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FINAL REPORT

ECONOMIC ANALYSIS OF THE CACHE CREEK GRAVEL MINING PROGRAM

Prepared for:

Yolo County Gravel Mining Committee

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TABLE OF CONTENTS

I. INTRODUCTION

Yolo County has been evaluating and planning its management of Cache Creek gravel mining activities over the past several years. This effort has included preparation of a comprehensive environmental analysis, regulation of mining activities through use permits issued under current Zoning Ordinance restrictions and environmental impact mitigation, and the formulation of two broad policy programs, one to improve resource extraction regulation (the Cache Creek Gravel Mining Program) and the other to provide a broader policy framework for integrating the management of all resources associated with Cache Creek (the Cache Creek Resources Management Plan).

The issue of gravel mining has been complex and controversial because of State mandates and related resource management activities, the conflicting interests involved (mining industry, agricultural interests, and environmentalists), and the lack of data and management information. The County has prepared a Draft Cache Creek Gravel Mining Program, which encompasses a wide range of regulatory activities for the gravel mining operations including data gathering and analysis, monitoring, land use regulation, special mitigation programs, and new operational requirements.

This Economic Analysis was initiated to provide the County with information regarding the cost of implementing the proposed Gravel Mining Program and its economic feasibility given industry economic characteristics. The Economic Analysis provides a framework and analysis necessary to support development of policy and discussions with interested public participants. It is expected that this discussion process will yield a revised project description and related set of policy determinations.

The Economic Analysis of the Gravel Mining Program addresses four major economic questions:

1. *What is the cost of the Program to the industry?*

An effort has been made to classify anticipated cost items and provide cost estimates. These estimates are based upon: 1) a general classification of cost items into seven cost categories; 2) analysis of cost items; 3) consultation with County staff regarding their intent and cost data; 4) literature research related to aggregate mining economics; and 5) consultation with companies and experts involved in aggregate mining, recycling and reclamation, and consultation with local aggregate producers.

2. *Are proposed fees and charges adequate to cover costs that will be incurred by County government?*

This question addresses the costs that will be incurred by the County for recommended management and mitigation activities. The Gravel Mining Program suggests a much expanded role for the County in this regard, including a resource management staff member who would have responsibility for implementing the Program as well as other monitoring and enforcement activities. The County would also have responsibility for addressing off-site impacts such as road maintenance. These costs will vary over time.

They will be higher during the initial years of the program and may level out or be reduced as time goes on. Costs will also vary with activity, e.g., a new operation may increase costs. However, on a per-ton basis, the addition of a new off-channel operation is likely to reduce costs due to economies of scale and a lower percentage of fixed costs.

3. *What is the ability of the industry to absorb additional operational costs, mitigation costs, and fees?*

This question addresses the economics of the industry and its ability to absorb additional costs, whether related to higher operational costs, mitigation of impacts, or additional fees for County management and mitigation activities. Key economic features of the industry which inform this consideration are: 1) there are relatively few producers of aggregate products in the region; 2) overall demand for aggregate within a region is relatively inelastic, that is, increases in price do not have a corresponding significant impact upon demand; and 3) the high cost of transportation tends to favor local producers. Despite industry-wide trends and economics, individual producers who are relatively inefficient or face higher costs (e.g., for impact mitigation programs) may be unprofitable or lose market share.

4. *What is the economic benefit of the local aggregate industry to Yolo County, and what effects would additional operational costs have on the local economy?*

Yolo County's local economy benefits from the aggregate industry in several ways, including provision of economical building materials, wages paid by the industry, and local tax proceeds. To the extent that additional operating expenses result in less mining activity, local jobs and tax receipts could decline proportionately.

After describing the existing management program, major conclusions of the Economic Analysis are presented. This is followed by a description of the cost analysis methodology, a program component cost analysis, and finally an overview of industry economics. The cost analysis model upon which the Economic Analysis is based is included as **Appendix A.**

II. EXISTING MANAGEMENT PROGRAM

The existing gravel mining policies and regulatory measures applied by Yolo County cover a similar range of considerations as the proposed Gravel Mining Program. However, the effectiveness of the current policies and regulations has been related to the lack of precise performance standards or criteria for mining operations in Cache Creek, a short-term, operation-by-operation orientation, and lack of sound management data. For example, operators must currently consider management guidelines, but are often not required to take action if no "reasonable alternative" exists. Terms such as "reasonable" lack the precision necessary to enforce the intended spirit of the ordinances.

The present operations are concentrated in the Creek channel, with only one operator currently mining terrace deposits. Operational costs and regulations for terrace mining differ substantially from channel mining, thus current costs may or may not bear any relation to the terrace mining operations that are anticipated under the Gravel Mining Program.

Currently the majority of the costs internalized by Cache Creek mine operations pertain to conformance with State laws, and instances where operational efficiencies are enhanced or where they must meet the County's monitoring requirements for in-channel mining. Examples include volume estimates, recordation of sales by destination and type of use, the composition of topographic maps, and general site activity monitoring by the County and an independent consultant. Other resource management and mitigation requirements under the Proposed Gravel Mining Program that are currently complied with include spill prevention and containment facilities, business emergency response plans, settling ponds, dust control, and other air pollution reduction programs and activities. In nearly all these cases, these costs will continue and expand as mining shifts to the terrace deposits. Thus, some portion of the costs estimated for the proposed Gravel Mining Program are already being absorbed by the industry, or will be as terrace mining activity expands.

III. CONCLUSIONS

1. *The proposed Gravel Mining Program contains a range of cost implications for the industry.*

The proposed Gravel Mining Program imposes a range of existing and new regulatory activities upon mining operations including data gathering and analysis, monitoring, land use regulation, special mitigation programs, and new operational requirements. Additional operational expenses include increased expenses related to meeting various regulatory and mitigation requirements, and funding County resource management and mitigation activities. Although some of these costs are readily verifiable, others are more difficult to estimate due to lack of precision in the regulation or activity proposed in the Project Description, or a lack of data regarding the magnitude of the specific problem being addressed.

There are several Project Description Components that could be infeasible from the industry standpoint, depending upon how they are implemented and the specific circumstances of a given mining site. The Components that may cause one or more operations to be infeasible include recycling requirements, the roadway buffer zone, and the habitat buffer zone delays.

Based on the best available information, Economic & Planning Systems (EPS) has compiled a regulatory cost analysis. According to this analysis the Cache Creek Gravel Mining Program and the Resources Management Conceptual Plan will result in an estimated total cost of approximately $0.30 to $0.40 per ton mined in the tenth year of implementation, including industry costs and County fees. Costs are higher on a per-ton basis when lower extraction rates are assumed, due predominantly to a higher percentage of fixed costs. This cost estimate is based on the assumption that the recycling, roadway buffer area, reclamation, and road maintenance programs included in the Project Description are interpreted in a cost-effective manner.

It should be noted that between 30 and 40 percent of these costs may otherwise be required by State law (e.g., SMARA and CEQA) and the requirements of other agencies, such as the Department of Fish and Game, the Corps of Engineers, and the U.S. Fish and Wildlife Service.

2. *The proposed Gravel Mining Program will increase mining costs but should not preclude mining operations.*

It is clear that regulatory, mitigation, and reclamation costs will increase as mining operations move to the terraces. Notwithstanding the uncertain cost components discussed above and current low economic margins related to the recession and high fixed costs, the industry appears to have significant capacity to absorb the additional regulatory, management, and mitigation costs included in the Gravel Management Program. This conclusion is based on the cost analysis presented in this report, and an analysis of industry

economics. Even if short-term price disadvantages occur, longer-term supply constraints in the Region will justify a price which properly internalizes sound resource management and environmental impact mitigation.

Moreover, the industry is facing a major expansion, wherein traditional in-channel operations will shift to off-channel operations. The costs imposed by the Project Description, within reasonable limits, can be internalized into the cost structure of these new operations. It is important to note the value of certainty and rationality that the Project Description can create if properly implemented. The present uncertain situation with case-by-case determinations, inconsistent regulations, and threat of litigation represents a significant cost and risk to the industry.

3. *County management and mitigation costs implied by the proposed Gravel Mining Program significantly exceed existing funding agreements.*

As an interim policy, the County has imposed a "fee per ton" on the industry for management and mitigation activities in addition to direct funding of data gathering, and research, and analysis. An estimate of County administrative and mitigation costs under the Gravel Mining Program is estimated to be $400,000 per year, not including the cost of one-time environmental impact reports. A fee of $0.10 to $0.11 per ton would cover County Resource Administration and road maintenance costs, depending on the level of extraction assumed.

4. *Implementation of the broader Resources Management Plan will require involvement and funding from the aggregate mining industry.*

The Cache Creek Resources Management Plan encompasses a full range of riverine-related resource management issues including wildlife management, cultural resources protection, open space and recreation, flood control, water resources management, and agricultural resources. Although specific programs and costs have not been fully identified, it has been concluded that past, present, and future mining activities will affect overall resource management and thus, the mining industry should assist with restoring and enhancing Cache Creek resource values. A funding approach has been proposed by the County that would involve an additional increment of fee on aggregate extracted, over and above that required for regulatory and mitigation activities. The revenue would accrue to a special trust fund that would be used for creek restoration and enhancement projects. For purposes of this analysis a fee of $0.10 per ton is assumed for this purpose, which would generate approximately $350,000 to $480,000 annually, depending on the aggregate extraction rate assumed.

5. ***The project description, if implemented as described in this report, will have minor economic impacts upon the County and the local economy.***

A study by George Bittlingmeyer, Ph.D. commissioned by the Yolo County Aggregate Producers Association (YCAPA) made the following findings:

- In 1993, the industry employed 55 people with a payroll of $2.5 million, purchased $1.6 million in goods and services within the County, and paid $406,000 in taxes. As many as 55 drivers may also be employed as a result of aggregate mining at Cache Creek.

- Based on Department of Commerce input-output data for mining in general, total direct and indirect effects of the industry without additional costs and fees amount to $35 million under medium-level projected industry growth (2.2 percent annually). According to Dr. Bittlingmeyer's study, the introduction of County fees and additional industry costs totaling $0.40 per ton (this analysis estimates a total of $0.30 to $0.36 per ton) would result in total direct and indirect effects of approximately $31 million – a decrease of 13.2 percent in the Year 1998.

IV. COST ANALYSIS METHODOLOGY

In order to perform this economic analysis, EPS relied on several sources, including financial records of publicly owned mining companies, State and federal publications, consultants involved in various facets of mining such as reclamation and ground water analysis, as well as data from trade publications, Yolo County, and the Yolo County Aggregate Producers Association (YCAPA). The general analytical methodology was as follows:

1. *Organize the Project Description into Program Components.* These Components include County Resource Administration, Recycling, Mitigation Programs, Biological and Archeological Analyses, Reclamation, Water Resources, and Cache Creek Resources Management Plan Implementation. Not every item described in the project description was analyzed. Tasks that are already performed by the industry were not estimated.[1]

2. *Develop Modeling Framework.* The three models presented in the appendix of this report are each organized as follows:

   - The initial table presents the "drivers" or baseline assumptions of the analysis -- extraction rates, amount of material sold, County-maintained haul route mileage, recycling volume requirements, etc. It should be noted that three extraction rates are used; a "low" rate begins at 1.5 million tons and increases to 4 million tons in Year 10; a "high" rate begins at 1.5 million and increases to 5.5 million in Year 10; and a "business cycle" scenario is included which simulates a ten-year business cycle, beginning at 1.5 million tons, increasing to 5.5 million tons in Year 5, and decreasing to 2.75 million tons in Year 10.

   - The second table uses the baseline assumptions and factors-in key determinants of costs to estimate program-related costs. The majority of industry-related costs are based on the level of extraction assumed, since costs will tend to be lower on a per-ton basis as mining activity increases due to economies of scale in production and a lower percentage of fixed costs. Other costs, such as the EIRs, represent one-time costs. Finally, costs such as those associated with the preparation of annual reports tend to be estimated on a fixed annual basis.

   - The third and fourth tables in the model summarize the Program cost estimates. The third table summarizes total costs by Program Component. The fourth table presents these costs on a per-ton basis, organized into industry, County, and total costs.

[1] Tasks or facilities currently performed or operated by the industry that are described in the Project Description include spill prevention and containment, business emergency response plans, settling ponds, dust control, air pollution reduction, and equipment maintenance and inspection. In addition, several components of the annual monitoring program, including disclosure of volume estimates, streambed elevation/width, and sales by destination are currently performed by the industry.

3. *Estimate Costs.* As discussed above, EPS worked with a variety of sources to determine costs related to the proposed Program. In particular, key inputs were sought from the County, the local aggregate industry, and independent industry experts.

4. *Analyze Impacts of Estimated Fee on Local Industry Market Share.* In order to assess the probable effects of a fee on the local industry share of the regional aggregate market, EPS reviewed the factors of demand for aggregate, competing producers of aggregate in the Sacramento-Fairfield region, and other characteristics of the industry. Dr. George Bittlingmeyer's analysis for the industry was particularly helpful in this regard.

V. PROGRAM COMPONENT COST ANALYSIS

COST SUMMARY

The Gravel Mining Program has been organized into seven categories for analytical purposes. In each case, EPS made certain assumptions regarding how the project description will be implemented. Table 1 shows major program components organized into these seven categories. These categories are described below, along with a summary cost estimate. Unless otherwise noted, summary cost estimates are for Year 10 of the high extraction rate (straight-line) scenario.

- **Component 1 – County Resource Administration.** This group includes persons in charge of managing the ongoing Gravel Mining Program and administration of EIR preparation. County staff estimates are about $150,000 annually including the Planning Staff, the County CAO, and County Counsel.

- **Component 2 – Recycling.** Each mining company will be required to submit a recycling plan to the County which describes how operators will receive, crush, and sell construction debris to local and regional contractors.

  Depending on specific requirements, this program could result in an up-front cost to the industry of $2 million, assuming a large-scale centralized recycling facility. The impact could be far less if a viable market for recycling is created or other alternatives are pursued. Over the long-term, the industry may be able to recoup initial costs associated with recycling, particularly if other disposal options become limited. Annual costs would be covered by sales of recycled materials.

- **Component 3 – Mitigation Programs.** This group includes monitoring and mitigation programs and required facilities associated with habitat preservation, air and noise pollution containment, water quality monitoring, road maintenance, roadway buffer zones, and public safety. Environmental Impact Reports (EIRs) and the Technical Advisory Committee are also included in this category.

  Many of these costs are presently required by State or local regulations and thus would not add substantially to existing operating costs. The one cost included that would be significant is associated with road maintenance. It should be noted that roadway buffer zones could also be a significant cost item, depending on the manner by which this requirement is implemented. This analysis assumes that the roadway buffer zones will be implemented when more information regarding their potential effects becomes available, thereby facilitating informed regulatory decisions.

Table 1
Major Program Components
Cache Creek Gravel Mining Program

Component Number	General Description	Included Program Cost Items
Component 1	County Resource Administration	County Staff
Component 2	Recycling	Recycling Program
Component 3	Mitigation Programs	Annual Monitoring Program Technical Advisory Committee Environmental Impact Reports Spill Prevention & Containment Facility/Plan Business Emergency Response Plan Settling Pond (conforming to CRWQCB) Dust Control Plan & Activities Air Pollution Reduction Program & Activities Equipment Inspection/Maintenance Program Truck Traffic Mitigation and Road Maintenance Land Use & Roadway Buffer Zones Noise Level Restriction (time, dBAs) & Monitoring
Component 4	Biological and Archeological Analyses	Cultural Records Search Biological Inventory Report
Component 5	Reclamation	Overall Reclamation Plan On-site Agricultural Reclamation Plan
Component 6	Water Resources	Off-Channel Surface Hydrology/Drainage Groundwater Resources Groundwater Monitoring Network Water Usage & Supply
Component 7	Cache Creek Resource Management Plan Implementation	Sinking Fund for Implementation Activities Flood Control Channel Boundary Hydrologic Evaluation

Source: Yolo County Cache Creek Gravel Mining Program; EPS

Off-site road maintenance is assumed to be funded through a fee levied upon the industry. The cost estimate is based on a review of County Public Works and industry data, and assumes that approximately 19 miles of County roads are heavily impacted by gravel trucks. A fee of $0.0040 per mile per ton, as estimated by the County Department of Public Works (inflated by EPS using a construction cost index), has been applied to estimate the annual cost of maintaining County-maintained haul routes. This would imply maintenance costs as high as $370,000 annually ($19,500 per road mile for approximately 880 daily truck trips). This analysis does not include capital costs such as bridge replacements that may be necessary in certain circumstances (i.e., Capay Bridge).

- **Component 4 – Biological and Archeological Analyses.** This covers detailed biological inventory reports, wetland buffer zones, and cultural records search and excavation. These costs are assumed to be included in the costs of the in-stream, off-channel, and site-specific EIRs that will be required.

  The incidence and magnitude of habitat buffer zone delay impact is unknown until the time in which detailed surveys are completed. If substantial delays interfere with normal operating conditions, the cost to the industry may be very significant.

- **Component 5 – Reclamation.** This component includes general and agricultural land reclamation studies and activities.

  The agricultural reclamation requirements are generally consistent with State-imposed standards and the specific agreements previously negotiated between the local industry and Yolo County. Reclamation costs may vary from site-to-site, given physical conditions, the nature of mining operations, and the soil quality that must be restored. Such efforts may be costly. Given examples of reclamation costs in other areas and the conditions on Cache Creek, the Gravel Mining Program reclamation requirements could result in costs of $440,000 annually. On a per ton of mined aggregate basis, this cost would be $0.08 per ton.

- **Component 6 – Water Resources.** This category covers specific engineering requirements, mapping/measurement, plans/programs, and other analyses of drainage, groundwater, supply, and general water resource cost items. Many of these tasks are currently performed by the industry or are included as EIR-related costs. One significant additional cost item that has been estimated is monitoring of the groundwater level and quality.

  The cost estimate for water monitoring activities related to the terrace mining are approximately $150,000 annually, as estimated by a consulting firm specializing in this field.

- **Component 7 – Implementation of Cache Creek Resources Management Plan.** The actual costs associated with this component include those associated with flood control, channel boundaries, and floodway engineering activities. It is assumed that the aggregate industry will contribute to resource restoration and enhancement along Cache

Creek. A trust fund approach has been suggested with funding derived from an additional fee per ton of extracted aggregate. The estimated cost of $0.10 per ton will require refinement when the Resources Management Plan is defined in greater detail.

Table 2 shows a forecast of Gravel Mining Program costs, expressed as "cents-per-ton" terms for the three operating scenarios. Excluding "one-time" costs, additional industry costs resulting from the Gravel Mining Program could range from $0.32 to $0.39 per ton mined. The County administrative fee would be in the range of $0.095 to $0.12 per ton for regulation and mitigation efforts. An additional $0.10 per ton is shown as a contribution to implementation of the Resources Management Plan.

In addition to the recurring industry operation costs, there will be a number of "one-time" costs and management activities. One-time costs include the on-stream and off-stream EIRs which are estimated to cost a combined $650,000, as well as a centralized recycling facility with a one-time cost of $2 million. Each ensuing project EIR is estimated to cost $75,000. The total cost resulting from the combination of EIRs, recycling, and several other minor one-time costs (e.g., road signage) that would be incurred in the first year is significant. For all three scenarios analyzed, this one-time cost (in combination with all other costs previously addressed) is estimated to equal $2.30 per ton in Year 1.

COMPONENT COST ANALYSIS

COUNTY RESOURCE ADMINISTRATION

Description

1. One full-time County Resource Coordinator and associated computer equipment.
2. Other County staff time, including that of the Planning Director, the County Counsel, and the County Administrative Officer.

Proposal

The Program will require extensive County personnel involvement, including the Planning Director and a County Resource Coordinator (proposed to be a senior planner with expertise in resource management), the Assistant County Counsel, and the County Administrative Officer.

Table 2
Per Ton Program Costs
Cache Creek Gravel Mining Program

Component	Estimated Costs Per Ton in Year 10 of Analysis		
	Scenario 1: Low Extraction Rate	Scenario 2: High Extraction Rate (straight-line)	Scenario 3: High Extraction Rate (business cycle)
Assumed Volume of Material Mined in Year 10	4,000,000	5,500,000	2,750,000
Additional Industry Costs			
Recycling (1)	$0.000	$0.000	$0.000
EIRs & Mitigation Programs (excl. road maint.)	$0.023	$0.017	$0.033
Biological and Archeological Analyses (2)	$0.000	$0.000	$0.000
Reclamation	$0.080	$0.080	$0.080
Water Resources	$0.039	$0.029	$0.057
SUBTOTAL	$0.142	$0.126	$0.170
Additional County Costs			
County Resource Admin.	$0.037	$0.027	$0.054
Road Maintenance	$0.068	$0.068	$0.068
Plan Implementation	$0.100	$0.100	$0.100
SUBTOTAL	$0.205	$0.195	$0.222
TOTAL PROGRAM COST PER TON INDUSTRY COST + COUNTY COST	$0.347	$0.321	$0.392

(1) Recycling cost is assumed to be a one-time capital expense in Year 1.
(2) Biological and archeological analyses are accounted for in EIR costs.

Future Cost Implications

Capital Costs: Computer hardware and software, and other miscellaneous office equipment are estimated to be minor (approximately $6,000).

Operational Costs: The estimated cost for County staff involvement is $150,000 per year, based on estimated billing rates. **Table A-2 in Appendix A** presents the calculation of these costs.

RECYCLING

Description

This component consists of a program to encourage the recycling of aggregate materials. Recycling can be done at production sites, at a central facility, or through purchases at job sites from other parties. The goal is to reduce net extraction of aggregate needed to support a market level of demand, in order to ensure the long-term availability of high quality aggregate.

Proposal

Each mining company would be required to submit a recycling plan or program to the County. Goals include a minimum of five percent annual tonnage recycled by the third year of program implementation, with the percentage of recycled material increasing over time (to 20 percent by Year 16). Recycled materials would not count toward the annual mining limits designated by the County.

The County should be aware of potentially conflicting elements in the Gravel Mining Program. For example, the additional land area required to accommodate a recycling facility (either on-site or a central facility) could conflict with the County's desire to minimize the operational size of mining operations.

Future Cost Implications

Recycling can be an economically viable enterprise under proper conditions. These conditions include an economic incentive for outside contractors to haul demolished paving or concrete structures to the operation site. The producer can then crush the material into a usable product and transfer it back to the contractor for appropriate uses. Hence, the contractor can reduce transportation costs by dumping and picking up material at one location.

Furthermore, recent studies by the National Cooperative Highway Research Program have suggested that aggregate particles produced by recycling have favorable characteristics (including particle shape, absorption, and specific gravity) compared to virgin mineral aggregate.

In Yolo County, the practicality of a recycling program is undermined by the fact that the Yolo County Sanitary Landfill does not administer fees for concrete rubble measuring less than 2' x 2' x 8". Material larger than this is charged a fee of $36/ton, while concrete pillars are charged a fee of $95/ton.

Components Resulting in Major Cost

Typically, a crusher would be required on a site of at least an acre in size. Material is typically stockpiled with a bulldozer after approximately 50,000 tons have accumulated and is crushed to a size that passes a one-inch screen. Recycling operations such as that assumed in this analysis are typically run with a three-person crew.

Given the dispersed nature of aggregate mining operations in the project area, as well as the economies of scale inherent in operating a centralized facility, it appears that one or two centralized facilities may be the optimal arrangement from an economic standpoint. Based on interviews of several large-scale recyclers and equipment dealers, a recycling facility capable of processing 312,000 tons per year would cost approximately $980,000. Given that the proposed County recycling requirement is 10 percent of excavated material in the second five years of the project (potentially 500,000 tons or more), and would increase to 20 percent by Year 16, it appears that a second unit would be necessary. This analysis assumed that both of these units are installed in Year 1, although it may be more economically viable for the industry to spread these costs over time. The total estimated cost of recycling is therefore a one-time cost of $2 million. It is possible, however, that recycling could be accomplished through contracts with operators at little or no net cost.

MITIGATION PROGRAMS

Description

Several mitigation programs and activities have been proposed which serve a variety of purposes. Major programs and activities include the preparation of Environmental Impact Reports, monitoring of groundwater level and quality, the use of a Technical Advisory Committee, ongoing maintenance of County-maintained haul routes, and the establishment of roadway buffer zones.

Proposal

Annual Monitoring Programs. An annual monitoring program is currently conducted by the County. The proposed program would require that the County fully adhere to the State Mining and Reclamation Act (SMARA) by requiring a more detailed groundwater monitoring, and documentation of reclamation implementation (discussed in the following section). The major costs associated with additional monitoring involve analysis and monitoring of groundwater quality.

Environmental Impact Mitigation. The proposal requires a spill prevention and containment plan and facility, air pollution/dust control plans and activities, noise level and operation time restrictions, and land use and roadway buffer zones. Except for roadway buffer zones, these costs are already incurred by the industry and are not expected to increase dramatically as a result of a shift to off-channel mining.

Truck Traffic and Safety Programs. This subset includes business emergency response plans to be updated and resubmitted to the County, an equipment inspection and maintenance program, truck traffic mitigation, and a road maintenance program. Of these, the road maintenance program is the most significant in terms of annual costs.

Future Cost Implications

Within the mitigation program category there are several major cost items. These are as follows:

- *Technical Advisory Committee (TAC).* The TAC is intended to provide technical input regarding a variety of resource, hydrologic, and engineering issues. Funding for the TAC will offset costs associated with the committee, and would vary from year to year. For this analysis it is assumed that the costs associated with the activities of the TAC are fixed at $36,000 annually.

- *Buffer Zone Requirements.* The buffer zones, as proposed, would be comprised of 500-foot excavation setbacks for County roads, 2,000-foot setbacks for State Highway 16, and 1,000-foot setbacks from Interstates 5 and 505. These setbacks appear to affect approximately 10,000 acres in the project area. However, the project description allows flexibility on a case by case basis, and these standards may be modified during the environmental review process for individual permits. Because of this potential flexibility on a case by case basis, this analysis assumes that buffer zone requirements can be met without significant costs to the industry. Relatively minor fixed costs have been assigned to stockpile buffer zones.

- *Environmental Impact Reports (EIRs).* The Environmental Impact Reports (in-stream and off-channel) are estimated to cost approximately $325,000 each, based on the County's prior experience with reports of similar scope and magnitude. Project EIRs are estimated to cost $75,000 for each new off-channel operation. These costs represent one-time costs to the industry.

- *Road Maintenance Costs.* Maintenance of publicly-maintained access roads is a major cost item, as the weight of gravel trucks often requires extensive repairs and/or reconstruction of road beds. In Sonoma County, these costs have been as high as $250,000 per affected road mile for reconstruction every three years in certain areas. It should be recognized, however, that the subject roads in Sonoma County are also heavily traveled by the public. In Yolo County, the Department of Public Works has estimated a per ton cost of maintaining County haul roads, as discussed below. It should also be noted that the County has identified several capital improvements required for roads and bridges used by the mining industry – $360,000 for various bridge widening, road widening, and school bus turnouts. In addition, structural

problems with Capay Bridge have been identified. Replacement of this bridge has been estimated by the County to cost $800,000. *These costs are not included in this analysis*, as data specifically addressing the gravel industry's share of such capital improvements have not been developed to date.

- *Groundwater Monitoring Costs.* The major variable cost shown under this category is associated with analysis of water quality. According to an industry consultant, each of the five assumed mining sites is likely to have a wet pit. The annual cost of five groundwater samples per mining site including two pit samples and lab analysis, is estimated to be $6,500 per quarter per site, or $26,000 annually per site. Given the assumption that five operations will ultimately mine off-channel aggregate, the estimated annual cost for water quality analysis for the industry is $130,000. Other costs, associated with groundwater levels and compilation of reports, are relatively minor.

Component Resulting in Major Cost

Road Maintenance. Road maintenance is assumed to be provided through a "sinking fund" comprised of industry contributions. The estimated sinking fund cost of $0.0040 per ton per road mile is based on a September 1989 estimate by Yolo County Public Works. This figure has been inflated to $0.0040 using a construction cost index compiled by the Engineering News Record. Existing affected road miles are estimated to be approximately 19 miles. The introduction of terrace mining is not expected to greatly increase the affected public roadways, as gravel resources are more concentrated and utilize less acreage on a per ton basis. Estimated road maintenance costs are $0.068 per ton annually, *not including capital improvements*, cited above. For illustrative purposes these costs can be expressed as follows:

1. Assuming a year in which 3.0 million tons are sold, and assuming 250 work days annually, approximately 12,000 tons per day will be hauled out of the project area.

2. Assuming that each truck hauls approximately 25 tons of material, estimated truck traffic is 480 round trips per day.

3. Given a per ton cost of County-maintained road maintenance of $0.068 (assumes a cost of $.0040 per mile per ton, 19 miles of road, and 90 percent of mined aggregate sales), the total road maintenance cost would be $204,000 ($10,736 per mile). Assuming 250 work days, the road maintenance cost per day is $816.

4. Given a daily road maintenance cost of $816 and 480 truck trips per day, associated road maintenance costs would equal $1.70 per round-trip.

BIOLOGICAL AND ARCHEOLOGICAL ANALYSES

Description

This work will be done by qualified biologists and archeologists. The goal of the biological analyses is a net gain in biological resources in the mining areas. Associated costs are assumed to be captured within the cost of the program EIRs as well as project EIRs.

Proposal

These analyses and the potential mitigation measures are extensive. Among the required tasks, mining companies would be required to setback haul roads at least 50 feet from wetlands; the height and diameter of all native trees would be measured; a complete inventory of oak trees would be conducted; and surveys would be conducted for the existence of bald eagles, Swainson hawks, burrowing owls, bank swallows, and the Valley Elderberry Longhorn Beetle.

If any of the above species are detected, site-specific mitigation measures would be implemented, including relocation programs, bank stabilization programs, and restrictions on removal of elderberry trees or other beetle habitat. Buffer zone delays are proposed as mitigation given the presence of Swainson hawks and bald eagles, whereby mining operations would not be allowed in certain areas during identified periods during the year.

Archeological surveys would be conducted prior to mining at new sites. Ensuing excavations would occur given evidence of cultural resources.

Future Cost Implications

Generally, costs associated with routine biological and archeological surveys are relatively minor. More substantial costs could be associated with operational delays.

Components Resulting in Major Cost

Buffer Zone Delays. Any actions which unpredictably restrain normal operation of mines could be costly to the mining industry in terms of operational inefficiencies and lost opportunity costs.

Initial Biological and Archeological Surveys. Significant front-end costs will be borne as a result of opening new land to off-channel extraction. These costs are assumed to be largely accounted for through the costs of the Master and Program EIRs. The comprehensive biological survey work is assumed to be accounted for through the evolving Yolo Habitat Management Program (HMP). This is one example of how various resource management efforts, if properly coordinated, can lower overall costs and better achieve a common goal.

RECLAMATION

Description

A "reclamation plan" will be required for new terrace mining permit. The reclamation plan must demonstrate that the County obtains a "net gain" from mining and ensuing reclamation, consistent with the Gravel Mining Program.

Proposal

SMARA's Minimum Verifiable Reclamation Standards are proposed to be incorporated into the program by reference. Mining operations producing less than 150,000 tons per year are exempt from the requirement to prepare and submit revised reclamation programs. This exemption applies to only one producer at the present time.

The reclamation plan will be required to demonstrate that the end use of reclaimed land is equal to or better than the use of the land prior to mining activities. This applies to agricultural land as well. The project description specifies that at least 80 percent of productive farmland that has been mined shall be reclaimed and returned to pre-mining agricultural production levels.

Future Costs

Costs of reclamation were developed from two perspectives. First, an estimation of future costs was made by contacting a major environmental firm with experience in reclamation of mined lands. The total cost of reclamation is estimated to be $6,500 per acre. These costs were independently confirmed by a recognized expert in reclamation who has conducted studies of reclamation costs in over 70 different locations. On average, the actual costs associated with the process of reclaiming land are approximately $0.06 per ton mined. Costs associated with government administration of reclamation are assumed to be additional. The County's administrative costs are captured within the County resource administration costs itemized earlier. An additional cost of $0.02 per ton is included to represent testing and monitoring costs, bringing the total cost to $0.08 per ton mined. These costs are consistent with those estimated by the reclamation/remediation firm that was interviewed and other industry data.

WATER RESOURCES PROTECTION

Description

The proposed Gravel Mining Program identifies a number of studies, required plans, and measures related to water resources that will be required prior to the issuance of mining permits. These tasks are included as implementation items under the Cache Creek Resources Management Plan. It should also be noted that a streamway and fluvial morphology study will be conducted, for ultimate use in the in-channel EIR. The cost of this analysis is folded into the estimated cost of preparing this EIR, discussed above.

Proposal

Flood Control. Each operator would be required to submit an engineered flood control program including flow rates, and water surface profiles. Also, erosion control activities such as rip-rap, brush layering, and revegetation would be required.

Off-Channel Surface Hydrology and Drainage. Each operator would be required to convey storm water run-off, agricultural tail water, and mining operation waters to prevent degradation of water quality.

Channel Boundary Survey and Maintenance. A more precise identification of channel boundary would be required, including surveys where boundaries are proposed to be modified.

Groundwater Resources. This includes a comprehensive study to analyze potential recharge and storage facilities.

Hydrologic Evaluation. This requires precise measurement of excavation depth. Also the impacts of mining and ensuing reclamation must be identified. Operators must show no adverse impacts to local recharge, no adverse increase in discharge into creek, no adverse impacts to groundwater storage and pumping, and no adverse impact on ground or creek water quantity or quality. Costs associated with the monitoring of groundwater levels and quality are reflected in the monitoring expenses itemized under the foregoing analysis of "mitigation programs". Estimated costs do not reflect potential costs borne by the industry in the event that performance standards are not met.

Water Usage and Supply. This requires documentation of existing and proposed rates of water usage, sources of supply, and requires reuse of processed water through operational modifications.

Future Cost Implications

The major costs associated with this component are related to floodway engineering, hydraulic engineering, and surveying. In many cases, the implications of costs associated with the above-referenced water resource requirements depend on specific County performance standards.

Flood control activities are likely to be divided into two major components – an annual plan and floodway engineering activities. It is also likely that operators will jointly contract out to a common consultant or the industry association to compile annual plans/programs, while engineering activities are appropriately estimated on a per acre basis.

The industry has pledged $75,000 to fund a groundwater resources study. Any additional costs associated with data collection and plan/program preparation would be minimal. Additional costs (not estimated) could be borne by the industry for facilities required as a result of the findings of the groundwater resources study.

Components Resulting in Major Cost

It is assumed that, aside from the groundwater resources study, costs in this component are covered through the sinking fund established to finance the implementation of the Cache Creek Resources Management Plan. The estimated annual amount of the sinking fund is $0.10 per ton of aggregate mined. This is a preliminary estimate of the projected cost that should be refined as the Resources Management Plan is defined in greater detail.

VI. INDUSTRY ECONOMICS OVERVIEW

INTRODUCTION

Understanding the economics of the gravel mining industry is particularly important in establishing a conceptual framework for a Gravel Mining Program of this magnitude. This section will profile the market area, identify regional submarkets, and establish Yolo County's competitive position in the regional gravel mining industry. Then, major economic factors are identified, operating characteristics are profiled, and the ability of the industry to withstand program costs is evaluated. An independent analysis of industry economics has been prepared for the industry by George Bittlingmeyer, Ph. D., a U.C. Davis professor and consulting economist. The findings of this study are used to augment this chapter where applicable.

MARKET AREA DESCRIPTION

The gravel mining operations along Cache Creek operate in the context of the Sacramento-Fairfield market area, as defined by the California Division of Mines and Geology (CDMG). This market area primarily serves the Sacramento metropolitan region including Vacaville and Fairfield.

According to the CDMG, Yolo County is a net exporter of sand and gravel, as the County ships 38 percent of its mined aggregate to Solano County, 14 percent to Sacramento County, and 8 percent to other counties. Only 40 percent of Yolo's product remains in the County.

Competitive Submarkets

The aggregate needs of the Sacramento-Fairfield market area are met by two major regions of production: Cache Creek and Sacramento County's American River Deposits. To a lesser extent, low priced deposits in the Yuba City region play a role in meeting demand for such materials. The two major concentrations of producers include 16 pits producing PCC-grade aggregates, seven of which are currently being mined along Cache Creek.

Competitive Position

Historically, the Cache Creek operations have been positioned to service the growing eastern Solano County region, including Dixon, Vacaville, and Fairfield, as well as Yolo County communities such as Woodland and Davis. However, given the fact that at Cache Creek only approximately three years worth of aggregate remains within the in-channel deposits at current rates of consumption, the American River and other deposits will be required to meet future demand, unless off-channel mining is permitted by the Yolo County. Assuming that off-channel mining will be permitted by the County, the Cache Creek operations are ideally suited to meet the growth demands of the I-80 corridor.

The aggregate producers along Cache Creek operate within the context of "monopolistic competition". The industry, taken as a whole, has few producers and relatively inelastic demand – a change in price has little effect on the overall level of demand. Local producers are also advantaged by a cost disincentive on the part of consumers to import due to high transportation costs.

MAJOR ECONOMIC FACTORS

At the present time, the industry is affected by a number of negative economic conditions including the recession (which has reduced demand for aggregate products), competition from lower cost producers (who are mining gold dredge spoils) in Sacramento County, and the uncertainty, delays, and litigation associated with resolving County regulations (which increase holding costs and investments without compensating returns). These conditions, while serious for the industry at the present time, should change over time, allowing greater profitability for the local industry.

Uses for Construction Sand and Gravel

According to the U.S. Bureau of Mines, the use of construction sand and gravel is as follows: 26 percent is used in the construction of residential and non-residential buildings, as well as other development; 15 percent is used as road base/cover; 8 percent is used as construction fill; and the remainder (51 percent) is used for concrete products and other miscellaneous uses.

Elasticity of Demand

This section briefly illustrates economic characteristics of the industry. The important point is that with inelastic demand, an increase in costs is unlikely to affect demand; however, individual producers unable to sell products at the market price because of higher than average costs will lose market share.

Interviews with wholesale cement manufactures in northern California indicate that the cost of bulk wet cement is approximately $95/ton. This implies, given the industry data provided by the Yolo County Aggregate Producers Association (YCAPA) that sand and gravel represents less than 20 percent of the cost of cement. For a concrete tilt-up warehouse structure, the cost of cement represents approximately seven percent of the total construction cost. For residential projects, cement costs are lower, at approximately four percent of total structural costs. Assuming a new home costing $100,000 to build, only $800 (less than one percent) is attributable to the cost of sand and gravel. Based on this relationship, a 50 percent increase in the cost of sand and gravel (for illustrative purposes only) results in a one-percent increase in home construction costs.

Therefore, a major change in the cost of concrete does not imply a corresponding change in the cost of construction and the related demand for concrete. Rather, the demand for concrete is dependent on the quantity of new housing starts, major infrastructure projects, and other major development trends. Major factors affecting consumer choices for sand and gravel include transportation costs and the availability of substitute materials.

Substitute Materials

The major substitute product for construction sand and gravel is crushed stone. Aside from crushed stone, several other products are available but are not price competitive or do not possess acceptable strength, density, or other specific characteristics.

The main sources of crushed stone in the market area are quarries in the nearby Coast Ranges. Overall, crushed stone is not a viable substitute due to the abundance of sand and gravel aggregates in California.

Transportation Costs

The selling price of aggregate is largely a function of the cost of transportation. Transportation of aggregate is regulated by the California Public Utilities Commission. Rates are charged on a distance-traveled basis. The base rate is fixed at approximately $0.50, and a per-mile charge of $0.10 to $0.13 is also applied. Generally, if a customer can obtain a certain type of aggregate from two or more producers, the deciding factor will be the price of transportation – which is in turn a direct function of distance. Table 3, based on data provided by Dr. Bittlingmeyer and YCAPA, shows the significant effect of distance delivered aggregate prices.

OPERATING CHARACTERISTICS

Revenue

In 1990, 3.6 million tons of sand and gravel material were extracted from Cache Creek. According to YCAPA, the average book price per ton was $6.98. Of the 3.6 million tons extracted, 2.9 million tons were sold. Applying "book" prices provided by YCAPA, sales income for the industry may have been as high as approximately $20.4 million. Discounts from "book" prices may have resulted in slightly lower revenues.

Expenses

EPS has constructed an operating budget that represents a typical breakdown of expense items based on an industry survey of approximately 400 aggregate mining operations. These data do not reflect the actual costs incurred by Cache Creek's mining operations, which, as noted above, may not be profitable under current economic conditions. Neither do these data reflect the distribution of costs incurred by a firm that is internalizing all of its costs, including reclamation and recycling.

Table 4 shows typical operating expenditures for sand and gravel mining operations for illustrative purposes. As shown, major cost items include processing (approximately 32 percent of annual operating expenses), loading (18 percent), equipment and site maintenance (18 percent), energy (10 percent) and internal hauling costs (10 percent). Other activities such as dust control and reclamation are relatively minor costs to these producers.

Table 3
Existing Aggregate Prices and Transportation Costs
Cache Creek Gravel Study

Location	Price of Concrete Aggegate (f.o.b.)	Assumed Location of Construction Site					
		Gibson Road @ Hwy. 101 (Woodland)		I-80 @ I-5 (Sacramento)		I-80 @ Nut Tree Road (Vacaville)	
		Miles	Delivered Cost	Miles	Delivered Cost	Miles	Delivered Cost
Cache Creek							
Teichert	$5.62	8.7	$7.23	21.3	$8.70	29.2	$9.57
Solano	$5.62	18.7	$8.37	29.3	$9.57	22.4	$8.82
Sacramento							
Teichert	$5.01	28.7	$8.86	13.3	$7.21	40.2	$10.11
Granite	$4.60	31.6	$8.76	16.2	$7.14	43.1	$10.02

Source: Dr. George Bittlingmeyer; YCAPA; Economic & Planning Systems, Inc.

Table 4
Pro Forma Analysis
Cache Creek Gravel Mining Industry

Item [1]	Per Ton	Total
Income		
Sales of Aggregate (1990)	$6.98	$20,433,950
Expenses		
Processing	1.79	5,231,091
Loading	1.01	2,942,489
Hauling	0.56	1,634,716
Stripping	0.34	980,830
Maintenance	1.01	2,942,489
Energy	0.56	1,634,716
Dust Control	0.17	490,415
Reclamation	0.17	490,415
NOI [2]		4,086,790
Industry Profit w/debt service deduction [3]		2,043,395

[1] Operating expenses, net operating income (NOI), and debt service estimates derived from industry research. Not actual Cache Creek data. Data does not reflect mining firms that internalize all costs.
[2] NOI (as percent of gross sales) = 20%
[3] Debt service (as a percent of NOI w/o program) = 50%

Source: Vulcan Materials, Martin-Marietta, Beazer USA, Rock Products; EPS

It should be noted that the low costs of reclamation and other mitigation activities do not necessarily reflect the real costs resulting from sand and gravel extraction. Historically, a large percentage of such costs have been "externalized" (i.e., not reflected on the balance sheet) and either reflected as environmental degradation – an environmental cost – or a public sector cost.

This type of externalization is occurring to some degree in Yolo County's Cache Creek deposits. In effect, the County is attempting to encourage the mining industry to internalize its fair share of environmental and resource-related costs by stipulating that additional costs be absorbed to provide a means for clean-up, preservation, and monitoring.

Net Operating Income

Deducting operating expenses from gross revenue yields net operating income (NOI). EPS analyzed annual reports from several large, publicly-owned mining companies. These companies included Vulcan Materials Company, Beazer USA, and Martin-Marietta. Based on segment financial data from the construction materials divisions of the companies, a typical NOI over the past decade for large-scale aggregate companies nationwide has been in the range of 20 percent of net sales.

ABILITY OF THE LOCAL INDUSTRY TO ABSORB PROGRAM COSTS

As discussed earlier, the price elasticity of demand associated with aggregate material implies that a change in price will not result in a corresponding change in demand. **Figure 1** shows the percent increase in aggregate prices, assuming that the industry "passes-through" the fee to its customers. As shown, a $0.40/ton program-related expense could increase the average "book" price of aggregate by as much as six percent. A $0.30 fee would result in a corresponding increase of approximately four percent.

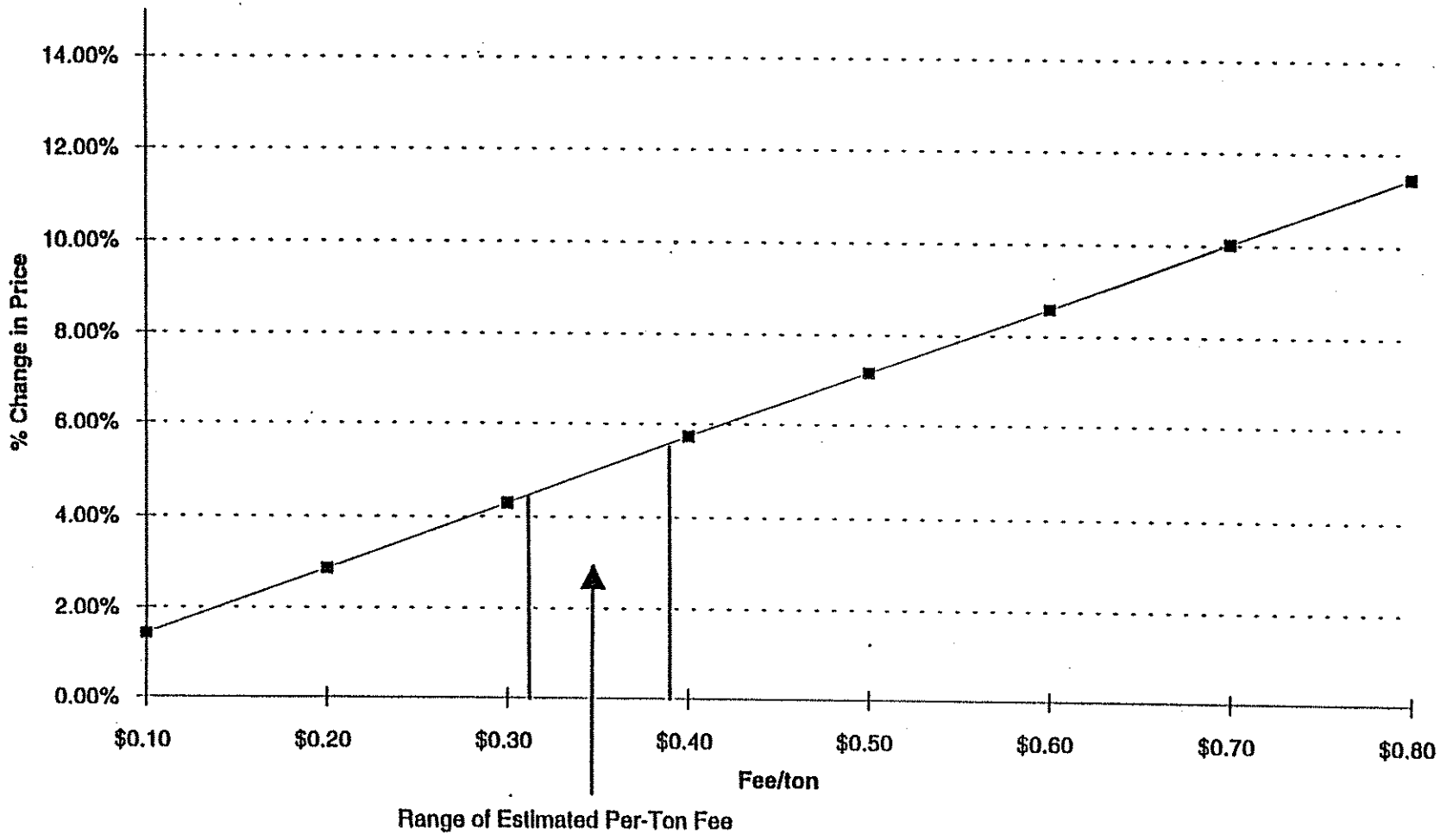
If we assume the average cost of PCC-grade aggregate increases 6 percent, the product is still price competitive at many construction locations with aggregate trucked from other areas such as the American River deposits. According to the analysis conducted for YCAPA by Dr. Bittlingmeyer, a per ton fee would have the following effects on sales volume:

- A $0.30 fee would reduce sales of concrete aggregate by 14 percent; aggregate base sales would decrease by 8 percent, and sand sales would decrease by 6 percent.

- A $0.40 fee would reduce sales of concrete aggregate by 19 percent; aggregate base sales would decrease by 16 percent, and sand sales would decrease by 12 percent.

It should be noted that these figures assume that construction sites are evenly dispersed across the Greater Sacramento Region. Furthermore, these estimates assume that there would be a one-to-one correlation between additional fee-related costs and the price of aggregate (i.e., additional costs cannot be internally absorbed by the local industry). Finally, the estimate is predicated on the assumption that buying decisions are purely a function of price – ignoring other factors such as buyer-seller relationships. Nevertheless,

Figure 1
Percent Increase in Aggregate Book Price
at Various Fees per Ton



the above-referenced estimates are useful and correct in illustrating the fact that price does have some effect on demand. As stated above, however, our analysis indicates that the Cache Creek *industry* could likely absorb a fee of $0.30 to $0.40 over time, although individual operators may be adversely affected if unable to adjust.

A final consideration is the element of time. Given the protected and/or urbanized status of the American River reserves, it is possible that such reserves may not remain available for mining in the future. As the viable American River deposits become more scarce over time, prices in that region will increase as production costs increase. Therefore, assuming that over the longer-term, off-channel aggregate mining occurs at Cache Creek as described by the Project Description, any temporary loss in market share will likely be recouped as competing areas incur higher operating costs due to a depletion of economically viable aggregate resource.

List of Sources and Contacts
Cache Creek Gravel Mining Program

Source/Contact	Agency/Firm/Publication/Author
Tom Gardner	Yolo County CAO Office
Donna Landeros	Yolo County CAO Office
Steven Jenkins	Yolo County Community Development
Dave Flores	Yolo County Community Development
Tom Tracy	Yolo County Public Works Dept.
Evert Terminello	YCAPA
Bob Lando	Andrews, Lando & Associates
George Bittlingmeyer, Ph.D.	U.C. Davis Graduate School of Management
A.G. (Sandy) McLellan, Ph.D.	University of Waterloo/Geo Concepts
Gary Case	East Bay Excavating
Steve Appleby	Compass Equipment, Inc.
Rita Schaffer	American Rock
Tom Chasm	Specialty Crushing
Greg Ryan	Zanker Road Landfill & Materials Management
Staff	Yolo County Sanitary landfill
Construction Cost Index	Engineering News Record/KCA Engineers
Joseph C. Scalmanini	Luhdorff & Scalmanini, Consulting Engineers
Solano Concrete Mining Application	Zentner & Zentner
Special Report 156 - Mineral land Classification	California Division of Mines & Geology
Yolo Co. HMP, Baseline Economic Conditions	Economic & Planning Systems, Inc.
"Riding the Recycling Wave" (October 1991)	Rock Products (trade journal)
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Lorin Ottonello	Morrison Knudson Corporation
"Economic Factors in Reclaiming Aggregate Mining Areas" (February 1981)	Mining Engineering (trade journal)
Recycling Portland Cement Concrete (1984)	Hankins, Richard B.
Gary Johnson	Mine Reclamation Corporation
Bob Gaiser	Sonoma County Planning Dept.
1991 Annual Report	Vulcan Materials Company
1992 Annual Report	Martin-Marietta Corporation
1990 Annual Report	Beazer USA
Selected Statistics on Mineral Industries (1982)	CA Dept. of Finance
Mineral Industry Surveys	U.S. Bureau of Mines
Cache Creek Associates EIR	CH2M Hill
"Construction Material Prices Continue to Rise" (November 1991)	Rock Products (trade journal)
1987 Census of Mineral Industries	U.S. Dept. of Commerce, Bureau of the Census
ABAG Projections '92 -- Recession Update	Association of Bay Area Governments
SACOG Draft Baseline Projections (1993)	Sacramento Area Council of Governments

Appendix A:

Gravel Mining Cost Analysis Model

Table 1a
Baseline Assumptions
Scenario I -- Low Extraction
Cache Creek Gravel Program -- Regulatory Cost Analysis

Annual Cost Factors	Allocation Methodology	Assumption	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)												
Scenario I -- Low Extraction	[1]	see note	1,500	3,500	3,345	3,443	3,545	3,649	3,757	3,836	3,917	4,000
Off-Channel Tons Sold	(percentage of tons mined)	90%	1,350	3,150	3,010	3,099	3,190	3,285	3,381	3,453	3,526	3,600
Off-Channel Sales Rev. (1,000s of 1993 $$)	(current avg. price per ton)	$5.76	$7,778	$18,144	$17,339	$17,850	$18,377	$18,919	$19,477	$19,888	$20,308	$20,736
Number of Off-Channel Operators												
New Operators w/o Monitoring Wells	(Excl. Teichert and Solano)		0	2	0	0	0	0	0	0	0	0
New Operators	(average per tons mined)	675,000	2	3	0	0	0	0	0	0	0	0
Cumulative Operators	(assumes current ratio, maximum of 5)		2	5	5	5	5	5	5	5	5	5
Acreage Mined												
Cumulative Off-Channel	(avg tons of resource per acre)	128,000	12	27	26	27	28	29	29	30	31	31
Sales Revenue/acre (1,000s of 1993 $$)			$664	$664	$664	$664	$664	$664	$664	$664	$664	$664
Acreage Under Reclamation												
Off-Channel	(per acre mined, three-year differential)	80%	0	0	0	9	22	21	22	22	23	23
Designated Access Roads (public)	(miles of Co.-maintained haul roads)	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
Administrative Time Requirement (all mining-related tasks)												
Planning Staff	FTE	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
County Counsel	FTE	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
County Administrator	FTE	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Recycling	(percent of off-channel material mined)		5%	5%	5%	5%	5%	10%	10%	10%	10%	10%
County Volume Requirement	total amount to be recycled		75.0	175.0	167.2	172.2	177.2	364.9	375.7	383.6	391.7	400.0
Acreage Precluded by Buffer Zone	(not estimated)	0.00%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Value of Buffer Zone Land	(not estimated)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

[1] Off-Channel Aggregate Extraction Rate Scenarios

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Scenario I	(low rate)	1,500	3,500	3,345	3,443	3,545	3,649	3,757	3,836	3,917	4,000
Scenario II	(high rate-straight-line)	1,500	3,500	4,500	4,735	4,874	5,018	5,168	5,275	5,380	5,500
Scenario III	(high rate business cycle)	1,500	3,500	4,500	5,000	5,500	5,000	4,500	3,500	3,000	2,750

Sources: Cache Creek Gravel Mining Program, Yolo County Planning, Sonoma County Planning, Means Square Foot Costs, Rock Products, California Division of Mines & Geology, other industry reports.

Table 2a
Estimated Component Costs of Program
Scenario I -- Low Extraction
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component (Co. costs in italics)	Assumption		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)												
Scenario I -- Low Extraction			1,500	3,500	3,345	3,443	3,545	3,649	3,757	3,836	3,917	4,000
1) County Resource Administration												
Staff Expenses												
Planning Staff (@ $50/hour)	$110,000	/year (see Table A-2)	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
Asst. County Counsel	$21,337	/year (see Table A-2)	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337
County Administrator	$17,258	/year (see Table A-2)	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258
New Equipment												
computer & software	$6,000	capital	6,000	0	0	0	0	0	0	0	0	0
maintenance & upgrades	$500	annual fixed cost	500	500	500	500	500	500	500	500	500	500
SUBTOTAL			155,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096
2) Recycling	$2,000,000	capital cost of central facility (	2,000,000	0	0	0	0	0	0	0	0	0
3) Mitigation Programs												
Environmental Impact Reports												
Master EIR -- off-channel	$325,000	one time up-front cost	325,000	0	0	0	0	0	0	0	0	0
Master EIR -- in-channel	$325,000	one time up-front cost	325,000	0	0	0	0	0	0	0	0	0
Project EIRs	$75,000	each new operator	150,000	225,000	0	0	0	0	0	0	0	0
Technical Advisory Committee	$36,000	annual fixed cost	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Truck Traffic Mitigation and Road Maintenance												
Truck Traffic Mitigation Program	$10,000	annual fixed cost	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
truck traffic mitigation activities	$10,000	annual fixed cost	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
signage	$10,000	capital cost	10,000	0	0	0	0	0	0	0	0	0
road maintenance	$0.0040	/ton hauled per mile	101,574	237,006	226,486	233,167	240,046	247,127	254,417	259,785	265,267	270,864
Land Use & Roadway Buffer Zones												
land use buffer zones -- stockpile regs	$20,000	annual fixed cost	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
roadway buffer zones	0%	of viable project area	0	0	0	0	0	0	0	0	0	0
Noise Level Restriction & Monitoring												
operational modifications	$15,000	annual fixed cost	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
SUBTOTAL			677,574	553,006	317,486	324,167	331,046	338,127	345,417	350,785	356,267	361,864
4) Biological and Archeological Analysis	INCLUDED IN EIR COST											
5) Reclamation												
On-site Agricultural Reclamation												
Reclamation Activities	$0.08	/ton mined	0	0	267,571	275,465	283,591	291,957	300,570	306,912	313,388	320,000
6) Water Resources												

Table 2a
Estimated Component Costs of Program
Scenario I -- Low Extraction
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component (Co. costs in italics)	Assumption	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Streamway/Fluvial Morphology	Cost encompassed by EIR										
Groundwater Resources Study	$75,000 capital	75,000	0	0	0	0	0	0	0	0	0
Annual Groundwater Report	$15,000 annual fixed cost	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
New Monitoring Wells	$3,600 capital per new operation	0	7,000	0	0	0	0	0	0	0	0
Water Level Evaluation	$2,400 annual per operation	4,800	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Water Quality Evaluation	$26,000 annual per operation	52,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
SUBTOTAL		146,800	164,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000
Implementation of Cache Creek Plan											
Sinking Fund	$0.10 /ton mined	150,000	350,000	334,464	344,331	354,489	364,946	375,712	383,640	391,734	400,000
TOTAL ALL COMPONENTS		3,129,470	1,216,102	1,225,617	1,250,059	1,275,221	1,301,126	1,327,795	1,347,432	1,367,484	1,387,960
TOTAL ALL COMPONENTS PER TON MINED		$2.09	$0.35	$0.37	$0.36	$0.36	$0.36	$0.35	$0.35	$0.35	$0.35

(1) Assumes costs to industry such as hauling would be offset by sales of recycled material.
Sources: Cache Creek Gravel Mining Program, Yolo County Planning, Sonoma County Planning, Rock Products, California Division of Mines & Geology, other industry reports.

Table 3a
Estimated Component Costs of Program -- Summary Table
Scenario I -- Low Extraction
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)										
Scenario I -- Low Extraction	1,500	3,500	3,345	3,443	3,545	3,649	3,757	3,836	3,917	4,000
TOTAL COSTS (Industry and County-Incurred)										
1) County Resource Administration	155,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096
2) Recycling	2,000,000	0	0	0	0	0	0	0	0	0
3) Mitigation Programs										
Environmental Impact Reports	800,000	225,000	0	0	0	0	0	0	0	0
Technical Advisory Committee	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Road Maintenance/signage	111,574	237,008	226,486	233,167	240,046	247,127	254,417	259,785	265,267	270,864
Traffic/noise/other	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000
4) Biological and Archeological Analysis	0	0	0	0	0	0	0	0	0	0
5) Reclamation	0	0	267,571	275,465	283,591	291,957	300,570	306,912	313,388	320,000
6) Water Resources	146,800	164,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000
7) Cache Creek Plan Implementation	150,000	350,000	334,464	344,331	354,489	364,946	375,712	383,640	391,734	400,000
TOTAL	3,454,470	1,216,102	1,225,617	1,250,059	1,275,221	1,301,126	1,327,795	1,347,432	1,367,484	1,387,960
PER OFF-CHANNEL TON MINED	$2.30	$0.35	$0.37	$0.36	$0.36	$0.36	$0.35	$0.35	$0.35	$0.35

Table 4a
Per Ton Program Costs
Scenario I -- Low Extraction
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)										
Scenario I -- Low Extraction	1,500	3,500	3,345	3,443	3,545	3,649	3,757	3,836	3,917	4,000
ADDITIONAL INDUSTRY COSTS										
Recycling	$1.333	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
EIRs & Mitigation Programs (excl. road mi	$0.594	$0.090	$0.027	$0.026	$0.026	$0.025	$0.024	$0.024	$0.023	$0.023
Biological and Archeological Analyses	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Reclamation	$0.000	$0.000	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080
Water Resources	$0.098	$0.047	$0.047	$0.046	$0.044	$0.043	$0.042	$0.041	$0.040	$0.039
SUBTOTAL	$2.025	$0.137	$0.154	$0.152	$0.150	$0.148	$0.146	$0.145	$0.143	$0.142
ADDITIONAL COUNTY COSTS (FEE)										
County Resource Admin.	$0.103	$0.043	$0.045	$0.043	$0.042	$0.041	$0.040	$0.039	$0.038	$0.037
Road Maintenance	$0.074	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068
Plan Implementation	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100
SUBTOTAL	$0.278	$0.210	$0.212	$0.211	$0.210	$0.209	$0.207	$0.207	$0.206	$0.205
TOTAL PROGRAM COST PER TON										
INDUSTRY COST + COUNTY FEE	$2.303	$0.347	$0.366	$0.363	$0.360	$0.357	$0.353	$0.351	$0.349	$0.347

Table 1b
Baseline Assumptions
Scenario II -- High Extraction -- Straight-line
Cache Creek Gravel Program -- Regulatory Cost Analysis

Annual Cost Factors	Allocation Methodology	Assumption	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)												
Scenario II -- High Extraction -- Straight-line	[1]	see note	1,500	3,500	4,599	4,735	4,874	5,018	5,166	5,275	5,386	5,500
Off-Channel Tons Sold	(percentage of tons mined)	90%	1,350	3,150	4,139	4,261	4,387	4,516	4,649	4,748	4,848	4,950
Off-Channel Sales Rev. (1,000s of 1993 $$)	(current avg. price per ton)	$5.76	$7,776	$18,144	$23,841	$24,544	$25,268	$26,013	$26,781	$27,346	$27,923	$28,512
Number of Off-Channel Operators												
New Operators w/o Monitoring Wells	(Excl. Teichert and Solano)		0	2	0	0	0	0	0	0	0	0
New Operators	(average per tons mined)	675,000	2	3	2	0	0	0	0	0	0	0
Cumulative Operators	(assumes current ratio, maximum of 5)		2	5	5	5	5	5	5	5	5	5
Acreage Mined												
Cumulative Off-Channel	(avg tons of resource per acre)	126,000	12	27	36	37	38	39	40	41	42	43
Sales Revenue/acre (1,000s of 1993 $$)			$664	$664	$664	$664	$664	$664	$664	$664	$664	$664
Acreage Under Reclamation												
Off-Channel	(per acre mined, three-year differential)	80%	0	0	0	9	22	29	30	30	31	32
Designated Access Roads (public)	(miles of Co.-maintained haul roads)	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
Administrative Time Requirement (all mining-related tasks)												
Planning Staff	FTE	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
County Counsel	FTE	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
County Administrator	FTE	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Recycling	(percent of off-channel material mined)		5%	5%	5%	5%	5%	10%	10%	10%	10%	10%
County Volume Requirement	total amount to be recycled		75.0	175.0	220.9	236.7	243.7	501.8	516.6	527.5	538.6	550.0
Acreage Precluded by Buffer Zone	(not estimated)	0.00%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Value of Buffer Zone Land	(not estimated)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

[1] Off-Channel Aggregate Extraction Rate Scenarios

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Scenario I	(low rate)	1,500	3,500	3,345	3,443	3,545	3,649	3,757	3,836	3,917	4,000
Scenario II	(high rate-straight-line)	1,500	3,500	4,599	4,735	4,874	5,018	5,166	5,275	5,386	5,500
Scenario III	(high rate-business cycle)	1,500	3,500	4,500	5,000	5,500	5,000	4,500	3,500	3,000	2,750

Sources: Cache Creek Gravel Mining Program, Yolo County Planning, Sonoma County Planning, Means Square Foot Costs, Rock Products, California Division of Mines & Geology, other industry reports.

Table 2b
Estimated Component Costs of Program
Scenario II -- High Extraction -- Straight-line
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component (Co. costs in italics)	Assumption		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)												
Scenario II -- High Extraction -- Straight-line			1,500	3,500	4,599	4,735	4,874	5,018	5,168	5,275	5,386	5,500
1) County Resource Administration												
Staff Expenses												
Planning Staff (@ $50/hour)	$110,000	/year (see Table A-2)	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
Asst. County Counsel	$21,337	/year (see Table A-2)	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337
County Administrator	$17,258	/year (see Table A-2)	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258
New Equipment												
computer & software	$6,000	capital	6,000	0	0	0	0	0	0	0	0	0
maintenance & upgrades	$500	annual fixed cost	500	500	500	500	500	500	500	500	500	500
SUBTOTAL			155,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096
2) Recycling	$2,000,000	capital cost of central facility (	2,000,000	0	0	0	0	0	0	0	0	0
3) Mitigation Programs												
Environmental Impact Reports												
Master EIR -- off-channel	$325,000	one time up-front cost	325,000	0	0	0	0	0	0	0	0	0
Master EIR -- in-channel	$325,000	one time up-front cost	325,000	0	0	0	0	0	0	0	0	0
Project EIRs	$75,000	each new operator	150,000	225,000	150,000	0	0	0	0	0	0	0
Technical Advisory Committee	$36,000	annual fixed cost	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Truck Traffic Mitigation and Road Maintenance												
Truck Traffic Mitigation Program	$10,000	annual fixed cost	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
truck traffic mitigation activities	$10,000	annual fixed cost	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
signage	$10,000	capital cost	10,000	0	0	0	0	0	0	0	0	0
road maintenance	$0.0040	/ton hauled per mile	101,574	237,006	311,418	320,605	330,063	339,800	349,824	357,205	364,742	372,438
Land Use & Roadway Buffer Zones												
land use buffer zones -- stockpile regs	$20,000	annual fixed cost	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
roadway buffer zones	0%	of viable project area	0	0	0	0	0	0	0	0	0	0
Noise Level Restriction & Monitoring												
operational modifications	$15,000	annual fixed cost	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
SUBTOTAL			677,574	553,006	552,418	411,605	421,063	430,800	440,824	448,205	455,742	463,438
4) Biological and Archeological Analysis	INCLUDED IN EIR COST											
5) Reclamation												
On-site Agricultural Reclamation												
Reclamation Activities	$0.08	/ton mined	0	0	367,911	378,764	389,938	401,441	413,283	422,004	430,908	440,000
6) Water Resources												

Table 2b
Estimated Component Costs of Program
Scenario II -- High Extraction -- Straight-line
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component (Co. costs in italics)	Assumption	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Streamway/Fluvial Morphology	Cost encompassed by EIR										
Groundwater Resources Study	$75,000 capital	75,000	0	0	0	0	0	0	0	0	0
Annual Groundwater Report	$15,000 annual fixed cost	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
New Monitoring Wells	$3,500 capital per new operation	0	7,000	0	0	0	0	0	0	0	0
Water Level Evaluation	$2,400 annual per operation	4,800	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Water Quality Evaluation	$26,000 annual per operation	52,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
SUBTOTAL		146,800	164,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000
Implementation of Cache Creek Plan											
Sinking Fund	$0.10 /ton mined	150,000	350,000	459,888	473,455	487,422	501,801	516,604	527,504	538,635	550,000
TOTAL ALL COMPONENTS		3,129,470	1,216,102	1,686,313	1,569,920	1,604,518	1,640,137	1,676,807	1,703,809	1,731,380	1,759,534
TOTAL ALL COMPONENTS PER TON MINED		$2.09	$0.35	$0.37	$0.33	$0.33	$0.33	$0.32	$0.32	$0.32	$0.32

(1) Assumes costs to industry such as hauling would be offset by sales of recycled material.
Sources: Cache Creek Gravel Mining Program, Yolo County Planning, Sonoma County Planning, Rock Products, California Division of Mines & Geology, other industry reports.

Table 3b
Estimated Component Costs of Program -- Summary Table
Scenario II -- High Extraction -- Straight-line
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)										
Scenario II -- High Extraction -- Straight-line	1,500	3,500	4,599	4,735	4,874	5,018	5,166	5,275	5,386	5,500
TOTAL COSTS (Industry and County-Incurred)										
1) County Resource Administration	155,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096
2) Recycling	2,000,000	0	0	0	0	0	0	0	0	0
3) Mitigation Programs										
Environmental Impact Reports	800,000	225,000	150,000	0	0	0	0	0	0	0
Technical Advisory Committee	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Road Maintenance/signage	111,574	237,006	311,418	320,605	330,063	339,800	349,824	357,205	364,742	372,438
Traffic/noise/other	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000
4) Biological and Archeological Analysis	0	0	0	0	0	0	0	0	0	0
5) Reclamation	0	0	367,911	378,764	389,938	401,441	413,283	422,004	430,908	440,000
6) Water Resources	146,800	164,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000
7) Cache Creek Plan Implementation	150,000	350,000	459,888	473,455	487,422	501,801	516,604	527,504	538,635	550,000
TOTAL	3,454,470	1,216,102	1,686,313	1,569,920	1,604,518	1,640,137	1,676,807	1,703,809	1,731,380	1,759,534
PER OFF-CHANNEL TON MINED	$2.30	$0.35	$0.37	$0.33	$0.33	$0.33	$0.32	$0.32	$0.32	$0.32

Table 4b
Per Ton Program Costs
Scenario II -- High Extraction -- Straight-line
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)										
Scenario II -- High Extraction -- Straight-lir	1,500	3,500	4,599	4,735	4,874	5,018	5,166	5,275	5,386	5,500
ADDITIONAL INDUSTRY COSTS										
Recycling	$1.333	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
EIRs & Mitigation Programs (excl. road mi	$0.594	$0.090	$0.052	$0.019	$0.019	$0.018	$0.018	$0.017	$0.017	$0.017
Biological and Archeological Analyses	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Reclamation	$0.000	$0.000	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080
Water Resources	$0.098	$0.047	$0.034	$0.033	$0.032	$0.031	$0.030	$0.030	$0.029	$0.029
SUBTOTAL	$2.025	$0.137	$0.167	$0.132	$0.131	$0.129	$0.128	$0.127	$0.126	$0.125
ADDITIONAL COUNTY COSTS (FEE)										
County Resource Admin.	$0.103	$0.043	$0.032	$0.031	$0.031	$0.030	$0.029	$0.028	$0.028	$0.027
Road Maintenance	$0.074	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068
Plan Implementation	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100
SUBTOTAL	$0.278	$0.210	$0.200	$0.199	$0.198	$0.197	$0.197	$0.196	$0.195	$0.195
TOTAL PROGRAM COST PER TON										
INDUSTRY COST + COUNTY FEE	$2.303	$0.347	$0.367	$0.332	$0.329	$0.327	$0.325	$0.323	$0.321	$0.320

Table 1c
Baseline Assumptions
Scenario III -- High Extraction -- Business Cycle
Cache Creek Gravel Program -- Regulatory Cost Analysis

Annual Cost Factors	Allocation Methodology	Assumption	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)												
Scenario III -- High Extraction -- Business C	[1]	see note	1,500	3,500	4,500	5,000	5,500	5,000	4,500	3,500	3,000	2,750
Off-Channel Tons Sold	(percentage of tons mined)	90%	1,350	3,150	4,050	4,500	4,050	4,500	4,050	3,150	2,700	2,475
Off Channel Sales Rev. (1,000s of 1993 $$)	(current avg. price per ton)	$5.78	$7,778	$18,144	$23,328	$25,920	$28,512	$25,920	$23,328	$18,144	$15,552	$14,256
Number of Off-Channel Operators												
New Operators w/o Monitoring Wells	(Excl. Teichert and Solano)		0	2	0	0	0	0	0	0	0	0
New Operators	(average per tons mined)	875,000	2	3	1	1	1	0	0	0	0	0
Cumulative Operators	(assumes current ratio, maximum of 5)		2	5	5	5	5	5	5	5	5	5
Acreage Mined												
Cumulative Off-Channel	(avg tons of resource per acre)	128,000	12	27	35	39	43	39	35	27	23	21
Sales Revenue/acre (1,000s of 1993 $$)			$664	$664	$664	$664	$664	$664	$664	$664	$664	$664
Acreage Under Reclamation												
Off-Channel	(per acre mined, three-year differential)	80%	0	0	0	9	22	28	31	34	31	28
Designated Access Roads (public)	(miles of Co.-maintained haul roads)	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
Administrative Time Requirement (all mining-related tasks)												
Planning Staff	FTE	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
County Counsel	FTE	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
County Administrator	FTE	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Recycling	(percent of off-channel material mined)		5%	5%	5%	5%	5%	10%	10%	10%	10%	10%
County Volume Requirement	total amount to be recycled		75.0	175.0	225.0	250.0	275.0	500.0	450.0	350.0	300.0	275.0
Acreage Precluded by Buffer Zone	(not estimated)	0.00%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Value of Buffer Zone Land	(not estimated)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

[1] Off-Channel Aggregate Extraction Rate Scenarios

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Scenario I	(low rate)	1,500	3,500	3,345	3,443	3,545	3,649	3,757	3,836	3,917	4,000
Scenario II	(high rate-straight-line)	1,500	3,500	4,599	4,735	4,874	5,018	5,166	5,275	5,386	5,500
Scenario III	(high rate-business cycle)	1,500	3,500	4,500	5,000	5,500	5,000	4,500	3,500	3,000	2,750

Sources: Cache Creek Gravel Mining Program, Yolo County Planning, Sonoma County Planning, Means Square Foot Costs, Rock Products, California Division of Mines & Geology, other industry reports.

Table 2c
Estimated Component Costs of Program
Scenario III -- High Extraction -- Business Cycle
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component (Co. costs in italics)	Assumption		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)												
Scenario III -- High Extraction -- Business Cycle			1,500	3,500	4,500	5,000	5,500	5,000	4,500	3,500	3,000	2,750
1) County Resource Administration												
Staff Expenses												
Planning Staff (@ $50/hour)	$110,000	/year (see Table A-2)	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
Asst. County Counsel	$21,337	/year (see Table A-2)	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337	21,337
County Administrator	$17,258	/year (see Table A-2)	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258	17,258
New Equipment												
computer & software	$6,000	capital	6,000	0	0	0	0	0	0	0	0	0
maintenance & upgrades	$500	annual fixed cost	500	500	500	500	500	500	500	500	500	500
SUBTOTAL			155,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096
2) Recycling	$2,000,000	capital cost of central facility (	2,000,000	0	0	0	0	0	0	0	0	0
3) Mitigation Programs												
Environmental Impact Reports												
Master EIR -- off-channel	$325,000	one time up-front cost	325,000	0	0	0	0	0	0	0	0	0
Master EIR -- in-channel	$325,000	one time up-front cost	325,000	0	0	0	0	0	0	0	0	0
Project EIRs	$75,000	each new operator	150,000	225,000	75,000	75,000	75,000	0	0	0	0	0
Technical Advisory Committee	$36,000	annual fixed cost	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Truck Traffic Mitigation and Road Maintenance												
Truck Traffic Mitigation Program	$10,000	annual fixed cost	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
truck traffic mitigation activities	$10,000	annual fixed cost	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
signage	$10,000	capital cost	10,000	0	0	0	0	0	0	0	0	0
road maintenance	$0.0040	/ton hauled per mile	101,574	237,006	304,722	338,580	372,438	338,580	304,722	237,006	203,148	186,219
Land Use & Roadway Buffer Zones												
land use buffer zones -- stockpile regs	$20,000	annual fixed cost	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
roadway buffer zones	0%	of viable project area	0	0	0	0	0	0	0	0	0	0
Noise Level Restriction & Monitoring												
operational modifications	$15,000	annual fixed cost	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
SUBTOTAL			677,574	553,006	470,722	504,580	538,438	429,580	395,722	328,006	294,148	277,219
4) Biological and Archeological Analysis	INCLUDED IN EIR COST											
5) Reclamation												
On-site Agricultural Reclamation												
Reclamation Activities	$0.08	/ton mined	0	0	360,000	400,000	440,000	400,000	360,000	280,000	240,000	220,000
6) Water Resources												

Table 2c
Estimated Component Costs of Program
Scenario III -- High Extraction -- Business Cycle
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component (Co. costs in italics)	Assumption	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Streamway/Fluvial Morphology	Cost encompassed by EIR										
Groundwater Resources Study	$75,000 capital	75,000	0	0	0	0	0	0	0	0	0
Annual Groundwater Report	$15,000 annual fixed cost	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
New Monitoring Wells	$3,500 capital per new operation	0	7,000	0	0	0	0	0	0	0	0
Water Level Evaluation	$2,400 annual per operation	4,800	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Water Quality Evaluation	$26,000 annual per operation	52,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
SUBTOTAL		146,800	164,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000
Implementation of Cache Creek Plan											
Sinking Fund	$0.10 /ton mined	150,000	350,000	450,000	500,000	650,000	500,000	450,000	350,000	300,000	275,000
TOTAL ALL COMPONENTS		3,129,470	1,216,102	1,586,818	1,710,676	1,834,534	1,635,676	1,511,818	1,264,102	1,140,244	1,078,315
TOTAL ALL COMPONENTS PER TON MINED		$2.09	$0.35	$0.35	$0.34	$0.33	$0.33	$0.34	$0.36	$0.38	$0.39

(1) Assumes costs to industry such as hauling would be offset by sales of recycled material.
Sources: Cache Creek Gravel Mining Program, Yolo County Planning, Sonoma County Planning, Rock Products, California Division of Mines & Geology, other industry reports.

Table 3c
Estimated Component Costs of Program -- Summary Table
Scenario III -- High Extraction -- Business Cycle
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)										
Scenario III -- High Extraction -- Business Cycle	1,500	3,500	4,500	5,000	5,500	5,000	4,500	3,500	3,000	2,750
TOTAL COSTS (Industry and County-Incurred)										
1) County Resource Administration	155,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096	149,096
2) Recycling	2,000,000	0	0	0	0	0	0	0	0	0
3) Mitigation Programs										
Environmental Impact Reports	800,000	225,000	75,000	75,000	75,000	0	0	0	0	0
Technical Advisory Committee	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Road Maintenance/signage	111,574	237,006	304,722	338,580	372,438	338,580	304,722	237,006	203,148	186,219
Traffic/noise/other	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000
4) Biological and Archeological Analysis	0	0	0	0	0	0	0	0	0	0
5) Reclamation	0	0	360,000	400,000	440,000	400,000	360,000	280,000	240,000	220,000
6) Water Resources	146,800	164,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000	157,000
7) Cache Creek Plan Implementation	150,000	350,000	450,000	500,000	550,000	500,000	450,000	350,000	300,000	275,000
TOTAL	3,454,470	1,216,102	1,586,818	1,710,676	1,834,534	1,635,676	1,511,818	1,264,102	1,140,244	1,078,315
PER OFF-CHANNEL TON MINED	$2.30	$0.35	$0.35	$0.34	$0.33	$0.33	$0.34	$0.36	$0.38	$0.39

Table 4c
Per Ton Program Costs
Scenario III -- High Extraction -- Business Cycle
Cache Creek Gravel Program -- Regulatory Cost Analysis

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons Mined (thousands)										
Scenario III -- High Extraction -- Business	1,500	3,500	4,500	5,000	5,500	5,000	4,500	3,500	3,000	2,750
ADDITIONAL INDUSTRY COSTS										
Recycling	$1.333	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
EIRs & Mitigation Programs (excl. road mi	$0.594	$0.090	$0.037	$0.033	$0.030	$0.018	$0.020	$0.026	$0.030	$0.033
Biological and Archeological Analyses	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Reclamation	$0.000	$0.000	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080	$0.080
Water Resources	$0.098	$0.047	$0.035	$0.031	$0.029	$0.031	$0.035	$0.045	$0.052	$0.057
SUBTOTAL	$2.025	$0.137	$0.152	$0.145	$0.139	$0.130	$0.135	$0.151	$0.163	$0.170
ADDITIONAL COUNTY COSTS (FEE)										
County Resource Admin.	$0.103	$0.043	$0.033	$0.030	$0.027	$0.030	$0.033	$0.043	$0.050	$0.054
Road Maintenance	$0.074	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068	$0.068
Plan Implementation	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100
SUBTOTAL	$0.278	$0.210	$0.201	$0.198	$0.195	$0.198	$0.201	$0.210	$0.217	$0.222
TOTAL PROGRAM COST PER TON										
INDUSTRY COST + COUNTY FEE	$2.303	$0.347	$0.353	$0.342	$0.334	$0.327	$0.336	$0.361	$0.380	$0.392

Table A-1
Derivation of Straight-Line Extraction Rates
Cache Creek Gravel Program -- Regulatory Cost Analysis

Item	Location of Material Consumed	Year 1 1995	Year 2 1996	Year 3 1997	Year 4 1998	Year 5 1999	Year 6 2000	Year 7 2001	Year 8 2002	Year 9 2003	Year 10 2004
Market Area Population Forecast											
Yolo County [1]		155,555	159,715	163,987	168,373	172,876	177,500	182,366	187,365	192,501	197,778
Solano County [2]		405,100	419,168	433,725	448,788	464,373	480,500	488,901	497,449	506,146	514,996
Sacramento County [3]		1,182,123	1,210,157	1,238,856	1,268,235	1,298,311	1,329,100	1,352,223	1,375,749	1,399,683	1,424,034
Napa County [4]		117,200	118,824	120,471	122,141	123,834	125,550	127,206	128,883	130,583	132,305
Annual Percentage Change		0	0	0	0	0	0	0	0	0	0
Yolo County	40%	n/a	2.67%	2.67%	2.67%	2.67%	2.67%	2.74%	2.74%	2.74%	2.74%
Solano County	38%	n/a	3.47%	3.47%	3.47%	3.47%	3.47%	1.75%	1.75%	1.75%	1.75%
Sacramento County	14%	n/a	2.37%	2.37%	2.37%	2.37%	2.37%	1.74%	1.74%	1.74%	1.74%
Napa County	8%	n/a	1.39%	1.39%	1.39%	1.39%	1.39%	1.32%	1.32%	1.32%	1.32%
Weighted Average Percentage Change [5]		n/a	2.95%	2.95%	2.95%	2.95%	2.95%	2.11%	2.11%	2.11%	2.11%
Aggregate Extraction Rates											
Low Off-Channel Scenario	[6]	1,500,000	3,500,000	3,344,643	3,443,310	3,544,888	3,649,462	3,757,121	3,836,396	3,917,344	4,000,000
High Off-Channel Scenario	[7]	1,500,000	3,500,000	4,598,884	4,734,551	4,874,220	5,018,010	5,166,041	5,275,045	5,386,348	5,500,000

[1] Based on "1990 Demographic Information for the County of Yolo" -- derived from special SACOG Report dated April 5, 1991. Interpolated based on estimates for 1995, 2000, and 2005.
[2] Based on "ABAG Projections '92 -- Recession Update" dated December 1992. Interpolated based on estimates for 1995, 2000, and 2005.
[3] Based on SACOG Draft Baseline Projections dated January 8, 1993. Interpolated based on estimates for 1990, 2000, and 2010.
[4] Based on "ABAG Projections '92 -- Recession Update" dated December 1992. Interpolated based on estimates for 1995, 2000, and 2005.
[5] Based on normalized weighted average using percentage of aggregate consumed in each respective County, per California Division of Mines & Geology Special Report #156, 1988.
[6] Initial two years represent estimated extraction during "ramp-up" period. After stabilization in year 3, extraction rates increase per regional population growth rate to a maximum of 5.5 million tons per year.
[7] Initial two years represent estimated extraction during "ramp-up" period. After stabilization in year 3, extraction rates increase per regional population growth rate to a maximum of 4.0 million tons per year.

Table A-2
Calculation of County Administrative Costs
Cache Creek Gravel Program -- Regulatory Cost Analysis

Position	FTE	Hours per FTE	Total Hours	Salary	Salary + OH/ Admin (1)	Hourly Rate	Annual Cost
Planning Staff	1.10	2,000	2,200	n/a	n/a	$50	$110,000
Asst. County Counsel	0.15	2,000	300	$71,124	$142,248	n/a	$21,337
CAO	0.10	2,000	200	$86,292	$172,584	n/a	$17,258
Total							$148,596

(1) Assumes a multiplier of 2.0.
Source: Yolo County Department of Community Development; County Administrator's Office; Economic & Planning Systems, Inc.