Appendix D

Vehicles Miles Traveled Analysis

Draft Memorandum

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Subject: Vehicle Miles Traveled (VMT) Analysis

1. Introduction

The City of Grass Valley has retained GHD, Inc. sub-consultant to Ascent Environmental, with preparing a Transportation Impact Analysis Report for the proposed development of the City's Southern Sphere of Influence (SOI) Planning and Annexation Project, hereafter referred to as the "Project". The Project consists of 420 acres and the City has previously completed an extensive general plan and prezoning planning process, including certification of an Environmental Impact Report (EIR) in 2014. As previously analyzed, the project consisted of a General Plan amendment to change land use designations, prezoning of the project area, and partial annexation. In 2016, the City amended the project to include a combining or overlay zone on several industrial properties and prepared an addendum to the EIR. The City is now proposing amendments to the Project, which changes the boundary of the SOI, includes revised land uses designations through a General Plan amendment, revises the prezoning and includes an area of by-right development, and annexes the southern SOI into the City. The Project proposes a mix of uses including manufacturing/industrial, commercial, open space, and various residential uses.

This technical memorandum has been prepared to document the results of the transportation impact analysis related to vehicle miles traveled (VMT), pursuant to SB 743 and local policy, and serve as a technical supplement to the environmental document. Under SB 743, automobile delay, traditionally measured as level of service (LOS), is no longer considered as the metric for environmental transportation impacts under the California Environmental Quality Act (CEQA), but rather VMT. VMT measures the number and length of vehicle trips made on a daily basis. VMT is a useful indicator of overall land use and transportation efficiency, where the most efficient system is one that minimizes VMT by encouraging shorter vehicle trip lengths, more walking and biking, or increased carpooling and transit. Since the project has a previously approved EIR, the VMT analysis will compare against the previously approved project's VMT.

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2. VMT Guidelines and Thresholds

As part of this study, GHD has reviewed available literature, guidance, and documentation from the City of Grass Valley and Nevada County Transportation Commission (NCTC) to identify any draft or advisory VMT baseline estimates and/or threshold recommendations. NCTC has established *SB 743 Vehicle Miles Traveled Implementation* guidelines (July 6, 2020), which identifies recommended screening criteria, VMT methodologies, baselines and thresholds values, consistent with the Office of Planning and Research's *Technical Advisory on Evaluating Transportation Impacts in CEQA* (OPR Technical Advisory, December 2018) and CEQA Guidelines. The NCTC VMT guidelines recommends to use total weekday VMT per service population (residents plus employees and students) as the measure of VMT.

The NCTC VMT guidelines identify that the following may be considered less than significant:

- The project or plan total weekday VMT per service population is equal to or less than "X" percent below the subarea mean under baseline conditions; and
- The project or plan is consistent with the jurisdiction's general plan and the Nevada County Regional Transportation Plan.

A specific reduction "X" below subarea baseline VMT may be selected by each jurisdiction based on key factors such as the setting (as noted in CEQA Guidelines Section 15064(b)(1)), evidence related to VMT performance, and policies related to VMT reduction. The City of Grass Valley is the subarea for which the Project will be evaluated against. The City of Grass Valley has not established a specific reduction from the subarea mean. GHD recommends to utilize a 15% reduction, consistent with the recommendations within OPR's Technical Advisory. The NCTC VMT guidelines presents the total VMT per service population for Grass Valley at 28.0. A 15% reduction from this subarea mean would then be 23.8 VMT per service population. However, since the project has a previously approved EIR, the VMT analysis will determine significant impacts compared against the VMT per service population calculated based on the previously approved Project.

2.1 Screening Criteria

The NCTC VMT guidelines identify the following screening criteria for land user projects and plans within Nevada County. If a project meets any of the following criteria, it may be presumed to cause a less-than-significant VMT impact without further study.

- The project generates less than 630 VMT per day and is consistent with the jurisdiction's General Plan and the Regional Transportation Plan.
- The project is a local-serving retail or other local serving employment project less than 50,000 square feet (larger retail projects may also qualify due to distance from other population centers) and is consistent with the jurisdiction's general plan and the Nevada County Regional Transportation Plan.
- The project is a residential or work-related land use, located in a traffic analysis zone (TAZ) with similar land uses and travel demand characteristics, and the TAZ VMT per service population is equal to or less

than x % below the subarea mean. The project should also be consistent with the jurisdiction's general plan and the Nevada County Regional Transportation Plan.

- The project is a residential-related land use and the TAZ home-based VMT per resident is equal to or less than x % below the subarea mean. The project should also be consistent with the jurisdiction's General Plan and the Regional Transportation Plan.
- The project is a work-related land use and the TAZ home-based work VMT per employee is equal to or less than x % below the subarea mean. The project should also be consistent with the jurisdiction's general plan and the Regional Transportation Plan.

Since the Project is a General Plan amendment, and is such a large development, the Project is not screened out from a VMT analysis based on the above criteria.

3. Project Description

The term "Project" as used in this study refers to the proposed City of Grass Valley Southern Sphere of Influence (SOI) Planning and Annexation Project, which encompasses approximately 420 acres along SR 49 between McKnight Road and La Barr Meadows Road. The Project's proposed prezoning was provided by parcel and aggregated by land use into TAZ's identified for the Project area from the travel demand model. The previous EIR zoning information was also provided and aggregated. Table 3.1 presents the land use information that was utilized in the model. The City's zoning and density (dwelling units per acre) was utilized to estimate the residential dwelling units. RE, R-1 and R-2 zoning are single family residential, and R-3 is multi-family residential. All light industrial and manufacturing uses were aggregated into the light industrial use for the model's inputs and trip production and attraction characteristics.

Table 3.1 Project Zoning and Model Land Use Inputs (Proposed and Prior EIR)

Proposed Prezoning		Units	FAR	Proposed Model Inputs	Prior EIR Model Inputs
C-2	Commercial	KSF	0.35	173.80	303.83
M-1	Light Industrial	KSF	0.25	332.18	462.42
M-2	Manufacturing	KSF	0.25	2,593.37	576.09
M-2 *	Manufacturing	KSF	0.25		
OS	Open Space	AC	1	48.6	102.43
CBP	Commercial Business Park	KSF	0.35	-	124.15
RE	Residential Estates	DU	-	-	7
R-1	Residential - Low Density	DU	-	51	66
R-2	Residential - Medium Density	DU	-	327	460
R-3	Residential - High Density	DU	-	134	-

Notes: FAR = Floor-Area-Ratio. KSF = 1,000 square feet. DU = dwelling units. All manufacturing and industrial land uses were combined into industrial use for model inputs and similar trip-making characteristics.
* Southeast Industrial Combining Zone

The proposed Project is estimated to have 512 dwelling units, and the prior EIR had approximately 533 dwelling units. The proposed project has significantly more industrial uses than the prior EIR did, and the prior EIR had a higher number of commercial/retail land uses. The proposed Project is estimated to generate

25,133 daily trips (not including internal capture or pass-by trip reductions), and the prior EIR had estimated to generate 25,377 daily trips, which is slightly higher than the proposed Project.

3.1 Lower Floor Area Ratios

The proposed project estimated square footage using floor area ratios (FAR) of 0.35 for commercial & commercial business park and 0.25 for light industrial & manufacturing. The previous EIR used a FAR of 0.25 for commercial and 0.15 for light industrial and manufacturing. Table 3.2 presents the land use information that was utilized in the model with the lower FARs.

Table 3.2 Project Zoning and Model Land Use Inputs with Lower FAR

Proposed Prezoning		Units	Lower FAR	Proposed Model Inputs
C-2	Commercial	KSF	0.25	124.14
M-1	Light Industrial	KSF	0.15	199.31
M-2	Manufacturing	KSF	0.15	1,556.02
M-2 *	Manufacturing	KSF	0.15	
OS	Open Space	AC	1	48.6
CBP	Commercial Business Park	KSF	0.25	-
RE	Residential Estates	DU	-	-
R-1	Single Family Residential - Low Density	DU	-	51
R-2	Residential - Medium Density	DU	-	327
R-3	Residential - High Density	DU	-	134

Notes: FAR = Floor-Area-Ratio. KSF = 1,000 square feet. DU = dwelling units. All manufacturing and industrial land uses were combined into industrial use for model inputs and similar trip-making characteristics.
* Southeast Industrial Combining Zone

With use of lower FARs, the proposed project is estimated to have the same number of dwelling units and approximately 49,660 less square feet of commercial, 132,870 less square feet of light industrial, and 1,037,350 less square feet of manufacturing.

4. VMT Methodology

GHD has estimated project-level trip-based VMT per service population, as well as boundary-based VMT for reference, using the Year 2040 scenario of the NCTC western Nevada Regional Travel Demand Model (updated August 2020). The Project's trips which extend to the Truckee area are estimated to be insignificant, therefore analysis including the Truckee model was not included. The forecast year model scenario was copied and modified to create the two different scenarios: the "2040 with Project" scenario, and the "2040 with Prior EIR" scenario. The Project's land uses identified in Table 3.1 were input into respective TAZ's for evaluation of the Project's VMT. The prior EIR's land uses were input into respective TAZ's for

evaluation of the Project's Prior EIR VMT. Each land use was added into separate TAZ's within the Project area. The industrial land uses were spread over multiple TAZ's to best represent the projected trips from those areas.

The travel demand model was utilized to estimate trip-based VMT for each of the different land uses associated with the Project by a "select link" or "select zone" evaluation. Technically, a "select link" analysis refers to the traffic demand modeling procedure that would yield the origin/destination and/or the network-wide trip distribution of the trips that appear on any particular "link" which is "selected" for analysis. More specifically, the select link analysis procedure helps identify the relative traffic volumes from the TAZ's and/or gateway cordons that contribute to the total traffic volume appearing on the selected link or roadway segment. This "select link" analysis is performed for all the links associated with the Project TAZ centroid connectors (link which connects the TAZ to the roadway network) and aggregated by land use.

Service population for each land use is estimated based on the travel demand model's land use input conversion factors (population per DU and employment per KSF or acreage rates; no students are proposed). Table 4.1 presents the service population rates utilized.

Table 4.1 Land Use to Service Population Conversion Factors

Land Use	Model Category	Unit	Residents per DU	Employees per KSF
Single Family	SF	DU	2.7	
Multi-Family	MF	DU	1.9	
Office	OFF	KSF		3.0
Retail	RET	KSF		2.3
Industrial (M-1)	LI	KSF		1.6
Industrial (M-2)	LI	KSF		0.34

Additionally, a boundary-based VMT assessment was conducted for the region (model-wide) to estimate the net change in total VMT, comparing the proposed Project to the prior EIR development, under forecasted model conditions. The boundary-based methodology is quantified by the length of the vehicle trips that occur within the boundaries of the model. The boundary-based VMT comparison is for reference only and is not used in determining significant impacts of the proposed project. Project impacts are determined based on the VMT per service population for the Project compared to the prior EIR's VMT per service population.

5. VMT Analysis & Results

5.1 VMT per Service Population

Table 5.1 presents the estimated trip-based VMT, trips, service population, and VMT per service population metrics for each of the proposed Project's land uses, and the total for the Project.

Table 5.1 VMT per Service Population – Proposed Project

Land Use	DU or KSF	Estimated VMT	Estimated Trips (from Model)	Average Trip Length	Estimated Service Population	VMT per Service Population
Single Family	394	5,033	3,126	1.61	1,064	4.7
Multi-Family	134	913	694	1.32	255	3.6
Retail	173.80	33,611	9,133	3.68	400	84.1
Industrial	2,925.55	49,631	10,229	4.85	1,413	35.1
Total		**89,187**	**23,182**	**3.85**	**3,131**	**28.5**

Table 5.2 presents the VMT, trips, estimated service population, and VMT per service population metrics for each of the Project's Prior EIR land uses.

Table 5.2 VMT per Service Population – Prior EIR

Land Use	DU or KSF	Estimated VMT	Estimated Trips (from Model)	Average Trip Length	Estimated Service Population	VMT per Service Population
Single Family	549	6,551	4,189	1.56	1,482	4.4
Office	124.15	5,355	1,260	4.25	372	14.4
Retail	303.83	53,297	14,638	3.64	699	76.3
Industrial	1,038.51	21,344	4,777	4.47	936	22.8
Total		**86,546**	**24,864**	**3.48**	**3,489**	**24.8**

5.2 VMT per Service Population Comparison

Table 5.3 presents the summary of the total VMT metrics for the proposed Project compared to the prior EIR. As shown, the Project has a higher VMT and higher VMT per service population compared to the prior EIR. Although the number of trips for the proposed Project is estimated to be lower than the prior EIR, the difference in average trip lengths contributes to the higher VMT. The proposed Project has a higher quantity of industrial uses which have a longer trip length, compared to the other uses. The prior EIR had more retail use and more retail-related trips, which have a shorter trip length. The Project's VMT per service population is also higher than the 15% below Citywide value of 23.8 VMT per service population. Therefore, the Project has a significant transportation impact.

Table 5.3 VMT per Service Population Comparison Summary

Scenario	Estimated VMT	Estimated Trips (from Model)	Average Trip Length	Estimated Service Population	VMT per Service Population
Prior EIR	86,546	24,864	3.48	3,489	24.8
Proposed Project	89,187	23,182	3.85	3,131	**28.5**

5.3 Boundary-Based VMT Analysis

Using a boundary-based methodology, VMT was quantified by the length of all vehicle trips that occur within the model's roadway network. Table 5.4 presents the boundary-based VMT results for the 2040 model,

comparing the proposed Project's net change in total VMT to the prior EIR. As shown, the model's net VMT will increase with the Project under the forecasted scenario, compared to the prior EIR.

Table 5.4 Net Change in Total VMT (Boundary-Based)

Year	Scenario	Total Net VMT
2040	with Previous EIR Land Uses	1,938,234
	with Proposed Land Uses (Project)	2,031,240
	Project Net Change from Prior EIR	**93,006**

5.4 VMT Comparison of Proposed Project and Lower FAR

Table 5.5 presents the estimated trip-based VMT using the Lower FARs identified in Section 3.1

Table 5.5 Net Change in Total VMT (Proposed Project Compared to Lower FAR)

Year	Scenario	Total Net VMT
2040	Proposed Land Uses (Project)	2,031,240
	Proposed Land Uses (Project) with Lower FAR	2,029,745
	Project Net Change with Lower FAR	**(1,495)**

As presented in Table 5.5, the assumed lower floor area ratio would reduce the projected total VMT by approximately 1,495.

6. Conclusion

The VMT analysis for the proposed Southern Sphere of Influence (SOI) Planning and Annexation Project quantified VMT per service population and compared it against the VMT per service population of the previously approved EIR for the Project, and against the criteria of 15% below the Citywide average VMT per service population. The net change in total VMT for the Project, compared to the prior EIR and without Project scenarios were also calculated utilizing a boundary-based VMT estimation of the NCTC travel demand model.

Based on the VMT analysis, the Project's VMT per service population is higher than the prior EIR and higher than 15% below the Citywide average. Therefore, the Project has a significant transportation impact. Potential mitigation measures should be considered to reduce the impact and reduce VMT. The California Air Pollution Control Officers Association (CAPCOA)'s Report, "*Quantifying Greenhouse Gas Mitigation Measures, A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures*" (August, 2010) identifies various on-site and off-site strategies for transportation-related mitigation.

Below is a list of potential mitigation measures for this Project:

- Provide pedestrian network improvements (2% maximum reduction)

- Improve Design of Development including Bike Lane street design, provide bike parking in non-residential Project areas and in multi-unit residential areas, and dedicate land for bike trails (3.0-21.3% reduction)
- If feasible, work with Transit agencies to modify routes to add transit stops and transit shelters in the Project vicinity. (8.2% maximum reduction)
- Incentivize Ride-share or carpooling (trip reduction programs, maximum 25% reduction for commute VMT)
- Limit parking supply (maximum 12.5%)

The feasibility, implementation, and quantity of these VMT reduction strategies cannot be guaranteed at this time, therefore the Project impact is considered significant and unavoidable. As development occurs of Project components, consult City staff on appropriate mitigation measures. Attached, for reference, is all transportation reduction strategies identified in the CAPCOA Report.

Chart 6-2: Transportation Strategies Organization

Transportation Measures (Five Subcategories) Global Maximum Reduction (all VMT): urban = 75%; compact infill = 40%; suburban center or suburban with NEV = 20%; suburban = 15%

Global Cap for Road Pricing needs further study

Transportation Measures (Four Categories) Cross-Category Max Reduction (all VMT): urban = 70%; compact infill = 35%; suburban center or suburban with NEV = 15%; suburban = 10%

Max Reduction = 15% overall; work VMT = 25%; school VMT = 65%;

Max Reduction = 25% (all VMT)

Land Use / Location	Neighborhood / Site Enhancement	Parking Policy / Pricing	Transit System Improvements	Commute Trip Reduction (assumes mixed use)	Road Pricing Management	Vehicles
Max Reduction: urban = 65%; compact infill = 30%; suburban center = 10%; suburban = 5%	Max Reduction: without NEV = 5%; with NEV = 15%	Max Reduction = 20%	Max Reduction = 10%	Max Reduction = 25% (work VMT)	Max Reduction = 25%	
Density (30%)	Pedestrian Network (2%)	Parking Supply Limits (12.5%)	Network Expansion (8.2%)	CTR Program Required = 21% work VMT Voluntary = 6.2% work VMT	Cordon Pricing (22%)	Electrify Loading Docks
Design (21.3%)	Traffic Calming (1%)	Unbundled Parking Costs (13%)	Service Frequency / Speed (2.5%)	Transit Fare Subsidy (20% work VMT)	Traffic Flow Improvements (45% CO_2)	Utilize Alternative Fueled Vehicles
Location Efficiency (65%)	NEV Network (14.4) <NEV Parking>	On-Street Market Pricing (5.5%)	Bus Rapid Transit (3.2%)	Employee Parking Cash-out (7.7% work VMT)	Required Contributions by Project	Utilize Electric or Hybrid Vehicles
Diversity (30%)	Car Share Program (0.7%)	Residential Area Parking Permits	Access Improvements	Workplace Parking Pricing (19.7% work VMT)		
Destination Accessibility (20%)	Bicycle Network <Lanes> <Parking> <Land Dedication for Trails>		Station Bike Parking	Alternative Work Schedules & Telecommute (5.5% work VMT)		
Transit Accessibility (25%)	Urban Non-Motorized Zones		Local Shuttles	CTR Marketing (5.5% work VMT)		
BMR Housing (1.2%)			Park & Ride Lots*	Employer-Sponsored Vanpool/Shuttle (13.4% work VMT)		
Orientation Toward Non-Auto Corridor				Ride Share Program (15% work VMT)		
Proximity to Bike Path				Bike Share Program		
				End of Trip Facilities		
				Preferential Parking Permit		
				School Pool (15.8% school VMT)		
				School Bus (6.3% school VMT)		

Note: Strategies in bold text are primary strategies with reported VMT reductions; non-bolded strategies are support or grouped strategies.

Table 6-2: Transportation Category

Transportation						
Category	Measure Number	Strategy	BMP	Grouped With #	Range of Effectiveness	
					Percent Reduction in GHG Emissions	Basis
Land Use / Location	LUT-1	Increase Density			1.5-30.0%	VMT
	LUT-2	Increase Location Efficiency			10-65%	VMT
	LUT-3	Increase Diversity of Urban and Suburban Developments (Mixed Use)			9-30%	VMT
	LUT-4	Incr. Destination Accessibility			6.7-20%	VMT
	LUT-5	Increase Transit Accessibility			0.5-24.6%	VMT
	LUT-6	Integrate Affordable and Below Market Rate Housing			0.04-1.20%	VMT
	LUT-7	Orient Project Toward Non-Auto Corridor			NA	
	LUT-8	Locate Project near Bike Path/Bike Lane			NA	
	LUT-9	Improve Design of Development			3.0-21.3%	VMT
Neighborhood / Site Design	SDT-1	Provide Pedestrian Network Improvements			0-2%	VMT
	SDT-2	Traffic Calming Measures			0.25-1.00%	VMT
	SDT-3	Implement a Neighborhood Electric Vehicle (NEV) Network			0.5-12.7%	VMT
	SDT-4	Urban Non-Motorized Zones		SDT-1	NA	
	SDT-5	Incorporate Bike Lane Street Design (on-site)		LUT-9	NA	
	SDT-6	Provide Bike Parking in Non-Residential Projects		LUT-9	NA	
	SDT-7	Provide Bike Parking in Multi-Unit Residential Projects		LUT-9	NA	
	SDT-8	Provide EV Parking		SDT-3	NA	
	SDT-9	Dedicate Land for Bike Trails		LUT-9	NA	
Parking Policy / Pricing	PDT-1	Limit Parking Supply			5-12.5%	
	PDT-2	Unbundle Parking Costs from Property Cost			2.6-13%	
	PDT-3	Implement Market Price Public Parking (On-Street)			2.8-5.5%	
	PDT-4	Require Residential Area Parking Permits		PDT-1, 2 & 3	NA	

Transportation - continued

Category	Measure Number	Strategy	BMP	Grouped With #	Range of Effectiveness	
					Percent Reduction in GHG Emissions	Basis
Trip Reduction Programs	TRT-1	Implement Voluntary CTR Programs			1.0-6.2%	Commute VMT
	TRT-2	Implement Mandatory CTR Programs – Required Implementation/Monitoring			4.2-21.0%	Commute VMT
	TRT-3	Provide Ride-Sharing Programs			1-15%	Commute VMT
	TRT-4	Implement Subsidized or Discounted Transit Prog.			0.3-20.0%	Commute VMT
	TRT-5	Provide End of Trip Facilities		TRT-1, 2 & 3	NA	
	TRT-6	Telecommuting and Alternative Work Schedules			0.07-5.50%	Commute VMT
	TRT-7	Implement Commute Trip Reduction Marketing			0.8-4.0%	Commute VMT
	TRT-8	Implement Preferential Parking Permit Program		TRT-1, 2 & 3	NA	
	TRT-9	Implement Car-Sharing Program			0.4-0.7%	VMT
	TRT-10	Implement School Pool Program			7.2-15.8%	School VMT
	TRT-11	Provide Employer-Sponsored Vanpool/Shuttle			0.3-13.4%	Commute VMT
	TRT-12	Implement Bike-Sharing Program		SDT-5, LUT-9	NA	
	TRT-13	Implement School Bus Program			38-63%	School VMT
	TRT-14	Price Workplace Parking			0.1-19.7%	Commute VMT
	TRT-15	Implement Employee Parking “Cash-Out”			0.6-7.7%	Commute VMT

Transportation - continued						
Category	Measure Number	Strategy	BMP	Grouped With #	Range of Effectiveness	
					Percent Reduction in GHG Emissions	Basis
Transit System Improvements	TST-1	Provide a Bus Rapid Transit System			0.02-3.2%	VMT
	TST-2	Implement Transit Access Improvements		TST-3, TST-4	NA	
	TST-3	Expand Transit Network			0.1-8.2%	VMT
	TST-4	Increase Transit Service Frequency/Speed			0.02-2.5%	VMT
	TST-5	Provide Bike Parking Near Transit		TST-3, TST-4	NA	
	TST-6	Provide Local Shuttles		TST-3, TST-4	NA	
Road Pricing / Management	RPT-1	Implement Area or Cordon Pricing			7.9-22.0%	VMT
	RPT-2	Improve Traffic Flow			0-45%	VMT
	RPT-3	Require Project Contributions to Transportation Infrastructure Improvement Projects		RPT-2, TST-1 to 6	NA	
	RPT-4	Install Park-and-Ride Lots		RPT-1, TRT-11, TRT-3, TST-1 to 6	NA	
Vehicles	VT-1	Electrify Loading Docks and/or Require Idling-Reduction Systems			26-71%	Truck Idling Time
	VT-2	Utilize Alternative Fueled Vehicles			Varies	
	VT-3	Utilize Electric or Hybrid Vehicles			0.4-20.3%	Fuel Use