Economic Costs and Benefits of the Proposed Austin Quarry in Madera County

October 23, 2014

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October 23, 2014

Bruce Gray, President
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Dear Mr. Gray:

I am writing in regard to the potential economic costs and benefits of the proposed Austin Quarry in Madera County, which is the subject of an environmental impact report issued on October 21, 2014.

I earned my PhD in economics from Yale University and have been the Fletcher Jones Professor of Economics at Pomona College since 1981. I have written (or co-authored) seventy-four academic papers and ten books. I co-authored a 2011 report titled, *The Estimated Costs and Benefits of the Proposed Liberty Quarry*, and testified before the Riverside County Planning Commission and Board of Supervisors regarding the proposed Liberty Quarry near Temecula, California.

I have reviewed the EIR for Austin Quarry. My conclusions are as follows:

1. There is no compelling evidence of a shortage of aggregate in Madera County, so the assumption that the quarry will fill a need that cannot otherwise be filled is faulty.

2. The proposed quarry would have a large negative impact on the health and lifestyle of Madera County residents, as measured by an estimated reduction in their property values of between $443 million and $738 million.

3. The reduction in property values within a 5-mile radius would reduce annual County property tax revenue by $0.9 million to $1.6 million.

4. The proposed quarry would increase travel times on SR 41 and SR 145 indefinitely, at an annual cost to Madera County residents of between $1.7 million and $3.4 million.

5. The cumulative cost to Madera County residents over the projected 100-year life of the proposed quarry would be between $615 million and $1,081 million.

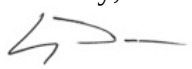
6. The proposed quarry would not increase the amount of aggregate produced, but instead would merely shift production, jobs, and County revenue from other quarries in the County.

7. The proposed quarry site could be generate far more tax revenue if it were developed as a residential community, with a net annual benefit to the County budget of over $4.5 million.

8. The quarry's net annual effect on the County budget would be a loss of between $5.4 million and $6.0 million, amounting to hundreds of millions of dollars over the quarry's 100-year life.

9. The proposed quarry site would generate many more jobs if it were developed as a residential project.

Sincerely,



Gary Smith

1. There is No Compelling Evidence of a Shortage of Aggregate in Madera County.

The population of Madera County is growing and aggregate will be needed to accommodate this increase. However, the Austin Quarry EIR does not contain any estimates of the demand for aggregate in Madera County in the coming decades, or any credible evidence that currently permitted quarries will not be able to meet future demand. Instead, the EIR simply assumes that the County needs a new quarry. This is a faulty and unsupported assumption.

The California Department of Conservation (DOC) periodically estimates the 50-year demand for aggregate in different regions of California (including the Fresno Production-Consumption region) by multiplying the predicted population each year by an assumed per capita usage of aggregate. The EIR discusses the DOC estimates,[1] but it does not use them to predict annual aggregate demand or supply in Madera County, or to justify a new quarry there. In fact, it would be improper for it to do so, because the DOC model is conceptually flawed and tends to overestimate future demand for aggregate.

The DOC states that "an increase in the population leads to the use of more aggregate."[2] Indeed, aggregate is used to build the homes, schools, roads, businesses, and other structures needed by a growing population. Except for maintenance and repair of structures, which require a relatively modest amount of aggregate, the demand for aggregate depends entirely on the amount of *new* construction. In contrast, an area with a population that is large but declining (as is common in some parts of the United States), there is no need to build new homes, businesses, and highways every year to support the declining population. Thus, the demand for aggregate will be higher in an area whose population increases from 19 million to 20 million than in an area whose population is constant at 20 million or declines from 21 million to 20 million.

Unfortunately, the DOC model itself ignores the fact that the population *increase* fuels the demand for aggregate, and instead bases its demand estimates on population *level*. Thus, in the example above, in order to arrive at a demand figure, the DOC simply multiplies 20 million by a per capita consumption number, thereby erroneously concluding that demand for aggregate is the same regardless of whether the population is increasing, remaining constant or declining.

When estimating the total demand for aggregate over a long time horizon (such as 50 years), as is necessary for operations like the proposed quarry, DOC magnifies its error. DOC multiplies the population *level* each year by a per capita number and then adds up these fifty numbers, instead of applying a per capita number to the annual *increase* in the population. Thus DOC's estimates may be much too large.

In connection with my review of another quarry project in Southern California, I have performed analysis that demonstrates that there is not a close correlation between the demand for aggregate and the population level, and that even when population level is *increasing* modestly

[1] Benchmark Resources, (October 2014), Austin Quarry Project: Revised Draft Environmental Impact Report ("Austin Quarry Revised Draft Environmental Impact Report"), Volume I, p. 2.0-4.
[2] Kohler, S. (2006), "Aggregate Availability in California," Department of Conservation, California Geological Survey, p. 5.

in a region there can nonetheless be a substantial *decrease* in the demand for aggregate. Because of the lack of suitable mine locations in and near Southern California and because of the high cost of transporting aggregate, Southern California is essentially a closed system in that very little aggregate is imported or exported outside the region. Thus, the demand in Southern California is satisfied almost entirely by production in Southern California.

I looked at data on the population[3] and production of aggregate[4] for six Southern California Counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and San Diego). Figure 1 shows total annual Southern California aggregate production (which in a closed system is roughly equivalent to usage or demand) between 1990 and 2010. Over this 20-year period, annual production (demand) averaged 79.5 million tons, with the highest value being 115 million tons in 2005 (during the height of the building boom) and the lowest value being 52 million tons (during the Great Recession).

Even though the population of these Southern California counties was a staggering 16 million in 1990 and 20 million in 2010, and even though the population actually increased by 29% over that time period (a relatively modest increase of about 1.5% per year), demand for aggregate in Southern California was 23% *lower* in 2010 than in 1990. This is because the demand for aggregate is not closely related to the population *level*; instead, it depends on the amount of new construction, which depends on population growth and other factors such as the economy, interest rates, and government funding.

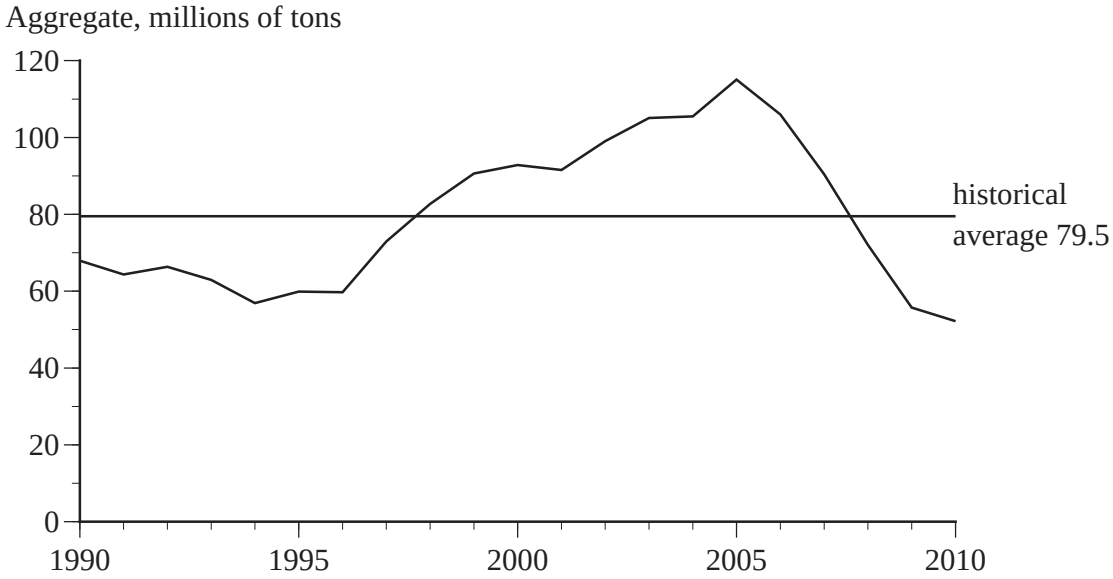


Figure 1
Southern California Annual Aggregate Consumption, 1990–2010

[3] State of California, Department of Finance, (February 2005), "Revised County Population Estimates and Components of Change by County, July 1, 1990-2000." Sacramento, California; State of California, Department of Finance, (December 2010), California County Population Estimates and Percent Change, July 1, 2000–2010. Sacramento, CA.
[4] State of California, Department of Conservation, private correspondence.

Another reason why 100-year projections of the demand for aggregate are problematic is that technological improvements may enable more efficient use of aggregate or the substitution of other materials for aggregate. In 2005, it was reported that these improvements reduce demand:

> A number of materials can be employed as replacements for different forms of aggregate.... Experience in other jurisdictions, particularly the United Kingdom where detailed analyses of the availability of substitute materials have been developed, suggests that substitution rates of over 20 percent may be possible.[5]

As one recent illustration of this phenomenon, in Claremont, California, where I teach, a 70,000-square-foot building was completed at Harvey Mudd College in 2013 using BubbleDeck technology, which replaces much of the concrete in slabs with hollow or foam-filled balls made from recycled plastic.[6] Speaking generally, humans have figured out how to use fossil fuels more efficiently and how to use plastic in place of wood, metal, and glass. No one knows what technological improvements or substitutions regarding the use of aggregate will take place over the next 100 years, but we can be certain that they will occur.

[5] Pembina Institute (January 25, 2005), "Rebalancing the Load: The need for an aggregates conservation strategy for Ontario," pp. 25–26.
[6] http://www.archdaily.com/229105/bubbledeck-technology-at-harvey-mudd-college-matt-construction/

2. Austin Quarry Would Have a Large Negative Impact on the Health and Lifestyle of Madera County Residents, as Measured by Reductions in Their Property Values.

Much of the land near the proposed site of the Austin Quarry is being developed or will be developed in the future for residential dwelling units. The health and quality of life of the residents of these dwellings would be negatively impacted by a quarry's blasting, processing, and transport activities. The Pembina Institute summarized some of the negative externalities of quarries generally:

> The extraction of aggregate resources changes the slope of the land and alters water drainage patterns. As well, aggregate deposits act as underground water reservoirs; once the aggregate is extracted, their water storage capacity is lost. Aggregate operations are also characterized by the release of significant amounts of particulate matter (i.e. dust) and noise pollution from extraction and processing activities as well as smog precursors and greenhouse gases from the operation of heavy equipment and machinery. The heavy truck traffic to and from aggregate sites is often a serious hazard and nuisance affecting people over wider areas, and is a significant source of air pollution itself.[7]

The Austin Quarry EIR specifically identifies these "significant and unavoidable" project impacts:[8]

Impact 3.3-1:	Project Operation Would Emit Criteria Air Pollutants, Including ROG, NO_x, CO, SO_x, PM_{10}, and $PM_{2.5}$ and Could Result in Adverse Health Effects;
Impact 3.3-2:	Project Criteria Air Pollutant Emissions Could Cause or Contribute to Exceedances of Ambient Air Quality Standards;
Impact 3.3-4:	Plant Construction and Operation would Result in Greenhouse Gas Emissions;
Impact 3.10-4:	Single-Event Noise from Project Truck Trips Could Cause Sleep Disturbance;
Impact 3.11-1:	Project Traffic Would Worsen Traffic Operations Levels of Service; and
Impact 3.11-3:	Project Truck Traffic Could Accelerate Damage to Off-Site Roadways.

The EIR also documents several other similar "significant and unavoidable" cumulative impacts from the project:[9]

[7] Pembina Institute, (January 25, 2005), "Rebalancing the Load: The need for an aggregates conservation strategy for Ontario, pp. 8–9.
[8] Austin Quarry Revised Draft EIR, Volume I, p. ES–18.
[9] Austin Quarry Revised Draft EIR, Volume I, p. ES–19.

Cumulative Impact 4-1:	Cumulatively considerable contribution to emissions of NO_x and PM_{10} and related health effects;
Cumulative Impact 4-2:	Increase in air pollutant emissions above those considered in County General Plan and regional air quality plans;
Cumulative Impact 4-3:	Cumulatively considerable contribution to emissions of GHGs;
Cumulative Impact 4-4:	Cumulatively considerable contribution to single-event noise from Project truck trips potential to cause sleep disturbance;
Cumulative Impact 4-5:	Cumulatively considerable contribution to traffic and unacceptable levels of service; and
Cumulative Impact 4-6:	Cumulatively considerable potential for accelerated damage to off-site roadways.

Many people move to Madera County because they value the natural beauty and serenity. The EIR confirms that the proposed Austin Quarry would make the area near the quarry less desirable to live in. One way to quantify the diminished quality of life for people living near a quarry is to estimate the negative effects on property values. Because their quality of life would suffer, people will not pay as much for a home if a quarry is nearby.

An oft-quoted scientific estimate that quantifies how home prices are affected by proximity to a quarry is Diane Hite's 2006 study of 2,812 home prices in Delaware County, Ohio.[10] By controlling for a variety of factors including square footage, lot size, number of rooms, number of bathrooms, and age of home, Hite was able to estimate how home prices are affected by proximity to a quarry. Figure 2 shows Hite's results.[11]

The Hite study was used to predict how property values would be affected by the proposed Stoneco Gravel Mine in Richland, Michigan (115-120 truckloads of gravel per day)[12] and the proposed Rockfort Quarry in Ontario, Canada (an average of 1.5 million tons per year over a 30-year period).[13] The Stoneco Application was withdrawn in 2007 and the Rockfort application was denied on November 15, 2010.

[10] Hite, D. (2006), "Summary Analysis: Impact of Operational Gravel Pit on House Values, Delaware County, Ohio," Auburn University.
[11] Ready, R. (2010), "Do Landfills Always Depress Nearby Property Values?" *Journal of Real Estate Research*, 32, 321-340.
[12] Erickcek, G. (2006), "An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mine Operation on Richland Township," W.E. Upjohn Institute for Employment Research.
[13] The Centre for Spatial Economics (2009), "The Potential Financial Impacts of the Proposed Rockfort Quarry."

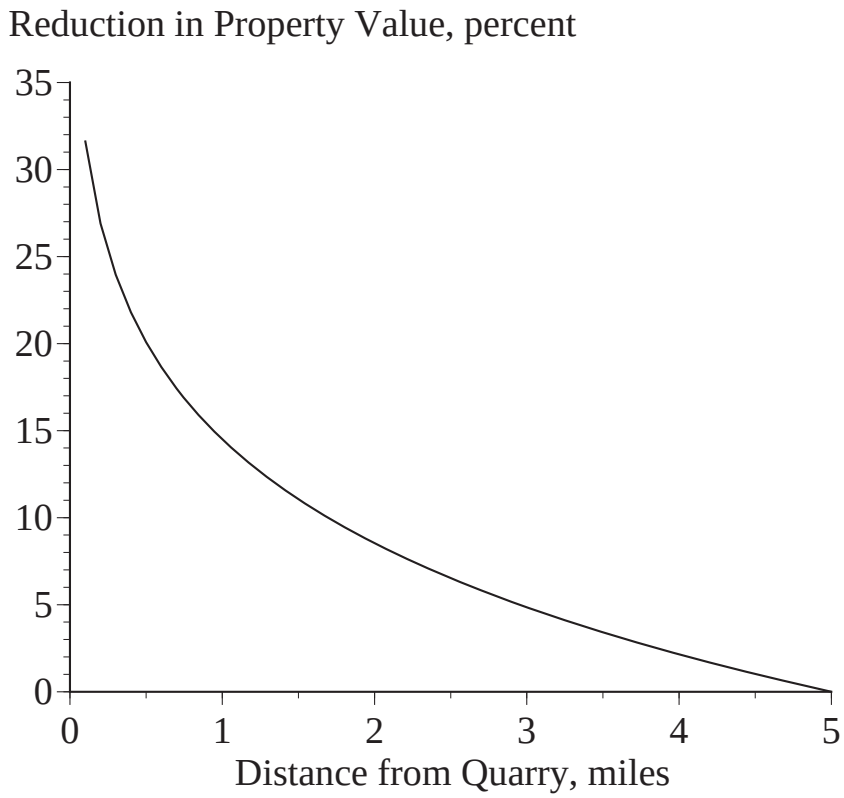


Figure 2
Quarries Reduce Property Values

In order to apply Hite's estimates to the Austin Quarry, we need to estimate the number of homes that might be built within the zone of impact; i.e., within a five-mile radius of the proposed site. There are 50,265.48 acres in a circle with a five-mile radius of the proposed quarry site.

In order to determine how many residential dwelling units might be constructed over time within the zone of impact, I reviewed several projects approved by the County, including Gateway Village, Gunner Ranch West and Tesoro Viejo. As Table 1 illustrates, these projects indicate that 3 dwelling units per acre is typical in this area.

	Dwelling Units	Acres	Dwelling Units/Acre
Gateway Village	6,578	2,225	2.96
Gunner Ranch West	2,840	1,000	2.84
Tesoro Viejo	5,190	1,656	3.13
Total	14,608	4,881	2.99

Table 1
Dwelling Units Per Acre for Other Madera County Projects

Of course, some of the 50,265 acres within the 5-mile zone of impact may not be developed in the future, either because of private decisions, government regulations, or other factors, along

with a desire by both residents and governmental agencies to preserve the highly valued rural environment of Madera County. Thus, to be conservative, instead of the typical three dwelling units per acre, I assumed that future development within the zone of impact would be at just one-third of this density, or one dwelling unit per acre. Thus, I assumed that a total of 50,265 units would be constructed within 5 miles of the proposed quarry site. For purposes of applying the factors used by Hite, I assumed that these units would be spread evenly over the 50,265 acres, even though there is a compelling argument that the areas closest to the quarry are more prime development sites.

Zillow, a popular property valuation website, provides information about the approximate value of a residential home in Madera County. It reports:

> The median home value in Madera County is $181,000. Madera County home values have gone up 11.3% over the past year and Zillow predicts they will rise 9.2% within the next year. . . . The median price of homes currently listed in Madera County is $259,000 while the median price of homes that sold is $193,575.[14]

Table 2 shows the effect of the proposed Austin Quarry on home values, conservatively estimating that homes that might be worth $150,000 to $250,000 if there were no quarry nearby.[15] The negative effects on the quality of life of current and future residents, as measured by the reduced property values for 50,265 dwelling units, would be in the hundreds of millions of dollars.

Home Price per unit	$150,000	$200,000	$250,000
Total Reduction in Home Values	$442,945,098	$590,593,464	$738,241,830

Table 2
Effects on Value of Existing and Future Homes in the Area

The above estimate of reduction in the value of existing and future homes does do not take into account the fact that if the quarry is approved, many locations proximate to the quarry and in places acutely affected by the quarry (such as along roadways subject to truck noise) will become so undesirable that homes will not be built at all in those locations. Thus, in these locations, instead of, say, a 20% reduction in property value resulting from the quarry, there would be a much greater reduction in property value because the home won't be built and there may be no feasible alternative use other than agriculture.

The proposed Austin Quarry would also reduce the quantity and quality of new businesses to service the population ("retail follows rooftops"). These effects may be larger than the effects on the values of residential property, but I have not included a dollar figure in my tabulation of the costs.

[14] http://www.zillow.com/madera-county-ca/home-values/

[15] The calculations in Table 3 take into account that no homes will be built within the proposed site and that a circle encompassing an area 5 miles from the site boundaries has a radius of somewhat more than 5 miles.

3. Austin Quarry Would Reduce County Revenue by Reducing Nearby Property Values.

Table 3 shows how diminished home values would reduce annual County property tax revenue. For simplicity, I assume that county expenses and revenues other than property taxes would not be affected by the reduced home values. The reduction in annual County tax revenue is shown in Table 3.

Home Price Per Unit	$150,000	$200,000	$250,000
Total Reduction in Home Values	$442,945,098	$590,593,464	$738,241,830
Prop 13 (17.84% of 1.0000%)[16]	$790,214	$1,053,619	$1,317,023
High School (0.0225%)	$99,663	$132,884	$166,104
Community College (0.0130%)	$57,583	$76,777	$95,971
Total Reduced Annual Property Taxes	$947,460	$1,263,280	$1,579,098

Table 3
Reduced Annual Property Taxes From Existing and Future Homes in the Area

[16] Approximately 17.84 percent of the Statewide 1% property tax will pass through to Madera County. Economic & Planning Systems, (July 11, 2008), County Services Area 22 Zone C - Gunner Ranch Services Delivery Plan, p. 42.

4. Austin Quarry Would Increase Travel Times, Causing Further Economic Losses to Madera County Residents.

The proposed Austin Quarry is at the intersection of State Route 41 (a primary road to Fresno) and State Route 145 (a primary road to the City of Madera). The Austin EIR notes that several intersections on SR 41 and SR 145 would operate below an acceptable level of service. It suggests, but not does not mandate, improvements (particularly to left-turn lanes) and proposes the payment of fair-share fees to CalTrans and the County, which may or may not be spent to improve left-turn lanes at congested intersections.

The adverse effects of increased traffic would not be limited to congested left-turn lanes. Travel times for local residents, especially those commuting south to Fresno, will be affected by heavy, slow-moving trucks, a faster deterioration in the quality of the roads, and an increase in road repair activity. In addition, any aggregate that falls off the trucks may slow traffic and damage cars.

The EIR specifically identifies these "significant and unavoidable" project impacts:[17]

Impact 3.11-1: Project Traffic Would Worsen Traffic Operations Levels of Service; and

Impact 3.11-3: Project Truck Traffic Could Accelerate Damage to Off-Site Roadways.

and these "significant and unavoidable" cumulative impacts:[18]

Cumulative Impact 4-5: Cumulatively considerable contribution to traffic and unacceptable levels of service; and

Cumulative Impact 4-6: Cumulatively considerable potential for accelerated damage to off-site roadways.

Traffic delay, in particular, has a value that can be measured. The EIR estimates 80 employee trips and 892 daily truckloads going to and from the quarry at full capacity.[19] Since every trip is two-way, a more relevant figure is 1,944 daily trips. It is not possible to allocate these trips precisely over the day. The EIR states that "operations at the site would be permitted to occur any time of day, 7 days a week."[20] A total of 1,944 trips a day is an average of 81 trips an hour, or 1.35 trips a minute. However, because quarries typically operate primarily during the day, these 1,944 trips would not be evenly spread over 24 hours but would instead largely coincide with daytime hours when local residents are driving to work, shopping, or recreation. The EIR essentially acknowledges this fact, estimating that during the peak morning hour, there would be 3.43 vehicles per minute entering or leaving the quarry site.[21]

[17] Austin Quarry Revised Draft EIR, Volume I, p. ES–18.
[18] Austin Quarry Revised Draft EIR, Volume I, p. ES–19.
[19] Austin Quarry Revised Draft EIR, Volume I, p. 2.0–32.
[20] Austin Quarry Revised Draft EIR, Volume I, p. 2.0–30.
[21] Austin Quarry Revised Draft EIR, Volume I, p. 3.11–19.

The California Department of Transportation estimated that the average daily traffic on State Route 41 at the junction of SR 145 was 13,500 southbound vehicles and 14,500 northbound vehicles, for a total of 28,000 vehicles.[22] A 2000 analysis of the Soledad Canyon quarry project near Santa Clarita estimated that 1,164 daily truck trips would increase travel time on the Antelope Valley and Golden State Freeways by between 0.75 and 1.5 minutes.[23] We can safely assume that Austin Quarry would cause travel time for both southbound and northbound vehicles on SR 41 to similarly increase by between 0.75 and 1.5 minutes. This is a conservative assumption given that Austin Quarry's proposed 1,944 daily truck trips is 67% more than in the Soledad project and the fact that it is more difficult to pass slow-moving trucks on county roads than on the freeways studied for the Soledad project.

In measuring the costs of this delay, a conservative assumption is that there is only one person per vehicle, whose time is worth $10/hour ($1 above the current California minimum wage). Based upon these conservative assumptions of 28,000 vehicles, a delay of between .75 and 1.5 minutes for each vehicle, and a $10/hour value of time, increased costs for travelers on SR 41 alone would be $1,231,875 to $2,463,750 per year, lasting indefinitely.

As the proposed quarry is located at the junction of SR 41 and SR 145, traffic delays would also occur on SR 145. The Department of Transportation estimates the average daily traffic on SR 145 to be 5,300 westbound vehicles; there is no eastbound estimate. Assuming that eastbound traffic is the same, the total daily traffic is 10,600 vehicles. Applying the same assumptions concerning delay and the value of time, increased driving costs on SR 145 would be $483,625 to $967,250 per year.

The total annual cost of increased travel on SR 41 and SR 145 alone is shown in Table 4.

State Route 41	$1,231,875 to $2,463,750
State Route 145	$483,625 to $967,250
Total	$1,715,500 to $3,431,000

Table 4
Annual Cost of Increased Travel Time

As shown on Table 5, the cumulative cost of these increased travel times over the projected 100-year timeframe of the proposed Austin Quarry is between $172 million and $343 million. These are very conservative estimates, in that they assume: (a) no increase in the value of a driver's time over the next 100 years; and (b) no increase in background traffic over the next 100 years.

[22] Caltrans, 2012 Traffic Volume on California State Highways, State of California, The Transportation Agency, Department of Transportation, Division of Traffic Operations.
[23] Brown, W. and S. Frates (December 10, 2000), "The Economic Impact of the Transit Mixed Concrete Company's Soledad Canyon Project on the Surrounding Community and Los Angeles County." Rose Institute.

State Route 41	$123 to $246 million
State Route 145	$48 to $97 million
Total	$172 to $343 million

Table 5
One-Hundred Year Cost of Increased Travel Time

The above estimates do not account for the fact that travel times and associated costs will also increase on other Madera County roads used by the trucks serving the quarry, most of which are also 2-lane roads on which it is difficult to pass. Nor do these estimates account for travel delays experienced by tourists driving through Madera County to get to Yosemite National Park or visiting Madera County's fledgling viticulture industry.

5. The Cumulative Cost to Madera County Residents Would be Enormous.

Using the above estimates of reduced property values and the cumulative cost of increased travel time, and assuming that there is no increase in property values generally, the number of people traveling on SR 41 and SR 145, or the minimum wage for the next 100 years, Table 6 shows that the cumulative cost to Madera County residents over the project's 100-year horizon would be between $615 million and $1,081 million.

Diminished quality of life (reduced property values)	$443 million to $738 million
Cumulative cost of increased travel time (100 years)	$172 million to $343 million
Total cost to Madera County Residents	$615 million to $1,081 million

Table 6
Cumulative Cost to Madera County Residents

6. The Proposed Quarry Would Not Increase the Amount of Aggregate Produced, But Would Merely Shift Production, Jobs, and County Revenue from Other Quarries in the County.

In my previous study of the Liberty Quarry near Temecula, I concluded that the production of aggregate in any given region is determined by the demand for aggregate in that region, and that the quantity demanded does not substantially increase when additional supply is available, such as when an additional quarry opens in the same region. Thus, a new quarry in a region merely changes where in the region the aggregate is produced, not how much total aggregate is produced in the region.

This principle applies in Madera County, which is essentially its own region for purposes of aggregate supply and demand. A million tons of aggregate produced at the Austin Quarry would simply mean a million fewer tons produced at other quarries in the County, such as the already existing Madera Quarry located on Road 209, north of the proposed site of Austin Quarry. There would be NO additional jobs, just a transfer of jobs from other quarries to Austin. There would be NO additional sales taxes, usage fees, or other revenue to Madera County, just a change in who pays those amounts to the County.

Even quarry proponents generally agree with this principle. In the proceedings concerning Liberty Quarry, an economist, Dr. John Husing, was hired by Granite Construction to prepare an economic analysis in support of the proposed quarry. In 2011 Dr. Husing testified before the Riverside Planning Commission on behalf of Granite Construction, stating:

> It is not demand that is increased by a quarry, it is the supply. Whether or not you have this facility, the demand is the demand. All it will change is where the material comes from.[24]

A similar conclusion was made by Dr. Peter Berck, a professor in the Department of Agricultural and Resource Economics and Policy at the University of California at Berkeley, whom Granite Construction hired to testify in support of the Liberty Quarry project. In 2012, Dr. Berck wrote a letter to the Riverside County Board of Supervisors, stating:

> All that a new quarry can do is substitute for the supply of an existing quarry. New quarries cannot and do not cause additional aggregates to be mined, shipped, or used.[25]

Dr. Husing and Dr. Berck were both correct about this. The production of aggregate is determined by demand, and demand is not affected by opening a new quarry. All a new quarry does is change where the aggregate is produced.

[24] Husing, J. (August 15, 2011), testimony before the Riverside Planning Commission.
[25] Berck, P. (January 28, 2012), letter submitted by Gary Johnson of Granite Construction to the Riverside County Board of Supervisors.

7. The Proposed Quarry Site Would Generate Far More Tax Revenue If it Were Developed as a Residential Community.

Madera County is very pro-growth. The most recent projections are that the County population will increase from 151,328 in 2010 to 373,929 in 2060.[26] In the review of any major new project, an important consideration is the alternative ways that the same land might be used to accommodate this projected growth. Every land use decision has an opportunity cost, which is measured by the difference in the value of the land for the proposed project and the value the land might have had if it were used differently.

The proposed Austin Quarry site at the intersection of State Routes 41 and 145 is very attractive for residential housing because of the proximity to Fresno, the City of Madera, and recreational areas like Millerton Lake and Lost Lake. There is consequently a substantial opportunity cost to the County from opening a quarry in such a desirable residential area.

One way to quantify the Quarry's opportunity cost is to compare the effect on County revenue of building a quarry instead of residential housing. As it turns out, the revenue to the County from a quarry is quite small when compared to a residential alternative.

By way of comparison, the proposed Liberty Quarry near Temecula, California, would have produced, at full capacity, 5 million tons of aggregate annually over a 75-year life cycle. In its economic analysis,[27] Granite Construction estimated that, as a result of its conversion to a mining use, the total assessed valuation of the 413-acre site would increase from $584,698 to $62.4 million. The proposed Austin Quarry would produce, at full capacity, 2.5 million tons a year on a 348-acre site with a 100-year life cycle. Although Granite's estimate of the increased valuation of the Liberty Quarry site may have been generous and although the production from the proposed Liberty Quarry was twice that of the proposed Austin Quarry, for purposes of this analysis I will conservatively estimate that the increased assessed value of the Austin site would be the same as Liberty Quarry; i.e., $60 million. Using these assumptions, Table 7 shows that the estimated annual property tax revenue for Madera County is only $128,340.00.

Assessed Value	$60,000,000
Proposition 13 (17.84% of 1.0000%)	$107,040
High School (0.0225%)	$13,500
Community College (0.0130%)	$7,800
Total Annual Property Taxes	$128,340

Table 7
Estimated Property Tax Revenue to Madera County

[26] State of California, Department of Finance, Report P-1 (County): State and County Total Population Projections, 2010-2060. Sacramento, California, January 2013.
[27] Husing, J. (February 13, 2007), "Liberty Quarry: Economic Impact on Riverside County & Its Southwestern Area," pp.22–25.

The alternative use of the proposed site is as a residential community. As shown in Table 1, above, 3 dwelling units per acre is typical in this area. Using that density, the 348 acres proposed for the Austin Quarry could support 1,044 dwelling units.

Housing developments create a variety of county-wide expenses for schools, fire protection, road maintenance, and other services and also generate tax revenue from several sources in addition to property taxes. As just one recent example, the recently approved 2,840-unit Gunner Ranch West development was projected to create an annual increase in County tax revenue of $12,383,229 at full buildout.[28] If the same per-unit revenue assumptions are used for a similar development on the proposed Austin Quarry site with 1,044 units (approximately one-third the size of the Gunner project), this hypothetical future project could be expected to generate an annual increase in County tax revenue of $4.55 million. This calculation is shown in Table 8.

(1,040 / 2,840) x $12,383,229 = $4,552,145

Table 8
Increased Tax Revenue for 1,044-Unit Residential Project on Proposed Quarry Site

[28] Economic & Planning Systems, (July 11, 2008), County Services Area 22 Zone C - Gunner Ranch Services Delivery Plan, p. 40.

8. Austin Quarry's Net Effect on the County Budget Would be an Annual Loss of Between $5.4 Million and $6.0 Million, Amounting to Hundreds of Millions of Dollars Over the Quarry's 100-Year Life.

Table 9 shows that the net annual effect of the Austin Quarry on the County budget would be a loss of between $5.4 million and $6.0 million.

Austin Quarry increased property taxes (Table 7)	$128,340
Foregone taxes from alternative residential use (Table 8)	–$4,552,145
Reduced property taxes on nearby homes (Table 3)	–$947,460 to –$1,579,098
Net effect of quarry on annual County budget	–$5,371,265 to –$6,002,903

Table 9
Net Effect on Annual County Budget

Cumulated over the 100 year life of the quarry, the above losses in property tax revenue and foregone tax revenue would amount to hundreds of millions of dollars.

Moreover, the above estimate does do not take into account the fact that if the quarry is approved, reduced property taxes in many locations proximate to the quarry and in places acutely affected by the quarry (such as along roadways subject to truck noise) will be even greater, as these locations will become so undesirable that homes will not be built at all in those locations. The estimate also does not take into account the fact that the proposed quarry would also reduce the quantity and quality of new businesses to service the population ("retail follows rooftops"), thus resulting in a reduction of property taxes from these businesses.

9. The Proposed Quarry Site Would Generate Many More Jobs if Developed as a Residential Project.

In addition to the positive benefits for County revenue, far more jobs would be created building, remodeling, and maintaining 1,044 homes on this 348-acre site than from operating a quarry there.

The Austin Quarry EIR estimates that the quarry will employ only "between 15 and 40" workers over the long term. Many of these workers have very specialized skills (such as heavy equipment operators) and thus are more likely to commute from outside Madera County than less skilled workers, thereby further reducing the number of jobs created for residents of the County.

There is also no indication in the EIR that the development of the quarry site will result in any additional workers during the short-term, when the quarry site is being developed; to the contrary, given that site development for a quarry consists mainly of grading and does not include the construction of any significant structures, it is fair to assume the quarry will employ even fewer than the estimated 15 to 40 workers during the development phase.

In contrast to the above figures, a residential project on the quarry site would employ exponentially more people than a quarry in the short term and substantially more than a quarry in the long term. In 2014 it was estimated that the construction of an average single family home requires the equivalent of 2.97 full-time, year-long jobs, including 1.76 construction jobs and 1.21 jobs in producing and transporting construction materials and services.[29] Applied to a project consisting of 1,044 homes, this would be the equivalent of 3,101 full-time, year-long jobs, or more than 100 times as many jobs as the development of the quarry site. Moreover, in contrast to specialized quarry jobs, construction jobs for residential development would largely come from local residents since 8.7% of the Madera County labor force is in the construction industry.[30]

This estimate of 3,101 year-long jobs does not include initial jobs associated with new home construction, such as landscaping and the installation of appliances. These additional jobs would last long after the construction phase of a hypothetical residential project on the proposed quarry site.

In addition to short-term jobs from construction of new homes, a 1,044-unit residential project would generate long-term jobs associated with the maintenance and improvement of the homes, for services such as gardening, painting, handyman, remodeling, and pool maintenance. These long-term jobs would likely dwarf the 15 to 40 jobs estimated to result from the operation of the quarry. To illustrate, if one gardener can handle 40 homes a week, it would take 26 gardeners to take care of 1,044 homes. In addition to this, it has been estimated that a $100,000

[29] Paul Emrath, Ph.D., "Impact of Home Building and Remodeling on the U.S. Economy," National Association of Homebuilders, May 1, 2014.
[30] ESA, (May 2011), Gunner Ranch West, Draft Environmental Impact Report, p. 3.12–12.

remodeling project creates the equivalent of 0.89 full-time, year-long jobs.[31] Even if the average home in a residential development at the proposed quarry site were remodeled only once every thirty years, remodeling alone would result in 31 full-time jobs annually over the long term. Together, remodeling and gardening alone would result in 56 long-term jobs, which is much more than the quarry operation.

In addition to the direct employment from building and maintaining homes, economists generally use a multiplier to measure the indirect economic benefits resulting from spending by people who construct homes and then live in those homes. These economic multiplier effects generally translate into many more jobs. A 2013 study estimated that every $1 spent on housing construction generates $2.90 in indirect benefits during the construction period and an additional present value of $8.30 during the occupant period, for a total multiplier of 11.2.[32] Meanwhile, Habitat for Humanity International has endorsed a multiplier of 7 based on information from different chambers of commerce in the United States.[33] The cost of constructing 1,044 new homes, assuming $100,000 in construction costs per home, would be $104,400,000. Multiplying this by 7, the total economic multiplier is $730,800,000. This number can be roughly translated into increased jobs by dividing it by a typical annual wage. Here, assuming a $40,000 annual wage, the economic multiplier for a residential project on the proposed quarry site would generate a number of jobs equivalent to $730,800,000 / $40,000, or 18,270 jobs, each lasting one year. Alternatively the multiplier can be interpreted as creating fewer jobs lasting for a longer time period, e.g., 1,827 jobs each lasting 10 years or 182 jobs each lasting 100 years.

[31] Paul Emrath, Ph.D., "Impact of Home Building and Remodeling on the U.S. Economy," National Association of Homebuilders, May 1, 2014.
[32] The Economic Consequences of Land Use Regulations on Jobs, Families, Communities and Housing Affordability in Mecklenburg County, 2011-2012: Piedmont Public Policy Institute and Johnson C. Smith University, 2013.
[33] Habitat for Humanity of Charlotte, Economic Impact Analysis, reviewed by the Center for Real Estate, Belk College of Business, University of North Carolina, Charlotte, 2013.