive expertise that are unrelated to other transportation sector measures as a part of this Program and are staff-intensive given that retrofits are done on building by building basis and they require extensive program controls and monitoring.
- **Onroad GHG Emissions Reduction Measures:** Onroad GHG emissions are one of the two largest sectors of GHG emissions in San Mateo County. VMT reduction measures are under exploration for the regional program and are not the domain of any other entity in San Mateo County. As noted above, electric vehicle charging could be a non-VMT GHG emissions reduction measure that could be included. Supporting measures for EVs can include EV charging programs and subsidies for EV chargers and/or EV purchase. Existing EV subsidy programs available in San Mateo County are discussed below under "EV Charging Program Implementation Considerations". Regional programs can achieve scale and cost efficiencies that local EV charging programs cannot achieve. Regional programs can also leverage state and federal funding to benefit the entire County. Regional programs can also focus on the most efficient EV charging locations in the entire County that would result in greater GHG emissions reductions and better cost efficiency than local only programs. Therefore, electric vehicle charging is recommended for inclusion within this Program.
- **Offroad GHG Emissions Reduction Measures**: Offroad GHG emissions reductions usually focus on electrifying offroad vehicles and equipment. The markets for offroad vehicles and equipment are

regional and national in nature and emissions are regulated by the state and federal governments. Programs to electrify offroad vehicles and emissions are often led by Air Districts and state programs, such as the Carl Moyer program, and require substantial expertise in developing and implementing. Offroad GHG emissions are a relatively small source of GHG emissions in San Mateo County and there are other air district and state programs addressing this sector, so new programming for offroad GHG emission reductions is not recommended.

- **Waste-Related GHG Emissions Reduction Measures**: Waste diversion and recycling requirements are regulated at the state level. Waste diversion and recycling programs are implemented at the local and county-level including the programs supported by the County of San Mateo Sustainability Department through their requirements. Although C/CAG serves as the Local Task Force for implementation of AB 939, a new County-level program is not recommended given these established programs.
- **Water-Related GHG Emissions Reduction Measures**: Water-related GHG emissions in San Mateo County are limited as water is either derived locally or is provided by the mostly gravity-fed Hetch-Hetchy water system. Water conservation measures are best implemented by water districts which have been implementing programs for many years to conserve water. The County of San Mateo Sustainability Department coordinates a range of integrated water programs, including the C/CAG-funded San Mateo County Energy Watch, that focus on conservation, re-use, watershed management, groundwater sustainability and water quality monitoring. In addition, C/CAG implements a countywide Stormwater program. For these reasons, a new County program focused on water-related GHG emissions reductions is not recommended.
- **Tree Planting**: Tree planting can reduce GHG emissions and also improve local air quality, such as along streets. However, the overall GHG gains from urban tree planting are limited compared to large-scale forest restoration. Some local cities have tree planting programs, such as the City of San Mateo Street Tree Planning Program. Tree planting requires extensive involvement of local cities who must approve tree planting. For trees planted in public areas, the cities have responsibility for maintenance of planted trees. Furthermore, there are limited advantages in terms of cost effectiveness for a regional program vs local programs for tree planting, given that cities already have local expertise and the cost for planting and maintaining trees are well established. A county-level tree planting program is not recommended given the existing local capacity and programs for tree planting.

Conclusion:

Based on the review above, given the primary focus of the regional program is on VMT reduction per TATF direction, and given that EV charging is a complementary measure to the rest of VMT-oriented measures, it is recommended that EV charging should be the only non-VMT GHG emissions reduction measure included in the program.

GHG Mitigation Quantification Considerations

The selected mitigation actions must be backed by substantial evidence to be used for CEQA GHG mitigation and to be included in the program. Such evidence includes research into the effectiveness of GHG emissions reductions. For example, the CAPCOA guide provides formulas to assess the VMT/GHG reduced by transportation project or program based on research findings. Other resources, such as

CARB's *California Climate Investments GHG Quantification Research* also include methods to quantify these reductions.

The CAPCOA guide provides generic approaches to calculating both VMT and GHG emission reductions from a wide range of VMT reduction measures that is based on research values. The accuracy of VMT reductions using CAPCOA methods can be improved through the use of County-level data wherever feasible as VMT reduction measures do not produce uniform VMT reductions at all locations in California. The use of a local transportation demand model and local or regional data on prior program effectiveness can improve the accuracy of VMT reductions. The use of local or regional data on the projected composition of passenger vehicle fleets can improve the accuracy of the GHG emissions reductions associated with VMT reductions.

Over time, the GHG emissions reduction value of VMT reduction strategies will decline as the passenger fleet electrifies and the electrical grid moves toward a renewable portfolio. As of 2023, there were approximately 900,000 registered electric vehicles in California and the qualified renewable share of electricity generation was 34% (including large hydroelectric generation, renewable share would be 43%). Approximately 25% of new passenger vehicle sales in California are electric vehicles. State regulations eliminate fossil fuel passenger car sales starting in 2035 and require a 100% renewable electric grid by 2045. As an increasing number of electric vehicles operate in San Mateo County and are charged using an increasing fraction of renewable electricity, the GHG value of reducing VMT will be reduced. As a result, while VMT reductions may be maintained over time, the estimation of GHG emissions reductions for long-term VMT reduction measures should take into account the projected trends of electric vehicle adoption and renewable electricity expansion.

In order to quantify GHG emissions for VMT reductions, one must identify the appropriate GHG emissions factor per mile to use. Please note that VMT reductions need to be identified by year, as the emissions factors are different depending on year. GHG emissions factors can be identified using the CT-EMFAC2021 model using the inputs noted below. Once the appropriate emissions factor(s)/mile for each year of VMT reduction have been identified, they can be multiplied by the VMT reduction for each year to quantify the GHG emissions reduction.

Below are the inputs needed for a simple and a more detailed approach:

- Method 1 – Simple Method to Convert VMT to GHG reductions
  - Location: Identify the location of VMT reductions in terms Air Basin/District/County: Some VMT reductions may be limited to San Mateo County, but others may have a larger influence area, such as in expanding Caltrain service.
  - Year: Identify the year (s) in which VMT reductions will occur
  - Fleet: Identify the vehicle fleet for VMT reductions: This could be passenger vehicles only or all vehicles (can use default for project location)

- Method 2 – Detailed Method to Convert VMT to GHG reductions
  - Location: Identify the location of VMT reductions in terms Air Basin/District/County:
  - Year: Identify the year (s) in which VMT reductions will occur
  - Speeds: Identify the speed bin (distribution of speeds) to be used for VMT reductions
  - Fleet: Identify the vehicle fleet for VMT reductions: This could be passenger vehicles only or all vehicles (can use default for project location)

The CAPCOA guide does not include methods for estimating GHG emissions reductions for EV charging installations. The first two methods below are described in a tool developed by Santa Clara County's Driving to Net Zero (DNZ) Program and can be used to estimate GHG emissions reductions from EV charging. The third method below is used by the RICAP program:

- **Method 1: Charging Activity Approach**. Under this method, VMT is estimated based on the expected charging activity per day. This approach assumes that the GHG emissions reductions for an EV charger installation are only related to the charging activity. The electricity (in kWh) delivered by the charger is converted to miles using the average efficiency of a battery electric engine (kwh/mile), which is then used to estimate both fossil-fuel vehicle GHG emissions and EV GHG emissions. This approach requires estimation of daily charger use and EV GHG efficiency/mile to establish associated mitigation benefit. This method was used in the DNZ EV Charging GHG Emissions Reduction Tool. The tool contains assumptions appropriate to Santa Clara county and at the time of the analysis, so should not be used in other locations without adapting to local conditions.
- **Method 2: Location-Based VMT Approach**. Under this method, VMT for EVs is based on the land use and location of the EV charger, the number of vehicle charges per day, and vehicle trips associated with that land use. For example, a residential EV charger would be assigned the benefit of shifting all residential fossil-fuel vehicle VMT to EV VMT. Alternatively, the assumption could be limited to home-based trip VMT. For non-residential development, VMT per charging parking space would need to be estimated or VMT could be assigned based on work-trips only. This approach requires estimation of VMT per residential vehicle or non-residential charging space. This approach has been used in a number of CAPs.
- **Method 3: EV Drivers Enabled Approach**. Under this method, VMT for EVs is based on the presumed number of EV drivers "enabled" by the addition of EV chargers. The basic assumptions are: 1) each additional workplace EV charging port will result in 0.88 additional EV drivers; 2) each additional multi-dwelling charging port will result in 1.0 additional EV drivers; and 3) each additional residential charging port will result in 0.1 additional EV drivers. The amount of VMT driven by fossil-fuel vehicle drivers is presumed to be the same for the enabled EV drivers (Source: RICAPS Menu of Measures V9.4).

EV Charging Program Implementation Considerations

This section addresses the only GHG-Only reduction measure (EV Charging) as implementation of VMT reduction measures is being addressed in separate deliverables.

Instead of creating a new program, C/CAG could instead partner with other existing EV charging programs to potentially channel GHG mitigation funds into EV charging in San Mateo County:

- **Peninsula Clean Energy's EV Ready Program**: The EV Ready Program is a $28 million electric vehicle (EV) charging infrastructure program seeking to install 3,500 charging ports in San Mateo County over four years. This program is for workplaces, multi-unit dwellings, public parking areas, and other public locations to improve access to EV charging and accelerate the adoption of electric vehicles. As a local program, this may be the first program to explore a potential partnership.

- **Bay Area Air Quality Management District *Charge!* Program**: The *Charge!* Program provides grant funding to offset a portion of the cost to purchase and install new publicly accessible (multi-family housing located projects are not subject to public accessibility requirements) chargers for EVs along transportation corridors, at multi-family housing facilities, destinations, transit parking locations, and workplaces across the Bay Area. The goal of the *Charge!* Program is to rapidly expand access to EV charging stations to help achieve the Bay Area's EV-adoption goals of 90 percent of the overall vehicle fleet by 2050. This program is funded through the Air District's Transportation Fund for Clean Air Regional Fund and other sources depending on funding availability, which provide grants to improve air quality within the nine-county Bay Area by reducing emissions of pollutants from on-road vehicles, and may include additional funding sources as available.
- **Communities in Charge:** Communities in Charge is an EV charging incentive project funded by the California Energy Commission's Clean Transportation Program, implemented by CALSTART, and supported in partnership with GRID Alternatives and Tetra Tech. Communities in Charge is designed to transform EV accessibility, rapidly catalyze new markets, and swiftly deploy Level 2 EV charging stations. Communities in Charge is built to scale as funding is made available.
- **CALeVIP**: The California Electric Vehicle Infrastructure Project (CALeVIP) provides funding for installing publicly available EV charging stations. CALeVIP is one of the many funding opportunities The California Energy Commission (CEC) offers to advance the state's transition to clean energy and transportation
- **PG&E Empower EV Program**: PG&E's Empower EV Program offers income-eligible households up to $2,500 in financial incentives. The program extends to qualifying customers in single-family households who have recently purchased or leased an EV within six months prior to applying to the program.

If C/CAG were to decide to design its own program, then it is recommended that the program leverage the implementation practices from existing EV charging programs such as those listed above. In particular, the practices and procedures of the Peninsula Clean Energy's EV Ready Program can provide San Mateo County specific implementation guidance but implementation of the other programs such as the BAAQMD Charge! Program, Communities in Charge, or CALeVIP could also provide useful models for designing a program. In addition, large-scale EV charging expansion will need to coordinate with PG&E relative to grid capacity issues locally and regionally.

Equity Considerations

Equity considerations are being separately addressed in the Equity and Environmental Memorandum (Task 2) so are not discussed in this memo.