Draft – Environmental Impact Report

LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

Alameda County
Planning Department

[illegible] Eastmont Street, Hayward, California [illegible]
(415) 881-6401

ALAMEDA COUNTY PLANNING DEPARTMENT
399 Elmhurst Street, Hayward, California 94544 (415) 881-6401

July 10, 1979

INTERESTED PARTIES:

Accompanying this letter for your review and comment is a copy of the Draft Environmental Impact Report for a "master" Reclamation Plan for the Livermore-Amador Valley Quarry Area, a 3,820 acre area currently being mined for sand and gravel by three operators, located between Livermore and Pleasanton in unincorporated Alameda County. The "master" Reclamation Plan was submitted jointly by the three operators, Kaiser Sand and Gravel, Lone Star Industries, and Rhodes and Jamieson, to coordinate land and water reclamation of the area shown for quarry use on the Alameda County General Plan and intended to be mined, and also to satisfy requirements of the State Surface Mining and Reclamation Act of 1975.

All comments on the Draft EIR must be received by September 1, 1979, to be considered and included in the Final EIR for this project.

Alameda County intends to adopt a Specific Plan covering quarry area reclamation, based on the submitted Reclamation Plan as modified through the EIR and public hearing process. The Planning Commission will take testimony on the EIR while it is still in draft form, on Monday, August 20, 1979, at 1:30 p.m. in the Auditorium of the Public Works Building, 399 Elmhurst Street, Hayward, California. Interested parties may appear and give testimony with respect to the project or the Draft EIR at that time. Written comments are also welcome. The public hearing will then be continued to a date in September which will be announced at the first hearing.

If you have any questions on the project, Draft EIR, or review process, please don't hesitate to contact me or Adolph Martinelli at 881-6401.

Very truly yours,

Paul Deutsch

Paul Deutsch, Planner II
Development Planning Division

PD:gr

DRAFT
ENVIRONMENTAL IMPACT REPORT

LIVERMORE-AMADOR VALLEY
QUARRY RECLAMATION PLAN

Alameda County Planning Department
July 10, 1979

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I. SUMMARY

The Alameda County Planning Commission has been requested to approve a "master" Reclamation Plan submitted by the three quarry operators in a 3,820 acre area between Livermore and Pleasanton designated for quarry use on the Alameda County General Plan. The Quarry Area is shown on the various maps included in this report. Much of the area has been mined or is under valid permit for future mining. The "master" Reclamation Plan, after analysis and changes based on this EIR, public testimony, and referral agency input, will be the basis for adoption by Alameda County of a Specific Plan for the quarry area's reclamation, under Sections 65450-65553 of the Government Code. The Specific Plan is, in a sense, the underlying project under consideration. Its general requirements, maps, policies, and supporting materials will form the framework and basis for very detailed reclamation plans to be submitted by each of the three operators. The three operators, Kaiser Sand and Gravel, Lone Star Industries, and Rhodes & Jamieson, have collaborated to produce a unified proposal. The Specific Plan to be adopted will allow analysis of individual reclamation plans as they mesh with overall adopted concepts. The process is intended to return depleted lands to productive use and mitigate permanent adverse effects of mining, and to satisfy requirements of the State Surface Mining and Reclamation Act of 1975 and the Alameda County Surface Mining Ordinance. The basic Reclamation Plan, dated January, 1977, was updated in November, 1978, to include mitigation for impacts identified early in the environmental review process. Excerpts from the original Plan and the full supplement appear as Appendix A of this EIR.

Reclamation Plan impacts and mitigation measures, and background and setting of the quarry area, are complex. THIS SUMMARY IS NOT INTENDED AS A SUBSTITUTE FOR READING THIS ENTIRE DRAFT EIR FOR THOSE WHO DESIRE TO UNDERSTAND THE ISSUES AND IMPACTS.

Quarry permits have been granted for much of the land area in the Quarry Area in recognition of the benefits of harvesting the sand and gravel resource in the Livermore-Amador Valley. These benefits include considerable cost savings to the Bay Area economy due to the relatively close proximity of high grade construction materials and significant energy savings in the form of transportation fuel, again due to the nearness of the resource to its markets. Mining has distinct impacts which Reclamation Plans are required to address. Certain impacts, such as those caused by heavy truck traffic, relate to ongoing operations and are not properly addressed in the Reclamation Plan or this EIR. The Reclamation Plan is a result of a mining plan, and mining impacts which continue after actual quarrying ceases are properly discussed in a reclamation plan; if they are not, then the plan is deficient. Reclamation is defined in the Alameda County Surface Mining Ordinace as:

> "...the combined process of land treatment that minimizes disruption or alteration of groundwater movement, water quality degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion, sedimentation, and other adverse effects from surface mining operations, including adverse surface effects incidental to underground mines, so that mined lands are reclaimed to a usable condition which is readily adaptable for alternate land uses, and so that adverse impacts on groundwater resources are mitigated, and no danger to public health or safety is created. The process may extend to affected lands under the control of the operator surrounding mined lands, and may require backfilling, grading, resoiling, revegetation, soil compaction, erosion and sediment control, stabilization, restoration of groundwater recharge areas, or other measures."

Because of the intertwined nature of mining and reclamation, strict separation of impacts of mining from some impacts of reclamation is difficult and would fail to present a full picture of the context of reclamation. Impacts of ongoing mining operations have occurred and will continue to occur. Past Quarry Permits were granted prior to CEQA and environmental review pursuant to CEQA was not conducted. Future permit applications will be subject to CEQA and the impacts of mining will be discussed in environmental review at that time. This EIR discusses impacts of the Reclamation Plan proposals as presented to the public.

The Reclamation Plan proposes arranging gravel pits in such a manner as to create a "chain of lakes" which would be interconnected to allow water movement to occur through the area. Otherwise, depleted pits backfilled with fine sands and silts remaining after quarrying is completed would block transmission of the important resource of groundwater through the area. The Plan describes the arrangement of land and water masses and potential available land uses from the present through the year 2030, when mining is to be terminated upon exhaustion of the sand and gravel resource. Figures 4A through 4D in this report present the proposed appearance of the Quarry Area over time. Beyond simply using the chain of lakes for water transmission, the Plan suggests possibilities of their use for water storage, flood control, recreation, and water quality enhancement. The Plan also proposes keeping groundwater levels low during the mining period so as not to interfere with quarrying operations. The Plan also calls for normal finished cut slopes of 1:1. Lands in the Quarry Area are in private ownership and may remain so; the Reclamation Plan does not discuss ultimate ownership. Specific land uses would be available for certain land areas, according to the Plan, based on engineering and geologic considerations concerning origin of the particular reclaimed land area. Actual commitment to the bulk of land uses proposed properly has been deferred until the usual factors determining land use become clearer, in the future. Land uses are flexible and impacts are purely speculative at this time; environmental review would have to occur at such time as specific uses were actually proposed. To a large extent, land uses are dependent on the uses of the water areas. For these reasons, impacts of land uses have been given only cursory treatment in this EIR in favor of detailed analysis of impacts of water uses.

This Environmental Impact Report is being prepared by the Alameda County Planning Department in accordance with requirements of the California Environmental Quality Act (CEQA), as amended, and State and County implementing guidelines, for consideration by the Planning Commission (Lead Agency) and Responsible Agencies prior to action on the request. Bruce Fry and Adolph Martinelli are responsible for overall direction and final editing of EIRs. Text is by Paul Deutsch, Project Director. Graphics are by Paul Deutsch. Portions of the report dealing with Water Resources are based on material prepared by Harvey O. Banks, Consulting Engineer, Inc., retained for this task. Geology, Soils, Seismicity, and Water Resources sections were reviewed by David Carpenter, Consulting Engineering Geologist (R.G. #248, C.E.G. #135). Reclamation Plan was developed by Environ, San Leandro.

The Quarry Area consists of 3,820 acres. At present, about half is undisturbed land, about 25% is working pits, 20% is water surface, and about 3% is regenerated land from past mining operations. By 2030, the Reclamation Plan proposes that 12% would remain undisturbed, 57% would be water surface, and 31% would be regenerated land (either capped settling ponds or earthfill). Agricultural and open space uses predominate on land not under active quarrying. The area is relatively flat and is traversed by two watercourses, Arroyo Mocho and Arroyo del Valle. It encompasses the central, and most important components of the water resource system in the Livermore-Amador Valley. Groundwater and groundwater storage is an important Valley resource. Most of the approximately 35,000 acre-feet of water used annually in the Valley is groundwater. Water is also imported from the South Bay Aqueduct. Significant recharge of natural and imported water into the groundwater basin takes place along Arroyos Mocho and del Valle. By 1965, groundwater levels in the Valley had dropped about 100 feet because of overdraft conditions; since importation of water began groundwater levels have been rising.

Positive and negative impacts of the Reclamation Plan are very briefly summarized below. Impacts are referenced to the section(s) in the text in which they are discussed in full.

The Reclamation Plan as proposed would generate significant positive impacts, including:

1. Precedential cooperation of the three operators to produce a coordinated plan, thus avoiding problems of disjointed planning in the Quarry Area. The interrelatedness of the Quarry Area in terms of geology, hydrology, and other factors is thereby recognized.

2. Regeneration of land areas after resource extraction which would be available to accommodate a variety of uses. (Section IV.D.1.)

3. Arrangement of land and water masses, which inevitably are produced by mining, into a coherent, reasonably flexible form. (Section IV.C.3.c.(1))

4. Establishment of permanent open space between Livermore and Pleasanton, consisting of water areas and certain unbuildable land areas. (Section IV.D.4.)

5. Increase in water storage capacity (in pits) over natural groundwater storage capacity in the groundwater basin. Open water storage would increase to over 2,000 acres. (Section IV.C.3.b.(3)). (But open storage instead of natural underground storage causes certain adverse impacts noted below.)

6. Opportunity for very significant public benefits with appropriate water management, including flood control, water conservation, water quality enhancement, and recreation. (Section IV.C.3.c.(6)).

7. Increased wildlife habitat with expected increase in wildlife species number and diversity. (Section IV.C.4.)

The Reclamation Plan would also generate adverse impacts, which, along with mitigation measures to reduce the impacts, are presented below:

1. About 1,300 acres of impermeable core would be placed in the center of the upper groundwater bearing zone. Mitigation is proposed as the heart of the Reclamation Plan in the "chain of lakes" concept, to maintain transmissivity of water, but at certain costs and with certain other impacts. (Section IV.C.3.)

2. Increase in water use primarily due to evaporation from proposed lakes. Some mitigation occurs via the increase in storage capacity available, but with impact of increased costs to make use of capacity. (Section IV.C.3.b. (2) and (3)).

3. Increased cost of transmitting water through the Quarry Area for operation and maintenance of necessary facilities. Can be mitigated by requiring an operating fund to be set up by the quarry operators. (Sections IV.C.3.b. (7) and IV.D.11.)

4. Potential degradation of water quality due to low inflow in relation to high evaporation rates. Salts may build up in the lakes. Some mitigation available if water flow is increased for any reason, e.g. flood flow control or conservation use. (Sections IV.C.3.b. (6) and IV.C.3.c. (1)).

5. Potential degradation of water quality due to exposure to atmosphere, human contact, potentially polluting development of land areas. Mitigation can be accomplished by establishing buffer strips around basins, limiting human contact in critical areas, and controlling land uses to minimize possibility of pollution. (Section IV.C.3.b.(6) and IV.C.3.c.(3).

6. Potential for siltation in water storage facilities if water is diverted into basins. Mitigation can be accomplished through construction of desilting basins. (Sections IV.C.3.b.(6) and IV.C.3.c.(4)(6)).

7. Increase in complexity of managing the groundwater basin, which is unmitigable. (Section IV.C.3 and IV.D.11.).

8. Possible loss of recharge and percolation areas due to impervious surfaces from development and loss of natural stream channels. Direct mitigation is possible if development is limited and if replacement channels are designed to allow percolation. Indirect mitigation is possible if available increased storage capacity is utilized. Either mitigation concept involves increased costs. (Section IV.C.3.b.(5)).

9. Increased safety hazard, difficulty of maintenance and access, potential for siltation, and limiting of potential land uses due to proposed 1:1 slopes. Mitigation would occur under the County Surface Mining Ordinance, which requires 2:1 reclaimed slopes unless demonstrated not to be necessary or desirable. (Sections IV.C.1, IV.C.3.c.(2) and IV.D.1.).

10. Although mining will result in loss of riparian habitat along Arroyo del Valle, no consideration is given in the reclamation plan to replacement of riparian and wildlife values. Some mitigation will occur through natural processes. Significant mitigation could be achieved through design and landscaping, of the proposed replacement channel. (Section IV.C.4.).

11. Possible abandonment of reclamation concept if costs become too large or if gravel companies, for whatever reasons, do not construct facilities. The Reclamation Plan depends on close cooperation of all three operators and could be jeopardized if this cooperation is not maintained over the decades. The Plan would also be jeopardized if one or more of the operators abandoned mining prior to effectuation of the Plan. Abandonment of concept would hinder effective reclamation of Quarry Area and could generate significant impacts on land and water resources. Mitigation could be accomplished by requiring that a fund be built up sufficient to guarantee execution of the concept as adopted during the active mining period, e.g., that in the year 2030, physical facilities will be in place. Estimates of construction costs would be necessary. (Sections IV.C.3.b.(7) and IV.D.11.)

12. Possible unworkability of concept due to lack of geologic and hydrologic information concerning certain assumptions made, resulting in possible loss of great public benefit if multipurpose use of facilities is not undertaken. Mitigation: studies to determine specific type and size of facilities needed to maintain water movement and quality would be needed and could be performed in connection with studies to expand the geohydrologic data base and to determine feasibility of multipurpose use. To mitigate cost impacts gravel companies would bear a portion of these studies attributable to Reclamation Plan implementation. (Sections IV.C.3.b., IV.C.3.c.(4) and (5), and IV.D.11.).

13. Possible abandonment of concept and possibility of operation contrary to the best public interest, assuming lands will remain in private ownership. Mitigation can be accomplished by assumption by the appropriate public agency(ies) of direction, construction and operation of the mitigation facilities, management and use of the facilities to effectuate a water management plan, access to all facilities for inspection and maintenance, management and use of the groundwater resources in the area undiminished from the natural state with respect to quantity and quality, and the use of the basins (if shown feasible) for multipurpose water resource management. A fund should be built up to ensure operation and maintenance expenses will be available for costs of mining mitigation operations, if conducted by a public entity, after the year 2030. (Sections IV.C.3.b.(7) and (V.D.11.)

14. A distinct set of impacts is associated with keeping basin groundwater levels low enough so as not to interfere with "economically viable extraction" of sand and gravel, as called for in the Plan, including:

    - loss of storage capacity of the groundwater basin during the mining period.

- loss of currently available water at cheaper rates
- loss of hedge against drought
- increased energy consumption necessary for increased pumping
- possible salt buildup in the basin
- curtailment of groundwater management options
- loss of opportunity to fill basin if State Water Project water becomes short in future years

This issue relates to mining, not reclamation, but is recommended as part of the operators' Reclamation Plan, and consequently discussed in the EIR. (Section IV.C.3.b.(4)).

15. The Plan claims that the only considerations which would limit future land uses on reclaimed land areas are proximity to ongoing mining, geology, and structural soundness. Impacts on future public plans, policies, and environmental quality could occur. Mitigation is possible through recognition in the Reclamation Plan and implementing Specific Plan that Open Space and mining-related industrial uses are most appropriate uses based on present knowledge until it can be demonstrated that more intensive uses would be consistent with public plans, policies, or environmental quality applicable at such future times. (IV.D.1.)

A number of alternatives are examined in the EIR text. The "No project" alternative of no reclamation is not possible under State law. An alternative which would increase land areas at or near original ground elevations under ultimate reclamation is advantageous from a land use standpoint, but would create critical groundwater movement problems and would cause permanent loss of water storage capability. Importation of extensive amounts of fill materials would be required which may not be feasible.

Maximization of resource extraction was examined and found to be beneficial in terms of economy and energy, but detrimental to future use flexibility upon reclamation.

An alternative which eliminates the chain of lakes concept in favor of creation of land areas, either above or below groundwater levels, was found to have advantages of eliminating evaporative losses (if groundwater movement was maintained via a system of conduits) and safeguarding water quality. Considerable study would be required to determine sizing and location of conduits to ensure full replacement of natural groundwater storage and flow. Disadvantages include possible adverse impacts on planned mining operations, questionable utility of land areas created, uncertain feasibility as to whether sufficient fill material would be generated by mining to reclaim such extensive land areas, and loss of opportunity for multipurpose water management.

The EIR text discusses (Section IV.C.3.c.(6)) the possibility of carrying the Reclamation Plan concepts further to ensure the future possibility of optimizing water resources to allow for multipurpose water management of the reclaimed Quarry Area.

II. INTRODUCTION

A. Background

In this section is presented a brief outline of quarrying and reclamation, so that the unfamiliar reader can grasp the context of the project and this EIR.

1. Quarrying and Reclamation

The type of quarry operation under consideration involves the extraction and processing of sand and gravel. Excavation is carried out to recover aggregate in areas where it naturally occurs. Aggregate is used either as an unbound base or as a filler mixed with a cementing matrix to form a conglomerate mass. Sand and gravel are two natural aggregates. Sand is defined as rock or mineral fragments between three-thousandths of an inch to one-quarter of an inch in diameter. Gravel consists of rock or mineral fragments between one-quarter inch and three and one-half inches. In an unbound state, aggregates are used as the foundation base for roads, all types of structures, and public works. When mixed with a binding agent to form asphaltic concrete, aggregates become a surfacing material with wide application; when combined with Portland cement and water they form concrete.

The mining process involves digging of very large pits in the surface to recover sand and gravel where it is present in economic amounts. Onsite conveyers and various processing machinery separate sand from gravel and sort the materials according to size. The operation is generally very large, visible, quite noisy and dusty, generates heavy truck traffic, and has the potential to leave mined out pits which serve no purpose and can constitute a safety and health hazard. Reclamation involves planning to avoid this undesirable end state. Reclamation, in a sense, is mitigation for the unavoidable adverse impacts of quarrying itself. As defined in the California Surface Mining and Reclamation Act of 1975, reclamation means the combined process of land treatment that minimizes water degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion, and other adverse effects from surface mining operations so that mined lands are reclaimed to a usable condition which is readily adaptable for alternative land uses and creates no danger to public health or safety. The process may extend to affected lands surrounding mined lands, and may require backfilling, grading, resoiling, revegetation, soil compaction, stabilization, or other measures.

2. Quarrying and Reclamation in the Livermore-Amador Valley

The Livermore-Amador Valley in Alameda County contains extensive deposits of high quality aggregate of great economic importance to the entire Bay Area. The 3,820 acre area between Pleasanton and Livermore, currently mined by three companies, supplies nearly half of all regional sand and gravel. This area also has the largest reserves of this resource in the region and so is expected to supply an even higher proportion in the future as other deposits are depleted. The companies eventually intend to extract a known reserve of 400,000,000 tons, which at currently projected rates of demand would last about 50 to 55 years.[1]

The three companies currently mining in the area are Kaiser Sand & Gravel, Lone Star Industries, Inc., and Rhodes and Jamieson, Ltd. (which recently acquired California Rock & Gravel, a former major producer). Mining in the Quarry Area takes place under seven separate permits issued by the County of Alameda. The permits were granted in the period 1957-1969. (An eighth permit, Q-14, expired in 1978). The earliest permits, covering most of the land area under permit, were granted with no time limit. Only two of the permits required submittal of a reclamation plan. One reclamation plan has been approved. The other will be submitted after the comprehensive plan is adopted.

Under the Surface Mining and Reclamation Act of 1976, submittal of a reclamation plan is required for all operations conducted after January, 1976. The major operators in the Quarry Area between Pleasanton and Livermore, recognizing that individual, uncoordinated reclamation plans were of limited value because of the inter-relationship of their contiguous operations, engaged a consulting engineering firm (Environ) to draw up a master reclamation plan for the entire 3,820 acre Quarry Area, including lands already under permit and reserves. This plan is the subject of this Environmental Impact Report.

The submitted Reclamation Plan covers the area shown on the Alameda County General Plan as Sand & Gravel Quarry. The Reclamation Plan assumes certain areas not now under permit will be mined. If, for some reasons these areas were not to be mined, the Reclamation Plan would need to be reviewed and, if necessary, revised.

3. Scope of the EIR

Alameda County, acting as Lead Agency, has determined that this EIR properly should consider impacts of the Reclamation Plan and not the quarrying operations themselves. All three operators have some existing vested rights under law to mine extensive areas. All existing permits were granted prior to CEQA. It is recognized that quarry operations in the Livermore-Amador Valley have significant impacts on the environment. A reclamation plan is intended to mitigate those impacts by restoring the land to a usable and beneficial form and to avoid potential impacts that would occur if no reclamation of depleted pits were to take place. The Reclamation Plan has a significant set of impacts distinct from those of ongoing, active quarrying. However, mitigable impacts of mining should be addressed in a reclamation plan, or else the plan should be considered deficient.

The Reclamation Plan as submitted is a general, not specific plan. Each quarry operator will be responsible for submitting and obtaining approval for a specific reclamation plan covering his particular operation. It is wise to build in flexibility to the Plan because goals and objectives of the area, which would be reflected in the Plan, can change drastically over the 50-year span of the Plan. For this reason, specific land uses are given only cursory discussion, it being assumed that they would be determined well in the future when future public needs and desires become clear. The primary impact identifiable at this time involves the effects of the Reclamation Plan upon water resources of the LivermoreAmador Valley. Accordingly, a consultant has been retained to determine these impacts and possible mitigation measures, which are treated fully in this report.

Based on initial stages of environmental review for this report, the quarry operators have incorporated certain changes in the Reclamation Plan as mitigation measures which were not part of the plan as originally referred to concerned agencies. Differences between the original and revised plans are discussed in detail in the main text of this EIR, and the revision text is included in Appendix A.

III. PROJECT DESCRIPTION

The Livermore-Amador Valley Quarry Reclamation Plan is intended to mitigate effects of quarry operations in the Quarry Area by arranging land and water masses in a coherent manner and ensuring that vital transmission of groundwater will not be impeded. The Plan is also intended to provide for and make explicit overall potential uses for the land and water masses, both while quarrying is taking place and after it is completed. The Plan is proposed by the three operators in the Quarry Area, Kaiser Sand & Gravel, Lone Star Industries, and Rhodes & Jamieson.*

*Since publication of the original Plan, California Rock & Gravel has been purchased by Rhodes & Jamieson. The California Rock operations were near the eastern border of the Quarry Area, near its center, and the designation carries over to some of the maps in this report as well as some references in the text.

The Plan reflects constraints of geology and timing as related to gravel extraction. The Plan is general at this point; each operator will be submitting detailed reclamation plans in the future, guided by the overall concepts to be approved in the "master" plan now under consideration. After comments on the Plan and this EIR are received and public hearings are conducted, the Plan will form the conceptual basis for adoption by Alameda County of a Specific Plan for quarry area reclamation. The Specific Plan may consist of maps, policies, and supporting materials and will guide the very detailed specifics of reclamation to be submitted by each operator and considered by the County after Specific Plan adoption.

The Reclamation Plan is presented in the publication "Livermore-Amador Valley Quarry Reclamation Plan," dated January, 1977, prepared by ENVIRON consultants in San Leandro, California.[2] The Plan was updated in December, 1978. Portions of the Plan and revision are contained in Appendix A. In this section, the Plan will be summarized. Part of the Plan consists of Maps of the quarry area, showing the proposed staging plan and available land use in 2030 and intervening years. These maps are reproduced in this report.

The most basic feature of the Reclamation Plan is the amount and relationship of land and water areas. Water fills empty pits which have been quarried out due to groundwater and runoff accumulation. Filling the pits creates land area. Land area can be segregated into three basic categories: undisturbed land, regenerated land where quarrying has been completed, and land used for active quarrying. In the Plan base year of 1975, 53% of the 3,820 acre Quarry Area had not been disturbed, 24% was working pits, 20% was water surface, and 3% was regenerated land area. By 1955, the Plan calls for 39% undisturbed land, 29% working pits, 20% water, and 12% to be regenerated. By 2010, the amount of undisturbed land would fall to 22%, 18% would be working pits, 36% would be water, and 24% would be regenerated land. At the conclusion of quarrying operations in 2030, 12% would remain undisturbed, never quarried. Regenerated land would cover 31% of the Quarry Area and water would cover 57%. The single most obvious feature of the Plan is the great shift from the present mostly land area to predominately water area.

The shift reflects the limited amount of earth material left after quarrying operations take place. The Plan proposes a "chain of lakes" to permit conveyance of water through the lakes from Arroyos del Valle, Mocho, and Las Positas to any location around the Quarry Area periphery. The Plan proposes conduits between key water-filled pits in order to maintain transmission of groundwater through the Quarry Area.

Beyond proposing locations for land and water masses, the Plan states potential uses for land areas for the period of active quarrying and for the period after quarrying is completed. Three types of reclaimed land areas are distinguished as to potential land use based on geologic stability and load bearing capacity, which in turn depends on the manner in which depleted pits are filled. One type of land (earth fill) will be structurally suitable for all types of urban development; another type (settling ponds) is not capable of supporting any structures; and the third type (capped settling ponds) can sometimes support industrial type structures. In the interim period between now and the closure of quarrying operations, the additional constraint of proximity to the operations serves to limit potential land uses. It should be made clear that the Plan depicts potential, available land uses only, to the "highest" uses for each distinguishable reclaimed area. The Plan does not propose land uses. All land areas could be capable of supporting agricultural or open space uses as well.

In addition to the gross designation of land and water areas, the Plan proposes the following additional physical features:

- Retention or construction of a channel for Arroyo del Valle along the southern perimeter of the Quarry Area, to help conveyance of water from South Bay Aqueduct or Del Valle Reservoir through the valley to Arroyo de la Laguna and thence through to Niles Cone (groundwater basin used for domestic water supply by Alameda County Water District in Fremont, Newark, and Union City).

- Conduits connecting water filled pits are proposed which could transmit or block water flow through the area. The Plan proposes that the Quarry operators be responsible for the cost of conduits which would be capable of maintaining a "natural" condition but that the cost of larger conduits or gates to enhance water management not be borne by them.

- Two alternative schemes for Arroyo Mocho: either (1) relocation to the north of the present channel, proposed by the Plan to be partly financed by the Special Drainage Area 7-1 program of Alameda County Flood Control Zone 7; or (2) retaining the existing Arroyo Mocho channel and diverting flood flows into depleted pits, using a tunnel which would be constructed underneath Stanley Boulevard, the cost of which would be "shared by Rhodes & Jamieson and Zone 7 based on the relative use of each and the relative size requirements for each."[3]

- Alignment of Las Positas Boulevard is depicted along a route just outside the northern boundary of the Quarry Area, north of the alignment shown on the Livermore General Plan.

As significant as the physical facilities proposed in the Reclamation Plan are the policies and management arrangements proffered:

- The Plan notes that 2,160 acres of lakes remaining in the Quarry Area after operations have ceased have significant storage capacity. Raising the water level 10 feet, for example, would provide over 20,000 acre-feet of storage which could be utilized during periods of heavy runoff. If the necessary physical facilities were to be built and operated, a 50 foot elevation rise, equivalent to 100,000 acre-feet of storage, could be effected in a major storm. Flood reduction benefits would occur downstream.

- The Plan suggests utilizing the pits to store high quality ground and imported water with which to recharge the groundwater basin, with the aim of improving water quality. Also suggested is the use of some pits to store urban runoff from the City of Livermore for treatment prior to discharge or underground recharge, to meet water quality requirements of the federal Clean Water Act. (Section 208 of PL 92-500).

- The Plan states that interim uses of some pits for flood control and recharge operations are possible through negotiations with individual operators. The potential uses of the depleted pits, at the conclusion of quarry operations and in the interim, often conflict with each other. These conflicts are not irresolvable; similar conflicts occur in determining how water storage capacity of any large reservoir is to be used. The Plan recognizes the need for an overall water management plan to guide operation of the physical facilities proposed. In addition, the operators desire a water management plan in the interim period which would minimize disruption to their operations caused by rising groundwater levels.

- Operation and maintenance of the facilities proposed would be an ongoing expense long after the quarry operators have departed. The Reclamation Plan implies that Zone 7, as the Valley's basic water management agency, would construct, maintain, and operate the diversion works and pipes, valves and gates hydraulically connecting the "chain of lakes." Recreational areas would be managed by a park district, possibly East Bay Regional Park District. Land areas might be sold off for development. The Plan does not indicate whether the gravel companies intend to ekkp, sell, or convey any part of their lands or future facilities.

- The Plan proposes final cut slopes of 1:1 or the natural angle of repose, whichever is flatter, with the exception of final cut slopes next to properties used for non-quarry purposes or next to public rights-of-way, which are proposed for the same slope but with a 15-foot wide bench about 5 feet above maximum ground water level.

- The Plan strongly suggests the possibility of recreational use of some of the water areas, agricultural and open space use of much of the land areas, and fishery use of some of the water areas.

- The Plan calls for augmentation of its physical and conceptual scheme by each operator, including precise reclamation proposals as required by the State Surface Mining and Reclamation Act of 1975. Provision for future modification of specific aspects of the detailed plans is also recommended.

Details concerning size and capacity of pits for water storage were not submitted, nor does the Plan discuss design or costs involved in constructing and operating the extensive physical facilities proposed. While the Plan suggests a wide variety of land uses and water management beneficial uses for the depleted mining area, commitment to providing for specific uses is generally absent.

IV ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

A. Regional Setting/Vicinity

The project site, shown on Figures 2 and 3, is between the cities of Pleasanton and Livermore in the unincorporated portion of Alameda County in the LivermoreAmador Valley. The Livermore Valley is located between the extensively developed San Francisco Bay plain and the agrarian San Joaquin Valley. The City of Pleasanton, population 34,700,[4] lies to the west of the Quarry Area and borders it for a short distance near Stanley Boulevard. The City of Livermore, population 50,400,[5] borders the Quarry Area to the east along most of Isabel Avenue. To the north of the area lies agricultural lands not planned for mining. The southern boundary is formed by Stanley Boulevard and Vineyard Avenue.

The Livermore Valley is surrounded by the Diablo Range. The major stream in the Valley is Arroyo del Valle, which converges with other streams on the Valley floor to join Arroyo de la Laguna and flow out of the Valley via Alameda Creek. Alameda Creek drains into south San Francisco Bay. Arroyo del Valle is controlled by Del Valle Dam, about six miles above the site. Water stored behind Del Valle dam is used, in part, for groundwater recharge into Arroyo del Valle and Alameda Creek. Arroyo Mocho and Arroyo Las Positas also drain the Valley floor in the area.

Bordering the Quarry Area on the southwest is Shadowcliffs Regional Recreation Area, operated by East Bay Regional Park District. Its major attraction is water recreation provided by a lake which is supplied by groundwater during the winter months. Water must be imported in the summer to keep the lake at operational level. The lake is a reclaimed Kaiser gravel pit.

B. Site

Project site comprises 3,820 acres (about six square miles). The site is about three miles east-west and varies from one to 2.5 miles north-south. It is delineated on the various maps included in this report.

Within the Quarry Area site are lands which have not been disturbed for quarrying operations, lands on which active quarrying is taking place, and lands which have been reclaimed from earlier quarrying operations. In 1976 about 750 acres of the site was water surface. The extent and configuration of water changes in response to successive stages in active quarrying areas. Various structures are present in the Quarry Area, ranging from farm houses to operators' corporate offices and extensive processing plants for quarrying operations.

C. Physical Environment

1. Topography

a. Setting

The floor of the Livermore Valley is relatively flat and slopes from an elevation of 500 feet at Livermore to about 300 feet near Arroyo de la Laguna on the west side of the Valley. The Quarry Area slopes from about 410 feet along its eastern boundary to about 350 feet at the western boundary. Highest elevation attained within the area is 448 feet at the extreme southeastern extension along Arroyo del Valle. Existing gravel pits range from 90 to 120 feet below natural elevation. Topography in the Quarry Area changes constantly as working pits are dug and depleted pits are reclaimed or fill with water.

b. Impacts

The Reclamation Plan is intended to ensure that topographical changes resulting from mining operations do not preclude coherent areawide future use of the Quarry Area. Land and water areas have been designated with this goal in mind, subject to physical constraints. Review of the Plan does not yield obvious problems with regard to overall land and water masses and their relationship to future potential circulation, land use, and provision of services and utilities. Potential problems with respect to geology and hydrology are discussed in those sections of the EIR.

As noted previously, the Reclamation Plan proposes that final slopes of pits be 1:1 (45°), with the exception of cuts adjacent to public rights-of-way or properties not used for quarrying, which would receive a 15-foot wide bench about 5 feet above maximum water level. Aside from possibly conflicting with provisions of the Alameda County Surface Mining Ordinance, which requires 2:1 slope unless certain findings can be made, conceptual approval of general 1:1 slopes would create identifiable impacts. Future uses could be unduly limited because of safety and access problems with 1:1 slopes. Revegetation and erosion control could be difficult. Access for normal or emergency maintenance would be impaired. Establishment of an asthetic and useful land/water edge for recreational purposes would be severely hampered.

c. Mitigation

Mitigation of non-hydrological/geological impacts caused by 1:1 slopes can be accomplished by changing the Reclamation Plan to call for 2:1 final slopes as the conceptual norm, unless information is presented enabling certain mandatory findings to be made by the Alameda County Planning Commission, pursuant to Section 8-119.3(e) of the County Surface Mining Ordinance. Said section requires that the applicant demonstrate, to the satisfaction of the Planning Commission, that slopes steeper than 2:1 will not: (1) be incompatible with the alternative future uses approved for the site; (2) be hazardous to persons that may utilize the site under the alternative future uses approved for the site; and (3) reduce the effectiveness of revegetation and erosion control measures where such are necessary.

In addition, commitment to an area of about 12:1 (8%) slope at some points on the perimeter of ponds to be used for recreation should be made to accommodate recreational facilities (swimming beach, dock, etc.), taking into account range of water surface level fluctuation.

2. Geology/Seismicity/Soils

a. Setting

Most geological information relevant to consideration of the Reclamation Plan is concerned with geohydrology and is presented in the Water Resources section (IV.C.3.) of this report. General background geological information is provided in publications by the State Department of Water Resources.[7,8] The Reclamation Plan contains geologic information relevant to the gravel resource.[9] The geologic information presented in this section is intended to be sufficient to understand the Reclamation Plan and to form an informed judgment on its effects. Reviewers in need of more detailed information are referred to the references above.

The Livermore-Amador Valley is underlain by several hundreds of feet of Holocene alluvial and sedimentary deposits consisting of interstratified sands, gravels, silts and clays. These are in turn underlain by middle Pliocene to Pleistocene deposits of similar composition known as the Livermore Formation.

Both the Holocene alluvial deposits and the Livermore Formation contain important aquifers. The Holocene alluvial deposits and the Livermore Formation are underlain at greater depth by essentially non-water bearing sedimentary and metamorphic rocks which range backward in age from late Tertiary to the Jurassic era. The Livermore Formation reaches ground surface in the Livermore and Sunol uplands south of the Valley and dips deeply underneath the Holocene alluvial deposits of the flatland of the Valley. Older rocks are exposed in the Diablo Range south of the Livermore Valley.

As the highlands to the south of the Valley rose, streams chiseled northward through to the Valley and deposited erosion products upon the Valley floor. During the relatively recent geologic past, the Valley drained northwestward through the San Ramon Valley to the ancestral Sacramento River. This drainage was alternately open and then blocked, probably due to seismic activity. When it was open, finer sediments and loose pebbles were washed through the Valley, leaving deposits of clean gravel. When it was blocked, finer sediments filled the Valley floor. As a result, the northerly portion of the Quarry area is underlain by layers of gravel alternating with layers of thick Clayey material (known as clay lenses). The southern portion of the Quarry Area, nearer Arroyo del Valle, because of its higher elevation, did not accumulate the sedimentary layers and so today lacks clay lenses. Groundwater flows through the gravelly layers, which are termed aquifers. Groundwater movement is blocked by clay lenses, referred to as aquicludes. Four clay lenses are known to separate the gravel layers under most of the Quarry Area (See Figure 6, Cross-Section through Amador Subbasin). Very recently geologically, the Valley drainage shifted to the southwest, through Arroyo de la Laguna and Alameda Creek. During this shift, the uppermost gravel layer was deposited. Almost within historical time, today's soils developed, and the final lake formed in the Valley. Remnants of this lake were present into the early part of this century in the form of marshy areas on the west side of the Valley. Drainage works have hastened the natural filling in of the lake. Except near active stream channels, the latest sediment layer consists dominantly of fine grained materials and increases in thickness from south to north.

Quarrying is limited to the upper layer of gravel deposits, the first (uppermost) aquifer, to protect groundwater in the lower aquifers. In most of the area north of Stanley Boulevard a deep mantle of sedimentary soils must be removed to reach the sand and gravel deposit. This material is called overburden. South of Stanley, little overburden is present and no substantial clay layers are present. For this reason, the Reclamation Plan contains less land area south of Stanley Boulevard.

The Livermore-Amador Valley is seismically active and contains numerous faults. As shown on Figure 5, Subbasins, Faults, and Wells, the Livermore Fault lies just to the east of the Quarry Area, the Parks fault is just north, and the Pleasanton Fault lies to the west. These faults act as impervious dikes to define different groundwater subbasins, as shown in Figure 5 and discussed in detail in the Water Resources section. More active faults include the Verona to the Southwest, the Calaveras about 5 miles west, the Hayward about 12 miles southwest, and the San Andreas about 30 miles southwest. The area would be strongly shaken by a major earthquake on the in-Valley faults and would also experience ground shaking as a result of a major earthquake on the Hayward or San Andreas Fault.

The sedimentary soils overlying the Quarry Area are generally fairly deep, well-drained, and gently sloping. They have been mapped as the Yolo-Pleasanton Association.[10] About 1750 acres of the 3820 acre Quarry Area are prime agricultural soils, either Soil Conservation Service Class I or II or rated 80 or better on the 100 point Storie Index. About 500 acres, mostly along Arroyo del Valle, is classified as Riverwash, coarse gravelly material not suited to cultivation. Another 970 acres are gravel pits, most of which were formerly covered with prime agricultural soils. The remaining 500 acres consist of various types of nonprime soils. Most of these non-prime soils (about 400 acres) are of the Livermore Series, uniquely suited for growing grapes for the production of white wine.[11]

b. Impacts

Most geologic impacts are upon the hydrology of the area and are discussed in the Water Resources section.

Areas termed "capped settling ponds," in which 5 to 10 feet of overburden material is proposed to be placed over water saturated fine sand and silt, may not be suitable for building construction. The Plan proposes industrial or open space uses for these areas, depending on individual analysis. Potential problems include exaggerated and uneven settlement, liquefaction, ground cracking, lateral spreading into pond areas, and exaggerated ground shaking during earthquakes. The degree of hazard would be increased if groundwater levels rise as a result of future basin management. Failures of working or finished slopes due to earthquakes may also occur.

Typical backfilled areas would be below original surface elevations. Drainage problems may result.

The Reclamation Plan does not call for conservation of prime agricultural soils overlying the gravel resource. These fertile soils would be lost if merely used for backfill or building dikes and levees. About 1400 acres would be lost, at depths of from 2 feet to 5 feet.

c. Mitigation

Ability of capped settling ponds to support structures should be clearly demonstrated through extensive soil and geotechnical investigations at the time such structures may be proposed. The Alameda County Surface Mining Ordinance requires that fill placement in backfilled and graded areas conforms to the Uniform Building Code "except that alternate methods of backfilling and grading may be utilized when incorporated in the approved reclamation plan." It is not expected that the forthcoming detailed reclamation plans for each operator will propose specific

structural uses for these areas, but if so, then methods as specified in the Surface Mining Ordinance should be detailed and subject to approval by the Building Official. A program for inspection of fill placement, which is often difficult due to the size and staging nature of quarry operations, should also be presented at that time. Until demonstrated otherwise, it should be assumed that the capped settling pond areas are not suitable for structures. Recreation and open space uses would remain as options.

A drainage system would need to be designed to ensure adequate drainage of below-grade filled areas. Loss of prime and unique agricultural soils is due to the quarrying operations and not the Reclamation Plan, but the Plan should be responsible for mitigation of this impact. The Plan does propose that a 5 to 10 foot layer of soil be used to cover settling ponds. This measure should be made a requirement in Reclamation Plan implementation and it should be ensured that the top few feet of soil replaced consists of the richest top soil. Uncapped settling ponds may also be viable for intensive agricultural use. Alameda County has recognized the loss of prime and unique agricultural soils as being an unavoidable adverse impact of quarrying, but has determined that the sand and gravel resource is of sufficient economic importance to the County and region as to outweigh this impact.

The Alameda County Surface Mining Ordinance provides some mitigation in that it requires topsoil to be stockpiled at the site of mining operations in amounts necessary for future reclamation and also specifies how resoiling is to take place; however, it only applies to new permits and not existing operations.

Agricultural use of many of the reclaimed land areas is proposed by the Plan. If top soil is required to be replaced, then all reclaimed land areas could probably support intensive agriculture if deemed more desirable than urban uses at the conclusion of quarrying in 2030. Agricultural use will continue over many undisturbed areas of the site while quarrying is still taking place and is compatible with adjacent or nearby mining use.

3. Water Resources

a. Setting

(1) Introduction

The project or quarry area is in the center of the Livermore-Amador Valley, within the Amador groundwater subbasin as shown on Figure 5. In 1976, the area encompassed about 2,100 acres of undisturbed, mostly agricultural area, 900 acres of working gravel pits and earth fill and settling ponds, and 750 acres of settling pond water area. By 2030, there will be 500 acres of undisturbed area and 2,200 acres of water area.

The Amador (also called Santa Rita) groundwater subbasin is the largest subbasin underlying the valley floor, situated between the Bernal (also called Pleasanton) subbasin on the west and the Mocho (also called Livermore) subbasin on the east. The Pleasanton fault forms the Amador/Bernal subbasin boundary, and the Livermore fault forms the Amador/Mocho boundary. Groundwater movement is restricted across the faults. The south side of the project area overlies the Arroyo Valle forebay area. This area, between Arroyo del Valle and Stanley Boulevard, is a primary recharge area for the groundwater basin.

Approximately 65% of the 35,000 to 40,000 acre feet of water used each year in the Valley is groundwater. About 8,000 acre feet of groundwater are used annually in the project area. Groundwater and groundwater storage capability are among the Valley's most valuable natural resources.

Two major watersheds, Arroyo Mocho and Arroyo del Valle, drain into the Valley. Both streams flow through the project area into Arroyo de la Laguna on the west (Figure 2). Arroyo de la Laguna flows into Alameda Creek which discharges to San Francisco Bay West of Niles. The average annual natural runoff of Arroyo's Mocho and del Valle is 3,000 and 21,000 acre feet annually, respectively. Del Valle reservoir, on Arroyo del Valle, five miles south of Livermore, was completed by the California Department of Water Resources (DWR) in 1968 to provide operational storage for the South Bay Aqueduct (SBA) system. Although it is the only surface water reservoir above the Valley, there is no allotment of storage in this reservoir for conservation of local Arroyo del Valle runoff. However, during the interim period between 1968 and the time when DWR will need the full storage for operation of the SBA, local runoff is being stored for later release. Water rights for Arroyo del Valle runoff are held by Zone 7 of Alameda County Flood Control and Water Conservation District, and Alameda County Water District (ACWD), and both share in the use of local water stored in Del Valle reservoir. There are no other major direct diversions of surface water in the Valley. Most of the non-groundwater component of the Valley's water supply is imported via the SBA.

Historically, the area adjacent to Arroyo de la Laguna was swampy; marsh lands persisted until the early 1900's when drainage canals were reconstructed, groundwater was exported, and the groundwater levels lowered. Groundwater levels continued to lower as annual extractions exceeded the natural 15,000 to 20,000 acre feet recharge rate and overdrafted the basin. By the mid-1960's groundwater levels had dropped to about 100 feet below historical high levels in the project area.

Imported water is used directly through the two Zone 7 water treatment plants completed in 1962 and 1975. In 1976, Zone 7 imported 21,000 acre feet of water, of which about 70% was used directly with the balance used to replenish the groundwater basin. The mix of import and groundwater used can vary since Zone 7 has facilities to provide customers both groundwater and imported water. Zone 7 wells, and the new treatment plant supplying Pleasanton and west valley area, are shown on Figure 5.

Groundwater quality in the project area varies from about 300 mg/l total dissolved solids (TDS) in the forebay area to over 700 mg/l on the north side of the project area. The U.S. Environmental Protection Agency (EPA) recommends a DS limit of 500 mg/l for drinking water. The groundwater is much harder than the imported water. Imported water normally has an average annual TDS range of 150 to 250 mg/l. Nitrates are a problem on the northeast side of the project area, near the Livermore sewage treatment plant, where the EPA limit of 45 mg/l is exceeded. Municipal wells for Livermore, Pleasanton, Zone 7, Camp Parks, and Dublin are located west of the project area away from the high nitrate area. The project area spans the Valley between the area of relatively high quality water on the south and the area of poor water quality on the north. Gravel is taken only from the uppermost zone of theaquifer; the aquifer has several additional water bearing zones at greater depth.

Unquestionably, the project area encompasses the central and most important components of the water resource system of the Valley. With respect to surface water, both major streams pass through the area; with respect to groundwater it overlies the forebay area where recharge takes place and the middle portion of the most important groundwater subbasin in the Valley.

The project area is within the area planned for gravel mining in the County General Plan. The mining operation as presently approved by Alameda County disrupts only the upper water bearing zone since mining is allowed only within that zone.

The basic Reclamation Plan as modified (Figures 4A-4D - described in Section III), shows what the surface area is anticipated to look like as mining progresses. Gravel pits, overburden storage areas, and silt settling ponds for deposit of gravel washout are necessary components of the general extraction process. Existing silt ponds along Arroyo del Valle and Stanley Boulevard already force changes in groundwater movement. This change would be more evident if groundwater levels were higher.

Mining gravel does and will affect the Valley's water resources. The Reclamation Plan describes the relative shape and arrangement of silt ponds, pits, and overburden disposal as mining progresses to completion. Whether or not this rearrangement of material and space beneficially enhances or adversely impacts the Valley's water resources depends upon the final physical arrangement, the uses made of the worked-out gravel pits, the area's water requirements and supplies, and water resource management objectives.

Background information on movement, supply, use, and disposal of water in the Valley is presented in this section. The three available sources of water are discussed, as are present and future water needs in the Valley. Basic information on geology, hydrology, water resources and agencies with responsibilities in the area is presented elsewhere in this report and in the Reclamation Plan[12] and is not repeated here.

(2) Surface Water Resources

Although surface water is not now directly diverted for use in the Valley it does recharge the groundwater basin. If storage were available, a portion of the runoff now flowing out of the Valley could be diverted and conserved with attendant flood control benefits.

The two major streams from which storm runoff could be conserved are Arroyo del Valle and Arroyo Mocho. Arroyo Las Positas, which joins Arroyo Mocho downstream of the project area, is a third source of surface water. Annual runoff volumes over time in these three streams were estimated by Zone 7 and are presented in Table 1.

Table 1

ANNUAL STREAMFLOW VOLUMES
(acre feet)
(Rounded to the nearest 1000 acre feet)

Water Year	Arroyo Del Valle At Livermore	Arroyo Mocho At Arroyo Road	Arroyo Las Positas At El Charro Rd.	Total
1912-1913	2,000	0	0	2,000
1914	85,000	12,000	3,000	100,000
1915	47,000	9,000	6,000	62,000
1916	63,000	13,000	14,000	90,000
1917	23,000	3,000	1,000	27,000
1918	3,000	1,000	0	4,000
1919	23,000	3,000	2,000	28,000
1919-1920	4,000	1,000	0	5,000
1920-1921	12,000	2,000	1,000	15,000
1922	35,000	5,000	2,000	42,000
1923	15,000	2,000	1,000	18,000
1924	incomplete	incomplete	incomplete	incomplete
1925	4,000	0	1,000	5,000
1926	20,000	3,000	1,000	24,000
1927	27,000	4,000	1,000	32,000
1928	12,000	1,000	1,000	14,000
1928-1929	2,000	0	0	2,000
1930-1941	no records	no records	no records	no records
1941-1942	19,000	2,000	1,000	22,000
1943	incomplete	incomplete	incomplete	incomplete
1944	12,000	2,000	1,000	15,000
1945	28,000	4,000	2,000	34,000
1946	9,000	1,000	1,000	11,000
1947	4,000	1,000	0	5,000
1948	2,000	0	0	2,000
1949	8,000	1,000	1,000	10,000
1949-1950	7,000	1,000	1,000	9,000
1950-1951	41,000	6,000	4,000	51,000
1952	58,000	9,000	9,000	76,000
1953-1957	incomplete	incomplete	incomplete	incomplete
1957-1958	81,000	15,000	incomplete	
1959	16,000	2,000	1,000	19,000
1959-1960	8,000	1,000	1,000	10,000
1961-1961	1,000	0	0	1,000
1962	22,000	3,000	2,000	27,000
1963	25,000	3,000	2,000	30,000
1964	4,000	0	0	4,000
1965	27,000	3,000	2,000	32,000
1966	6,000	0	0	6,000
1967	45,000	7,000	5,000	57,000
1968	3,000	1,000	0	4,000
1969	58,000	9,000	9,000	76,000
1969-1970	20,000	2,000	3,000	25,000
1970-1971	13,000	3,000	2,000	18,000
1972	2,000	0	0	2,000
1973	46,000	1,000	11,000	58,000
1974	32,000	4,000	3,000	39,000
1975	30,000	5,000	2,000	37,000
1976	1,000	0	0	1,000
1976-1977	0	0	0	0
Mean	21,000	3,000	2,000	26,000
Median	15,000	2,000	1,000	
Standard Dev.	22,000	4,000	3,000	
Skew	0.98-1	1.88	2.50	

As previously discussed, Del Valle reservoir was completed as part of the South Bay Aqueduct system in 1968. Storage in the 77,000 acre foot reservoir is allocated as follows: 10,000 acre feet for silt storage; 30,000 acre feet for water supply; 35,000 acre feet for primary flood control; and 3,000 acre feet for secondary flood control. Until the 30,000 acre feet of water conservation storage is needed for South Bay Aqueduct operation - probably some time after 1985 - Arroyo del Valle storm water can be and is stored and released into either Arroyo del Valle or the Aqueduct at the request of Zone 7 or Alameda County Water District. Flood water, water released when storage exceeds the 40,000 acre foot level, is likewise released into either Arroyo del Valle or the Aqueduct. In the future, when the reservoir storage is needed for import water, both storm water and uncontrolled flood water could be conserved if storage were available below Del Valle Reservoir.

As discussed in the U.S. Corps of Engineers 1962 report,[13] flooding is a problem in the Valley. Del Valle reservoir provides considerable, though not complete protection from Arroyo del Valle flood waters. However, both Arroyo Mocho and Arroyo Las Positas can overtop the present channel and flood adjacent areas. The current flood plain maps, showing 1 in 100 and 500 year flood prone areas, indicate that flooding will occur along Arroyo de la Laguna and along Arroyos Mocho and Las Positas. The Corps urban study now underway should define the magnitude of the flooding problem. The Corps is currently studying storage volumes required to control flooding, but even with 38,000 acre feet of flood storage in Del Valle reservoir additional storage is needed to prevent flooding.

A frequency analysis of the annual stream flows shown in Table 1 is presented in Table 2. This indicates that over 50,000 acre feet of storage would be needed to conserve 10 year frequency storm flows.

Table 2

FREQUENCY OF ANNUAL STREAMFLOW VOLUMES
OF LIVERMORE VALLEY STREAMS*
(1000 acre feet)

Stream	Recurrence Interval in Years						
	2	5	10	25	50	100	1000
Arroyo del Valle	18	38	51	66	67	87	119
Arroyo Mocho	2	5	8	11	14	16	24
Arroyo Las Positas	1	4	6	9	11	14	22
	21	47	65	86	101	117	165

Source: Zone 7
*Based on the 46 years of runoff data presented in Table 1.

Major water right applications for diversion in the Valley are presented in Table 3. Alameda County Water District and Zone 7 share rights in Arroyo del Valle storm water. Zone 7 has a permit to divert Arroyo Mocho and Arroyo Las Positas waters. ACWD has certain prior water rights to flow from the Alameda Creek drainage basin by diversion downstream of Niles, obtained under litigation with San Francisco and under its Alameda Creek water right permit. Prior rights are based upon flow into the San Francisco Bay, and storm water can be conserved when such flow occurs; during wet years much of the storm runoff does flow into the Bay. Since Alameda County Water District diverts and conserves water in the Niles Cone area, a water rights study should be conducted in planning for further local water conservation in the Valley.

Table 3

MAJOR WATER RIGHT APPLICATIONS ON
ARROYO'S DEL VALLE, MOCHO & LAS POSITAS

Application Number	Applicant	Year Filed	Source
17002	Zone 7*	1956	Arroyo Del Valle
17003	ACWD	1956	Arroyo Del Valle
17768	Zone 7	1957	Arroyos Mocho & Las Positas

*Originally filed by now defunct Pleasanton Township County Water District.

(3) Groundwater Resources

The three major groundwater subbasins in the Valley are shown in Figure 5 and were described previously in this section.

As described in the Geology Section and shown in Figure 6, there are about 500 feet of upper Holocene (recent) alluvial deposits. These deposits are the principal source of groundwater in the Valley; however, deep wells penetrating the lower Livermore Formation also have high yields.

(a) Movement

Prior to extensive development of the groundwaters, water moved westerly downslope from the vicinity of Livermore through the Amador subbasin and into the Bernal subbasin, where artesion and marsh conditions existed and groundwater seeped into Arroyo de la Laguna. At the turn of the century, San Francisco extracted and exported groundwater, drainage canals were dug and the marshes dried up. Land once used for agriculture is now partially developed for residential and commercial purposes. Horizontal movement of groundwater between subbasins is retarded and partially blocked by the subsurface faults. Water levels in both the upper and lower aquifers indicate that groundwater movement is now toward the Amador subbasin from the Mocho and Bernal subbasins on the east and west, respectively.

(b) Recharge

As discussed in the Reclamation Plan, the area along Arroyo del Valle is a major recharge area for the subbasin. As stated by the Department of Water Resources, "The portion of the subbasin south of this above limit (Southern Pacific Railroad) is the major forebay for the confined aquifers in the north portion of the Santa Rita (Amador) subbasin. Groundwater recharged in the forebay moves north and west toward areas of depletion, becoming confined under pressure beneath the progressively thickening aquicludes".[14] Obstructions that could impede flow through and from the forebay should be minimized.

Natural recharge in this area includes Arroyo del Valle channel percolation and direct infiltration of rainfall and local runoff during storms. In addition, Zone 7 has, since 1971, spread about 5,000 acre feet of water annually in the channel for artificial recharge of the subbasin, mostly during the summer.

Considerable direct percolation can take place between the Veterans Hospital and Pleasanton outside the Arroyo del Valle channel. The importance of direct percolation of precipitation and of runoff in the minor streams in this area has been indicated in preliminary studies done by the State Water Resources Control Board in connection with water rights. The entire forebay area is highly permeable, as shown by DWR.[15] The area of maximum infiltration in the Valley is along and adjacent to Arroyo del Valle. Annual rainfall on the hills south of Arroyo del Valle averages about 4 inches more than the 16 inch average experienced in the Valley. Hill runoff and direct rainfall percolate directly to the groundwater underlying the recharge area. The forebay area has up to 80% gravel in the top 300 feet - the highest percentage in the Valley.[16] This is significant since recharge directly enters the gravels.

(c) Safe Yield

The safe yield of a groundwater basin may be defined as that amount of average annual groundwater pumpage which is equal to the average annual basin net recharge. In a state of nature, the basin is full and groundwater flows into the streams, thus there would be no safe yield in the strict sense of the term. In 1967, Livermore Valley agencies concerned with groundwater reached general agreement regarding the annual safe yield of individual subbasins. Historic use, water levels, and geohydrologic data developed by DWR were the basis for the agreed upon values shown in Table 4.

Table 4
SAFE ANNUAL GROUNDWATER YIELD
LIVERMORE-AMADOR VALLEY
(acre feet)

Subbasin	Yield
Mocho (Livermore)	3,900
Amador (Santa Rita)	8,500
Bernal (Pleasanton)	3,300
Dublin, Bishop (San Ramon)	1,600
Camp (Parks)	700
	18,000

In a 1963 report[17] the Department of Water Resources estimated the safe yield to be 17,000 acre feet per year, as shown in Table 5 below.

Table 5
ESTIMATED ANNUAL GROUNDWATER YIELD
(acre feet)

Item		Quantity
Mean water supply, 1951 conditions:		
Surface and subsurface inflow		42,000
Precipitation		60,000
	Subtotal	102,000
Mean surface outflow, 1951 conditions	-	39,100
Available to meet requirements		63,000
Mean consumptive use of precipitation	-	47,800
	Difference	15,200
Adjustment for return flow in Arroyo de la Laguna	+	1,800
	Yield	17,000

In a 1972 report,[18] Thad C. Binkley and Associates, Consulting Engineers, estimated recharge west of the Livermore fault as between 13,000 and 17,000 acre feet annually. If recharge for the other subbasins were added, the volume would be around 20,000 feet per year.

Thus the safe annual yield of the groundwater basin under 1954-1970 conditions probably exceeded 18,000 acre feet. The Amador subbasin appears to have twice the safe yield of either the Mocho or Bernal subbasins, making it the most important subbasin from a water supply standpoint.

(d) Extractions

Since the mid 1960's, groundwater pumpage for the major cities, Livermore, Pleasanton, and Dublin, have been limited by mutual agreement to approximately the safe yield, with Zone 7 providing additional water as required. Zone 7 pumps supplemental groundwater but artificially recharges more than it extracts, reversing the overdraft condition. Total groundwater pumpage has been estimated by the Department of Water Resources[19] as shown in Table 6 below. Since the safe yield is lower than historic extractions, the basin was in an overdraft condition when importation was begun in 1962.

GROUNDWATER PUMPAGE IN THE LIVERMORE-AMADOR VALLEY
(acre feet/year - Oct. 1/Sept. 30)

Water Year	Pumpage	Water Year	Pumpage
1961-62	21,070	1966-67	24,990
63	19,890	68	25,860
64	23,730	69	23,426
65	23,150	1969-70	26,950

Binkley and Associates[20] estimated groundwater extractions west of the Livermore fault and for the Amador subbasin as shown in Table 7.

Table 7

ANNUAL GROUNDWATER EXTRACTIONS
WEST OF THE LIVERMORE FAULT
(1000 acre feet)

	Municipal		Agricultural		Other		Sum	
	Total	Amador	Total	Amador	Total	Amador*	Total	Amador
1966	5	3	9	5	3	2	16	10
1967	5	3	7	3	4	3	16	9
1967	5	4	6	4	3	2	14	10
1969	6	5	6	3	5	4	17	12
1970	7	6	4	3	6	5	18	14
1971	8	6	5	3	6	4	19	13

*Mostly evaporation from Shadow Cliff recreation reservoir and gravel operations.

Most of the groundwater extracted west of Livermore is from the Amador subbasin, and about 50 percent of the Valley groundwater usage is in the Amador subbasin, location of the proposed reclamation project. Date are not available to distinguish between pumpage from the upper unconfined aquifers, and that from the deeper confined water bearing zoned. Both Zone 7 and Pleasanton have municipal wells along Santa Rita Road, just west of the project area, which tap both upper and lower water bearing zones.

Information from Zone 7[21] and recent reports[22, 23] indicates annual groundwater extraction in the Valley between 1970 and 1975 was about 25,000 acre feet. Agriculture use has leveled off because of urban growth, and municipal extractions have been maintained at the agreed upon quota rate as augmented by artificial recharge.

Pumpage and consumptive use of water in the project area also remain relatively constant. Evaporation from Shadow Cliffs recreation reservois and from the silt ponds, plus water used in the gravel operations, totals about 4,000 to 5,000 acre feet annually. About 3,500 acre feet annyally are used on the 2,000 acres of agricultural[24] land. Total annual groundwater depletion is about 8,500 acre feet. Since water surface evaporation is higher than plant consumptive use, the net groundwater loss in the area will increase in the future, unless extractions are further curtailed with greater use of imported water.

(e) Groundwater Levels

In the project area the undisturbed land surface elevation increases from 350 feet on the west to 400 feet on the east.[25] Information compiled in 1912 by Cyril Williams Jr.[25] on the Livermore Valley for the City of San Francisco relative to the Hetch Hetchy Project indicates that in a natural state, groundwater levels along Arroyodel Valle were approximately at stream bed elevation, and in general followed ground slope between Livermore and Arroyo de la Laguna. Thus groundwater levels probably ranged from about 330 feet to over 400 feet in the project area originally.

Historic groundwater levels for selected wells in each of the three key subbasins are shown in Figure 9. Well locations are shown on Figure 5. These data indicate that by 1965, groundwater levels had dropped about 100 feet because extractions exceeded recharge.

Since the mid 1960's, after importation of water was initiated, extractions limited by agreement, and Zone 7 started its artificial recharge program, overdraft in the Plan area has stopped and, as shown in Figure 9, levels are rising in both the Bernal and Mocho subbasins. Levels in the Amador basin have remained relatively level largely due to mining operations. Recent groundwater elevation contour maps by Zone 7 confirm this analysis. However, groundwater levels could rise in the Amador subbasin if both the Mocho and Bernal subbasins fill and pumping is discontinued or not increased adjacent to the quarry area.

(4) Import Water

Water imports from the Sacramento-San Joaquin Delta and delivered to Zone 7 from the South Bay Aqueduct (SBA), as reported by the Department of Water Resources, are shown in Table 8 below.

Table 8

WATER IMPORTED INTO THE VALLEY
(1000 acre feet annually)

Year	Amount	Year	Amount
1961	0	1971	5
1962	0.5	1972	10
1963	2	1973	3
1964	2	1974	1
1965	3	1975	5
1966	6	1976	21
1967	5	1977	13
1968	6	Future Contract-Amounts	
1969	7	1980	22
1970	9	1990	32
		2010	46
		2030	46

Import water is treated and supplied for direct use in the Livermore, Pleasanton, and Dublin areas by Zone 7 as demands exceed the independent groundwater pumping quotas for the areas. Local runoff captured in Del Valle reservoir is also used to meet these demands. Import water is also used for groundwater recharge in Arroyos Mocho and Valle. During the recent drought, importation of water was increased because there was very little local runoff.

(5) Water Quality

(a) Surface Water

Periodic sampling of Arroyo del Valle runoff from 1958 to 1968 (before Del Valle Reservoir), indicate TDS ranges from 150 to over 1000 mg/l. Most samples were of low flows, and indicate that with a flow of 5 to 20 cfs TDS averaged about 325 mg/l. One sample taken at 941 cfs had a concentration of 159 mg/l and one at 219 cfs had a concentration of 210 mg/l, so storm flow is of a relative high quality. The water has been classified as a calcium bicarbonate type by the Department of Water Resources.[26, 27] Since 1968, however, flow below the Reservoir is often imported water, not natural runoff, and has not been sampled on a regular basis.

Arroyo Las Positas runoff was sampled at the freeway (Int. 580- old Hwy. 50) for several years by Alameda County Water District. These data show a TDS range of 150 to 1400 mg/l with winter flows averaging about 300 to 500 mg/l. Chlorides are also present, but not in adversely significant amounts. Storm runoff and wastewater effluent from Livermore are discharged into Arroyo Las Positas.

(b) Groundwater

The concentration of TDS (total dissolved solids) in the upper and lower aquifers underlying the project area, based on a interpretive study and map by Zone 7,[28] are shown in Figures 10 and 11. Review of these data and published reports[29, 30, 31, 32, 33] show that TDS in the project area ranges from 300 mg/l in the forebay area to over 700 mg/l along the northerly limit. EPA recommends a 500 mg/l TDS limit. This is only a recommended limit however, and many urban supplies exceed it; for example, the Colorado River water used extensively in the Los Angeles area exceeds 700 mg/l TDS.

Along the northerly edge of the project area the groundwater is high in boron, and is a sodium bicarbonate type water.[34, 35] This is considered to be due to poor quality water which originates in the Tassajara Formation north of the freeway. In the forebay and central areas of the project area, the water quality is calcium or magnesium bicarbonate in nature, and is satisfactory for most uses, although softening may be desirable for domestic and industrial use.

Nitrate concentrations in the project area for both the upper and lower aquifers are shown in Figures 12 and 13. In the northeast corner adjacent to the Livermore sewage treatment plan, concentrations are higher than the EPA "Not to exceed" limit of 45 mg/l. This limit was adopted by the U.S. Public Health Service in 1962 because of the association between high nitrate in water and the serious infant disease known as methoglobinemia. No urban wells are located in this area, but comparison of maps prepared in 1973[36] (9) and 1977[37] show the area exceeding 45 mg/l has enlarged. Zone 7[38] monitors water quality and has published a report on the subject.

(c) Import Water

Since 1968, part of the flow in Arroyo del Valle has been imported. Water from the Sacramento-San Joaquin Delta is released into Arroyo del Valle in the summer; during the months of September, October, and November releases are made from Del Valle reservoir to evacuate about 15,000 acre feet of storage for conservation of local runoff.

Import water generally is lower in TDS than the groundwater in the project area, and appears to be about the same or better in quality than natural Arroyo del Valle water. The average monthly TDS of imported water, from DWR operational records, is presented in Table 9. The quality of water in the South Bay Aqueduct terminal reservoir reflecting a mix of import and Del Valle reservoir water is also presented. If the proposed Peripheral Canal is constructed, the quality of import water would improve.

Table 9

QUALITY OF IMPORTED WATER
AVERAGE TOTAL DISSOLVED SOLIDS*
(milligrams per liter - mg/l, rounded)

Month	Delta Pumping Plant	South Bay Aqueduct Terminal Reservoir
Oct.	220	230
Nov.	260	230
Dec.	290	280
Jan.	270	280
Feb.	300	260
Mar.	260	260
Apr.	210	250
May	170	170
June	150	160
July	210	200
Aug.	220	210
Sept.	220	200

*Average for 11 years, 1966 through 1976

Though averaging about 230 mg/l TDS over time, the imported water averaged nearly 600 mg/l TDS from February through December during the 1977 drought. This is considerably higher than the groundwater.

(d) Del Valle Reservoir and Shadow Cliff Lake

The quality of water in Del Valle reservoir has been sampled periodically since 1971 by DWR. Phytoplankton and nutrient data were examined to determine if, under proper conditions, algae production would be a problem.

An examination of the data shows that nutrients - nitrogen and phosphorus - are generally available, and that the number of phytoplankton organisms is high enough so that conditions in Del Valle reservoir are right for algal growth and proliferation, occasionally to nuisance levels.

The available data from Shadow Cliff, the groundwater lake operated by East Bay Regional Parks District near Pleasanton, suggest that various species of algae can and do live in the lake. However, the temperature is lower, and environment more sterile, and algal concentrations lower than at Del Valle. Wind mixes the water on top. Shallow surface ponds in nearby Arroyo del Valle turn green with algae in the summer.

Water from Del Valle reservoir released and reimpounded in the gravel pits lakes would increase the natural likelihood for algae growth in the new impoundments.

This evaluation is supported by the conclusion of the Department of Water Resources in 1974[39] regarding Del Valle reservoir that "Concentrations of (nitrate, nitrogen, and orthoposphate) this magnitude should be sufficient for moderate to high levels of algae production." Graphs of phytoplankton volume were plotted and "The graphs show intermittent pulses of algae production, as is the usual case in most reservoirs. Rather high algal levels have been common in early Spring and in Autumn." The report notes high phytoplankton values in 1971 at the upstream shallow end of the reservoir and states "these are extremely high volumes, and nuisance conditions should result in nearly all instances with such algae concentrations."

(6) Water Requirements

Valley wide water requirements were estimated by and were presented in a report by John Carollo Engineers[40] as shown in Table 10 below.

Table 10

PROJECTED ANNUAL WATER DEMANDS:
LIVERMORE-AMADOR VALLEY
(1000 acre feet)

	1973-74		1980		2000	
	E-O	Low	E-O	Low	E-O	Low
Urban:	19*	25**	22*	29**	31*	40**
Agriculture:	10	10	7	7	3	3
Quarry & Other:	6	6	7	7	9	9
TOTALS	35	41	36	43	43	52

*Based on State Department of Finance Projections
**Livermore-Amador Valley Water Management Agency Projections

Since 1970, growth in the Livermore Valley, one of the fastest growing areas in Alameda County, has been slowed by sewage disposal restrictions and growth control policies of the major cities. Urban demands will continue to grow, but agricultural demands have leveled off in recent years and may not decrease in the future particularly if legislation is passed preserving agricultural land.

b. Impacts

(1) Introduction

As discussed in the previous section on the Environmental Setting, the project area encompasses the central and most important element of the water resources system in the Valley. It overlies the middle portion of the most important groundwater area; it overlies the Arroyo del Valle forebay area where groundwater recharge takes place; and the major surface streams pass through the project area.

As a result of concerns raised during the environmental impact analysis, the Reclamation Plan has been modified from the original proposal as noted in the introduction. Basic changes that affect water resources are:

1. A channel is to be retained or constructed along the southern perimeter of the Plan so that Arroyo del Valle flow could pass through the area without first going into the gravel pit lakes.

2. Conduits to transmit water between the gravel pit lakes are now included in the basic Plan as shown in Figure 4D.

3. An alternative is proposed which would allow early use of the old California Rock and Gravel Company pits on an interim basis for flood control purposes. Under this alternative, Arroyo Mocho would not be relocated. This alternative is discussed in Section IV.C.3.c.(6).

4. Fish farming is suggested as a use for the gravel pit lakes.

This modified Reclamation Plan is referred to subsequently simply as the Reclamation Plan, or Plan. Identified Plan impacts are for the modified Plan. Impacts described are based upon the Reclamation Plan report and reference material listed, and upon discussions with the gravel companies and their representatives, with Zone 7 staff, with Alameda County Planning Department staff, and with staff members of other responsible agencies. It is assumed that, under the Plan, with the facilities as shown in Figure 4D, surface water from Arroyo Mocho or Arroyo del Valle would not be put directly into the gravel pit lakes.

About 3,820 acres are included in the Reclamation Plan area. About another 400 acres adjacent have been mined and regenerated as either land area (consisting of industrial development in the city of Pleasanton) or water area (Shadow Cliffs Park) southwest of the Quarry Area proper. The change in this area over the next 50 years as proposed in the Plan would be significant as summarized in Table 11.

Table 11
LAND USE IN RECLAMATION PLAN AREA OVER TIME
(acres)

	1976	1995	2010	2030
Undisturbed	2,100	1,500	900	500
Disturbed: fill, settling ponds	200	600	1,000	1,300
Working	900	1,100	700	0
Water: recreation and storage	1,000	1,000	1,600	2,400
	4,200	4,200	4,200	4,200

Gravel will have been mined from over 1,500 acres of the presently undisturbed area by 2030. The upper groundwater bearing zone in the Valley which is over 100 feet thick and up to 150 feet deep, will be altered significantly. A 1,300 acre impermeable core will be placed in the center of the aquifer, undisturbed underground storage will be significantly reduced, and water in the remaining open pits will be exposed to the atmosphere and to people and the pollution therefrom. The Reclamation Plan groups together the impermeable core and water areas in a logical manner and provides for a generally coordinated plan for the several gravel extraction and reclamation operations. The lower groundwater bearing zones, currently the source of much of groundwater used for municipal purposes, would not be significantly impacted if the forebay area is kept open. Total water storage in the area would be increased as underground storage would be replaced with open pit storage. Opportunities exist to conserve additional storm water, provide flood control benefits, and provide extensive water-oriented recreational opportunities. As in so many areas in California, the impact of gravel extraction on the area's water resources during and after mining can be beneficial or detrimental depending upon advance planning and a program for implementation.

The Plan, together with the individual quarry permit plans, provides the opportunity to design, before the fact, the landform around the open water to accommodate facilities needed to operate and maintain the worked out gravel pits.

The Reclamation Plan, as modified, coordinates the physical arrangement of silt disposal areas, overburden fill, and the open pits by the several mining operators. It is areawide -- detailed individual area mining plans will be prepared by the quarry operators for their parcels after overall plan adoption. Areas presently under permit are shown on Figure 3.

Groundwater management in the Valley is being investigated by Zone 7. The model developed by DWR can be modified and used. However, the geohydrological data and the groundwater models necessary for detailed groundwater evaluations are not available. Requirements for flood protection in the Valley are under study by the U.S. Corps of Engineers and have not been updated. Studies to conserve local storm runoff under future operation of the South Bay Aqueduct and future groundwater management plans have not been completed. Detailed information on the cost and design of facilities needed to handle water in the Plan area has not been provided, nor does the Plan provide information on possible institutional and financial aspects of implementing the Plan.

(2) Water Use

Use of water in the project area would increase as estimated in Table 12.

Table 12
ANNUAL WATER USE* IN RECLAMATION PLAN AREA OVER TIME

	1976 Area (acres)	1976 Water Use (acre feet)	2030 Area (acres)	2030 Water Use (acre feet)
Undisturbed area	2,100	4,200	500	1,000
Disturbed area	1,100	2,000	1,300	2,000
Water area	1,000	3,500	2,400	8,400
TOTAL	4,200	9,700	4,200	11,400

*Loss to area

Presently, groundwater is used within the area for agriculture and gravel processing and lost by evaporation from water surfaces. As proposed, water would be used for agriculture and/or recreation and commercial or domestic purposes, and would be lost in greater amounts through evaporation from water sources. Groundwater use is presently controlled by agreement and increased use and losses within the project area would decrease the amount of safe yield water available for use elsewhere. The additional water needed could be obtained by Zone 7 from its imported water supply or by diversion of surface water. If the increase in water consumptively used and lost were to be provided from surface diversion, a water rights permit would have to be obtained from the State unless Zone 7 diverted it under existing permits.

Mining affects the type of use made of the water. During the mining period water is beneficially used for the mining operations. However, after mining the water is lost through evaporation. Evaporation might be considered a non-beneficial use unless the water body is used beneficially. Even if the water body is used beneficially, the amount of water concumed would probably be considered unreasonable. The inoperative loss of 8400 acre feet per year is about one half of the safe yield of the entire ground water basin and therefore is a major adverse impact.[41]

(3) Water Storage and Movement

Filling the center area of the upper aquifer with impermeable material would severely impact upper aquifer storage and groundwater movement.

Natural movement of groundwater would be impaired. However, as stated in the Plan (p. 24), "One of the major features of the quarry reclamation plan - the 'chain of lakes' - is to overcome this potential problem by providing an alternative means of moving groundwater around impervious barriers in the upper aquifer." Essentially, the natural transmission function of the upper aquifer would be replaced with pipes, canals and the lakes. With makeup water to fill the increased storage space to provide the required hydralic conditions and with proper operation, and ample volume of water count moved from east to west through the project area with the facilities shown in Figure 4D. Adverse impacts would be the required volume of the make-up water which could be as much as 20,000 acre feet, or more, increased cost in moving the water, and increased evaporative losses.[42]

The lower groundwater storage zones, except as forebay recharge might be altered, would not be impacted. The upper zone storage would be altered, however. Gravel would be replaced with open space and storage volume would be controlled by reasonable target groundwater operation levels. Although data on storage volumes in pit areas are not provided, it appears usable storage would increase*, not decrease.

Table 13
GROUNDWATER LEVELS IN THE PROJECT AREA

Area*	Historic high elev.	1977 elev.	Target Elevations** Mining	Conservation
Forebay				
Channel ab Isabel (28)	420	400+	-	420
Channel bl Isabel (30)	385	-	-	385
Forebay west (26)	365	-	260	365
Forebay east (26, 32)	370	-	260	370
Northeast area				
NE east (32)	370	320	330	370
NE central (26)	360	-	-	360
NE north (32)	360	-	250	360
NE west (32)	350	280	250	350
West Area				
West El Charro Road (29)	345	260	240	345

*Numbers refer to areas as shown on Plate 10 of the Reclamation Plan (Figure 4D).
**Dash - indicates data not available.

The Plan would increase usable water storage volumes. Increased storage could be a benefit if the cost of water to fill the storage and the cost of facilities to use the water are reasonable. As with movement, the adverse impacts associated with the replacement storage is the cost of developing and maintaining it, and protecting quality. Other potential beneficial uses of the storage include recreation, flood control, and conservation of water which would otherwise run off to the ocean.

The hydraulics and geohydrology, discussed in Section IV.C.3.c.(6), will allow water movement and use of the gravel pit storage as proposed if the physical facilities are properly planned and provision is made to operate them. Design and cost details of water movement facilities have not been provided and can not be evaluated. The physical characteristics of the area are favorable for development of the area for water related beneficial uses.

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*Data from DWR 43 indicated a specific yield of about 14% for the gravels. Assuming 90 foot deposits, natural storage volume in the Plan area would be about 50,000 acre feet. Usable storage in the gravel pit lakes could exceed 70,000 acre feet.

(4) Groundwater Levels

The impact of the Plan on groundwater levels during the mining period would be considerable. In the past, levels lowered under overdraft conditions and were a problem for the pumpers; in the future — unless managed — levels will rise and create a problem for the quarry operations.

The Plan report indicates (page 30) that high groundwater levels in the Plan area will ". . . severely hinder quarry operations . . ." The Plan further recommends (p. 47) that groundwater levels be maintained "at elevations which will permit economically viable extraction of the sand and gravel without major interference from groundwater." The potential for conflict between low levels as required for quarry operations and periodic high groundwater levels occurring under a groundwater management program exists. A major purpose of an EIR is to clarify issues and conflicts. Points relevant to the groundwater level conflict are summarized below.

- Gravel extraction and groundwater management are both important activities relevant to the public good.
- The gravel is an important resource needed in the entire Bay area; the groundwater basin is a resource with great local value; in the future it may have regional and even statewide significance due to limited availability of developable surface storage.
- Use of groundwater storage is impossible when groundwater levels are kept low. However, under a groundwater management program, the excavated area could be used to store imported water or to conserve local runoff.
- The evidence is not conclusive, but it appears groundwater levels in the Amador subbasin may be rising. Levels are rising in adjacent subbasins.
- Higher water levels mean lower energy requirements and cost for pumping.
- Artificially raising groundwater levels in areas being mined may not necessarily be in the public interest because of the increase in costs of aggregates.
- Annual "natural" groundwater safe yield does not increase with maintenance of higher water levels.
- With import water available the Livermore-Amador Valley has an ample water supply in normal years.
- In drought years in the future, the Valley may need to rely more upon the groundwater basin; import water may not be available.
- The data in Table 13 shows there is little conflict between target "mining" and 1977 groundwater levels.

- Potential conflicts in groundwater levels will exist only during the mining period and only in areas where mining is going on.

- It will cost considerably more to fill the groundwater basin after 1983 when imported water prices will increase because of increased energy costs.

- State policy on groundwater basin management is being formulated. Legislation may be enacted which would require a management plan and program for each major groundwater basin. Under normal circumstances, such plans usually contemplate filling the basin at times when water is available for that purpose.

- Presently salts are accumulating in the groundwater; if it becomes desirable to restore the salt balance, the basin management plans may require the basin be filled occasionally. More study is needed.

- In any gravel pit area designed for flood storage, water levels would have to be kept low except when storm inflow occurs. Flood water would have to be evacuated after a storm.

The data in Figure 9 indicates groundwater levels are rising around the project area in the adjacent Mocho and Bernal subbasins. Groundwater levels in the Amador subbasin may have started to rise in 1973 before the drought. As shown in Figure 9, they are still 80 feet lower than the historic high. Absent the gravel industry, it is reasonable to assume that the subbasin would be allowed to fill, unless there were adverse impacts from filling it such as rising groundwater in the Bernal subbasin. Although rising water could occur in the Bernal subbasin and should be further studied, the groundwater basins were full in 1942 and 1943 (Figure 9) and none of the reference reports indicated a problem occurring at that time. In any case, increased extractions by Zone 7 and the City of Pleasanton along Santa Rita Road would eliminate the problem of rising groundwater levels. Groundwater levels in the Amador subbasin will continue to rise unless recharge (artificial or natural), pumpage, and subsurface inflow from the Mocho and Bernal subbasins were controlled to aid mining.

Maintaining lower groundwater levels during the mining period directly impacts, by limitation, the ability to manage the groundwater basin. There are prudent management reasons that would dictate filling the groundwater basin now. These include:

- The present availability of surplus State Water Project water during wet years,

- the possibility of deficiency in the SWP supply in the future even in normal years,

- the increased cost to fill the storage ($21 per acre foot increase in the cost of SWP water starting in 1984),[44]

- the prevention of inflow of high nitrate and high TDS water from the north side of the groundwater basin into the main portion of the basin,

- the benefit of reducing the pumping head for groundwater pumpers (about $.10 per acre foot per foot of lift), and

- the operations value to Zone 7 and downstream water users in the Fremont area and to the State, of having extra water in storage if a drought or other emergency occurs.

During the past 15 years the impact on mining has been minimal because levels have been low. This situation is changing and inflow to working pits may increase. As shown in Table 13, conservation levels could be about 100 feet higher than target mining levels, and under this admittedly extreme condition, gravel would be more expensive and/or mining might be discontinued.

(5) Water Supply

Under the Plan, normal surface water flows in Arroyo del Valle and Arroyo Mocho reaching the project area would not be altered. Downstream surface water rights would not change and water supply with respect to quantities and quality would not be decreased.

After relocation of Arroyo Mocho and Arroyo del Valle the safe yield of the groundwater basin would not be reduced if provisions were made to maintain the existing channel streamflow percolation rates for both storm and non-storm conditions. Percolation from the present Arroyo del Valle channel is normally between 10 and 25 cubic feet per second during low flow periods. During storms it exceeds this since water now spreads out over a larger channel area. Detailed studies would need to be made if the channel were to be relocated. Detailed estimates of percolation from Arroyo Mocho have not been made. Zone 7 releases water into Arroyo Mocho and significant losses have been observed in the channel west of the Livermore fault. If the water required to maintain existing channel percolation is diverted from the relocated channels, desilting facilities would be required. Direct percolation of rainfall into the groundwater basin would increase under the Plan; however, this increase would be more than offset by increased evaporation losses from the water surfaces in the summer, and by loss of recharge in developed fill areas where storm runoff would be increased because of impervious surfaces.

A potential beneficial impact of the Plan is the opportunity it would provide to increase the local water supply. By diverting storm water into the worked out gravel pits, additional water could be conserved to increase net water supply. When Del Valle Reservoir is fully needed to regulate import water, the amount of surface water available for conservation, as shown in Tables 1 and 2, will exceed 50,000 acre feet once every ten years. Even with minimum downstream flow released of 4,000 to 8,000 acre feet, possibly an average of over 10,000 feet of water could be conserved annually with a conjunctive surface/groundwater management operation. This water could be used to meet either in-Valley (see Table 10) or downstream demands. Both South Bay Aqueduct and Hetch Hetchy (San Francisco Bay area) water contractors may need additional water by 1985.

The value of the groundwater in storage to meet water supply requirements during periods of drought or import supply outages will increase as water demands build up. When filled with water, the Valley groundwater basin is a valuable resource to the Valley and to other downstream users in an emergency situation. This is a beneficial impact during mining only if the storage can be utilized.

Another possible beneficial impact of the Plan on water supply would be the use of the storage for imported SBA water. However, use of the groundwater basin storage for: a) conservation of local runoff, b) flood control, c) dry year carry-over storage, d) emergency water supply use, and e) meeting post2030 basin demands, would appear to utilize the available storage. Del Valle Reservoir provides sufficient operational storage for the SBA; and as SBA demands require more regulation storage in Del Valle, the reservoir storage now used to conserve local runoff will be lost. This lost storage could be replaced with storage in the proposed gravel pit lakes, with proper planning.

In summary, the adverse impact on the surface water supply would be negligible with relocation of either Arroyo del Valle or Arroyo Mocho channels. The adverse impact on the groundwater safe yield would be negligible if the water lost through increased consumptive use is replaced and the present channel percolation amounts are maintained by some means.

(6) Water Quality

Considerable concern has been expressed regarding the potential impacts of the Plan on water quality. The potential for pollution or contamination of the groundwater resource would be increased since over 2,400 acres of originally protected groundwater basin would ultimately be directly exposed to surface influences. Pollution sources include storm water runoff, recreational and commercial activities within the gravel pits, and polluting accidents such as tanker truck mishaps.

Since both Arroyo del Valle streamflow and imported South Bay Aqueduct water are less mineralized than the groundwater, introduction of the water supply in the short term. However, the gravel pit lakes have a large evaporation rate and moderate inflow. This situation, absent mitigation measures, would create an adverse salt balance in the water body, with the water deteriorating in quality as salts build up. Under present groundwater recharge and extraction rates the potential deterioration rate could exceed 10 to 20 mg/l total dissolved solids per year. Detailed groundwater modeling in conjunction with studies of alternative management strategies would be necessary to project the net change in water quality over time.

In addition, as discussed previously, water from Del Valle Reservoir clearly has the potential for algal growth in the proposed lakes. The nutrients, seed organisms, and sunlight necessary for nuisance-level growths would be present. Monitoring of water throughout the system would be necessary, and water circulation and water levels would have to be managed to prevent quality deterioration and nuisance in the proposed shallow gravel pit lakes.

Since Del Valle Reservoir was completed, sediment data on the flows in Arroyo del Valle have not been collected. However, Arroyo del Valle originally carried heavy sediment loads and storm water now passing through the project area is turbid. Sediment would be a problem with water diverted from the three Arroyos, and provisions to contain it would have to be made. It would be particularly important that sediment not be allowed to clog the recharge areas in the forebay. Water from Arroyo Las Positas should only be diverted for flood control, not for water conservation purposes.

The high nitrates in the groundwater underlying the northeast portion of the project area move slowly. Movement onto the gravel pit lakes would depend entirely upon how water is managed in the Plan area.

The net impact on groundwater quality would be adverse if conjunctive use is not undertaken but could be beneficial if conjunctive use is practiced and proper operation provided.

(7) Implementation and Operation

The Reclamation Plan report is nearly silent with respect to responsibility for implementation, operation and maintenance of the water resources mitigation facilities outlined therein. Facets of this shortcoming are discussed below as relates to water resources and in greater detail, including mitigation Measures, in Section IV.D.11.

For purposes of this EIR it is assumed the gravel companies would continue to own the land and be fully responsible for operation and maintenance measures, including bearing the cost to design, construct, operate and maintain reclamation facilities, and would be liable for any damages incurred by others. Operational costs include those needed to:

- Purchase water to fill the worked out gravel pits.
- Provide water to replace that lost through evaporation and any needed for water quality control.
- Operate the facilities.
- Maintain the facilities.

There is no assurance in the Reclamation Plan of funding sufficient for proper supervision, operation and maintenance of the reclamation project. A fund or other mechanism to ensure continual operation and maintenance may be necessary. There is also no suggestion as to institutional arrangements which may be necessary to implement the Plan. Coordination of land use; water resource, recreational, and operational decisions, along with adjacent uses and jurisdictions, would probably be necessary.

(c) Mitigation

(1) Introduction

Actions necessary to maintain the facilities and developments under the Reclamation Plan are discussed in this Section. These are necessary to mitigate potential adverse impacts on groundwater quality movement and storage after the gravel pits are worked out. Certain general measures necessary were discussed in the preceeding Section. The distinction is drawn between mitigation measures proposed in the Reclamation Plan relating to groundwater movement and storage (mitigation of mining impacts) and mitigation measures suggested in this EIR relating to impacts of the Reclamation Plan itself.

The facilities to mitigate mining impacts have been discussed conceptually and are presented in the Plan, as modified, and shown in Figure 4D. Under the Plan, surface water would not be routed through the worked out gravel pits. The facilities proposed would be used to maintain water movement and circulation for water quality protection. It may be assumed that, in accordance with Zone 7 policy, the basin will be restored to full optimum use.

Maintenance of water quality could be a significant factor in the studies of alternative management strategies that are necessary because of the proposed Reclamation Plan. Implementation and operation costs, including water and physical facility costs, will have to be estimated and allocated between mitigation and non-mitigation uses to be made of the pits.

Factors associated with mutiple use of the area -- for flood control, water conservation, ect. -- are discussed in Subsection (6) below. Provisions for multiple use of the pits would not be the responsibility of the gravel companies, except possibly as tradeoff mitigation for certain unavoidable adverse impacts.

(2) Side Slopes

Experience in California -- in Los Angeles County, in Orange County, in Santa Clara County, and in the Niles Cone area-has been that worked out gravel pits used for groundwater recharge must occasionally be cleaned and reshaped. Steep side slopes are difficult to maintain, are not conducive to water-oriented recreation, and present a safety hazard to those who may enter the water for any reason. Earthquakes may create problems, and equipment should be able to enter the pits. As a mitigation measure enabling maintenance and management of the gravel pits after excavation is finished, a minimum side slope standard of 2:1 should be set. Exception to this standard should be allowed under certain conditions when compatible with the water and land use planning for a specific area. See Sections IV.C.1. Topography and IV.D.1. Land Use for further discussion.

(3) Maintenance Access and Buffer Strips

Without access worked out gravel pits can become a nuisance; it is difficult to monitor them, to prevent or clean up pollution, and to maintain, and/or to rehabilitate them.

For routine maintenance, a minimum access of at least 20 feet should be provided around the gravel pits. These access areas should be shown in the Plan. Additional area should be designated where special maintenance problems might occur; for example, around water conduits and areas where silt cleaning equipment would have to operate. In Los Angeles County, maintenance benches are designed for the pits so carry-alls can collect silt as it is scraped from the pit sides. These benches could also be used for recreation purposes and for safety.

In addition, buffer strips should be provided along each major traffic corridor and adjacent to urban areas to minimize the potential for pollution of groundwater. The major traffic corridors identified in the Plan are Vineyard Avenue, Isabel Avenue (Route 84), Stanley Boulevard, Las Positas Boulevard, and El Charro Road. Extra space also should be provided where pollution could be a problem from heavy concentrations of people, traffic, or urban uses. Reasonable standards would be 50 feet along major corridors and 50 to 200 feet or more adjacent to urban areas where direct pollution could be a problem. Lands adjacent to the basins could be zoned for uses that would be compatible and non-polluting; for example, service stations should not be allowed next to the open gravel pit lakes.

In the past, setbacks for maintenance roads and buffer strips have been set for individual quarry permits. With standards adopted as part of the Reclamation Plan, or as part of the County General Plan, the general setback allowances could be modified over time as necessary in the site specific reclamation plans developed by the quarry operators. General agreement should be reached on the setback standards by the County, local agencies, Zone 7, and the gravel companies. However, the establishment of maintenance access and/or buffer strip standards cannot be done without considering alernative plans for the area as described in the Alternative Section. Maintenance and buffer strips should be shown as part of the Reclamation Plan as illustrated in Figure 14.

(4) Physical Facilities

(a) Relocation of Arroyo Mocho and Arroyo del Valle Channels.

For both channel relocations, the existing streamflow capacity and the percolation rates under both low flow and storm conditions would have to be maintained. To prevent possible adverse impacts on the groundwater due to any reduction in channel percolation, spreading basins might be needed. All costs for design and construction and in kind maintenance for the proposed relocation of these two channels would accrue solely to increase gravel production.

Extensive studies would be required to determine existing channel capacities and percolation rates. Some special monitoring of streamflow rates would be necessary. Both Zone 7 and ACWD share rights to storm water in Del Valle. Existing agrements between the two agencies might have to be modified if percolation rates in Arroyo del Valle are changed. A water rights study will be needed if the channel is relocated and percolation rates changed and the point of diversion moved.

(b) Desilting Facilities

Desilting and flocculation facilities would be necessary for storm runoff diverted to spreading basins if spreading basins were found necessary. Desilting basins will be necessary if water is diverted into the gravel pits for any operational(c)Local Storm Water Control Facilities

(c) Local Storm Water Control Facilities

Because of potential pollution from storm water originating on the development areas envisioned in the Plan, storm water runoff should be prevented from directly entering the gravel pit lakes. A storm drainage system should be designed for Reclamation Plan Class 1, 2, and 3 development areas as part of the reclamation plans for individual quarry areas. Likewise, storm runoff from adjacent or nearby industrial, commercial, residential and agricultural areas should be prevented from directly entering the lakes through diking or other means.

(d) Groundwater Movement and Storage Facilities

In the modified Plan, conduits are shown connecting the several gravel pit lakes. The modified Plan indicates (page 4), "The exact size of the conduits connecting the quarry pits should be determined by the need to carry the water so as to maintain as near a natural condition as possible."

To determine natural flow rates, additional groundwater monitoring and planning studies would be required. Water quality must be considered. Modeling might be necessary. The size and design of the facilities needed to maintain water movement and water quality would have to be determined. More conduits might be needed to release water into Arroyo Mocho and del Valle and also in the forebay area south of Stanley Boulevard since the northwesterly movement of water might be more rapid under the Reclamation Plan than under natural conditions. Gates might be needed on the conduits to maintain water quality and flow. With full exposure of the gravel pit lakes along both sides of Stanley Boulevard, the proposed conduit under Stanley Boulevard probably would not be required for water movement.

During mining operations, each gravel pit is composed of several individual cells separated by earthfill dikes. After the pit has been worked out, it is proposed to breech the earthfill dikes between these cells so as to allow water to move freely within each gravel pit lake. The dikes should be lowered to a point below normal low groundwater levels, as shown by studies, and the breeching should be done in a manner which will insure adequate water movement throughout the pit after the dike has been under water many years.

Engineering studies should be made in each major pit area to show that the underwater earthfill material will not create sediment and/or turbidity that would block water flow through exposed gravel faces. This is particularly necessary in the forebay area south of Stanley Boulevard and in the area west of El Charro Road.

In the forebay area, water percolates sideways and downward into the upper and lower aquifers. It is very important to maintain this area free of silt. The gravel pits north of Stanley Boulevard could theoretically be dewatered for maintenance, but it would be difficult to dewater the forebay area once it is filled with water. As shown in the Plan, earthfill dikes would be constructed adjacent to Arroyo del Valle and in between the gravel pit lakes. Gravel dikes, perhaps topped with earthfill above the high groundwater level, should be used instead of earthfill dikes in the forebay area unless it can be conclusively shown that earthfill dikes would not interfere with water movement or create other problems.

Since the storage capacity created would exceed the present groundwater storage, mitigation measures with respect to storage capacity would not be necessary except for the volume of water necessary to fill the additional space.

The Alameda County Surface Mining Ordinance prohibits, upon reclamation, any condition "which will or could lead to the degradation of water quality below applicable standards of the Regional Water Quality Control Board or any other agency with authority over water quality."

(5) Monitoring

Geohydrologic and water resource data for the project area and areas adjacent thereto are insufficient for the needed analyses. Zone 7 has a groundwater monitoring program for the entire Valley. This needs to be expanded so the gravel extraction area and adjacent areas, where maximum disruption to the basin is occurring, can be modeled in detail.

Specifically, the monitoring program should be expanded to include more data on groundwater levels, water quality, and water use in the Plan area. Geologic data on storage and transmissibility should be compiled. Water quality data is needed on flows in Arroyos Los Positas, Mocho, and del Valle. Water levels and pumpage into specific pits during specific period of time should be monitored as needed.

One of the best ways to design the monitoring system would be to develop a detailed model nodal pattern for the area and then monitor to obtain the hydrologic and geohydrologic input needed. The detailed or fine grid model would be part of the larger model of the Valley already partially developed by the California Department of Water Resources. The monitoring program should be carried out by Zone 7 and the gravel companies.

(6) Water Resource Optimization/Multiple Use Scenario

The arrangement of land and water areas proposed in the Reclamation Plan presents great opportunities for a variety of public benefits. An ideal Reclamation Plan could present basic elements needed for management of the Livermore-Amador Valley's water resources for multiple purpose and not just minimal mitigation facilities needed for water transmissivity as proposed. This would enable the general public and agencies using the Plan report to be aware of the larger potential water resource management concepts for the area, and the validity of subsequent reclamation plans for individual areas could be judged against this larger concept. Included would be use of the Plan area to help achieve management goals for flood control, water conservation, recreation, and water quality management. All these goals are mentioned in the Reclamation Plan but are not fully explored, especially as they translate to possible physical facilities necessary for effectuation.

Properly envisioning this alternative requires postulation of a possible optimum water resource management concept, under which landforms would be shaped over time to accommodate all needed water management facilities, not just mitigation facilities. Costs of both mitigation and non-mitigation facilities would be estimated. Allocation of costs toward different functions, such as between quarry mitigation, flood control, and water supply, could be identified. Complete range of benefits (many of which could outweigh impacts which cannot be directly mitigated) could be specified, rather than just adverse impacts.

An example of such a concept is presented in Figure 14, Illustration of a water resource optimization scenario. The basic land and water areas as proposed in the Reclamation Plan would be retained because of thier assumed flexibility. Building upon the Plan, general management concepts could be explored for their feasbility, benefits, cost, and compatibility. Such a scenario, for example, could be based on the following management concepts:

- Water management in the gravel pits would be done in conjunction with the adjacent groundwater basin.
- The west gravel pit basins would be used for current operation purposes.
- The south (forebay) basins would be used for recharge purposes and as a source of emergency water supply.
- Flood control storage would be provided in the north and east basins area.
- An annual average of over 10,000-acre feet of runoff would be conserved.
- Well fields to evacuate water stored in the gravel pits lakes would be located within the project area and in the groundwater basin to the west.

- The pit basins could be used for temporary storage of imported South Aqueduct water and storage of storm flows for other agencies.

- Urbanization and urban activities would be minimized in the forebay area; the forebay would be used primarily for passive recreation and open space to prevent pollution.

- In the west and east basins area there would be strict separation of the basins from urban uses. Buffer zones would be maintained.

- To minimize the inflow of poor quality groundwater it might be practical to seal off the northern side of the north and east basins.

- Recreation use, facilities, and linkage trails would be considered in the design of the water management facilities.

The facilities needed to manage the water under these concepts would include:

- Surface water diversion structures

- Surface conveyancy channels connecting the streams to the basins and turnouts as required.

- Desilting areas for each stream.

- Maintenance areas for each stream.

- Maintenance roads throughout the area.

- Buffer strips needed for prevention of pollution.

- Well fields.

- Recreation facility linkage including bridges.

- Gated multiple level conduits designed for water quality control purposes between the basins.

Land and water shapes and physical facility arrangement would, of course, change over time. Some flood control would be provided for Arroyos Mocho and Las Positas, and some storm water conserved from Arroyos Del Valle and Mocho. Active water recreation would be allowed in selected areas. Under any multiple use concept, canals, turnouts, underground conduits, silt basins and operations roads would be needed to manage the open water in conjunction with the surface and groundwater resources of the Valley.

As discussed elsewhere in this EIR, the hydraulics of use of the proposed gravel pit lakes area for flood control and water supply are excellent. Water could be diverted through the forebay during wet years into the gravel pits west of El Charro Road, and this water could be recaptured by pumping from wells located in the project area and between Martin and Santa Rita Roads. Flood waters from Arroyo Mocho and Arroyo

Las Positas could logically be stored in the gravel pit lakes adjacent to Isabel Avenue (route 84). The forebay area would be kept relatively full to replenish water in all water bearing zones. Although detailed operational modeling studies would be necessary, preliminary analysis indicates that this is a viable plan and the, in any case, the proposed gravel pit lakes could be used for conjunctive use under managed conditions.

Recreational, water conservation, and water quality enhancement benefits could be significant. Facility cost might exceed $15 million, but allocated mitigation costs of the Quarry operators would probably be lower than in the "mitigation only" case previously discussed. Mitigation measures would differ.

About 6,000 acre feet of storage is available in the old California Rock & Gravel Company pits. This would provide flood control for Arroyo Mocho storm flows, particularly if high flows could be routed through to Arroyo del Valle.

Preliminary operation studies indicate water could be conserved in the gravel pit basins. Well fields are needed to remove the water to provide storage to capture storm runoff. Groundwater transmissivity west of Martin Avenue is adequate. Under normal year conditions it would take perhaps ten years to fill the basins. Flood storage could be provided. The unit cost of the developed water appears reasonable when compared with the cost of imported water; however, early implementation of water conservation might involve interim use by agencies outside the Valley of the water developed. A long range view must be taken in developing water resource optimization concepts.

Future studies must consider recreation needs in more depth. In other urban areas, use of work-out gravel pits for water purposes has often been controlled by the trails and access needed for recreation use. The canals could be designed as enjoyable waterways. Live strea,s should be considered. A recreation plan for the entire area could be developed in connection with the Reclamation Plan.

The Reclamation Plan could be modified to conceptually include the multiple use facilities. Under the multiple use concept, mitigation facilities would be limited to those needed to preserve the natural movement of water. However, required mitigation measures would reflect tradeoffs possible under this alternative. Extra wide strips could be provided where needed for maintenance in lieu of water conduits. As proposed in the Reclamation Plan. A tunnel under Stanley Boulevard would be paid for partially as a flood control measure. It could be sized for movement, of water, gravel, and people (recreational).

4. Biota

a. Setting

The Quarry Area has been greatly modified from its natural state through decades of cultivation and mining. The primary area of biotic significance is the Arroyo del Valle and its associated riparian vegetation. The Arroyo contains largemouth bass, bluegill, hitch, carp, Sacramento blackfish, goldfish, Sacramento sucker, Mississippi silversides, white catfish, and Sacramento squawfish near the Quarry Area in Shadow Cliffs Park.[45] No rare or endangered plant or animal species is known to exist in the area. The area exhibits a mix of vegetation and habitat including cultivated fields, settling ponds and other lakes, and barren areas devoted to active quarrying.

The Arroyo Mocho, which passes through the area, carries seasonal water but is virtually devoid of riparian habitat and is essentially a straightened channel. In 1976 rainbow trout, greensunfish, Sacramento sucker, and western roach were present in the stream.[46]

The presence of water in settling ponds and other quarry pits attracts waterfowl, such as blue herons, which would otherwise not occupy the area. The Livermore-Amador Valley is part of the hunting area of the Southern Bald Eagle and the American Peregrine Falcon, which have been classified "endangered" by the State authorities. However, neither is endemic to the region and their primary hunting area would lie outside the Quarry Area.

b. Impacts

The most significant adverse impact of the Plan on biota would result from replacing the existing Arroyo del Valle channel with an artificial channel. Approximately a three-mile reach of the watercourse would be so affected. Existing riparian vegetation would be removed and this scarce habitat would be rendered even scarcer in the Valley. The diversity and abundance of fish and wildlife would be reduced.

In other areas, implementation of the Reclamation Plan would greatly enhance wildlife habitat and increase the number and diversity of species present over existing and "natural" levels. The other 2,000 acres of water area proposed would attract area ground animals and overflying birds. Ponds could support fish and even commercial fisheries, although fluctuating water levels would hinder fishery use. Differences in pond levels and management will help increase the diversity of species.[47]

The 1:1 standard slopes proposed for pond edges would increase the likelihood of siltation. Siltation in the ponds is, to some extent, inevitable. It would adversely affect wildlife and fish.

Fish and wildlife use of the habitat provided by the ponds would not be compatible with residential use of the nearby land areas.[48] Light industrial use is more compatible with wildlife.

Trespassers, poachers, or vandals will be tempted by the pond areas and would inhibit wildlife if not controlled. Disturbance-intolerant species would not frequent pond areas open to the public.

c. Mitigation

The best mitigation of loss of the natural Arroyo del Valle channel is to construct the new channel as close in appearance and function to the natural channel as is feasible. (An alternative of leaving the existing channel untouched is discussed in Section VI. Alternatives). The most important measure is revegetation of the channel banks to natural riparian species. Also, ponds should be placed at certain points along the channel to encourage fish habitat. The channel should meander in a natural manner to maximize edge habitat and also for aesthetic reasons. In general, its artificiality should be minimized and softened. The proposed new channel should be completed, revegetation established, and should be functioning as a viable watercourse prior to commencement of mining in the existing channel. Continuous riparian habitat should be maintained at all times; in time it will become even more critical as wildlife habitat as urbanization continues. Modification of the Del Valle channel will require a stream alteration permit issued by the State Department of Fish and Game. The Department will impose conditions intended to mitigate adverse impacts of stream alteration on fish and wildlife. A program of revegetation and other mitigation measures should be worked out between Fish and Game and the operator involved (Lone Star Industries).

Slopes should be minimum of 2:1 to reduce the possibility of erosion and silt deposition. To cope with the inevitable siltation of various ponds, a sediment deposit area should be designated as part of the Reclamation Plan and reserved for that purpose to receive spoils from periodic dredging of pits.

Certain appropriate ponds could be set aside and managed to allow no public access to encourage disturbance-intolerant species. As many ponds as possible should be set back from roads and fenced to avoid a line-of-sight temptation for poachers, trespassers, and vandals.

Areas proposed in the future for uses other than open space, agriculture, or light industry should be carefully evaluated on the basis of potential degradation of available wildlife habitat.

The ideal wildlife-enhancing design for the pits would be for shallow edges and deep centers, with perhaps some islands. Shallow edges may not be compatible with mosquito abatement unless properly managed. Habitat edges, such as land/water and grassland/woodland, should be maximized throughout the reclamation area.

5. Climate and Atmospheric Conditions

a. Setting

The Livermore-Amador Valley experiences hot, dry summers and mild, wet winters, typical of intermontane valleys of coastal California. Mean maximum temperatures during July average 99° and mean minimums during January average 35°. Temperatures over 100° are common during the summer and below freezing temperatures usually occur every winter. Extremes of 113° and 21° were recorded in the decade 1951-1960.[49]

Average annual precipitation at Pleasanton is 17 inches, decreasing easterly to 14 inches at Livermore. Precipitation is a few inches more in the hills to the south of the Quarry Area.[58] Normally, over 80% of annual rainfall occurs between November and March. During storms, this extra rainfall makes considerably more water available for percolation into the Arroyo del Valle forebay area.

The bowl shape of the Valley, together with commonly occuring temperature inversions which prevent normal mixing and dilution of the air, allows critical air pollution levels to be reached periodically. The principal types of air pollution in the Valley are photochemical oxidants (caused by reactions between hydrocarbons and oxides of nitrogen in the presence of sunlight) and particulate matter. The number of days per year during which standards are exceeded varies widely, in proportion to adverse or beneficial weather patterns. From 1973 to 1977, the area experienced between 17 and 93 days per year during which the oxidant level exceeded the National Ambient Air Quality Standard of 0.08 parts per million.

The State standard for suspended particulate was exceeded from 16 to 41 days per year during this period. Such wide variations in the annual average make it difficult to analyze long-range trends.

b. Impacts

The significant increase in water surface area proposed should result in a slight moderation of temperatures in the Quarry Area microclimate.

No adverse impacts are forseeable. No other impacts on climate are identifiable at this time.

Quarrying activities contribute directly to air pollution through emissions from heavy machinery and dust from earth moving operations. These activities will be occuring with or without the proposed Reclamation Plan; thus, the Plan's implementation would have little effect on the total amount of emissions and dust. Conversion of quarried land to residential, industrial, and recreational uses would greatly increase local vehicle miles travelled. It is impossible to quantify the impact on air quality because of the uncertainty, 20 to 50 years from now, of various crucial factors in estimating such impacts, including vehicle emission rates and areawide transit modal split.

c. Mitigation

Availability of reclaimed land for higher intensity land uses does not necessary mean that the land would actually be put to such uses. The potential impact on air quality would be eliminated by adherence to environmental policies which do not allow large scale development which would measurably deteriorate air quality.

D. Cultural Environment

1. Land Use

a. Setting

Present surface land use in the Quarry Area is agricultural and industrial.

Agricultural use predominates in the northern portion of the area, on land which has not yet been quarried. Some areas are put to no use but function as open space prior to mining. Generally, the central and southern portions of the area (See Staging Plan--1976) are still used for some part of the quarry operation, either working pits, process water storage, settling ponds, or operators' buildings and corporation yards.

Present uses of water and groundwater in the Quarry Area are described in the Water Resources section.

b. Impacts

As quarrying continues to its conclusion in the area over the next 50 years, agricultural and open space uses will decline while land used for quarrying increases. The Project Description section provides detailed estimates of particular land use acreages over time, as given in the Reclamation Plan. The Reclamation Plan's function is to specify available land uses during, and upon completion of, quarrying (and also to ensure present water uses can continue, as discussed in the Water Resources section). The prime concern is to create usable land and water areas through planning to provide enough flexibility so that use decisions to be made well in the future are not unduly constrained, and that the depleted quarry area not represent a hazard. The end-state Plan notes land uses available of varying intensities, ranging from open space and agriculture to urban development, based on geologic suitability and stability from reclamation practices. Interim uses proposed are based on compatibility with continuing mining, and are limited to industry and the quarrying operations themselves. Land available for industrial use between now and 2030 bears no obvious relation to other land uses or available infrastructure. Impacts of such use are impossible to determine at such a future time and environmental review would take place only if and when specific uses are proposed. Any land in the Quarry Area may never develop to its available use. The Plan proposes that the Specific Plan to be adopted for the Quarry Area designate land uses. The Plan also states that upon completion of mining, only stability and load bearing capacity of regenerated lands constrains their use. However, land uses also would be constrained by public policies, plans, and Valley-wide land use context at that future time. Commitment at this time to irreversible types of uses could be detrimental to the future orderly development and environment of the Valley.

Uncontrolled and unplanned land uses in the Quarry Area could have adverse impacts on the environment and on the quarry resources. Use of water areas and environmental impacts are discussed in the Water Resources section. The Plan proposes cut slopes of 1:1 as the norm in pits, with an additional 15-foot wide bench five feet above maximum water level in slopes adjacent to properties used for purposes other than quarrying or adjacent to public rights-of-way. This standard would severely compromise future land use flexibility and could constitute a clear health and safety hazard. Reclamation goals would be adversely affected. No matter how pits are used or managed, periodic maintenance and easy emergency access is essential if problems occur elsewhere on the slope, in areas which machinery cannot reach from the bench. If the pits are used for recreation, 1:1 slopes make it difficult for a swimming person to exit water. Also, the slope proposed is much too steep for general access for water-oriented recreational use.

c. Mitigation

To mitigate impacts of untimely or illogical development on reclaimed lands, policies should be adopted in the Specific Plan to implement the Reclamation Plan as part of Livermore-Amador Valley General Plan to guide such uses during the Plan period. To avoid impacts of commitment to intensive land uses, an assumption could be made in the Specific Plan that Open Space and mining related industrial uses of reclaimed lands are appropriate as a present designation until it can be demonstrated that agricultural, industrial, or residential uses would not conflict with other land uses, policies, plans, and environmental quality existing at that future time. If it can be so demonstrated, then commitment to such uses should be made through revisions in the Specific Plan as early as possible. As quarrying is phased out and much land becomes available for development, planning will have to continue to ensure minimization of impacts. This can be accomplished through the 5-year review of Reclamation Plans required by the Alameda County Surface Mining Ordinance. It is impossible to be more specific at this time with scarce knowledge to predict what environmental and other issues will dominate planning for the area 50 years hence. Any specific land uses or infrastructure (roads, utility extensions, etc.) would undergo environmental review at the time of proposal.

Impacts caused by 1:1 slopes could be reduced if 2:1 slopes were adopted as the conceptual standard in reclamation. This measure is discussed in Section IV.C.1.c. (Mitigation of Topographic Impacts). An explicit trade-off is involved between this mitigation measure and maximization of extraction and sale of the gravel resource. For example, assuming a yield of saleable materials at 90% of total volume of materials, average excavation depth of 100' and weight of saleable materials of 100 pounds per cubic foot, the difference between 1:1 and 2:1 is approximately 225 tons per foot of frontage. Taken altogether, the 10 lake pits proposed have a combined frontage of about 142,000 feet. Of this total, about 60% is interior frontages which abut impermeable fills, which are not critical for groundwater movement and which thus can be excavated and then backfilled to 2:1. The remaining frontage, if harvested to only 2:1, represents a loss of about 12.6 million tons of gravel resource, about 3.2% of the 400 million tons expected to be excavated from the Quarry Area. The actual loss would be less because of overburden and the thinning of deposits to the north and west, where much exterior frontage is concentrated. Perhaps between 2% and 3% would be lost, roughly equivalent to about one to one and one-half years current production in the Quarry Area.

2. Transportation

a. Setting

The primary public route through the Quarry Area is Stanley Boulevard, a 4-lane highway connecting Pleasanton and Livermore. The Western Pacific and Southern Pacific Railroad tracks parallel Stanley Boulevard, and together with the road divide the Quarry Area in an east west direction roughly in half. A pedestrian and bicycle path also parallels Stanley on its south side. Primary circulation within the active mining operations is provided by two private roads which connect El Charro Road with Stanley Boulevard (See Figure 4A, 1976 Staging Plan). Other access to the area is available leading off from Mohr Avenue to the west, Isabel Avenue on the east, and Vineyard Avenue to the south. El Charro Road is connected via an interchange to I-580 is to the north of the Quarry Area.

Stanley Boulevard carries about 23,000 vehicles per day at First Street near the Pleasanton City Limits. The other roads are lightly travelled, less than 1,000 ADT.[31]

b. Impacts

Approval of the Reclamation Plan would have no significant effect on traffic levels on area streetss for the duration of the interim period while quarrying is still taking place. Urban or recreational development of the area would generate significant amounts of traffic; meaningful analysis cannot be accomplished at this time but would occur in detailed environmental review for any specific proposal.

The Plan depicts an alignment for El Charro Road between I-580 and Stanley Boulevard as well as Route 84 (Isabel) Expressway, and Las Positas Boulevard. These are not new proposals but simply reflect existing local and state plans. The massing of land areas as depicted by the Plan appear to allow sufficient flexibility to accommodate future circulation needs in the Quarry Area.

3. Services/Utilities

a. Setting

Detailed review of existing community facilities and services is not pertinent to consideration of the Reclamation Plan at the present time. Few services are required for sand and gravel operations or for construction of reclaimed sites. Few services are required for interim industrial uses. It is assumed that an appropriate range of urban facilities would be available through municipal annexation for the eventual use of reclaimed areas.

b. Impacts

Sand and gravel excavation and reclamation activities are self-contained and have little need for community facilities and services. Financial support received through sales and property taxes from operations provides net benefits to community facilities and services, without corresponding costs. Land uses on reclaimed areas have not yet been determined. It is premature to assess service requirements since no such uses would occur until about 1995.

4. Aesthetics/Visual Quality

a. Setting

A great diversity of aesthetic quality is present in the Quarry Area. The most pleasant areas are those as yet untouched by quarrying operations, especially the Arroyo Del Valle area east of Isabel Avenue, with its heavy riparian vegetation and year-round water flow. Other unmined lands are typical flat, Valley agricultural landscapes. The most attractive areas used for active quarrying are the settling ponds, which appear as tranquil bodies of water surrounded by steep slopes, upon many of which vegetation has begun to appear. The remaining areas of quarry operations are interesting to observe and understand but would not be termed aesthetically pleasing. As a whole, the Quarry Area appears flat with a skyline of trees and mining machinery. Pits are not visible until one is quite close to them.

b. Impacts

The Reclamation Plan is intended, in part, to restore the Quarry Area landscape to an attractive condition. Pits will either be backfilled or filled with water. In most areas, the net result will not deteriorate current aesthetics and may enhance visual quality in some cases. The Plan would establish permanent open space areas between the cities of Livermore and Pleasanton, consisting of potentially attractive water and open space area..

One identifiable adverse impact is potential for degradation of visual quality of the Arroyo del Valle area. The Plan proposes that the channel be relocated to the edge of the Quarry Area primarily for the purpose of maintaining transmissivity of water through the area where pits would replace the existing Arroyo. Quarrying of the channel is allowed under existing Quarry Permit Q-1. The constructed channel would not exhibit the riparian vegetation and meandering course of the existing natural channel. The amenity created by Arroyo Del Valle, perhaps the most aesthetically pleasing feature in the Quarry Area, would be lost. The visual quality of the channel is especially important as it is proposed to be paralleled by a regional hiking trail.

Establishment of 1:1 side slopes as the norm would impair visual quality due to the artificiality and abruptness of the water edge. Water edge is important for recreation, wildlife, and visual quality.

c. Mitigation

To mitigate loss of the natural Arroyo del Valle, a specific landscaping/design plan should be proposed by Lone Star Industries at the time their specific reclamation plan is submitted. The landscape/design plan should incorporate extensive revegetation of the channel banks to native species, perhaps a meandering channel alignment, and in general a restoration to as near a natural appearing watercourse as possible. Costs for this program should be borne by the company, as relocation is to occur solely to increase resource yield.

Mitigation of adverse effects of 1:1 side slopes could occur by establishing 2:1 slopes as the norm, unless 1:1 can be shown to be beneficial, as discussed in Sections IV.C.1. Topography and IV.D.1 Land Use. Details of revegetation, slope treatments, and other aesthetic considerations involved in reclamation are most appropriately analyzed in future specific plans to be submitted by the individual operators.

5. Recreation

a. Setting

Three public entities are capable of providing recreation and park services to the Quarry Area in addition to possible private recreation operations. The State of California operates an extensive system of parks. East Bay Regional Park District provides parks and recreational services for western Alameda and Contra Costa Counties. EBRPD's eastern boundary passes through the Quarry Area; the Area is within the District with the exception of its northeast corner. Livermore Area Recreation and Park District (LARD) encompasses eastern Alameda County. Its western boundary passes through the Quarry Area; the northern and eastern portion is within the District. EBRPD and LARD boundaries overlap somewhat in the Quarry Area. EBRPD presently owns and operates Shadow Cliffs Regional Recreation Area adjacent southwesterly to the Quarry Area, developed from a donated, abandoned pit generated by previous quarrying.

b. Impacts

The Reclamation Plan discussed recreation potential of portions of the Quarry Area and management for recreational purposes is suggested as a significant use after termination of quarry operations. One specific recreation facility, a regional hiking trail along the Arroyo Del Valle channel, is depicted on the year 2030 end-state plan map. Although both EBPD and LARD are suggested as appropriate agencies to consider operation of recreation areas, the size and complexity of land and water areas to be managed suggests that LARD may not be equipped to handle the job. Also, the facilities would certainly be regional in scope; it would be inequitable for local taxpayers to support operation of facilities (through LARD) used primarily by non-residents of the District.

The potential for recreation in the reclaimed Quarry Area is enormous; but large, too, is the potential cost of constructing, managing and operating a park of such size and with so much land and water interface. In the near term, prospects for expansion of existing park facilities by EBRPD appear dim because of the austere financial mood of District residents. While it is impossible to predict this factor 50 years from now, it is clear that the expense of creating and operating the fullest potential recreational facilities in the Quarry Area will be considerable and perhaps beyond the means of any local agency.

Any recreational use would logically focus upon the water resources of the reclaimed pits. Recreational use may be compromised or hindered because of competing uses for the water areas. For example, using the pits as storage for flood flows or groundwater recharge in times of drought would cause water levels to fluctuate greatly, which would almost preclude recreational use. Active, heavy recreational use has the potential to degrade water quality in the open pits. There appears to be adequate land area to allow development of facilities and access to the water.

The 1:1 slopes proposed as standard in the Reclamation Plan would cause adverse impacts in areas used for recreation, including lack of access, increased safety hazards, increased maintenance porblems, difficulty of establishing plantings, and lack of an aesthetic water edge. These impacts are discussed in more detail in Sections IV.C.1 Topography and IV.D.1 Land Use.

c. Mitigation

The expense of creating usable parkland could most inexpensively and efficiently be borne by the quarry operators, over a period of time, through shaping their operations to permit specified recreational needs. Interested recreation agencies should specify minimum requirements for their prospective re-use of mined lands and these should be translated into operational guidelines for the operators to be made a part of their own, more detailed specific reclamation plans. Tentative recreation areas should be identified as soon as possible. Optimum landforms should be specified by landscape architects and adhered to through mining planning and staging. To mitigate the expense of operating recreational areas upon completion of mining, the possibility of operation as a State Park should be investigated, as well as certain operations by private interests.

Alternative water management scenarios as they affect surface elevations in various pits should be studied to determine at the earliest practical date the potential areas for various types of recreation. Some pits may be suitable for recreation with the understanding they would be unavailable a certain percentage of the time due to more critical uses, such as flood control storage. Planning for safety should be an important part of recreational study of the area. Recreational use would have to be well supervised and monitored to ensure that it was not adversely affecting water quality.

Study and selection of areas to be used for recreation would help in planning for adequate finished cut slopes. No finished slope should be less than 2:1, whether excavated to this slope or backfilled, and far lesser slopes, such as 12:1, should be planned for forseeable active water edge recreation areas so that swimming, boat launching, etc., can be accommodated. See Sections IV.C.1 Topography and IV.D.1 Land Use for further detail on slope mitigation. A "live stream" park of size and potential unique in Alameda County could be developed along a relocated Arroyo del Valle. An enormous opportunity is available if coordinated planning of channel alignment, revegetation and recreational facilities takes place.

6. Energy

a. Setting

Little energy is consumed in the Quarry Area outside active mining operations. Agricultural or open space predominates. Operation of quarries and support buildings requires energy for building operation, and to run equipment for earthmoving, excavation, crushing, screening, stockpiling, and transporting of quarry materials.

Excavation and related site activities are estimated to use about .45 therms per cubic yards moved (=.675 therms per ton moved), .4 therms per ton crushed and stockpiled, and transportation of materials from the site about .27 therms per ton per mile travelled.[52] Quarrying the 400 million tons proposed over the next 50 years would consume 430 million therms due to on site quarrying and finishing and 2,700 million therms to transport materials to construction sites (assuming an average trip of 25 miles). Although clearly a large amount of energy, alternative sources of high grade quarry materials are located still further from places of use. Use of other sources would increase total energy consumption for construction in the quarries' service area proportionate to increased distances similar materials would have to be hauled. The Quarry Area is presently competetive in supplying an area ranging from San Jose to Walnut Creek and west to San Francisco, including the entire East Bay.

b. Impacts

Energy would be consumed to construct the Reclamation Plan facilities. Heavy excavating and transporting equipment used in levelling and backfilling, and pumping activities will use most of the energy. The amount of energy would be small in the context of overall operations.

The Plan, if followed, would indirectly cause an increase in energy needed to supply water to the Livermore Valley from the State Water Project. More of this import water would be needed if groundwater levels are kept low so as not to interfere with mining. Also, more energy would be consumed due to increased pumping needed to extract groundwater.

After the completion of mining, some energy would be required to transmit water through the area. The amount depends upon the specific design and operation of water movement systems. The system of conduits and gates proposed could rely largely on gravity, avoiding significant energy use. However, taking advantage of opportunities for more sophisticated management of the interconnected lakes (e.g., for water supply or flood control purposes) would require considerable amounts of energy for pumping and various support facilities.

c. Mitigation

Measures to minimize energy intensive use of quarry equipment are not easily applied considering the nature of operations. Energy wasted by inefficient equipment can be reduced by proper maintenance. Planned, progressive reclamation as proposed, tied to the proposed mining staging, can produce operational efficiencies by eliminating unnecessary earthmoving activities, thereby reducing energy consumption. In carrying out the Reclamation Plan, hauling distances of land forming material should be minimized, and overburden and waste material, when originally handled, should be placed in areas designated for its final use. These efficiences are consistent with the operators' interests to reclaim the site economically.

Mitigation of increased energy needed to import water if groundwater levels are kept low could occur through managed conservation of water in abandoned pits. This could occur by 1985. A net savings of energy needed to supply water to the Valley could be realized. See section IV.C.3. Water Resources, for further discussion of this possibility.

Consumption of energy is but one factor to be taken into account in planning for a water management plan for the Quarry Area. Public benefits of increased water supply, flood control, and conservation may outweigh costs of increased energy consumption. Furthermore, use of pits for conservation and water supply could be more energy efficient than use of State Water Project water.

7. Archaeology

a. Setting

No archaeological sites have been recorded within the Quarry Area. Several recent surveys conducted by qualified archaeologists of inclusive and adjacent areas were negative for archaeological sites. Four sites are recorded within one mile of the Quarry Area boundary.[53]

b. Impacts

The quarrying has the potential both to reveal and to destroy archaeological sites. The Reclamation Plan makes no mention of the possibility of discovery of artifacts or methods of action to deal with the possibility.

c. Mitigation

It is doubtful that more extensive archaeological surveys than have already been performed over portions of the Quarry Area would reveal sites because of the highly disturbed earth surface due to decades of cultivation and quarrying. If, however, archaeological finds are made during excavation, work in the area should halt pending consultation of a qualified archaeologist, whose recommendations should be followed. Work could continue in other areas not near the site.

8. Noise

a. Setting

High noise levels are currently being generated in the Quarry Area in those specific areas in which mining is taking place. Heavy equipment used for extraction and processing of gravel and trucks used to transport materials off site generate the most noise. Individual equipment may generate 90dBA or greater. Overall

operations noise may reach 100dBA. Planning in the Quarry Area has long sought to minimize the location of sensitive noise receptors in close proximity to existing or planned operations. Where mining has been proposed in areas near to existing sensitive receptors, conditions have been placed to curtail noise, such as establishing a broad unmined buffer area and setting specific noise maxima allowed at the property edge. Typically, sand and gravel operations are below grade, reducing perceived offsite noise. As a result of these factors, on-site quarry noise has not been a major problem.

To reach South Bay markets, gravel trucks use I-680 via First Street in Pleasanton. This use of city streets has impacts, including noise, but is associated with the quarrying operations themselves and not reclamation.

b. Impacts

High noise levels would be generated in excavation and backfilling processes. In the context of overall gravel harvesting, which would be taking place while reclamation proceeds gradually, the increment is not considered significant. Most operations would be below ground level, thus reducing perceived offsite noise.

c. Mitigation

Reduction of noise at the source can be accomplished by proper maintenance of equipment and usage of newer equipment. Newer trucks, for example, are quieter than old trucks because of recent noise emission standards. Use of quieter trucks will increase over the life of the Reclamation Plan as older trucks are replaced.

9. Health and Safety

a. Setting

Potentially hazardous areas exist within the Quarry Area. Large ponds are present with near-vertical sides. Steep slopes abound. The operators police their own property and trespassers are usually promptly spotted and removed.

b. Impacts

The Reclamation Plan calls for 1:1 final cut slopes as the norm for water-filled pits. Slopes this steep are difficult to grab into to pull ones' self out of the water in an emergency (overturned boat, swimming too far, etc.). Such slopes also have a tendency to crumble underfoot if walked upon, and they make rescue operations difficult.

A potential for increased production of mosquitoes exists due to the extent of water areas proposed and the nature of quarrying operations, which often leave temporary pools of water. Either permanent or temporary pools may breed large quantities of mosquitoes if they do not contain predators, or if they have vegetation or other physical factors to protect mosquitoes against wind. Slow reclamation of pits with watery silt can provide these conditions. Malarial mosquitoes, while not yet introduced in the area, are a potential problem because of favorable conditions and increased foreign travel.

c. Mitigation

Mitigation of safety hazards of steep slopes can be accomplished by adhering to 2:1 slope requirements of the Alameda County Surface Mining Ordinance, as discussed in Sections IV.C.1 Topography and IV.D.1. Land Use.

Mitigation of mosquito production includes the following measures: proper grading and reformation of land to allow proper drainage and prevent standing water; avoiding extensive shallow areas in permanent ponds; minimization of vegetation near the edge of ponds; establishment of access roads to allow inspections and control activities; and coordination of planning and project management with the Alameda County Mosquito Abatement District to provide information and mosquito control materials.[54] The Alameda County Surface Mining Ordinance requires approval of bodies of water created by reclamation plans by the County Mosquito Abatement District and the Health Care Services Agency, further mitigating health and safety impacts.

10. Public Plans and Policies

a. General Plan

(1) Setting

The Livermore-Amador Valley Planning Unit General Plan (A part of the Alameda County General Plan) adopted November 1977, designates the Quarry Area for "Sand and Gravel Quarry" use, reflecting knowledge of the resource present. The Plan contains the following Goal relating to mineral extraction:

> "To ensure the extraction of needed mineral resources, consistent with conservation and recycling of materials, as a temporary use of the land not detrimental to other resources or surrounding land uses."

The Plan also contains the following Objectives relating to Mineral Extraction:

- Provide Access to Mineral Resources: To provide access to minerals through identification of the resource.
- Require Reclamation Plans: To require plans for and commitment to rehabilitation and reuse of mineral extractionn areas before new areas are mined.
- Protect Groundwater: To protect groundwater from short and long range deterioration or depletion as a result of mineral extraction.
- Compatible with Surrounding Areas: Mineral extraction and related activities, such as transport of materials, should not adversely affect surrounding areas in terms of sound levels, air quality, traffic, aesthetics.

The General Plan proposes that ultimate land use in the Quarry Area be designated through the adopted Reclamation Plan. The General Plans of Livermore and Pleasanton are similar to the County Plan. The County Open Space Element shows no open space designation within the Quarry Area; quarrying is presumed to continue for the life of the General Plan (1995). The County Scenic Route Element designates Vineyard Avenue as a scenic route. Other designated routes in the area are proposed, but as yet unbuilt: Isabel Freeway, Las Positas Boulevard, and Del Valle Parkway.

Alameda County Local Agency Formation Commission has placed the western half of the Quarry Area in the City of Pleasanton's Sphere of Influence. The eastern half of the Quarry Area is not in a Sphere.

(2) Impacts

Sand and gravel mining is consistent with the General Plan, as is the concept of reclamation and reuse of land in the Quarry Area. Policy for land use on reclaimed sites is not defined in current plans.

(3) Mitigation

A Specific Plan for the Quarry Area will be developed, based on the submitted Reclamation Plan as may be modified through further studies and public hearings. The Specific Plan should define policies for land use within the Quarry Area as reclamation takes place, to ensure compatible uses and maintenance of environmental quality. The Specific Plan would be, under State law, part of the General Plan and serve as the implementing procedure for overall progressive reclamation of the Quarry Area. Review of the Reclamation Plan every 5 years, as required by the Alameda County Surface Mining Ordinance, will ensure timely consideration of land use issues prior to final commitment.

b. Zoning

(1) Setting

The project site is zoned A (Agricultural). Sand and gravel extraction and associated interim uses are permitted uses in all zoning districts subject to issuance of a Surface Mining Permit. Agricultural zoning as applied to much of the project site is an interim designation. Urban uses would require reclassification to residential, industrial, or commercial districts. Recreation is permitted in the A district subject to issuance of a Conditional Use Permit.

(2) Impacts

No impacts on zoning or impacts of zoning upon the Reclamation Plan are evident.

c. Surface Mining Ordinance

(1) Setting

The Alameda County Surface Mining Ordinance, (ACSMO) adopted by the Board of Supervisors July 14, 1977, supersedes the previous County Quarry Ordinance and regulates surface mining and reclamation of lands within the unincorporated area of the County, pursuant to the California Surface Mining and Reclamation Act of 1975. The ACSMO is included as Appendix B of this report. Operations under permits granted prior to adoption of the ACSMO are exempt from its provisions and are governed by their permit conditions. Reclamtion requirements of the ACSMO apply to all operations after January 1976.

It is the intent of the Surface Mining Ordinance that mining activities be regulated in a manner that assures:

(a) "Prevention or mitigation of adverse effects on the environment, including air pollution, impedence of groundwater movement and water quality degradation, damage to aquatic or wildlife habitat, flooding, erosion, sedimentation effects, and excessive noise;

(b) Progressive reclamation concurrent with mining so that mined lands are returned to a condition adaptable for alternate land uses, with no residual hazards to public health or safety and with land and water resources maintained in a state beneficial to society; and

(c) Consistency with mineral resource management policies of the General Plan."

The ACSMO defines reclamation as "the combined process of land treatment that minimizes disruption or alteration of groundwater movement, water quality degradation, air pollution, damage to aguatic or wildlife habitat, flooding, erosion, sedimentation, and other adverse effects from surface mining operations, including adverse surface effects incidental to underground mines, so that mined lands are reclaimed to a usable conditions which is readily adaptable for alternate land uses, and so that adverse impacts on groundwater resources are mitigated, and no danger to public health or safety is created. The process may extend to affected lands under the control of the operator surrounding mined lands, and may require backfilling, grading, resoiling, revegetation, soil compaction, erosion and sediment control, stabilization, restoration of groundwater recharge areas, or other measures."

Upon the filing of a surface mining applicatio· or a reclamation plan, the Planning Commission is requ··ed to determine whether the proposed mining and reclmation operations conform to the County Surface Mining Ordinance.

The Commission is also required to make specific findings whether the permit and reclamation plan conforms, or can be made to conform, to the Surface Mining Ordinance and the public health, safety and welfare. These findings must state the basis for such determinations. If the application is approved, conditions of approval must include:

(a) "That one of the following types of security, in an amount determined by the Planning Commission, be furnished to guarantee faithful performance of the work to be done under the terms of the surface mining permit and reclamation plan:

(1) Bond or bonds by one or more duly authorized corporate sureties.

(2) A deposit, either with the local agency or a responsible escrow agent or trust company, of money or negotiable bonds of the kind approved for securing deposits of public moneys.

Table 14

SUMMARY OF QUARRY PERMITS

PERMIT NUMBER	OPERATOR	TIME LIMIT	APPROVED	AREA	COMMENTS
Q-1	Lone Star	None	1/1957	1000 acres	Top of cut slope at least 80' from Stanley Boulevard r/w; 100' from centerline of Isabel Avenue, Vineyard Avenue, other roads; required levees from flood prevention along Arroyo del Valle; Cut slopes set back 100' plus depth from creeks and roads.
Q-2	Rhodes & Jamieson	None	2/1957	170 acres	Setbacks 100' from streams; 50' from roads required.
Q-4	Rhodes & Jamieson	None	2/1957	250 acres	Setbacks 100' from stream banks and centerline of various streets; 80' from Stanley Boulevard r/w; original permit operator was California Rock & Gravel, purchased by R&J in 1977.
Q-14	Rhodes & Jamieson	20 years	3/1958	84 acres	EXPIRED 3/1978. (Original operator was California Rock).
Q-33	Kaiser	None	3/1962	84 acres	100' setback from streams, 50' from road r/w required.
Q-40	Rhodes & Jamieson	None	4/1963	50 acres	100' setback from streams, 80' from Stanley Boulevard r/w 70' from centerline of Isabel Avenue required. Original operator was California Rock.
Q-53	Kaiser	12/31/1990	6/1965	400 acres	Reclamation Plan required.
Q-76	Lone Star	12/31/1995	4/1969	165 acres	Reclamation Plan required; 5 year review of permit and conditions required.

(b) The term of the permit.

(c) A schedule for periodic review of the surface mining permit and the reclamation plan by the Planning Commission at time intervals not to exceed five (5) years for the reclamation plan and at such interval as the Planning Commission determines appropriate for the surface mining permit."

In addition to the conditions specified above, the Commission may impose other conditions related to the public health, safety and welfare, including, but not limited to, such matters as hours of operation, limitations on hauling and the use of public roads and streets.

The action taken by the Planning Commission to issue, approve, deny or modify a surface mining permit or reclamation plan may be appealed to the Board of Supervisors by any person within 10 days of that action. If the Board determines the findings made and action taken by the Planning Commission to be unsatisfactory, then the appeal shall be denied. If it determines otherwise, the Board must make its own findings and take action in accordance with provisions of the Surface Mining Ordinance.

As provided by the State of California Public Resources Code, an applicant whose request for a surface mining permit to conduct operations in an area of statewide or regional significant has been denied by the Board of Supervisors on appeal, may within 15 days of such denial, appeal to the State Mining and Geology Board. If the State Board determines the decision of the Board of Supervisors is not supported by substantial evidece in the record, the Board of Supervisors shall hold a public hearing to reconsider its action.

If the surface mining permit and reclamation plan are approved, the Planning COmmission must establish a schedule at the time of approval to consider new or changed circumstances within the general area to mining operations that should be accommodated by the permit or plan. The review must include a public hearing (as specified in Section 8.117.1 of the ACSMO) after which the permit or reclamation plan may be modified. Modifications will become binding on the surface mining operation.

(2) Impacts

The consistency of the Reclamation Plan as submitted with the ACSMO must be evaluated by the Planning Commission, as the designated decision-making body, with the help of public input, this EIR, and other elements comprising the record on this matter.

Specific requirements of the ACSMO are relied upon, as discussed in various sections throughout this EIR, to mitigate impacts which would otherwise occur.

d. Surface Mining Permits

(1) Setting

Existing mining in the Quarry Area takes place under authorization through various Quarry Permits granted by the County since 1957. Significant conditions were attached to all of the permits, including requiring preservation of groundwater quality; final cut slopes no steeper than 1:1 (and, in some cases, 1.5:1); setbacks of cut slopes from creeks and streets (usually 100' plus the depth of the cut); control of siltation; excavation limited to depth of upper aquifer; and various conditions controlling noise, vehicular access, fencing, and operating procedures. The more recent permits have, in addition, required submittal of reclamation plans, posting of faithful performance bonds, and periodic Planning Commission review of the operation.

About 2760 acres of the 3820 acre Quarry area is under active, valid permit. Another 210 acres consist of expired permits or depleted resources. Thus, 850 acres, or about 22% of the Quarry Area is not under active permit. The sand and gravel operators have a vested right to mine the 2760 acres under permit under conditions imposed at the time the permits were granted. Submittal of a reclamation plan at this time is in response to the State Surface Mining and Reclamation Act of 1975, which is discussed in the following section. See Table 14 for a summary of permits in the Quarry Area.

(2) Impacts

The vested rights which the quarry operators have under terms of their permits limits, along with their individual staging and operating plans, the range of reclamation alternatives available. Also circumscribed is the range of requirements which can be imposed upon reclamation, so as not to interfere with existing vested rights. Requirements which can be imposed are limited to those directly affecting reclamation, rather than the quarrying operation itself. The Kaiser operation under Q-53 has somewhat less vested rights in that the permit requires approval of a reclamation plan prior to mining the majority of the site. Permits which will expire prior to 2030 will lose vested rights and thus have future operations regulated under the ACSMO.

No vested rights exist for the 850 acres for which no permit has been issued. The Reclamation Plan calls for 470 acres to remain unmined; thus, 380 acres not now covered by Quarry Permit are proposed to be mined in the future. This represents only about 10% of the Quarry Area, but it will be possible to better coordinate the future operation with ultimate reclamation at the time of permit application for these lands. If all or part of the 380 acres is not mined for some reason, then a revised overall reclamation plan would need to be submitted by the operators to reflect this circumstance. Environmental assessment of mining in this area would take place through the EIR process at the time applications for new Quarry Permits are received.

e. State Surface Mining and Reclamation Act of 1975

(1) Setting

The California Surface Mining and Reclamation Act of 1975 set State policy toward mineral extraction and required reclamation plans for operations to be conducted beyond January 1, 1976. Features of the Act are the implementing responsibility of the State Mining and Geology Board, created by the Act as part of the Division of Mines and Geology. The Act calls for surface mining and reclamation practices to include soil erosion control, water quality and watershed control, flood control, protection of fish and wildlife habitat, resoiling, and revegetation. The Act requires that the Lead Agency (in this case, Alameda County) "shall assure that the objectives of the reclamation plan will be obtained. This may include provisions for liens, surety bonds or other security, to guarantee the reclamation in accordance with the approved reclamation plan."

Under the Act, the State Mining and Geology Board adopted further policy for reclamation of mined lands in April, 1977.[55] This policy recognizes Legislative intent to regulate surface mining to assure that:

(1) Adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition which is readily adaptable for alternative land uses.

(2) The production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment.

(3) Residual hazards to the public health and safety are eliminated.

The State definition of reclamation is similar to that contained in the County SMO, given in Subsection c. of this Section. State Policy provides that "evaluation and acceptance of the operation to achieve this level of reclamation, using reasonable and practicable measures."[55]

(2) Impacts

It is the responsibility of the Alameda County Planning Commission, as Lead Agency, to ensure compliance of the Reclamation Plan with the 1975 Act and State policies.

f. State Water Resources Control Board

(1) Setting

The State Water Resources Control Board is responsible for allocation of water rights. Existing water rights permits relevant to the Reclamation Plan are discussed in the Water Resources section.

(2) Impacts

Changes in existing water rights permits or new permits may be required under Reclamation Plan proposals. The Water Resources section of this report contains a full discussion.

g. Regional Water Quality Control Board

(1) Setting

The Regional Water Quality Control Board regulates discharge to surface and ground waters in the Bay Area. It also formulates a Water Quality Control Plan (basin plan). The groundwater basin of the Livermore-Amador Valley and the downstream Alameda Creek-Niles Cone watershed and basin are considered water quality problem areas. Specific water quality and related information is presented in the Water Resources section.

(2) Impacts

Impacts of the Reclamation Plan on water quality are presented in the Water Resources section.

h. Alameda County Flood Control and Water Conservation District--Zone 7

(1) Setting

Zone 7 of Alameda County Flood Control and Water Conservation District is responsible for flood control, water supply and conservation, and groundwater management in the Livermore-Amador Valley. The Zone has local water rights and also buys water from the State for wholesaling to Valley retail water service agencies. Present Zone 7 policy on groundwater management is directed toward filling the basin as much as possible. Further details are presented in the Water Resources Section.

(2) Impacts

Impacts of the Reclamation Plan on Zone 7 and its policies, and vice versa, are presented in the Water Resources section.

i. State Department of Fish and Game

(1) Setting

The California Department of Fish and Game must issue a permit prior to any stream channel modification, under Section 1603 of the Fish and Game Code. The Department may place conditions on granting a permit to mitigate effects of the channel alteration on fish and wildlife.

(2) Impacts and Mitigation

Impacts and mitigation of proposed channel modification of Arroyo Mocho and Arroyo del Valle are discussed in detail in the Biota section of this EIR.

11. Operation/Maintenance/Management of Proposed Facilities; Long-Term Guarantees/Compliance/Enforcement

a. Setting

Presently in the Quarry Area, groundwater is transmitted through aquifers underlying the area to downstream users. Mining the area places severe impermeable obstacles to this natural groundwater flow. The Plan proposes using mined-out pits to hold water and to transmit this water through a system of physical facilities so that water transmissivity is maintained.

b. Impacts

As discussed in the Water Resources section, the primary impact of the Reclamation Plan is the cost of constructing and operating physical facilities necessary to transmit water through the Quarry Area, which is now done in nature at no cost. The Reclamation Plan is vague about much of the specific facilities needed, and there is no mention of specific costs. This lack of quantification makes the extent of the impact difficult to measure, important for at least two reasons. First, the overall feasibility of the Plan is hard to evaluate. Second, many of the mitigation measures alluded to in the Plan involve multiple use of the facilities, that is, certain impacts which are unavoidable are not mitigated directly but through indirect tradeoff mitigation measures. Without quantification, the effectiveness and reasonableness of these measures cannot be properly analyzed.

Elements of the Reclamation Plan for which significant costs would be incurred include (1) Cost of construction of diversion works, pipes, valves, gates, and other facilities needed to transmit water; (2) Cost of support facilities, such as roads, needed to operate and maintain the facilities; (3) Cost of operation of the facilities, including maintenance, desilting, and diversion works; (4) Costs of not filling the groundwater basin, as proposed in the Plan to avoid hindering gravel mining operations; (5) Costs of water lost to evaporation from lakes (the Plan claims this is mitigated by the greater storage capacity available in the lakes than in the groundwater aquifer, but utilization of this increased capacity will require additional costs of diversion, management, etc.); and (6) Cost of extensive studies required to implement the Plan, as detailed in the Plan itself and in the Water Resources section of this EIR (Much of these study costs would be shared but costs in the Reclamation Plan are not allocated to the quarry operators at all).

The Plan is also vague as to the institutional arrangements necessary to implement the Plan proposals, both in the interim period and after mining is completed. Zone 7 is suggested as the agency to "construct, maintain and operate the diversion works and pipes, valves and gates hydraulically connecting the 'chain of lakes'." But such construction and operation is necessary to maintain water transmissibity and should be the responsibility of the operators.

Inequities would arise if Zone 7 were to pay these costs. For example, citizens of the Livermore-Amador Valley comprising Zone 7 would be taxed as the sole support of a system which has beneficiaries outside the Zone, such as Alameda County Water District. Furthermore, the quarry operators, who created the necessity for construction and operation of the works in the first place, may be gone and so public costs might be incurred to mitigate the effect of short-term, private gains.

The Plan hints that East Bay Park District and/or Livermore Area Recreation and Park District could operate recreational areas within the Quarry Area. Some sort of commitment by these or other agencies, at least to further study, would be necessary before recreational use could be made a key part of the reclamation concept.

The Plan is silent with respect to ownership of lands within the Quarry Area after the mining period. It contains no provision for failure of any portion of the vast facilities proposed, nor for any such contingency. Nor does it contain suggestions for quaranteeing construction and operation as proposed. Financial and institutional commitment by both the quarry operators and appropriate public agencies is necessary to implement the Plan.

c. Mitigation

The Alameda County Surface Mining Ordinance requires that security be furnished "to guarantee faithful performance of the work to be done under the terms of the . . . reclamation plan." It is questionable whether it is feasible to meet this requirement through a bond or deposit at the outset because of the magnitude of the sum of money involved. Also, the requirement does not address the problem of continuing maintenance and operation of facilities, in essence, a continuing mitigation. The quarry operators should be responsible for establishment of a fund of some sort out of which, by 2030, sufficient annual income is available to meet operation and maintenance costs attributable to mitigation. A separate fund should be built up over the course of mining operations sufficient to guarantee execution of the Reclamation Plan. Such a fund could be established in a number of ways, such as a depletion of gravel resource tax or a simple royalty on material sold. Whatever method chosen should contain provisions for escalation for inflation and periodic review for adequacy and appropriateness. A bond should also be established by the operators to provide for failure of facilities or other contigencies. The County Surface Mining Ordinance requires all reclamation work be guaranteed for two years or longer, if determined necessary by the Planning Commission. Ongoing reclamation activities during the mining period should be monitored and required to meet an appropriate schedule. Penalties for non-compliance can be connected to continuance of mining.

Because of the overriding interest involved in proper functioning of the chain of lakes, control, use, and access to the facilities could be assumed by an appropriate public entity if the operators continue to own Quarry Area lands. If multiple use of the facilities is undertaken, the right to direct their operation to achieve multipurpose water resource management objectives should also be assumed by the public, in accordance with an approved water resource management plan. At minimum, arrangements should be made to have the following reserved to the public:

- right to manage and use groundwater resources (water and storage) in the area undiminished with respect to quantity and quality;
- right to use the basins for multipurpose water resource management, including flood control and water conservation;
- right to access to, in, and around the pit lakes in perpetuity.

Responsibility for providing basic facilities cost and operation cost estimates should rest with the quarry operators insofar as these costs are necessary to effectuate basic mitigation. Lack of cost figures and institutional arrangements in the Reclamation Plan for implementation should be seen as a deficiency in the Plan and addendums should be prepared which remedy these shortcomings.

Until specific costs of Reclamation Plan proposals (as presented in the Impacts section) are made explicit, debate as to allocation of costs is difficult to undertake. A supplemented Plan should also specify guarantee methods and adopt a more realistic approach to contributing to costs of necessary studies.

V. UNAVOIDABLE ADVERSE IMPACTS

Certain impacts attend the sand the gravel operations and are only marginally related to the Reclamation Plan, such as depletion of mineral resources, loss of prime agricultural soils, and operational nuisances (noise, dust, aesthetics, etc.).

Impacts identified below are significant and are generated primarily by the Reclamation Plan as proposed. Many can be mitigated through changes in the Plan; these are noted. They are unavoidable only under the Plan as proposed. Lesser impacts which can be mitigated relatively easily, as identified throughout this report, are not presented here. Many benefits are possible with facilities proposed in the Reclamation Plan, but informed judgment regarding tradeoffs versus impacts cannot be accomplished without more quantification of costs involved.

Impacts identifiable at this time include:

- Increased cost of transmitting water through the Quarry Area for operation and maintenance of necessary facilities
- Loss of water through annual evaporation from lakes (can be mitigated by providing replacement water on an annual basis).
- Potential degradation of water quality due to exposure to atmosphere and human contact, including potential development (can be mitigated by limiting water surface exposure to potential contaminants)
- Substantial degradation of water quality due to salt buildup because of high evaporation in lakes coupled with low inflow (assuming no diversion from Arroyos del Valle and Mocho; can be somewhat mitigated if waterflow is increased significantly e.g., for flood flow or conservation use)
- Potential water quality degradation and interference with potential reclaimed uses due to algal growth (mitigation may be available, but at some cost)
- Potential for siltation in Water Storage facilities if water is diverted into basins. (Mitigation is available through construction of desilting basins)
- Commitment to a certain landform, topography, circulation system, overall potential development concept, etc., which circumscribes possible future use of the area (some mitigation is possible if periodic review is written into Plan approval)
- Increased safety hazard, limiting of potential land uses, potential for siltation, difficulty of maintenance and access due to proposed 1:1 slopes (mitigation is possible if 2:1 slopes are required as the norm unless demonstrated not to be necessary or desirable)
- Placement of a 1,300 acre impermeable core in the center of the upper aquifer of the Amador subbasin (mitigation is proposed as the heart of the Reclamation Plan via the "chain of lakes" concept, but at costs)
- Unknown, but potential impacts on lower aquifers caused by placement of the impermeable core. (mitigation consists of carrying out additional data gathering and analysis to predict impacts and potential mitigation, if necessary)
- Possible loss of recharge and percolation areas due to impervious surfaces from development and loss of natural stream channels (direct mitigation is possible if development is limited and if replacement channels are designed to allow percolation. Indirect mitigation is possible if available increased storage capacity is utilized. Either mitigation concept involves increased costs)
- Increase in water use in Quarry Area due to evaporation, agricultural, recreational, commercial or residential uses (mitigation would require provision of replacement water for non-beneficial or unreasonable increase)
- Necessity for and cost of carrying out studies to determine feasibility of various aspects of the Reclamation Plan (mitigation is possible if the gravel operators bear costs attributable to implementation of their Reclamation Plan)

- Possible creation of large, unusable area if development is not feasible (for example, because of the risk of water contamination) and no recreation agency is willing or able to manage the area

- A distinct set of impacts is associated with keeping groundwater levels low, as called for in the Plan, including:

  - loss of storage capacity of the groundwater basin during the mining period

  - loss of cheaper (present) water

  - loss of hedge against drought

  - loss of opportunity to fill basin if State Water Project water becomes short in future years

  - increased energy consumption necessary for increased pumping

  - possible salt buildup in the basin

  - possible inflow of high nitrate/high TDS water from north side of groundwater basin into central part

  - curtailment of groundwater management options

VI. ALTERNATIVES TO THE PROPOSED PROJECT

A. No project

The project is a Specific Plan which will form the basis for reclamation plans intended to comply with requirements of the California Surface Mining and Reclamation Act of 1975 and the Alameda County Surface Mining Ordinance. "No project" (i.e., no reclamation) is not an alternative allowed by law and, in any event, would clearly generate greater environmental impacts than implementation of the project.

B. Maximation of Land Area

Increasing the amount of land area, especially along Stanley Boulevard, has some advantages, particularly for potential future industrial or other development. However, the area along Stanley is critical for movement of groundwater through the Quarry Area and blockage would occur if fill capable of supporting development was placed there. Limited land area can be created because of the volume of material to be removed. Significantly more refill could feasibly only be accomplished by importing inexpensive materials, such as solid waste or debris. Aside from blockage of water flow through the area, such uses would probably encounter much community opposition.

C. Maximization of Resource Extraction

Under this alternative, sand and gravel resources would be extracted to their fullest extent. No dikes would be left; two very large lakes, one on either side of Stanley Boulevard, would be created. Quarrying would take place to the limits of individual permit requirements, usually 1:1 slopes. Active quarrying would take place over a longer period, and ultimate reclamation would thus be postponed. Less backfill would be available to create land areas, so a higher proportion of water to land would result. Lack of a number of lakes would severely limit capability of management of water for a variety of beneficial uses. Less land would reduce future land use flexibility and access and recreation potential. Slopes of 1:1 would cause safety, maintenance, and land use flexibility problems

D. Retain Natural Arroyo del Valle Channel

Under this alternative, mining would not occur in the Arroyo del Valle channel and relocation of the channel would not be necessary. A suitable setback from the banks of the stream would be required. This alternative would eliminate impacts on biota resulting from destruction of the riparian environment along the existing watercourse. In addition, natural percolation and pass-through of water would continue to occur via the stream and studies to ensure these functions (necessary if the channel were to be relocated) would not be needed. Readily available gravel resource would be lost, which may mean higher prices for Bay Area gravel would occur sooner than if the channel were to be mined. Lone Star Industries has a vested right to mine the channel under terms of Quarry Permit Q-1. Impacts of mining can be mitigated, albeit at considerable expense, through construction of a new Arroyo del Valle with all natural features such as vegetation and meandering course.

E. Elimination of Chain of Lakes Concept

The concept of using depleted pits as lakes to store and transmit water could yield to other concepts. One possibility (1) could involve creation of dry land below the level of groundwater, surrounded by dikes or levees and potentially suitable for agriculture. A second possibility (2) would be to use overbruden and slimes to develop land at a low level but above the normal groundwater elevation, to maximize land area. In either case, groundwater transmissivity through the area might be achieved through use of pipes, channels, or much smaller lakes than shown on the Reclamation Plan.

Under this alternative, evaporative losses which would occur with the chain of lakes concept would be minimized; if pipes were used, such losses would be eliminated. Also, less water quality degradation due to sale buildup and atmospheric and human exposure would occur. However, considerable study would be needed to determine sizing and location of pipes or channels to ensure full replacement of natural groundwater storage and flow and to receive sufficient water from recharge areas. Study would also be necessary to determine whether sufficient overburden and slimes would be present after mining to backfill depleted pits above future groundwater levels. As w h the Reclamation Plan proposed, studies would have to be undertaken to property evaluate feasibility. The entire cost of these studies would be the responsibility of the gravel companies, because they are necessary solely to mitigate transmissivity and storage impacts of mining on groundwater. Another possible disadvantage of this alternative is problems it may pose for ongoing mining operations. With possibility (2), stockpiling and eventual movement of overburden and slimes may be difficult and present logistical problems for the operators' mining plans. Timing of reclamation in this manner, e.g., refilling of pits and construction of pipes, channels, or lakes would be critical. A fund or other method to ensure eventual construction of a complete system would need to be set up.

With either possibility, usability of land areas is uncertain. Agricultural use may be precluded by gravel or clay soils. The possibility of flooding of pits must be guarded against the possibility (2). Land created with overburden and slimes may not be suitable for alternative uses should agriculture prove infeasible. Finally, opportunities would be lost for water management, proposed in the Reclamation Plan and recognized therein as perhaps the most significant potential future use. No public benefits would accrue beyond mitigation of mining damage.

VII. GROWTH INDUCING IMPACTS

Sand and gravel is a basic building material and its availability accommodates growth induced by other factors. The resource is not in short supply in absolute terms, but alternative sources are more expensive to the consumer. The project is in the center of the urbanized Livermore Valley and its adoption for future use through reclamation planning is not construed to be growth inducing. Land areas to be created would have the potential to contain development. Development, if it were to occur at all, would be too far in the future (50 years) to speculate upon its extent, form, and impacts.

VIII. ORGANIZATIONS AND INDIVIDUALS CONSULTED IN THE PREPARATION OF THIS REPORT AND TO WHICH THE REPORT WAS REFERRED

State Clearinghouse, Office of Planning and Research
State Water Resources Control Board
State Department of Water Resources
State Division of Mines and Geology
State Department of Fish and Game
State Air Resources Board
Regional Water Quality Control Board, Attn: Adam Olivieri
U.S. Army Corps of Engineers, San Francisco District
Anthropology Lab, California State University at Sonoma
East Bay Regional Park District
Association of Bay Area Governments
Alameda County Water District
Alameda County Flood Control and Water Conservation District, Zone 7
Alameda County Public Works Agency
Livermore-Amador Valley Sand and Gravel Committee
Harvey O. Banks, Consulting Engineer
David W. Carpenter, Consulting Engineering Geologist
Rhodes & Jamieson, Ltd.
Kaiser Sand & Gravel, Inc.
Lone Star Industries, Inc.
Environ
Ned Robinson, Stark, Stewart & Simon

IX. OTHER ORGANIZATIONS AND INDIVIDUALS REFERRED THIS REPORT

California Department of Water Resources, Red Bluff, c/o Doug Denton
Department of Geography, Cal State Chico, Dr. Albert Beck
Department of Community and Environmental Services, Sonoma County, Ray Crauss
William Apperson, Pleasanton
Livermore-Amador Valley Water Management Authority
East Bay Dischargers Authority
Alameda County Local Agency Formation Commission
U.S. Geological Survey
California Department of Parks and Recreation
Livermore Area Park & Recreation District
Dublin-San Ramon Services District
Alameda County Building Official
Alameda County Road Department
City of Pleasanton
City of Livermore
U.S.D.A. Soil Conservation Service
Alameda County Mosquito Abatement District
Alameda County Health Care Services Agency
Bay Area Air Quality Management District
National Sand & Gravel Association

Pleasanton Planning Department
Livermore Planning Department
Alameda County Farm Bureau
Alameda County Sheriff's Department
California Department of Transportation
League of Women Voters, Livermore-Amador Valley Chapter
Sierra Club, Livermore-Amador Valley Regional Group
Sierra Club, San Francisco Bay Chapter
Valley Ecology Center
Institute of Government Studies, U.C. Berkeley
Hayward Daily Review
Fremont Argus
Livermore Independent
Oakland Tribune
Tri-Valley Herald
Valley Times
Village Pioneer
San Francisco Chronicle
San Francisco Examiner
Dublin Library
Pleasanton Library
Livermore Library
Dublin Chamber of Commerce
Pleasanton Chamber of Commerce
Livermore Chamber of Commerce
Southern Pacific Transporation Company
Western Pacific Railroad Company
Joel Werth, American Planning Association
Greg Carr, Sonoma County Planning Division
Joe Maden, Pleasanton

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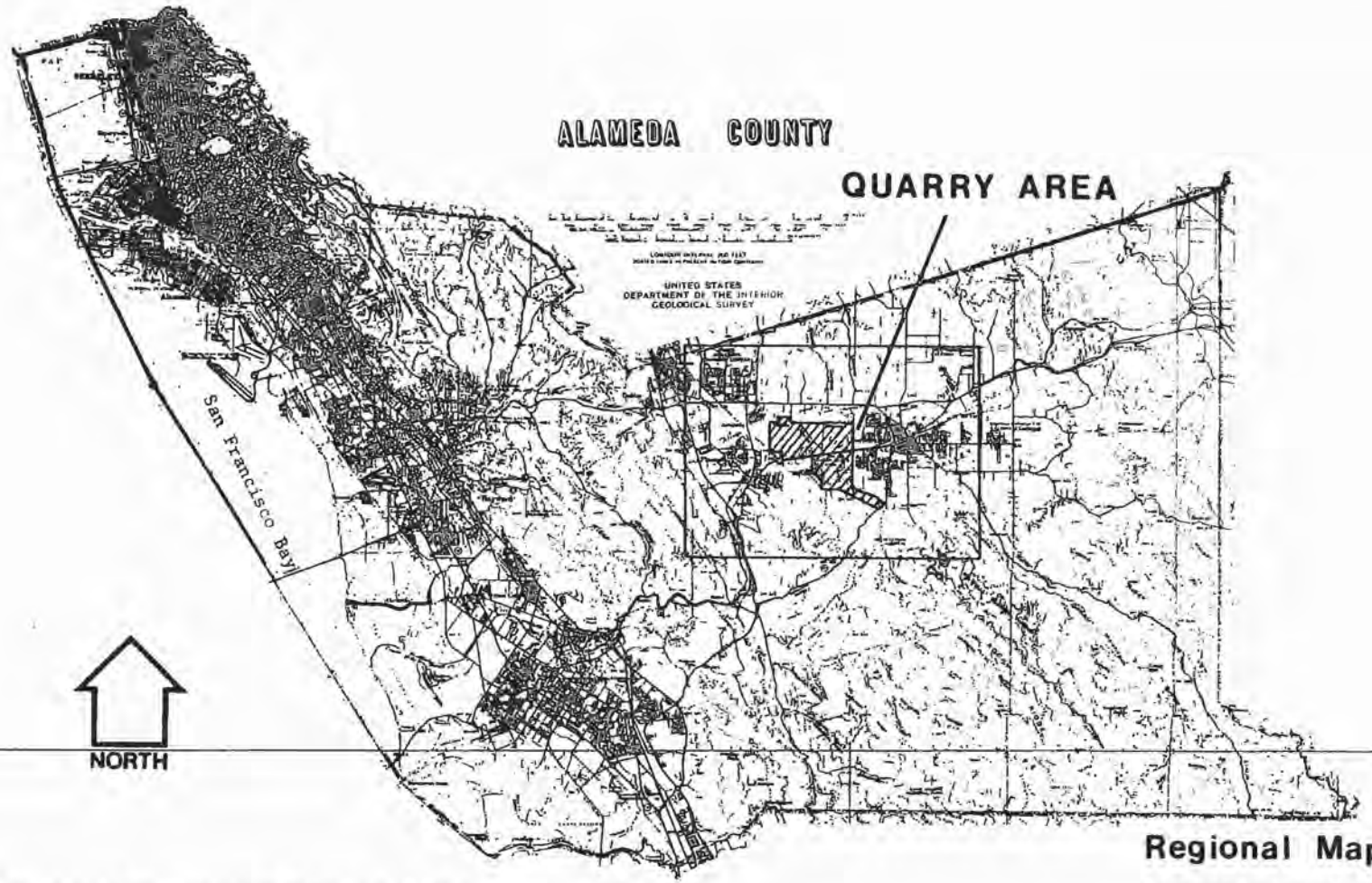
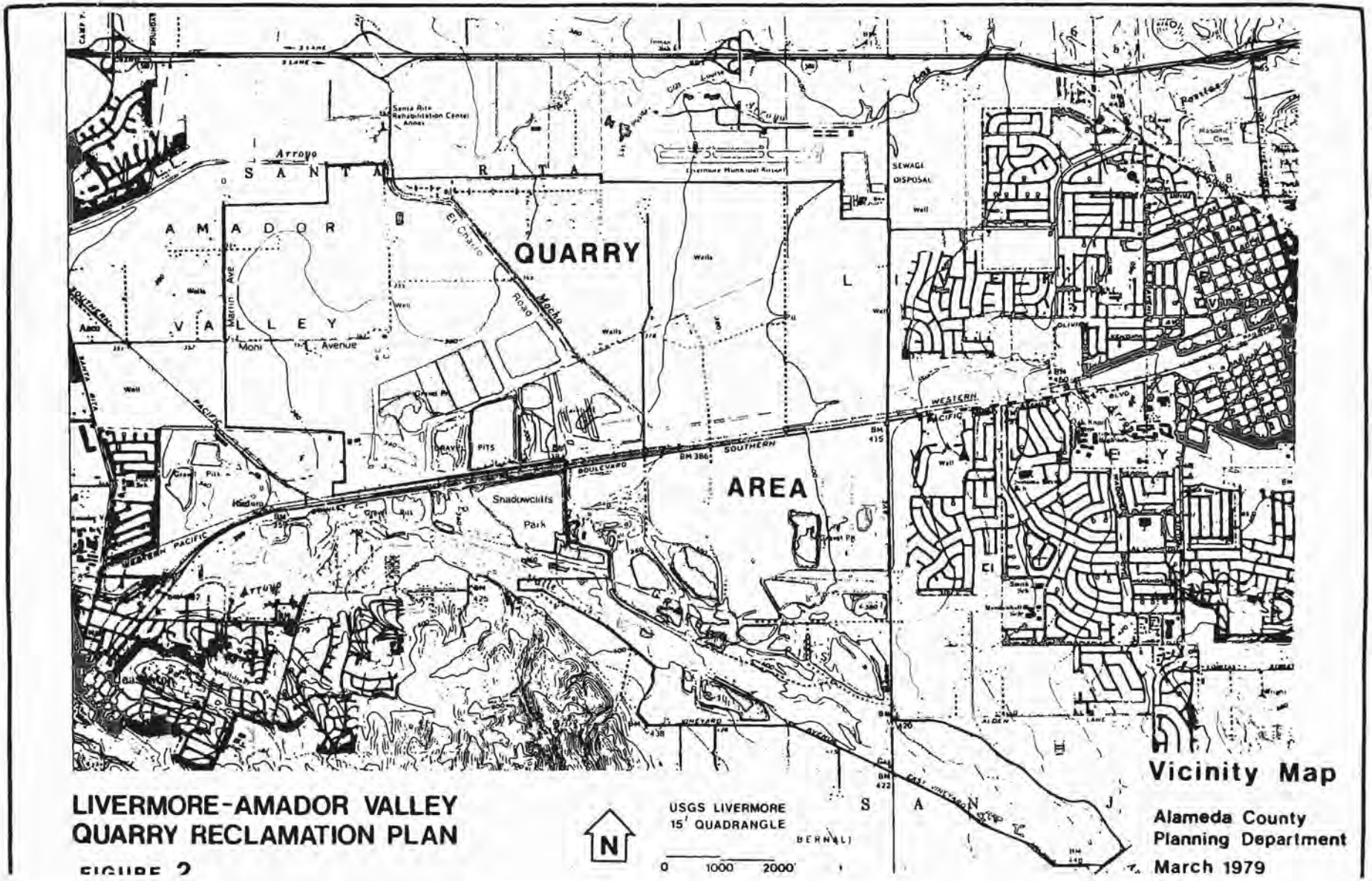


Regional Map

LIVERMORE-AMADOR VALLEY
QUARRY RECLAMATION PLAN

FIGURE 1

Alameda County
Planning Department
March 1979

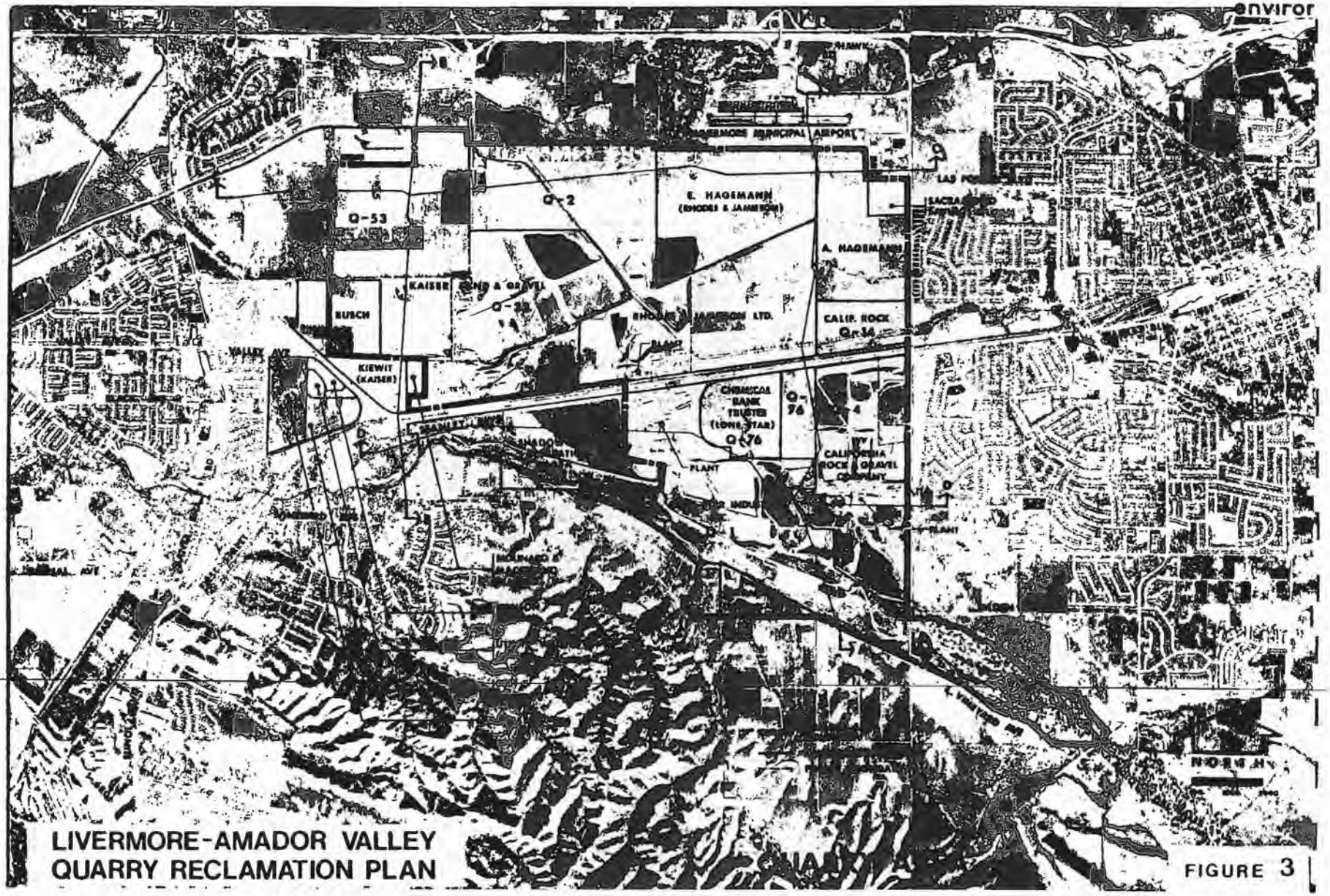


Vicinity Map

LIVERMORE-AMADOR VALLEY
QUARRY RECLAMATION PLAN

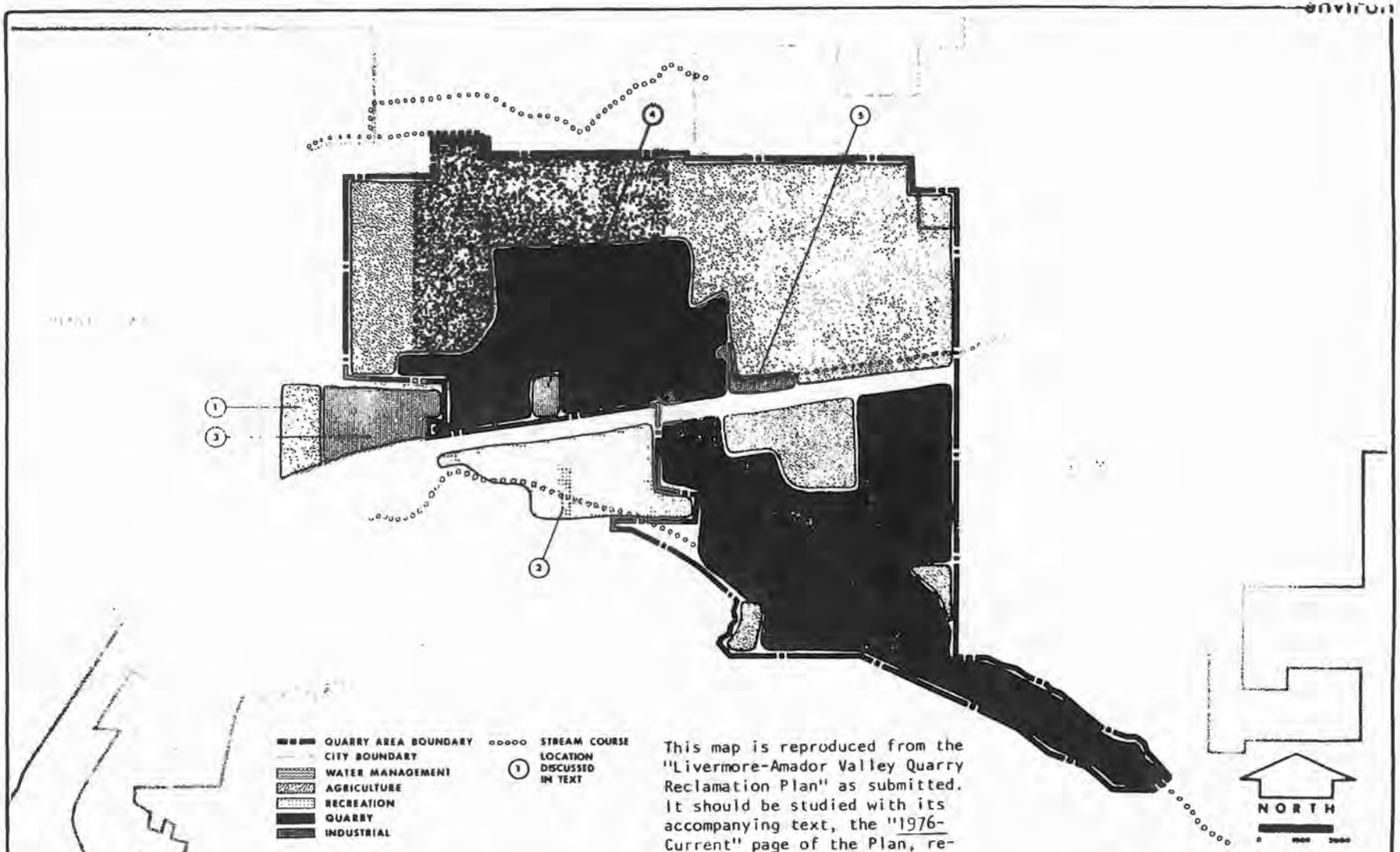
FIGURE 2

Alameda County
Planning Department
March 1979



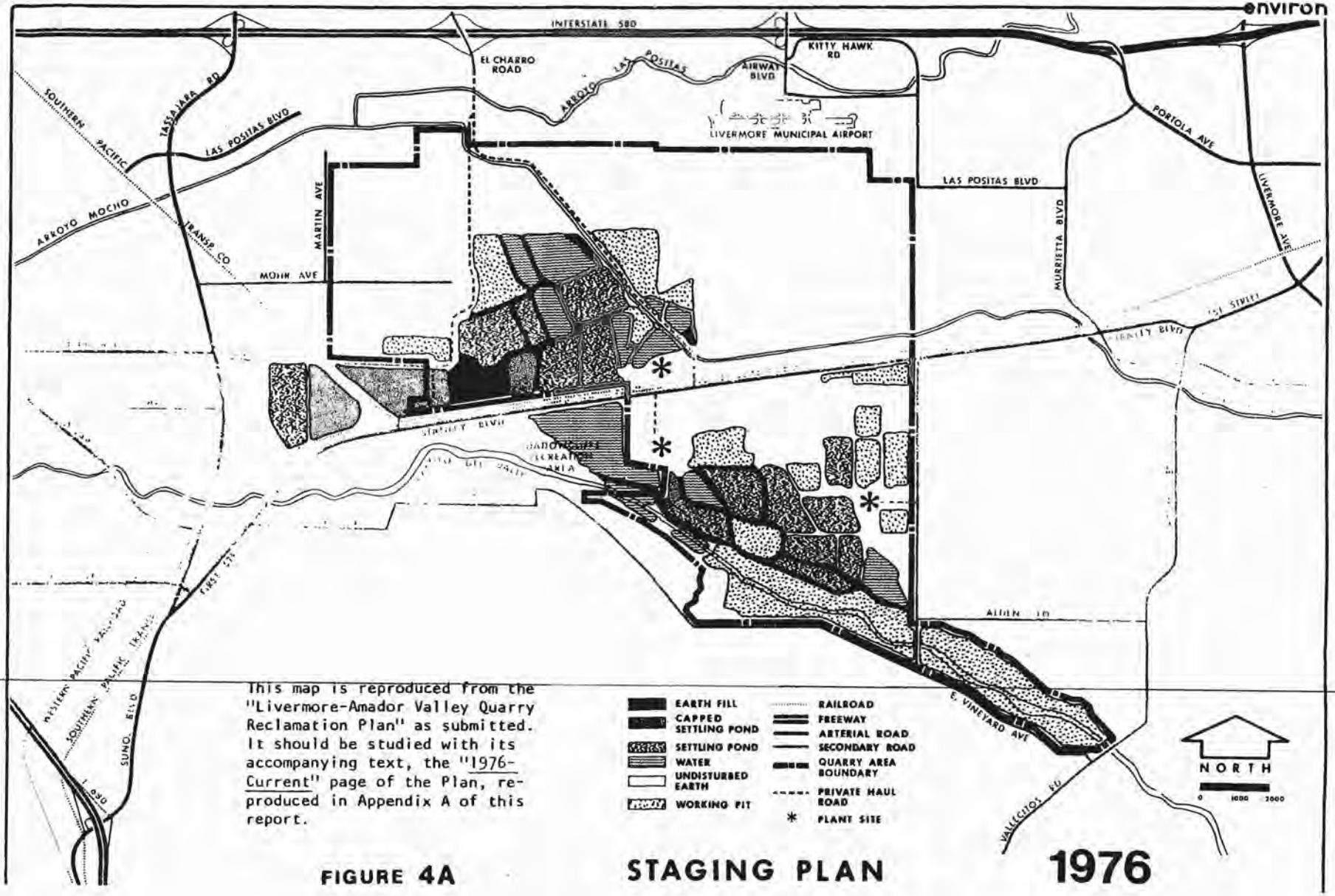
LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

FIGURE 3



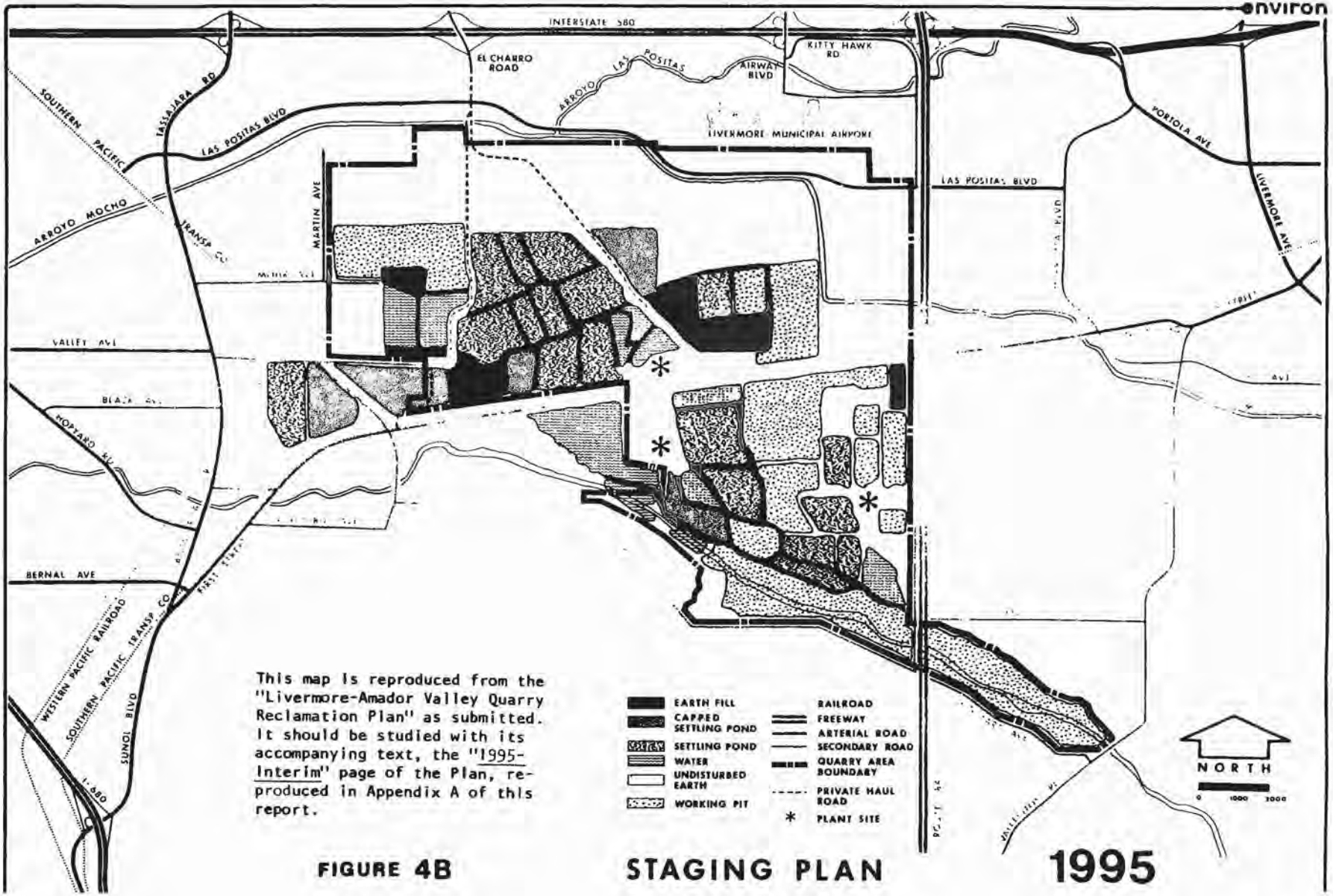
This map is reproduced from the "Livermore-Amador Valley Quarry Reclamation Plan" as submitted. It should be studied with its accompanying text, the "1976-Current" page of the Plan, reproduced in Appendix A of this report.

AVAILABLE LAND USE **FIGURE 4A** **1976**



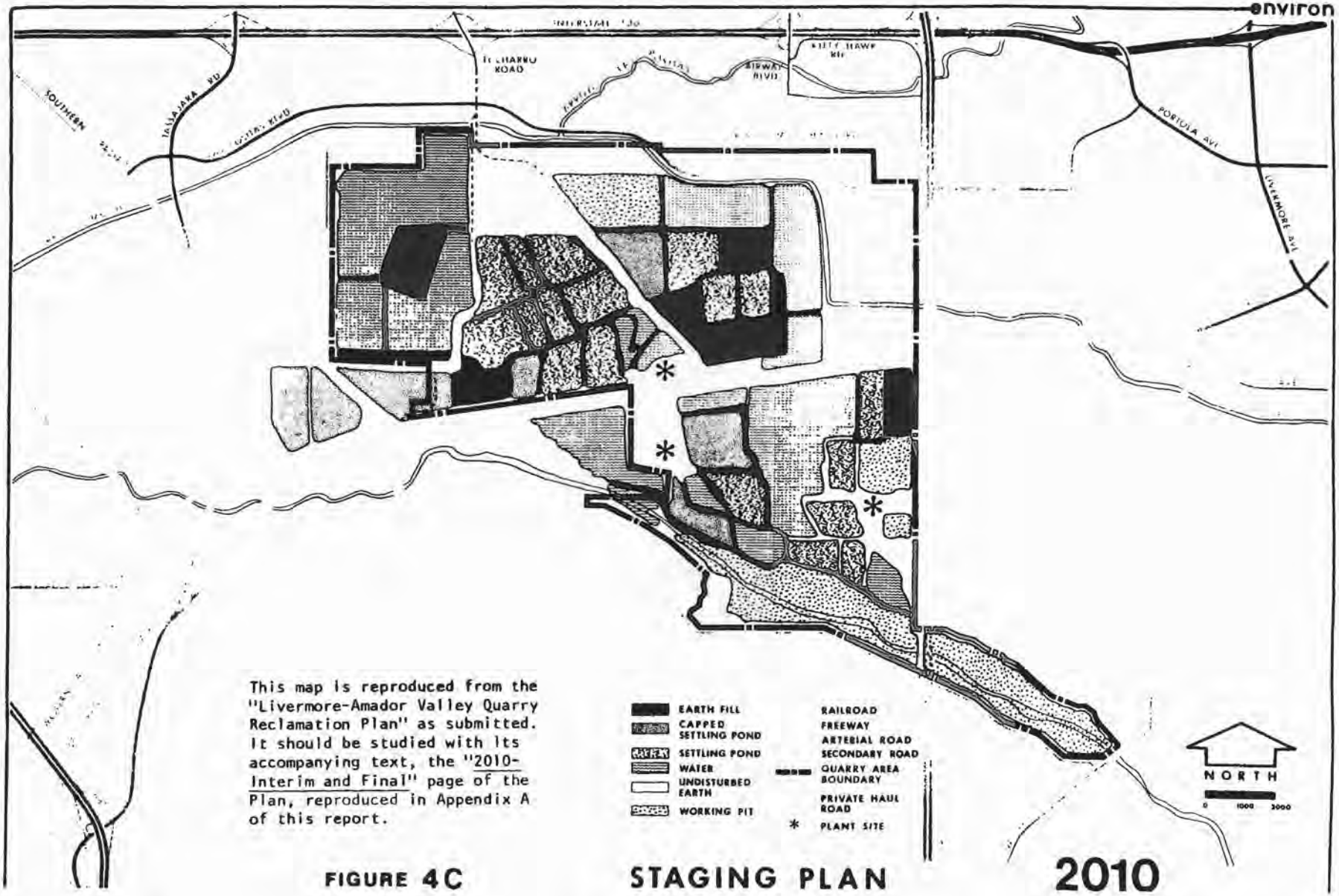
This map is reproduced from the "Livermore-Amador Valley Quarry Reclamation Plan" as submitted. It should be studied with its accompanying text, the "1976-Current" page of the Plan, reproduced in Appendix A of this report.

FIGURE 4A **STAGING PLAN** **1976**



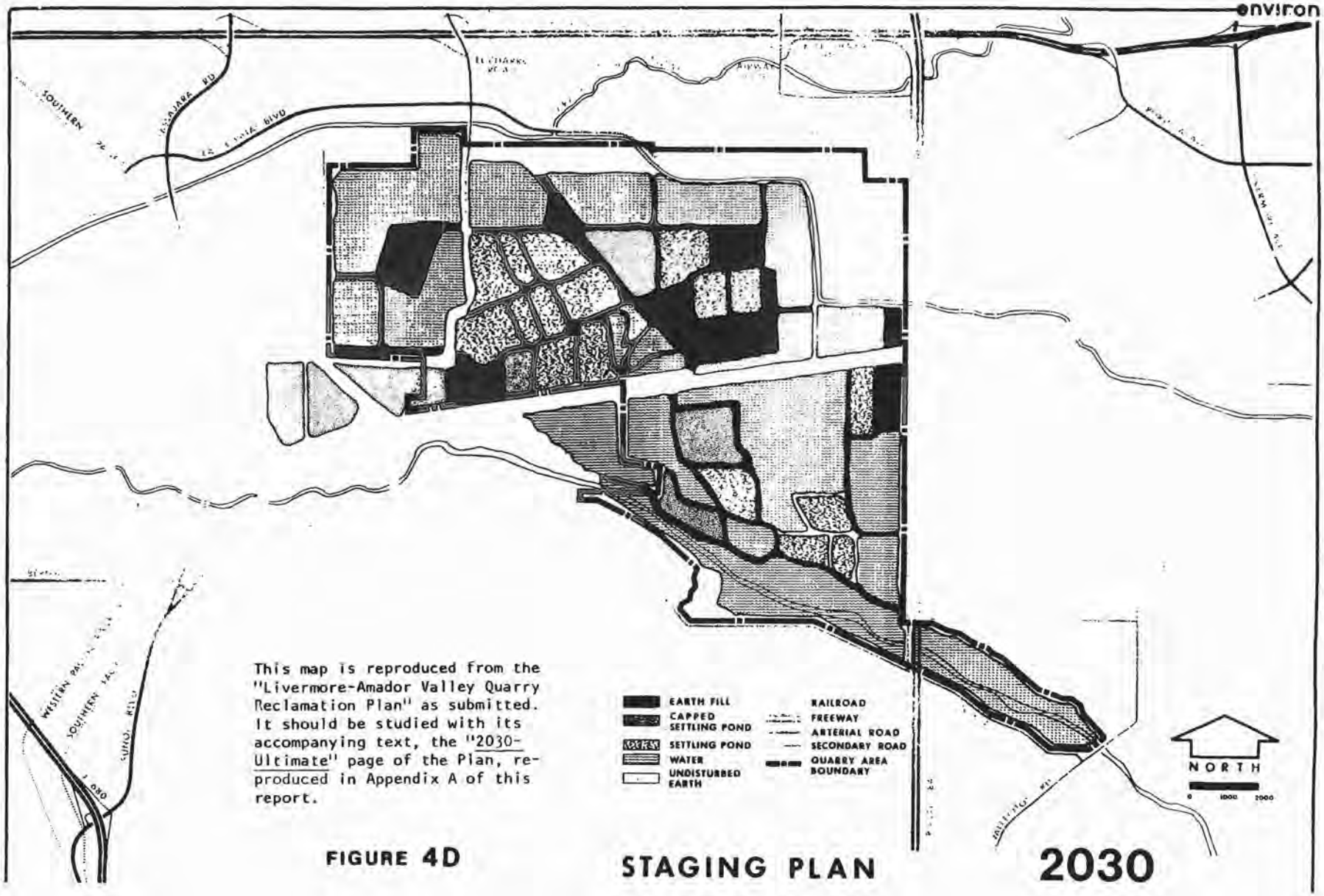
This map is reproduced from the "Livermore-Amador Valley Quarry Reclamation Plan" as submitted. It should be studied with its accompanying text, the "1995-Interim" page of the Plan, reproduced in Appendix A of this report.

FIGURE 4B **STAGING PLAN** **1995**



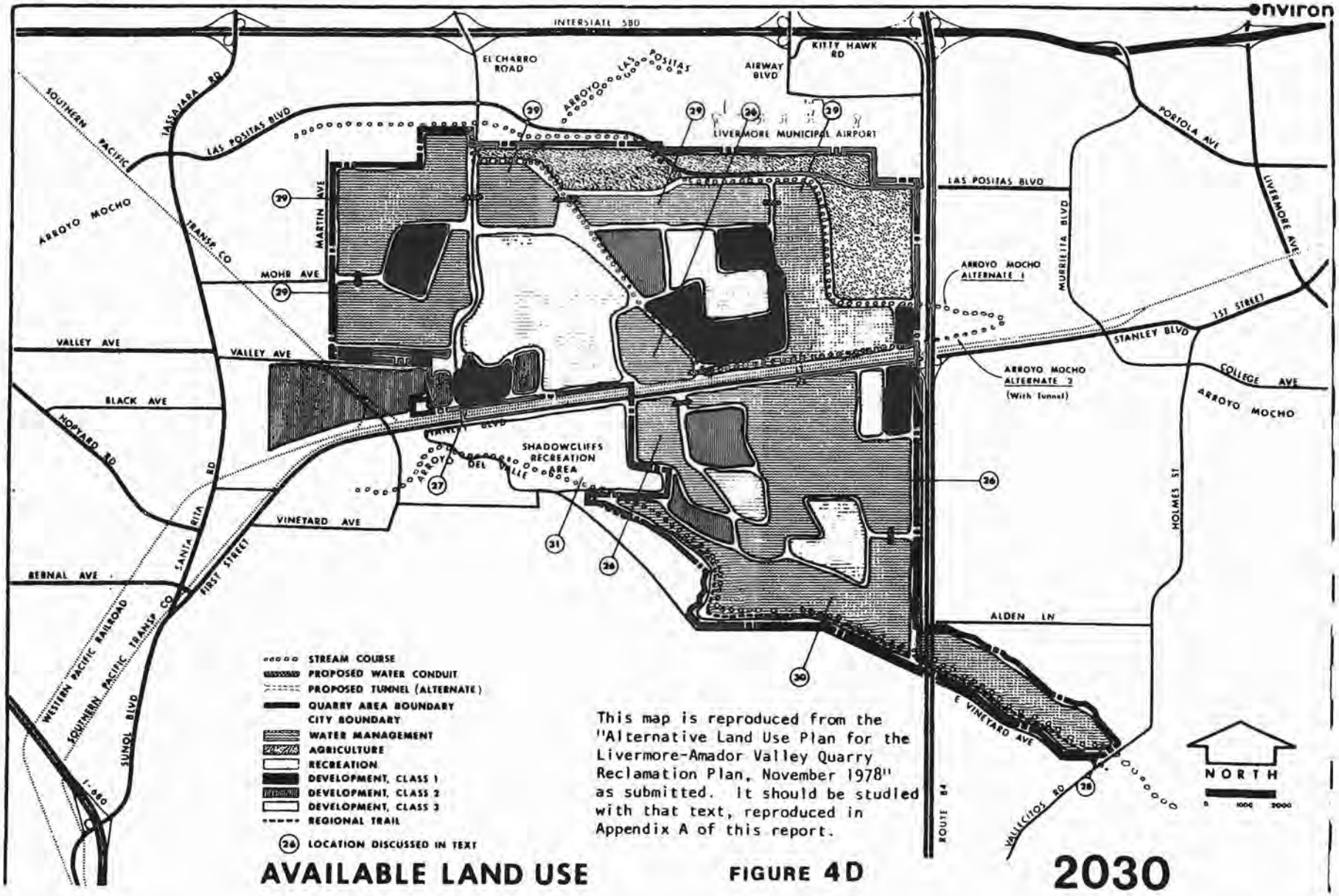
This map is reproduced from the "Livermore-Amador Valley Quarry Reclamation Plan" as submitted. It should be studied with its accompanying text, the "2010-Interim and Final" page of the Plan, reproduced in Appendix A of this report.

FIGURE 4C **STAGING PLAN** **2010**



This map is reproduced from the "Livermore-Amador Valley Quarry Reclamation Plan" as submitted. It should be studied with its accompanying text, the "2030-Ultimate" page of the Plan, reproduced in Appendix A of this report.

FIGURE 4D **STAGING PLAN** **2030**

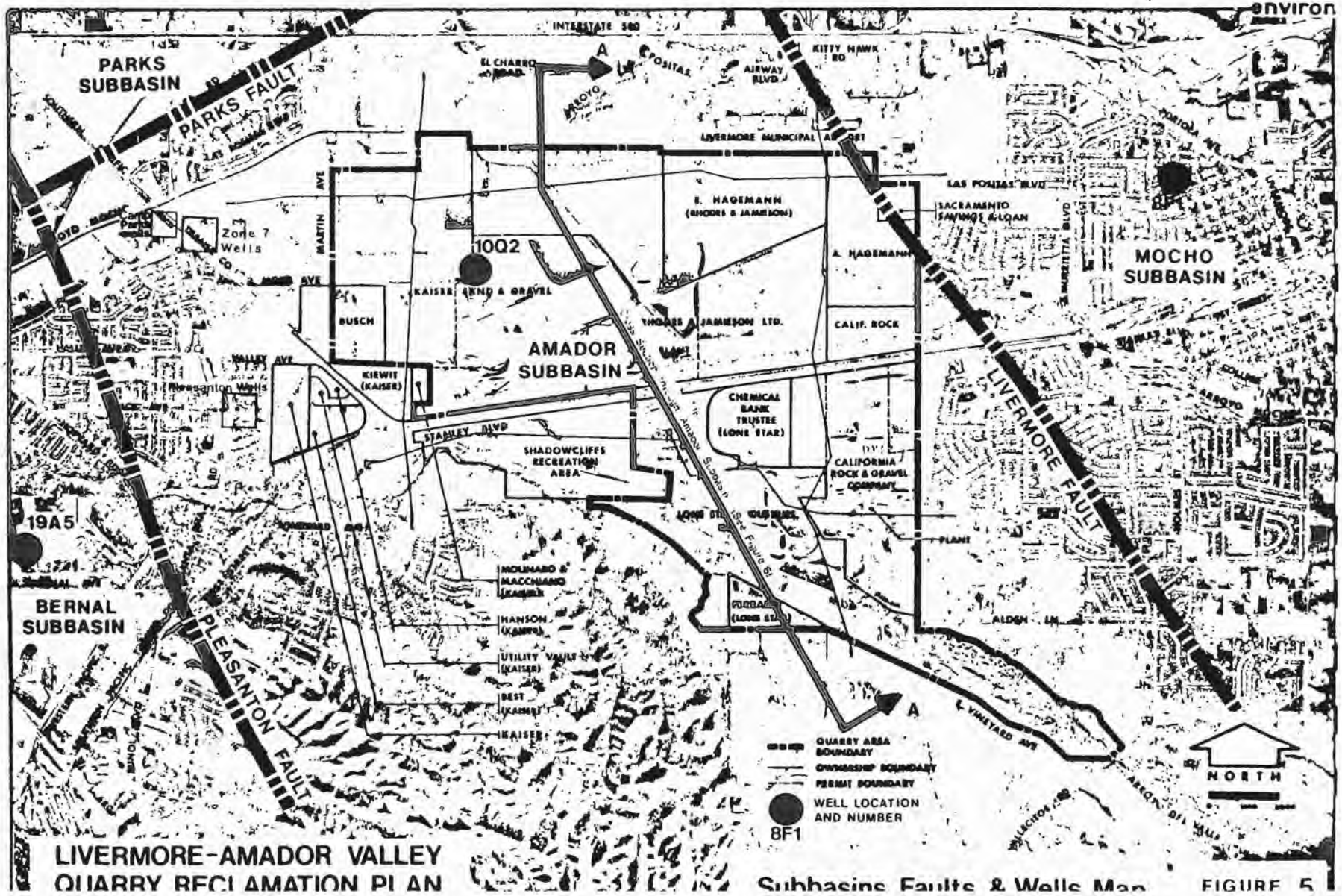


This map is reproduced from the "Alternative Land Use Plan for the Livermore-Amador Valley Quarry Reclamation Plan, November 1978" as submitted. It should be studied with that text, reproduced in Appendix A of this report.

AVAILABLE LAND USE

FIGURE 4D

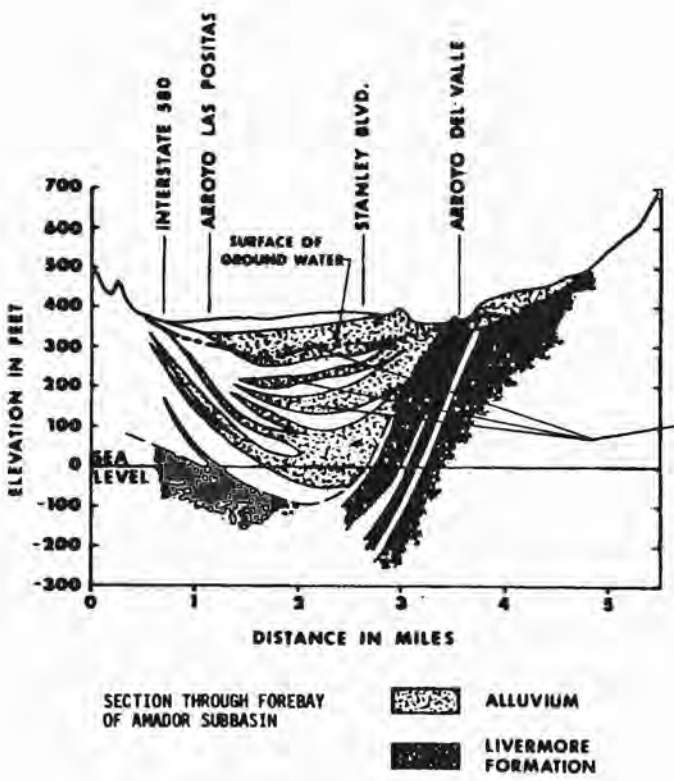
2030



LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

Subbasins Faults & Wells Map

FIGURE 5



THE THREE AQUIFERS IN THE CENTRAL PORTION OF THE AMADOR SUBBASIN

Refer to Figure 5 for Cross Section Location

Adapted From: Bulletin No. 118-2
"Evaluation of Ground Water Resources: Livermore and Sunol Valleys"
Department of Water Resources, June 1974.

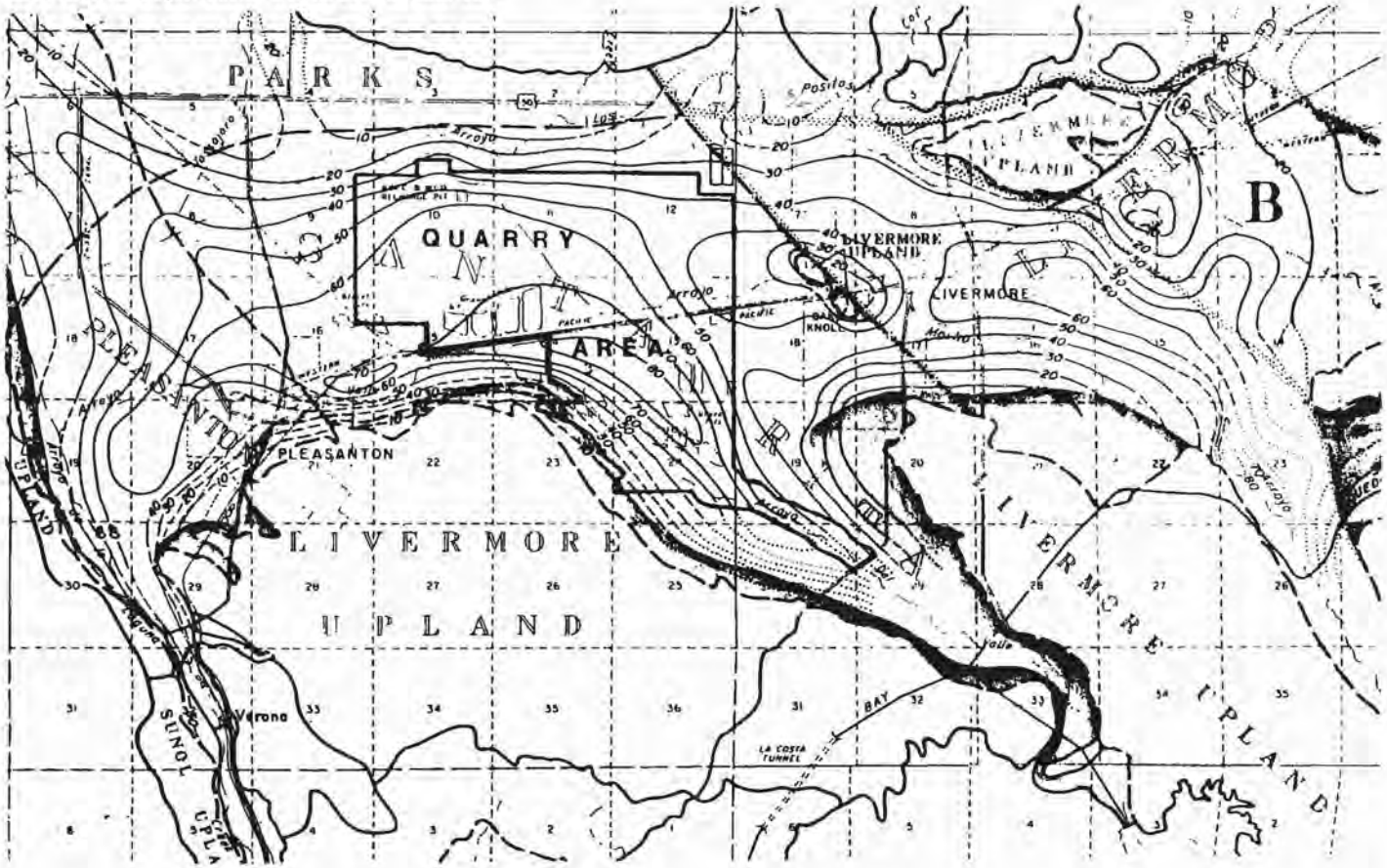
LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

Alameda County Planning Department
March 1979

FIGURE 6

Cross Section Through Amador Subbasin

Adapted from Bulletin 118-2, Appendix A,
California Department of Water Resources



LEGEND

30 — LINES OF EQUAL PERCENTAGE OF AQUIFERS FROM 0-300 FEET BASED ON LOGS OF WELLS LESS THAN 300 FEET DEEP

30 — LINES OF EQUAL PERCENTAGE OF AQUIFERS FROM 0-200 FEET BASED ON LOGS OF WELLS LESS THAN 200 FEET DEEP

30 LINES OF EQUAL PERCENTAGE OF AQUIFERS FROM 0-100 FEET BASED ON LOGS OF WELLS LESS THAN 100 FEET DEEP

QUATERNARY ALLUVIUM PROBABLY LESS THAN 100 FEET THICK AND UNDERLAIN BY NONWATER-BEARING FORMATIONS

QUATERNARY ALLUVIUM PROBABLY LESS THAN 100 FEET THICK AND UNDERLAIN BY WATER-BEARING LIVERMORE FORMATION

QUATERNARY ALLUVIUM PROBABLY LESS THAN 200 FEET THICK AND UNDERLAIN BY WATER-BEARING LIVERMORE FORMATION

N

SCALE OF FEET
0 4000

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
SAN FRANCISCO BAY DISTRICT
EVALUATION OF GROUND WATER RESOURCES
IN LIVERMORE – SUNOL VALLEYS

LINES OF EQUAL PERCENTAGE OF AQUIFERS WITHIN THE INTERVAL 0-300 FEET BENEATH LIVERMORE VALLEY

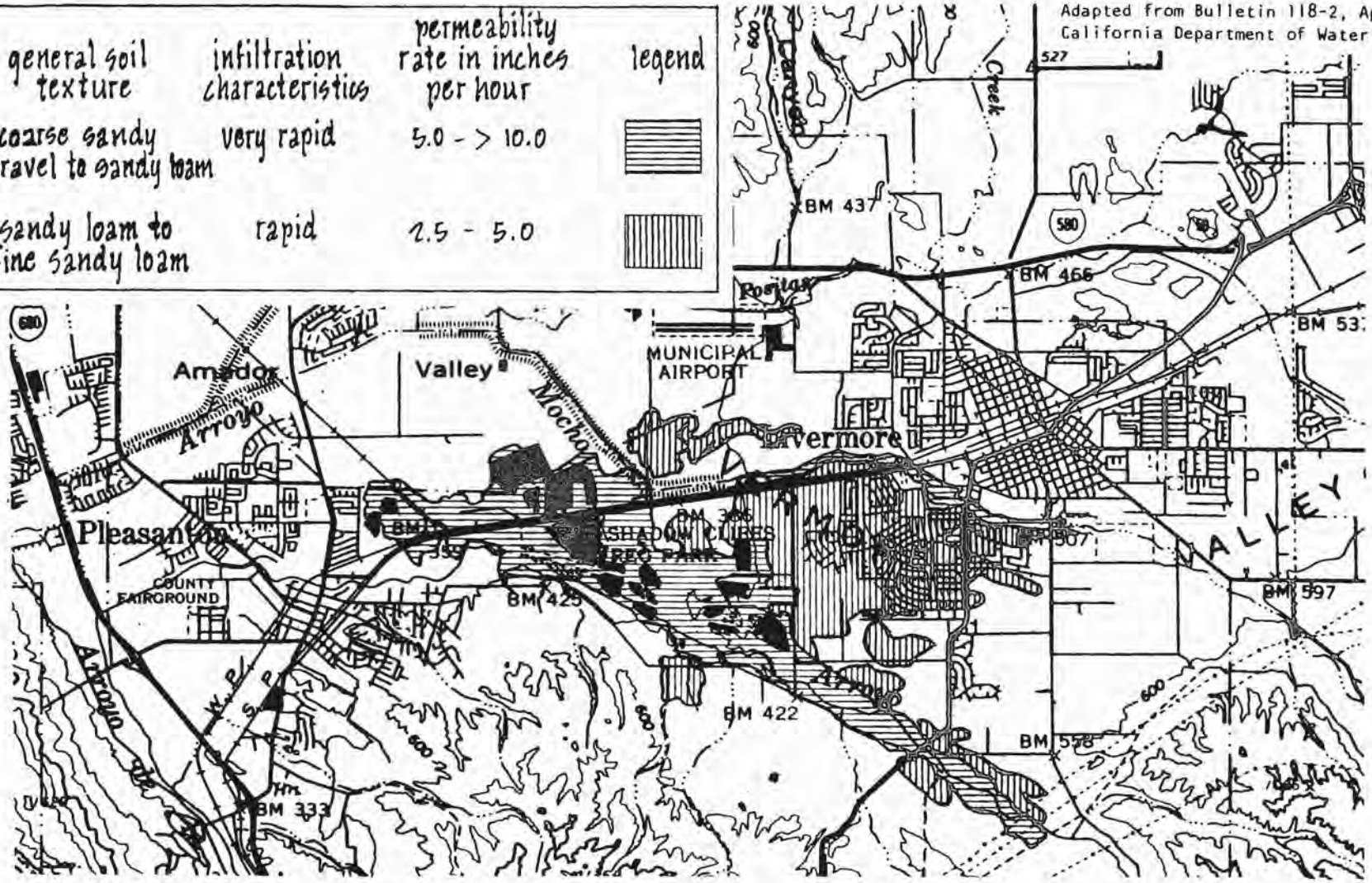
LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

Alameda County
Planning Department
March 1979

FIGURE 7

general soil texture	infiltration characteristics	permeability rate in inches per hour	legend
coarse sandy gravel to sandy loam	very rapid	5.0 - > 10.0	
sandy loam to fine sandy loam	rapid	2.5 - 5.0	

Adapted from Bulletin 118-2, Appendix A, California Department of Water Resources

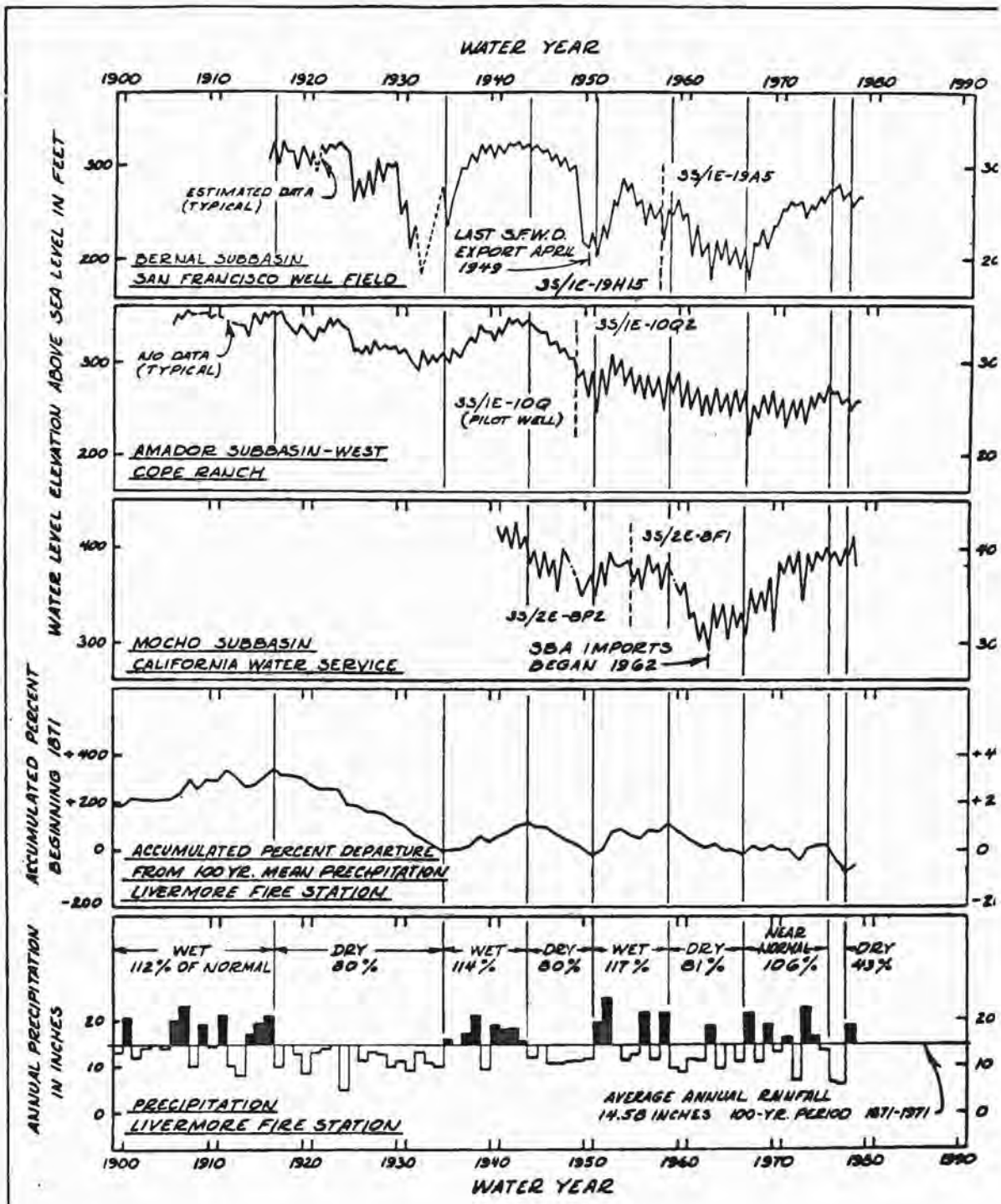


LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

Alameda County
Planning Department
March 1979

FIGURE 8

Soil Infiltration Characteristics, Livermore Valley



DRAWN: W. HARVEST
NOV. 1978

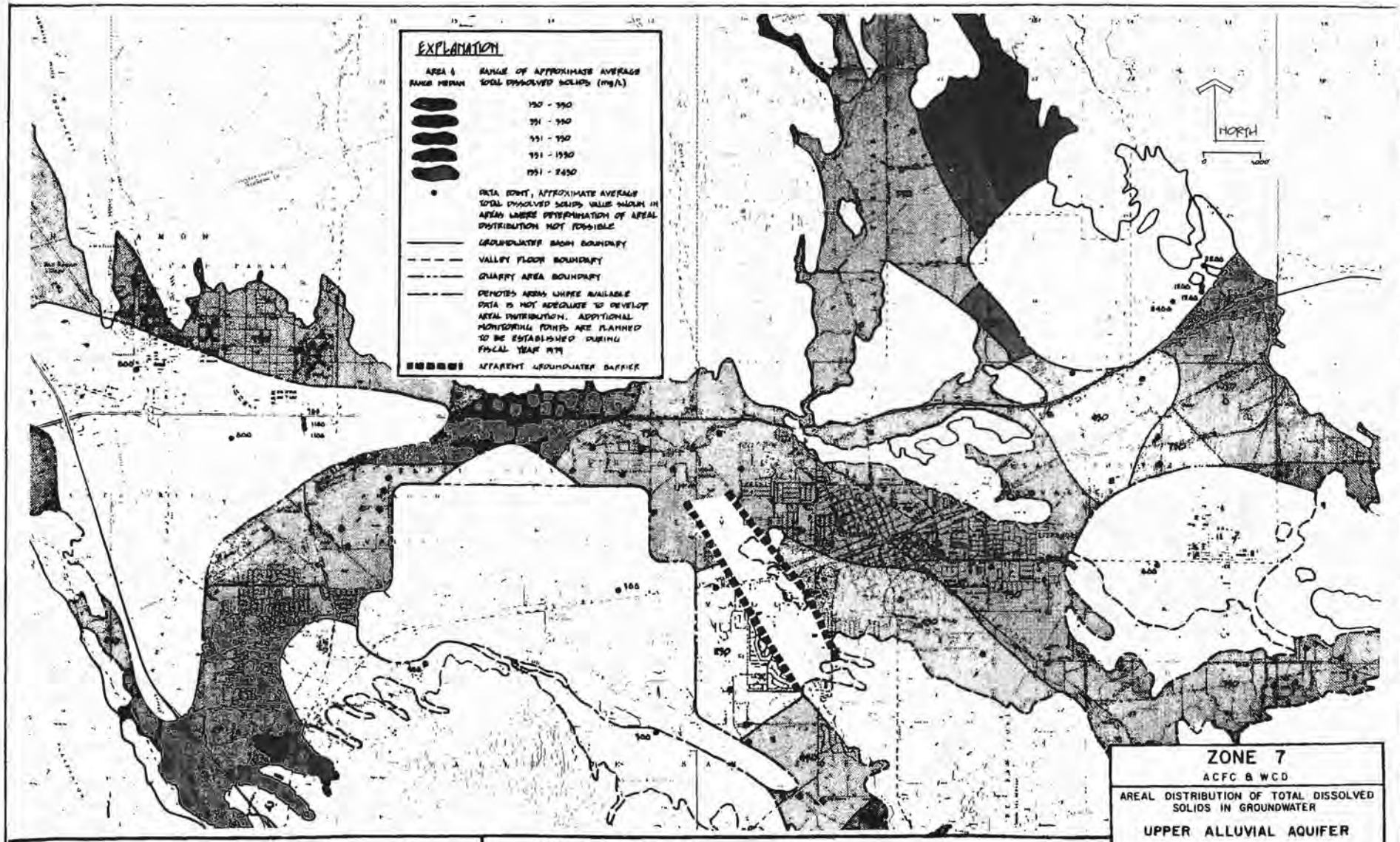
FIGURE 9

Historic Well Levels

LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

Alameda County Planning Department
March 1979

SOURCE: ZONE 7



ZONE 7
ACFC & WCD

AREAL DISTRIBUTION OF TOTAL DISSOLVED SOLIDS IN GROUNDWATER

UPPER ALLUVIAL AQUIFER

LIVERMORE VALLEY BASIN

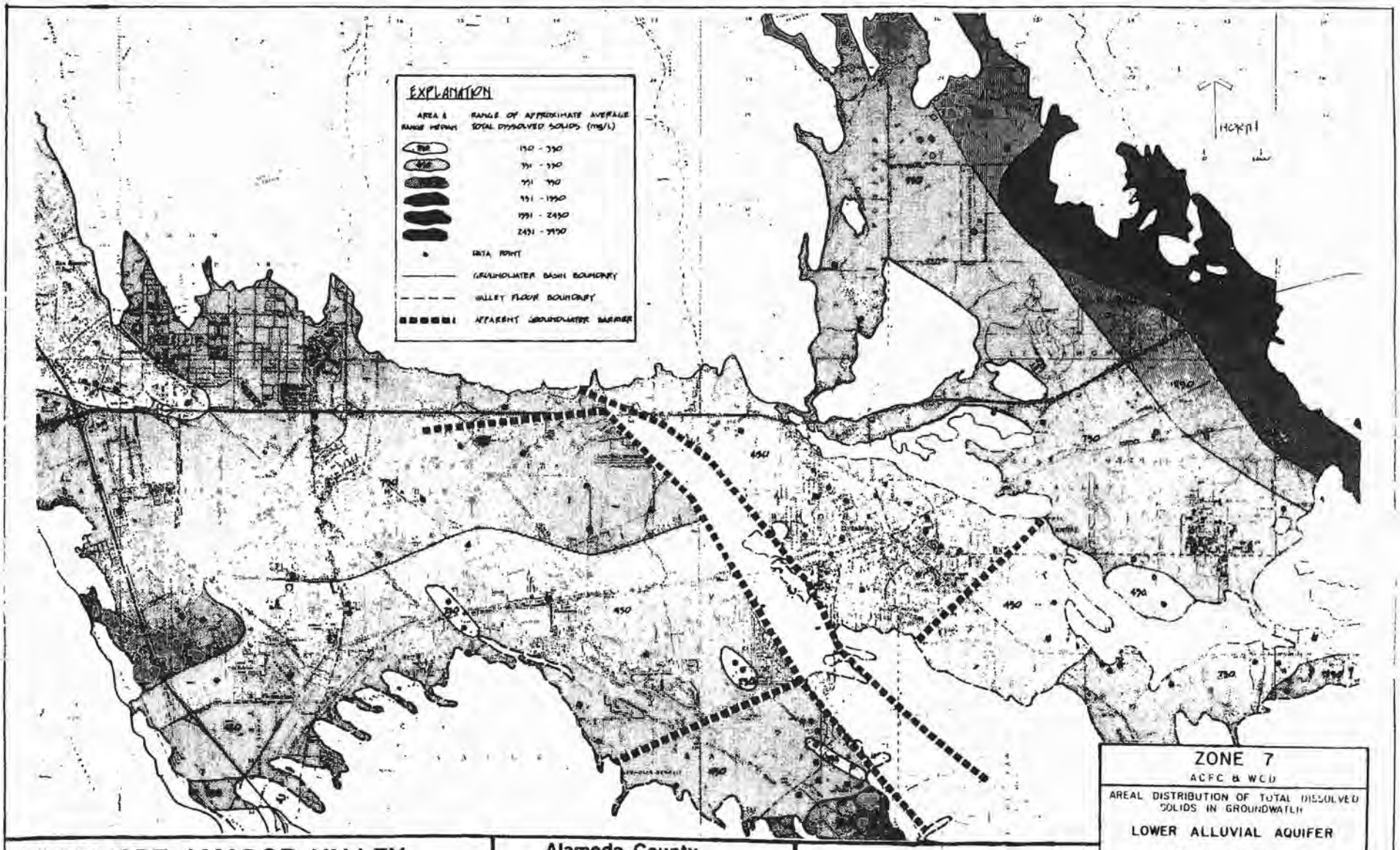
By | Date: 23 Aug '78

Drawn | Scale

LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

Alameda County Planning Department

FIGURE 10



LIVERMORE-AMADOR VALLEY

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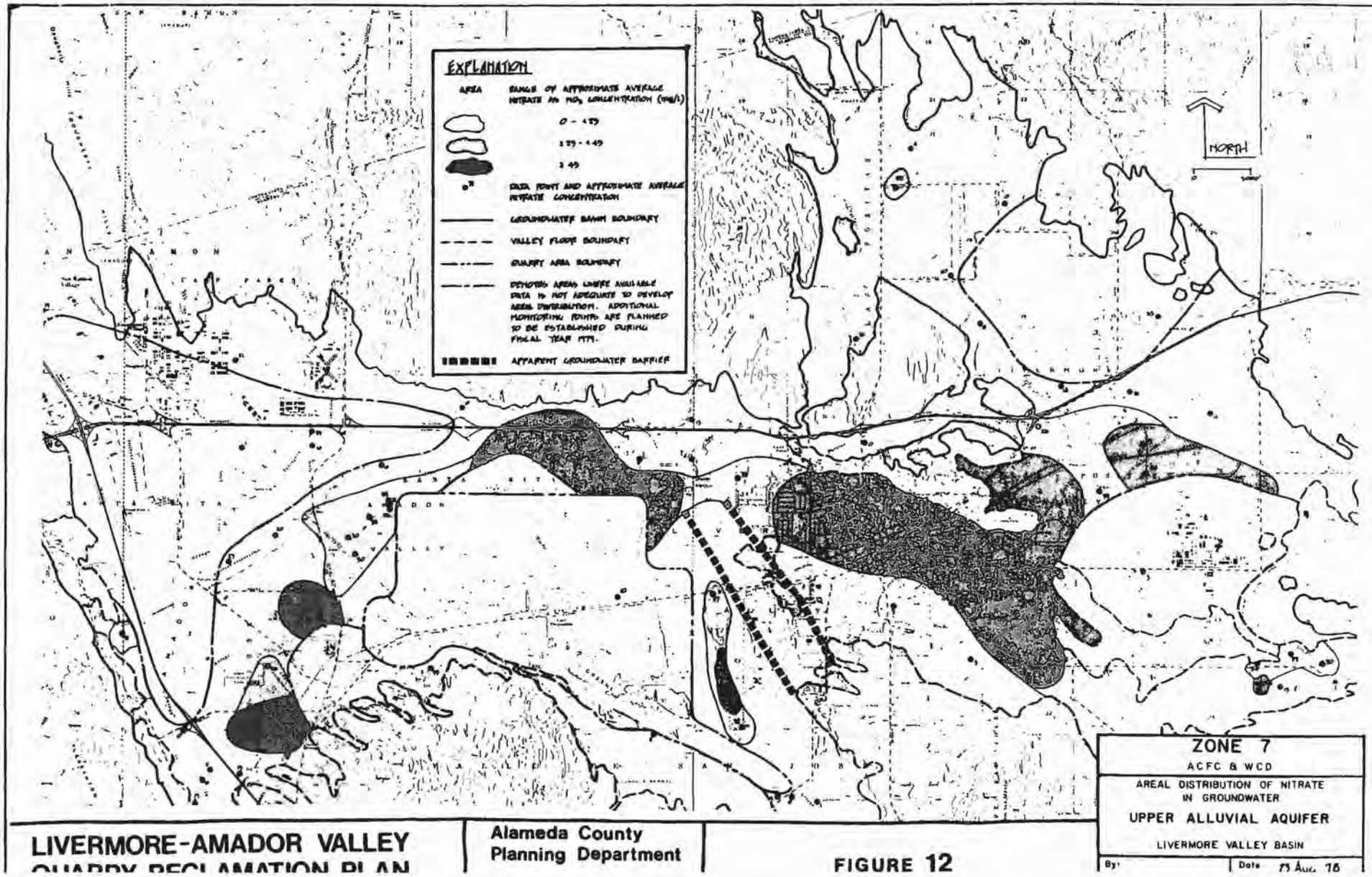
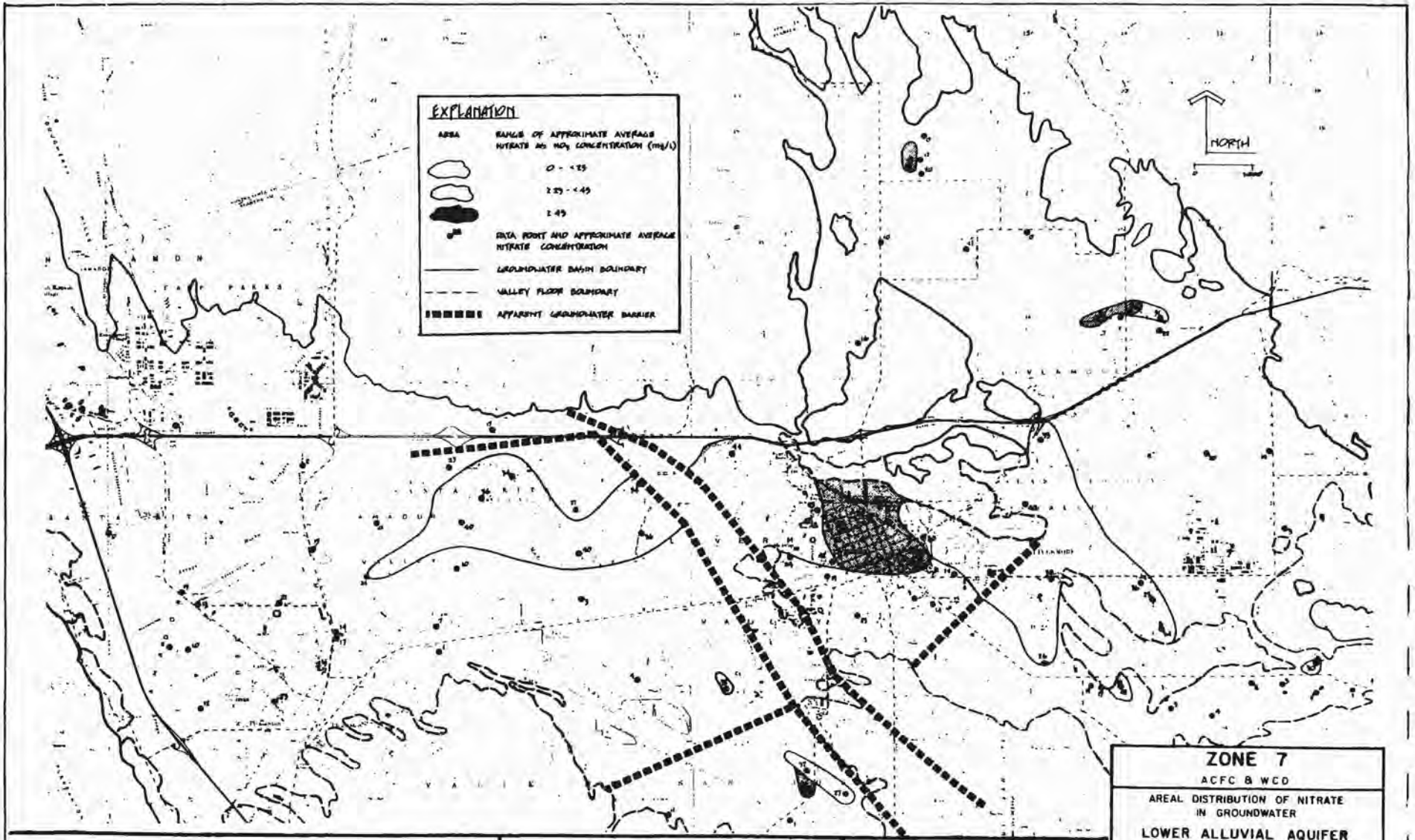
FIGURE 11



LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

Alameda County Planning Department

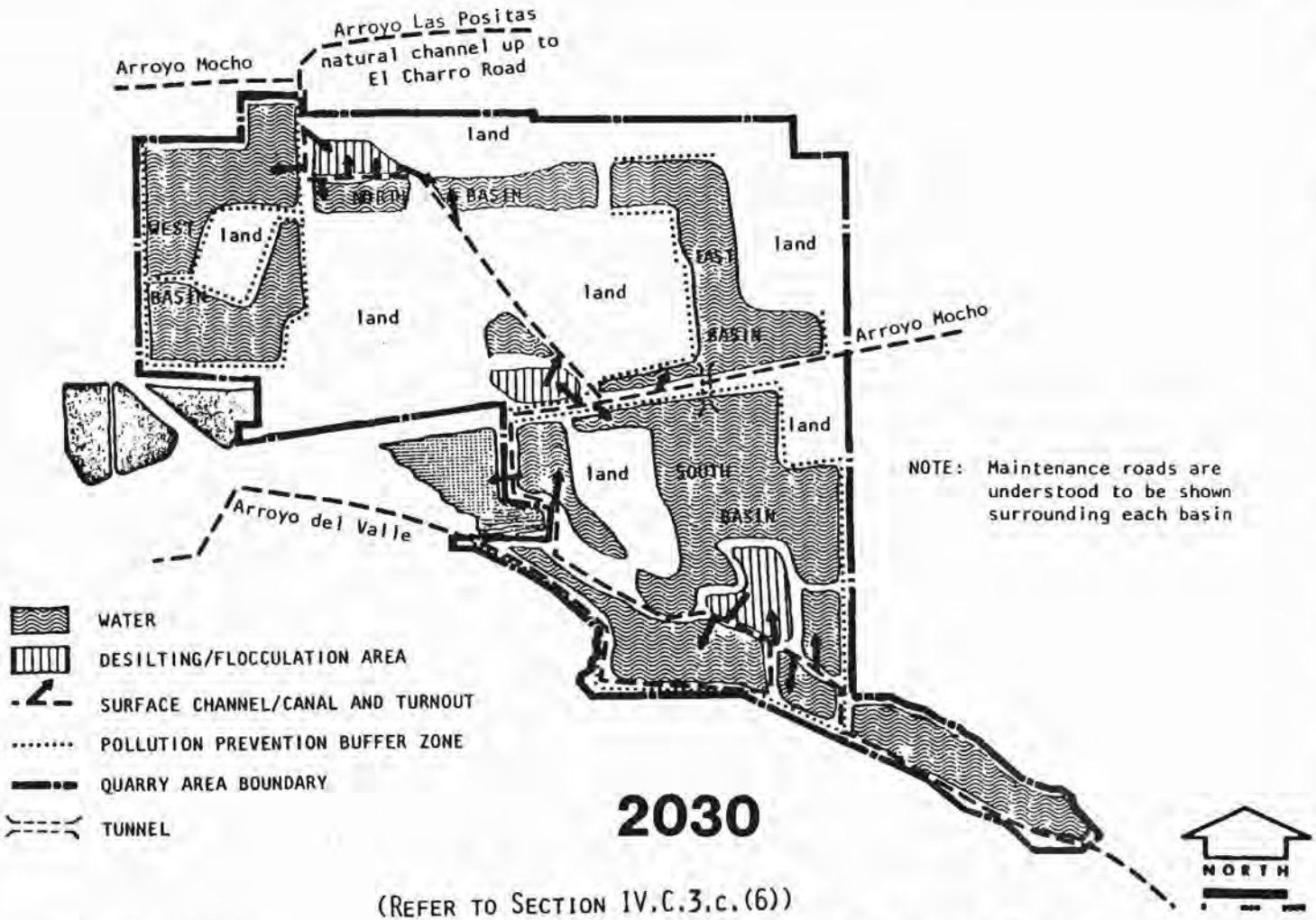
FIGURE 12



LIVERMORE-AMADOR VALLEY

Alameda County Planning Department

FIGURE 13



(REFER TO SECTION IV.C.3.c.(6))

LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN

FIGURE 14

Water Resource Optimization Scenario

March 1979 **Alameda County Planning Department**

APPENDIX A

Excerpts from the

"Livermore-Amador Valley Reclamation Plan"
January, 1977

and

"Alternative Land Use Plan for the

Livermore-Amador Valley Quarry Reclamation Plan"
November, 1978

Proposed by Kaiser Sand & Gravel
Lone Star Industries
Rhodes & Jamieson

Prepared by Environ, San Leandro

RECLAMATION PLAN

A. GENERAL

The Reclamation Plan provides for a variety of potential uses of the land within the QUARRY AREA, both during the period of quarrying and after operations have been terminated. In actuality the proposal is not a static "plan" since the Reclamation Plan is designed to reflect the changing conditions at the quarries and provide for the maximum utility and benefit consistant with those conditions.

During the planning process, preliminary revisions of the Staging Plans discussed in the previous section were repeatedly reviewed and adjusted with the operators to provide for the best interim and ultimate use of the land and water masses which could evolve from their operations.

B. FEATURES OF THE PLAN

Several specific features of the plan are worthy of discussion. The first of these is the proportionately smaller land area remaining south of Stanley Boulevard as compared to the north. This is the result of several factors, the most important of which is the shallower overburden that must be stripped from the QUARRY AREA prior to excavation of the marketable material. Also, less land will result because of the smaller amounts of silt and clay in the natural deposit. Both of these factors are discussed in earlier sections of this report.

Another feature of note is that a "chain of lakes" will result from the quarry operations. This will permit the conveyance of water through the lakes and connecting conduits from the Arroyo del Valle, the Arroyo Mocho and the Arroyo las Positas to any location around the periphery of the QUARRY AREA. This important feature is discussed in a subsequent section of this report.

The relocation of the Arroyo Mocho around the QUARRY AREA is another significant feature. This is shown on the 1995 Staging Plan (Plate 7) and can be accomplished through use of Special Drainage Area 7-1, approved by the Zone 7 Board of Directors and the Board of Supervisors in 1966. This program sets up a reimbursement program for construction of major flood control facilities and establishes a 1966 cost base of $890,000 for construction of improvements and purchase of right-of-way for this reach of Arroyo Mocho. If the water management features of this plan are implemented, the storage of peak flood flows in pits left from quarry operations could reduce the size and cost of downstream flood control channel improvements.

Other major features include the alignment of Las Positas Boulevard along a route north of and adjacent to the relocated Arroyo Mocho, a route north of the alignment shown on the Livermore General Plan. The Staging and Reclamation Plans show the QUARRY AREA extending into an area designated as Industrial on the Livermore General Plan. Rhodes and Jamieson have an option to purchase the E. Hagemann property and propose to quarry it to the limits shown on this plan.

Three properties located within the designated QUARRY AREA on the Alameda County General Plan, but not having quarry permits, are shown to be quarried. These are a remaining portion of the Busch property to be quarried by Kaiser, and the Johnson and E. Hagemann properties to be quarried by Rhodes & Jamieson. Conversely, the northern portion of the Jamieson and E. Hagemann properties are not proposed for quarrying by Rhodes & Jamieson because the gravels thin out in that area and because it is felt that the proposed uses (horse ranching and airport expansion) are more reasonable uses because of low gravel yield. Even though the A. Hagemann property is located in the QUARRY AREA on the General Plan, it has been shown undisturbed on the plan since no quarry operator has expressed interest in mining the sand and gravel. Furthermore, data indicating yield of gravel in commercial quantities is not available.

C. RECLAMATION SPECIFICS

The Reclamation Plan represents a master plan for the four quarry operations and sets forth an overall area plan for land and water forms and potential uses to be developed during the quarrying and reclamation process. The backfilling and grading of the final land forms can be in conformance with the Reclamation Plan and can be controlled by the conditions set forth in the quarry permits for each individual operator and in the Quarry Ordinance. Those conditions require setbacks from the adjacent roads, streams and other properties, and require final cut slopes to be at the natural angle of repose of the native material or 1:1 slope (45°), whichever is flatter.

Final cut slopes adjacent to properties used for purposes other than quarrying or next to public rights-of-way should be at the same 1:1 slope but with the additional protection of a 15-foot wide bench about 5 feet above maximum ground water level. This would result in a net overall slope for a 100-foot deep pit of 1.15:1 (41°) - in effect, a flatter slope where adjacent properties need to be protected. The bench will provide access for maintenance vehicles, a safety measure and erosion control, and its exact elevation and relation to the water surface should be set after the maximum ground water level in the depleted pits is established as part of a water management program.

In certain existing permits, there are requirements for final cut slopes not to exceed 1.5:1 adjacent to Arroyo Mocho. Setbacks of 25 feet from exterior property lines, 50 feet from road rights-of-way and 100 feet from stream banks are required as conditions of some permits and the County Quarry Ordinance. Other special

requirements have been applied to specific permits for individual operations. Because the physical conditions are different for each operation, the operators should submit detailed descriptions of their own operating area setting forth final slopes, revegetation plans and other details required for approval of their individual quarry Reclamation Plans.

D. CONSTRAINTS

The Reclamation Plan is a direct product of the mining operations and, as such, has constraints placed on it due to the limited quantity of earth material left after quarrying and the physical characteristics of the material which does remain. At any stage of the operations and upon completion, five distinguishable land and water categories will occur in the QUARRY AREA. Briefly described, they are:

1. Earth Fill: Overburden is placed in depleted pits creating land masses with a finished surface elevation above anticipated levels of the surrounding water areas. During placement, the overburden is compacted creating structurally sound land capable of supporting urban development (Table 3).

2. Settling Ponds: The fine silts and clay separated from the aggregate by washing gradually settle out of the wash water in settling ponds. The filled ponds which are principally made up of finer materials, may take many years to consolidate. The resulting land area may be restored to a useful purpose after consolidation; however, it is not capable of supporting heavy structures (Table 3). Some settling ponds have been restored to agricultural use. Generally, the filled settling ponds will have final ground surface elevations below the natural ground level, in some cases as much as 40 feet below.

3. Capped Settling Ponds: After the waste material in the settling pond has consolidated sufficiently, the resulting land area can be capped with a layer of 5 to 10 feet of overburden material. This capping adds to the structural stability of the soil and permits the land to be developed for higher uses. For example, the West Pit area of Kaiser Sand & Gravel consists of capped settling ponds and has been put to industrial use. There are some limitations on such uses and each area must be individually analyzed to determine its suitability for the proposed use. The capped settling ponds could also be used for open space purposes (Table 3).

4. Water Areas: After the quarrying in any particular area ceases, unless filled, a large pit sometimes over 100 feet deep will remain. As noted above, some of these depleted pits are to be filled with overburden and others with fines. However, large areas will remain as depleted pits and, because of their depth, will contain water. The surface elevation of the resulting lakes may fluctuate as much as 60 feet in a single season and 125 feet over several seasons. This variation is due to fluctuation in ground water caused by natural recharge, artificial percolation, and withdrawal by wells. The wide variations in water levels would create serious problems for recreational uses of the water areas, unless a water management program is instituted.

5. Undisturbed Earth: Certain areas shown on the Reclamation Plan will remain undisturbed. These are the properties which are not being proposed for quarrying, as well as certain buffer and setback areas which would be reserved to meet ordinance and permit requirements.

E. OPPORTUNITIES

The Reclamation Plan offers the opportunity of arranging the five

distinguishable land and water types into an overall form. The shape and elevations of specific areas are heavily influenced by the quarrying operations that will precede their development. Usable land masses are generally arranged to make maximum use of the land in a developable pattern. Water areas are arranged to provide a "chain of lakes" around the periphery of the QUARRY AREA which provide the means for a water management program discussed in a later section. Without the guidance of a Reclamation Plan, these land and water areas would be scattered throughout the QUARRY AREA in a haphazard pattern, severely restricting the opportunities for potential use. The forms shown on the Reclamation Plan reflect willingness by the operators to modify their normal operating procedures to develop usable land and water elements. The implementation of such an overall plan will require coordination of the ground water levels through a water management program. A high ground water level in the QUARRY AREA will severely hinder the quarry operations and could prevent implementation of the plan.

One of the main opportunities offered by the Reclamation Plan is possible expansion of the existing park and recreation use at Shadowcliffs Recreation Area. The staff of the East Bay Regional Park District (EBRPD) has indicated that the area south of Stanley Boulevard has long range possibilities of becoming a major aquatic recreation area. The District is presently developing such a park in the Niles quarry area in Fremont in cooperation with the Alameda County Water District and the City of Fremont.

Another obvious possibility offered by the Reclamation Plan is the opportunity to assure large areas of permanent open space between the cities of Pleasanton and Livermore. During the period of quarry operations, substantial areas of land will continue to be used for agriculture while being reserved for future quarry purposes. After quarry operations have ceased, over half of the QUARRY AREA will be in lakes and ponds and, as previously indicated, some of the regenerated land will be limited to open space use because of poor load-bearing characteristics of the fill. Some reclaimed settling ponds have been returned to agricultural use and have proven to be productive. Additional experimental operations are being conducted by some of the operators and the results of these investigations are promising.

AVAILABLE LAND USES

A. GENERAL

The Staging Plans previously discussed describe the physical conditions which already exist or which can be anticipated for specified times in the future. Those plans served as the basis for evaluating the potential land uses which could occur within the QUARRY AREA and for preparing the Available Land Use Plans shown on Plates 4, 6, 8 and 10. For convenience, these latter plans are printed on overlay paper, permitting direct comparison with the corresponding Staging Plan. An analysis of each Available Land Use Plan in text and table form is on the page facing that plan.

As pointed out earlier, the possible uses for land which has been regenerated by the filling of depleted pits are limited by the type of material which created the fill. Geologic stability and bearing capacity of the soil are different for each of the three categories of filled pits, and their potential uses are given in Table 3.

Perhaps the most significant potential use is for the depleted pits which are not filled with earth materials but which will contain water instead. Their role as part of a proposed water management program is discussed in the following section. The area of open pond and land available for water management use at each stage is given in the tables accompanying the plans. It is important to note that additional areas designated as Quarry on each plan - including the current operation - might also be utilized for water management purposes, as discussed elsewhere.

A major consideration reflected in the Available Land Use Plans is the suitability of each type of use for close proximity to an operating quarry. Juxtaposition of incompatible uses has been avoided, while uses which can comfortably take place near a quarry have been introduced as early as possible. These compatible interim uses (agriculture, industry, water management) can occur on substantial parts of the site

TABLE 3
USES FOR LAND REGENERATED BY FILLING PITS

Designation	Fill Material	Identification	Potential Land Uses
Earth Fill	Overburden	Development, Class 1	Agriculture Recreation Industrial Commercial Residential
Capped Settling Pond	Fines of silt and clay capped with overburden	Development, Class 2	Agriculture Recreation Industrial
Settling Pond	Fines of silt and clay	Development, Class 3	Agriculture Recreation

during the life of the operations using virgin and regenerated lands or depleted pits. Once excavation and processing of material on a substantial portion of the QUARRY AREA has ended, then more sensitive uses - such as residential development - can occur on lands which are sufficiently remote from any continuing operation. Obviously, this concern for avoiding incompatible and conflicting uses no longer will apply when all of the quarries ultimately cease operation.

Some land within the QUARRY AREA remains unexcavated throughout the period covered by this study. For this land, both the interim and ultimate uses are shown as Agriculture - a use which would not preclude excavation of the underlying aggregate material in the future should that land become available for quarrying.

The Available Land Use Plans demonstrate the maximum utilization of lands not being quarried while quarries are in operation and when they finally close down.

B. 1976 - CURRENT

Currently, agriculture and quarrying are the two predominant uses of land within the QUARRY AREA boundary. Agriculture utilizes a majority of the extensive virgin land awaiting quarrying allowing for later extraction of aggregates. One area west of the quarry boundary and just north of the railroad tracks (1) had its aggregate material extracted and was used as a settling pond, and is now available for agriculture.

Quarrying, the other major use, occupies most of the remaining land. This includes not only those areas actually under excavation, but also lands used for the storage and clarification of process water, and the processing, stockpiling, and internal transportation of material. While no areas on the 1976 plan have been specifically designated as used for water management, the quarry operations do return water to the ground through percolation from the process water storage pits and, to a lesser extent, through the settling ponds. Also, the quarry operations have removed the overburden in order to gain access to the aggregate material, and thereby provided direct access on a selective basis to the upper aquifer for local surface water.

Shadowcliffs Recreation Area (2), part of the East Bay Regional Park District, occupies a former quarry excavation.

Industrial uses compatible with the quarry operation occupy the remainder of the land under study. Included here are industrial operations on capped settling ponds within the City of Pleasanton (3) and (4) which are able to co-exist in close proximity to the quarry operations as well as industrial operations elsewhere within the site (5) which are on virgin land. These latter installations are of a type which do not require extensive development on the land and therefore, as with agriculture, do not preclude later extraction of the underlying aggregate resource. For the most part, the industrial operations in the area utilize quarry materials, and their proximity to the source minimizes transportation costs and energy consumption.

TABLE 4
1976 LAND USE ACREAGES

Category		Uses	Outside QUARRY AREA	Inside QUARRY AREA	Total Acres
Undisturbed Land		Agriculture Quarry Industrial	5	1,875 170 15	2,065
Regenerated Land	Earth Fill	Quarry Industrial		45 5	
	Capped Settling Ponds	Industrial	90	50	
	Settling Ponds	Agriculture	55		245
Working Pits		Quarry		910	910
Water		Recreation Process Water Storage Settling Ponds	210	 240 510	960 946
		Total Acres	360	3,820	4,180

C. 1995 - INTERIM

At this stage, quarrying will have expanded into areas which previously carried an interim designation for Agriculture (6, 7, 8). North of Stanley Boulevard the abundance of overburden material removed in this expansion will be used to regenerate land in pits from which aggregate materials have been extracted. Additionally, a number of settling ponds will have filled up and will no longer be utilized. These ponds will be available for reuse as Agriculture (9, 10), and the pits filled with overburden will be suitable for Industrial use (11).

The shallower overburden south of Stanley Boulevard will result in the regeneration of a smaller amount of land by filling than to the north. This regenerated land will continue to be required for quarrying operations (12). A capped settling pond will be available for Industrial use (13).

Excavated areas specifically available for Water Management purposes have begun to appear (14, 15) and offer the potential for recharging the upper aquifer if satisfactory conditions can be agreed upon between the operators and Zone 7.

A signifant area of land will remain virgin and will continue as Agriculture. During this interim period, the reuse of regenerated land for Agriculture and Industry will maximize the potential of the area without causing incompatible conditions.

TABLE 5
1995 LAND USE ACREAGES

Category		Uses	Outside QUARRY AREA	Inside QUARRY AREA	Total Acres
Undisturbed Land		Agriculture Quarry Industrial	5	1,290 160 15	1,470
Regenerated Land	Earth Fill	Quarry Industrial		70 100	
	Capped Settling Ponds	Industrial Agriculture	90	90 55	
	Settling Ponds	Agriculture	55	140	600
Working Pits		Quarry		1,125	1,125
Water		Recreation Water Management Process Water Storage Settling Ponds	210	 60 185 530	 870
		Total Acres	360	3,820	4,180

D. 2010 - INTERIM AND FINAL

Based on the projected rate of demand and the known reserves, it is anticipated that the Kaiser Sand & Gravel operation in the northwest portion of the QUARRY AREA will be terminated at about this time. The land which will have been regenerated in the center of their pits by filling with overburden will be capable of supporting buildings and related improvements, and will be sufficiently isolated from other on-going quarry operations to permit the widest range of development possibilities - Development, Class 1 (Table 3). This regenerated land (17) will be surrounded by water-filled depleted pits (18). These pits, as discussed later, will significantly contribute to aquifer recharge. Overburden material from these excavations will have been used to cap the settling pond to the west (19) and that area's potential use can change to include Industrial.

The other three producers will still be operating within the QUARRY AREA. Expansion into virgin lands will have continued but the total area devoted to quarrying will have begun to be reduced (especially north of Stanley Boulevard) with substantial areas of regenerated land becoming available for Agriculture (20) and Industrial (21).

In addition to the depleted pits at the northwest (18), other substantial water-filled areas will be available for Water Management purposes (22 and 23).

Agriculture will continue to occupy large acreages of both virgin and regenerated land and additional Industrial areas will be available (24 and 25).

TABLE 6
2010 LAND USE ACREAGES

Category		Uses	Outside QUARRY AREA	Inside QUARRY AREA	Total Acres
Undisturbed Land		Agriculture		710	
		Quarry		120	
		Industrial	5	15	850
Regenerated Land	Earth Fill	Quarry		65	
		Industrial		200	
		Development, Class 1		65	
	Capped Settling Ponds	Industrial	145	205	
	Settling Ponds	Agriculture		365	1,045
Working Pits		Quarry		690	690
Water		Recreation	210		
		Water Management		840	
		Process Water Storage		230	
		Settling Ponds		315	1,480
		Total Acres	360	3,820	4,180

E. 2030 - ULTIMATE

It is projected that by this time, all quarrying and processing operations will have been terminated, that the processing plants will have been removed, and that three of the plant sites will have been excavated (26). The fourth plant (27) is already located on earth-filled land.

When the quarrying operations have been completed, land uses which have been incompatible with the extraction and processing of aggregate material will be able to take place. Consequently all regenerated land has been designated as being in one of three Development Classes: 1, 2, or 3. The only limitations on use of the regenerated land in each of these categories are the geologic stability and load bearing capacity of the land itself. Table 3 indicates the uses which could occur in each class of regenerated land.

Water Management areas will occupy the remaining excavations. They will provide a continuous link from Arroyo del Valle in the southeast (28) to the exposed aquifer faces to the west (29) which will be left with a clean face for ground water percolation. Also, the Water Management area along the Arroyo del Valle (30) will provide the possibility of both recharge directly into the forebay and replenishment of the "chain of lakes" (31).

A reduced but still significant area will still remain as virgin land suitable for Agriculture or other uses.

TABLE 7
2030 LAND USE ACREAGES

Category		Uses	Outside QUARRY AREA	Inside QUARRY AREA	Total Acres
Undisturbed Land		Agriculture Development, Class 1	5	470	475
Regenerated Land	Earth Fill	Development, Class 1	145	345	1,325
	Capped Settling Ponds	Development, Class 2		205	
	Settling Ponds	Development, Class 3		640	
Water		Recreation Water Management	210	2,160	2,255
		Total Acres	360	3,820	4,180

WATER MANAGEMENT

A. GENERAL

As previously noted, Zone 7 has the responsibility for development and implementation of water management policies for the Livermore-Amador Valley. The Zone has implemented programs to import water into the valley, recharge the ground water basin, supply treated water to the retail water agencies and solve the flood and drainage problems of the valley. However, the Zone has not developed an overall policy for the management of ground water levels in the Livermore-Amador Valley, although a policy of restoration of high ground water levels is implied as a result of an ambitious recharge program.

Nearly ten years ago, Kaiser Sand & Gravel undertook a reclamation plan for a portion of the QUARRY AREA. The proposed plan was determined to be unsatisfactory because it did not properly respond to the fluctuating ground water levels which occur in the Livermore-Amador Valley basin. Ground water levels in the basin have fluctuated 125 feet from 1944 to 1966, and as much as 60 feet in a single season (Livermore Groundwater Basin Key Well Report, 1976). Recognizing the difficulty of preparing a meaningful reclamation plan without a stated ground water management policy, Kaiser Sand & Gravel requested the Zone to indiciate what ground water level fluctuations could be expected.

Zone 7 and the State Department of Water Resources have undertaken a long term study to develop a mathematical model of the basin which could be used to predict the response of the basin to natural conditions as well as to man-made modifications to the recharge and withdrawal of ground water. The study has proven to be more complex than anticipated and, although the ground water model has been verified, the results have not led to the development of a ground water management program for effective water planning. Arrangements are being made for Zone 7 and the Department of Water Resources to

embark on an added phase of this program to develop additional data to make the model a usable tool for planning for future water needs of the valley.

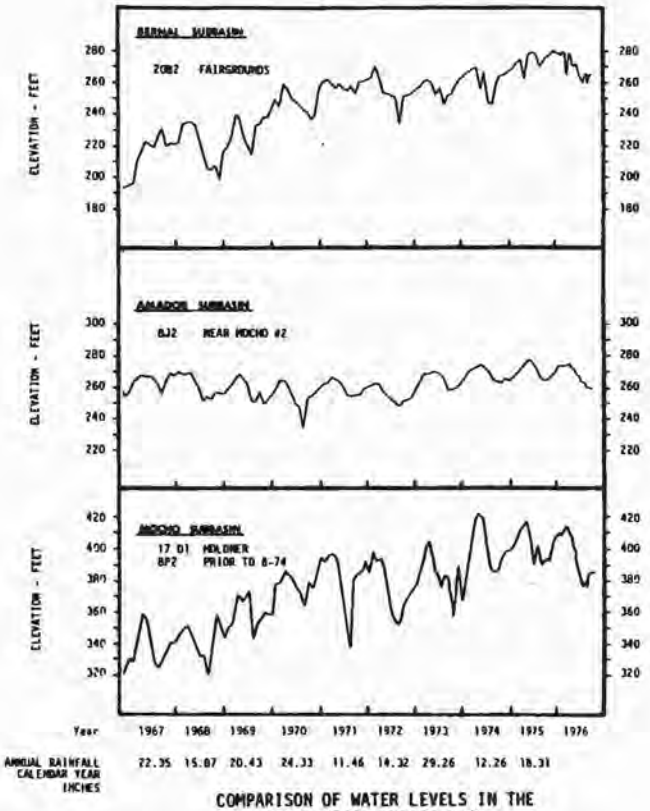
In the meantime, through a series of separate actions, Zone 7 has reversed the trend of lowering ground water levels. The importation and local conservation of water has increased the supply of available water. The imposition of pumping limitations on the retail water agencies has reduced the ground water withdrawal. A continuing program of recharging the basin has increased the quantity of water in the basin, and a decrease in agricultural pumping due to urbanization of farm lands has reduced withdrawal. The net effect has been a general rising of ground water levels in all three major subbasins over the past ten years. The Bernal subbasin has risen almost 80 feet; the Mocho subbasin has risen about 60 feet; and the Amador subbasin in which the quarries are located has risen less than 10 feet as shown on Figure 4. Even though these actions have affected ground water levels, they still do not represent a comprehensive policy for ground water management.

B. WATER RIGHTS

Any proposal to divert or modify stream flow must occur within the limitations of existing water rights in the area. Prior downstream rights are held by Alameda County Water District (ACWD) to operate a diversion and percolation program from Alameda Creek in the Niles quarry area. Those rights result from two water rights applications filed in 1949 and 1950 and any subsequent applications are subject to ACWD's prior rights.

ACWD and Pleasanton Township County Water District (PTCWD) filed separate but concurrent applications to conserve water from Arroyo del Valle in 1956. The PTCWD rights were subsequently transferred to Zone 7 and the rights have been implemented through an operating

FIGURE 4



COMPARISON OF WATER LEVELS IN THE THREE MAJOR SUBBASINS*

* *Adapted From: "Livermore Groundwater Basin Key Well Report" Zone 7 of the Alameda County Flood Control and Water Conservation District, November 1976.*

agreement with the State Department of Water Resources for the Del Valle Reservoir. The agreement provides that Zone 7 and ACWD have interim capacity in the reservoir for storage of local runoff. As the service of water from the South Bay Aqueduct increases, the State will require use of a larger amount of storage capacity in the Del Valle Reservoir and the interim capacity to store local runoff for later percolation will decrease. However, the availability of depleted gravel pits for storage of local runoff will increase as the availability of Del Valle storage capacity decreases. Proper planning for use of depleted gravel pits could offset the storage loss in Del Valle Reservoir and maintain or increase the ability of Zone 7 to conserve local runoff from Arroyo del Valle.

In 1957, Zone 7 made application for water rights on Arroyo Mocho and Arroyo las Positas to divert flow to underground storage in the amount of 10,000 acre feet annually on each stream. Some diversions have been made to perfect these rights in recent years, but the combination of storage and percolation capacity is not sufficient to conserve total water rights in a wet year with high runoff. The addition of the storage capacity available through depleted gravel pits will make conservation of the surplus waters from the 143 square mile drainage area of these two streams a very real possibility. Stream flow records from 1962 to date indicate a mean discharge of 10,650 acre-feet per year at this location.

C. GROUND WATER REPLENISHMENT

The Reclamation Plan provides for the creation of a "chain of lakes" (noted as (31) on Plate 10) to encircle the QUARRY AREA and provide hydraulic continuity of the upper aquifer from the Arroyo del Valle in the southeast to the exposed aquifer face in the most northwest corner. Surface or ground water can be conveyed through these lakes by interconnecting them with pipelines and valves to control the amount and direction of flow. The natural ground surface slopes approximately 60 feet from the Arroyo del Valle to the most northwest corner of the quarries, in the same northwestern direction as the downslope of the ground water. Thus, the "chain of lakes" will provide an alternate conduit to the natural subsurface flow. In addition, the lakes can provide a means of collecting and storing surface runoff from the Arroyo Mocho, Arroyo las Positas and Arroyo del Valle and conducting it to areas of percolation and into ground water storage. The "chain of lakes" can be achieved through the quarry operation and Reclamation Plan. Zone 7, as the valley's water management agency, could construct, maintain and operate the diversion works and pipes, valves and gates hydraulically connecting the "chain of lakes".

Zone 7 has estimated that 7,000 acre feet of ground water will be lost annually to evaporation from the large area of lakes shown in the final reclamation plan. Offsetting this will be the elimination of the quantity of water used by the quarry operators in processing the sand and gravel and more significantly, the increased capacity of the lakes for storing and later percolating local runoff into the ground water basin. The combined drainage area of the Arroyo Mocho and Arroyo las Positas north of the QUARRY AREA is 143 square miles. Insufficient data is available to determine exactly how much runoff water could be conserved by use of the depleted gravel pits for diversion, but it is estimated that the combination of yield from a controlled diversion combined with the decrease in water use by quarry operations would equal or exceed the loss due to evaporation.

With 2,160 acres of lakes remaining in the QUARRY AREA when operations have ceased, an increase in storage capacity of over 20,000 acre feet can be obtained by simply raising the water level 10 feet in those lakes. This can be done during periods of heavy runoff by diversion of surplus waters through specially constructed diversion structures designed for that purpose. Depending on the particular year and the condition of the ground water basin at the time of

heavy runoff, the water levels in the final lakes could be raised as much as 50 feet and make 100,000 acre feet of storage available if water and diversion capability were present.

The depleted pits, or lakes will also increase the total volume of storage available in the ground water basin over what would be available for a comparable ground water depth in the undisturbed basin. The amount of ground water stored in the natural sand and gravels has been determined by the State Department of Water Resources to be 15 to 25 percent of the total volume. In the lake areas formed from the depleted quarry pits, the water is obviously 100 percent of the volume. Even accounting for the loss of some storage capacity due to filling with silts, clays and overburden, there will be a substantial net gain in ground water storage capacity. Therefore, more volume of water can be stored in the ground without raising the water levels to undesirably high elevations. If ground water levels rise to their historic high in the QUARRY AREA, it is probable that ground water levels in the west end of the basin would be restored to the artesian conditions that existed 60 years ago. This would cause serious problems in developed areas of Pleasanton that were once very wet due to high ground water. When Spring Valley Water Co. first drilled wells in these areas, a standpipe that extended several feet above the ground was placed on the well casing because the water was under such pressure that it would flow out of the ground if not confined. Thus, the use of the depleted quarry pits to store water could increase the storage capacity of the ground water basin without threatening to restore adverse conditions in the west end of the valley.

D. FLOOD CONTROL

Another benefit from the diversion of runoff waters from the Arroyo Mocho and Arroyo las Positas would be the reduction in flood peaks in channels downstream from the points of diversion. Maximum flood flows occur when surplus water is available for diversion to storage. During these periods, the peak flood flows and design flood capacities can be reduced. Some of the flood control channels have already been built to contain the design flood flows and, in those instances, there will not be any savings in capital cost. However, in the remaining reaches, new channel improvements may not need to be constructed to such large dimensions. In some cases, such as along the Arroyo de la Laguna, it may be possible to substantially reduce the environmental damage to the tree lined creek that would result if the present design flow had to be accommodated. This possible benefit must be analyzed more carefully to determine what storage capacity would be available at the time that the flood control improvement is to be constructed.

Zone 7 has established a design capacity of Arroyo Mocho through the QUARRY AREA of 5,200 cubic feet per second (cfs). The entire peak day runoff from Arroyo Mocho during a design storm could be contained in approximately 6,000 acre feet of storage, which would result in raising the water level in the completed pits only about 3 feet. If this flow could be contained in the QUARRY AREA, peak flows in downstream channels could be reduced 10 percent in the largest channels and as much as 75 percent in the channels immediately downstream. Similar reductions could be gained through the diversion of peak flood flows from Arroyo las Positas and, to a more limited extent, from Arroyo del Valle.

It should be noted that flood water stored in the quarry pits is not easily utilized as in a reservoir located in the hills which can be drained by gravity. However, this limitation is offset by the much larger capacity of the pits.

E. WATER QUALITY

In the central and southern portions of the Livermore-Amador Valley, ground water quality is generally good due to replenishment by the good quality waters of Arroyo del Valle and Arroyo Mocho. Averages of significant mineral constituents range as follows: total dissolved solids - 300 to 500 mg/l; total hardness - 200 to 400 mg/l; and boron - 0.3 to 0.8 mg/l (Alameda Creek Watershed Above Niles, 1964). Ground water in the northern and eastern portions of the valley contains substantially higher mineral concentrations. Imported water from the South Bay Aqueduct has been used to recharge the basin and it is better quality than local waters. During the period from 1962 to 1972 the aqueduct water quality averaged as follows: total dissolved solids - 249 mg/l; chlorides - 57 mg/l; and sulfates - 40 mg/l (Bulletin 118-2, p. 153). The overall ground water quality could be further improved through the diversion and storage of the generally better quality surface waters and the recharge and storage of more high quality imported water. During periods of heavy runoff into the Sacramento-San Joaquin Delta, surplus waters of high quality could be conveyed through the South Bay Aqueduct and placed in the depleted quarry lakes for storage and later use.

The quarry lakes can also be used to help meet the water quality requirements set forth in Section 208 of PL 92-500, the federal Clean Water Act. This act established discharge requirements on non-point sources of pollution, specifically urban storm water runoff. Some of the depleted pits could be isolated from the ground water basin and used to store the urban runoff for treatment before downstream discharge or underground recharge. Being located upstream from the quarries, Livermore's urban runoff can be controlled in this manner. The other urban areas in the valley may have more difficulty in meeting these requirements by use of the quarry lakes.

F. INTERIM USES

The water management uses outlined above are based on the completed quarry operations. However, some uses can be developed during the quarry operations. Although limited water management areas are shown on the available land use map for 1995, there are some pits that may be available for use in a water management program at an earlier date. It is beyond the scope of this study to set forth the manner in which some of this capacity could be made available, but there are some pits that could be used for flood control and recharge programs while quarry operations are underway. For example, some of the pits are presently being used as water surge pits in the quarry operations and under certain conditions, the same pits could be used for storage of flood waters or for ground water recharge. Such interim uses should be developed through separate negotiations with each quarry operator.

One of the serious problems facing the operators is the rising ground water which tends to flood out their operations and decrease the efficiency of their operations. It may be possible to develop interim ground water levels through a management program which could benefit both the operators and the ground water managers.

G. OTHER STUDIES

Several other studies are in progress that will develop information regarding water management in the Livermore-Amador Valley. These include the following:

1. The Upper Alameda Creek Basin California Urban Study by the U.S. Army Corps of Engineers is the most extensive study underway. It will include flood control and flood plain management, water supply and water quality, non-point wastewater management,

water-oriented recreation, and fish and wildlife preservation and enhancement. This $1,268,000 study is scheduled to be completed in fiscal year 1979 and will undertake detailed analyses of some of the proposals contained in this study on quarry reclamation.

2. The U.S. Geological Survey is undertaking a ground water monitoring program of 101 wells in the Livermore-Amador Valley in cooperation with Zone 7. This study is involved with determining ground water quality in the entire basin.

3. The State Department of Water Resources is undertaking further verification of their ground water model in a cooperative study with Zone 7. The results of this work could provide a valuable tool for ground water management analysis.

4. ABAG is conducting the Section 208 (PL 92-500) Area-wide Wastewater Management Planning Study on discharge from non-point sources. The Corps of Engineers is doing the surface runoff input to the ABAG overall study.

5. Flood insurance studies are being done or have been completed for the Federal Insurance Administration in Pleasanton, Livermore and the unincorporated areas of the valley.

In many areas, these studies could influence the Reclamation Plan and might suggest certain modifications. The final quarry Reclamation Plan could become a tool to be used in implementing some of the findings of these studies.

H. GROUND WATER MANAGEMENT PROGRAM

As indicated in preceding sections of this report, the Livermore-Amador Valley basin is a complex hydrologic unit. The development of a ground water management program will be difficult because of these complexities, but can and should be accomplished. The various studies that are currently under way will provide new information on the basin and will provide the basis for a management program. This Reclamation Plan can become a valuable tool for giving direction to the quarry operations so that a sound water management program can be implemented.

RECOMMENDATIONS

A. GENERAL

This Reclamation Plan can be the basis for sound measures to protect a valuable resource, to regulate its extraction, and to maximize both interim and ultimate beneficial land use possibilities. To achieve these goals, a number of important actions will be required, the most significant of which are listed below.

B. WATER MANAGEMENT

It is recommended that the following steps be pursued to evaluate and confirm the water management potential for both operating and depleted quarry areas, and to finally achieve a water management policy and program for the Livermore-Amador Valley and the downstream areas affected by its water.

1. The U.S. Army Corps of Engineers should include - as part of the Upper Alameda Creek Basin California Urban Study - an analysis of the potential use of land and water areas within the QUARRY AREA for water management purposes. This should include evaluation of the opportunities for flood control, water conservation, flood plain management, water supply and quality control, water-oriented recreation, and fish and wildlife enhancement.

2. The ground water monitoring program in the Livermore-Amador Valley being conducted by the U.S. Geological Survey in cooperation with Zone 7 should be completed for use in evaluating ground water quality in the entire basin.

3. The cooperative study by the State Department of Water Resources and Zone 7 to verify the DWR ground water model should be completed so that the findings can be utilized in the development of a water management program.

4. Using the results of all available studies, including the proposals contained in this study, Zone 7 should develop a water management plan for the Livermore-Amador Valley which can be adopted as official policy and program. When preparing that plan, Zone 7 should:

   a. Work with the quarry operators to develop a program for early and continuing interim use of specific pits for flood control and ground water recharge. Negotiations should be aimed at evolving a program which will accommodate these uses without adversely affecting the quarry operations.

   b. In cooperation with the operators, arrive at a mutually satisfactory program for maintaining ground water levels at elevations which will permit economically viable extraction of the sand and gravel without major interference from ground water.

   c. Develop an acceptable program with the operators for the relocation of Arroyo Mocho, establishing the location and size for a suitable channel.

   d. Evaluate the "chain of lakes" concept proposed for the QUARRY AREA (assuming conduits and valves to control flow between pits), and determine the manner in which this water complex should be managed for maximum benefit. Special consideration should be given to ground water levels and their fluctuation, as well as to the possibility of regulating those levels in some or all of the completed lakes for potential recreation use.

   e. Based on added storage capacity which could be available in the QUARRY AREA, re-evaluate the flood control improvements

required downstream, to reduce those improvements and their cost as much as possible.

C. RECREATION

1. Both the East Bay Regional Park District and the Livermore Area Recreation and Park District should evaluate and comment on the recreation and park needs in the area and the potential for suitable facilities within the QUARRY AREA when operations are terminated. Consideration should be given to water access, the problems posed by water level fluctuation, the desirability of controlling the water level in specific ponds, and related park development concerns. As indicated in the section on Reclamation Specifics, most of the final slopes will be quite steep and will not afford public access to the water. Recommendations should be offered on how the Reclamation Plan may be modified to enhance future public use in the areas where that may be desirable.

2. A determination should be made on the feasibility of installing a regional trail at an early date along the southern side of Arroyo del Valle connecting Shadowcliffs Recreation Area with Sycamore Grove Park. Consideration should be given to: avoiding conflicts between such public use and the adjacent quarry operations; responsibility for acquisition, development and maintenance of the trail; adequate safety measures; and visual separation from the quarrying.

D. RECLAMATION

1. This Reclamation Plan, once adopted, should be augmented by each operator submitting more detailed information about the unique aspects of his operation not covered in this overall plan. This should include more specific reclamation proposals as required by the State Surface Mining and Reclamation Act of 1975, including provision for such items as slopes, benches, revegetation, erosion control, and drainage.

2. Provision should be made for future modification of specific aspects of each operator's Reclamation Plan to accommodate changes in operating requirements, provided that such modifications do not significantly alter the overall Reclamation Plan for the QUARRY AREA.

E. IMPLEMENTATION

1. Alameda County should take the necessary steps to modify the present Quarry Ordinance to bring it into compliance with the State Surface Mining and Reclamation Act of 1975 as the basis for implementing this Reclamation Plan.

2. After adequate public exposure and input, this Reclamation Plan should be adjusted and then adopted as the Specific Plan for the QUARRY AREA.

3. The Alameda County General Plan and the General Plan of the Cities of Livermore and Pleasanton should be reviewed and amended as may be required to be in compliance with the QUARRY AREA Specific Plan.

4. All future development or quarry proposals within the QUARRY AREA, as well as all future development proposals for lands in the vicinity of the quarries, should be in conformance with the QUARRY AREA Specific Plan, with special attention to avoiding incompatible or conflicting land uses.

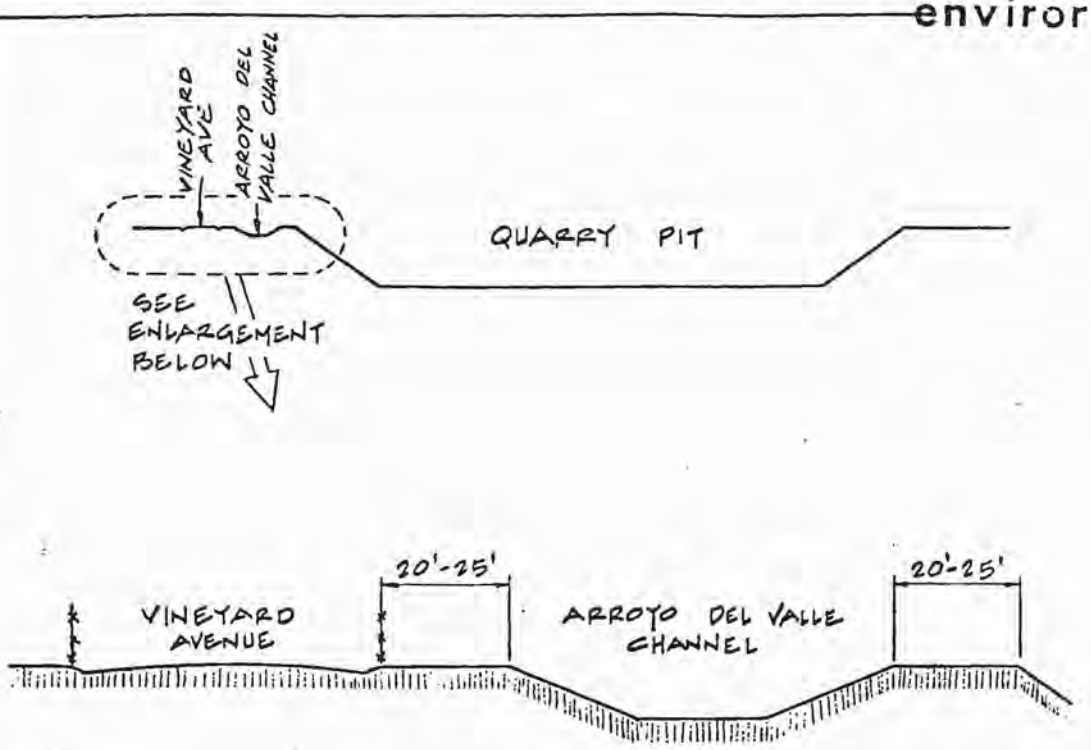
ALTERNATIVE LAND USE PLAN FOR THE
LIVERMORE-AMADOR VALLEY QUARRY RECLAMATION PLAN
NOVEMBER 1978

In response to concerns raised during the environmental impact analysis on the Quarry Reclamation Plan, some modifications to the plan are proposed as mitigation. Plate 10 of the Reclamation Plan is proposed to be modified as shown on the attached drawing entitled "Available Land Use-2030, Plate 10, Revised October 1978." The modifications to Plate 10 and a description of these modifications are as follows:

1. Concern has been expressed that quarrying of the entire Arroyo del Valle as shown on original Plate 10 and as defined in Quarry Permit Q-1 would have a serious effect upon the ability to convey water released from the South Bay Aqueduct or from Del Valle Reservoir through the valley to an outflow in Arroyo de la Laguna. The use of Arroyo del Valle to convey water is considered necessary to the operations of Alameda County Water District and Zone 7 of Alameda County Flood Control and Water Conservation District. To overcome this problem, it has been suggested that a channel be retained or constructed along the southern perimeter of the proposed quarry pits which presently constitute the channel of Arroyo del Valle. The channel could be sized to contain the design flood releases from Del Valle Reservoir without overflow into the gravel pits, or it could be sized to contain only the water conveyance releases and the flood releases could be diverted

to the gravel pits for storage and percolation into the groundwater basin. The exact size and dimensions of this channel will be determined and sumbitted as a part of the detailed Reclamation Plan for Lone Star Industries. Its general configuration would be as shown on the typical section attached hereto as Figure 1.

2. It was pointed out that the "chain of lakes" concept could not operate unless there were physical means of conveying the waters from one quarry pit to another. Since this concept is a basic part of the mitigation for interference with the transmissivity of the upper aquifer, Plate 10 has been modified to show conduits to be installed in the impervious levees between the pits. As time passes, more is known about the significance of the upper aquifer as a major factor in the groundwater basin. In recent years, the groundwater levels in the western portion of the basin (Bernal Sub-basin) have risen to a level where they are approximately the same elevation as the levels in the central portion of the basin (Amador Sub-basin). This is due to many factors, including the reduction of groundwater use in the Bernal Sub-basin. However, it is apparent that water can and does get to the Bernal Sub-basin in spite of the interferences of the quarry pits and silt ponds in the upper aquifer. Future water management programs of Zone 7 may desire to restrict the flow of groundwater from the Amador Sub-basin to the Bernal Sub-basin in order to prevent high groundwater elevations in the Bernal Sub-basin and a return to the saturated



TYPICAL SECTION OF ARROYO DEL VALLE

THROUGH PROPERTIES OF LONE STAR INDUSTRIES

Livermore-Amador Valley Quarry Reclamation Plan
Amended November, 1978

ground conditions that existed during the historic periods of high groundwater levels in the valley. Gates placed on the conduits between the gravel pits could be used to restrict the flow in the upper aquifer and pond it in the depleted quarry pits for storage and later use. The exact size of the conduits connecting the quarry pits should be determined by the need to convey the water so as to maintain as near a natural condition as possible. It is estimated that a maximum flow of 50 c.f.s. would provide this capability and that it could be attained with pipes of approximately 36 to 42 inches in diameter. Larger conduits or gates for water control could be installed to move water more rapidly or to restrict its flow, but such facilities should be considered as enhancing the operations for water management and should not be a burden to be borne by the quarry operators. Plate 11 indicates several levees which separate the smaller pits which make up the larger pits shown on Plate 10. The final reclamation plan should include a statement that these levees are necessary for water control during quarry operations and will be breached when quarry operations cease. These levees are generally quite low in elevation, and during high water levels will be completely inundated. They will appear when groundwater levels are very low, but they will not interfere with the flow of water within the larger pits as shown on Plate 10. The levees separating the larger pits should be of sufficient top width to allow access for maintenance vehicles.

3. It has been suggested that the quarry operators could provide a very real benefit to the valley by agreeing to allow certain of the quarry pits to be flooded during peak stream flows in order to reduce flood flows in undersized channels in the west end of the valley. Because Rhodes & Jamieson has recently acquired the properties of California Rock and Gravel Company, an unusual opportunity is available to work out a program for some early flood storage. In the long-range, there will be ample capacity in the pits for storage of flood waters from Arroyo Mocho and Arroyo las Positas. However, the use of these pits for these purposes at this time would cause operational difficulties for the operators. Rhodes & Jamieson has revised its sequence of operations since acquisition of the Cal Rock properties. The current plans anticipate continuing to move north in the present operating pit until reaching the southern boundary of the orchard south of the Rancho del Charro horse farm. Plate 10 has been revised to indicate this modification. The next step is to begin quarrying the Johnson property located east of the main office building and move in an easterly direction to the eastern property limits, including the Harney parcel acquired from Cal Rock. It is estimated that this phase will be completed about 1995 when operations will move onto the Cal Rock property south of Stanley Boulevard where the gravel will be quarried and moved by conveyor system to the present plant for processing. The gravel must be moved over or under Stanley Boulevard and the railroad tracks. Following the

completion of quarrying on the Cal Rock property, the operation will move north and west on the Hagemann property and finally terminate on the most northwestern parcel of land presently in Rhodes & Jamieson ownership.

Because of this changed sequence of operations, it is physically possible to make the Cal Rock gravel pits immediately available for storage of flood waters during peak runoff periods, since they will not be used by Rhodes & Jamieson until completion of quarrying the Johnson and Harney properties. If flood waters from the Arroyo Mocho could be conveyed to these pits for storage, the peak flood flows downstream could be reduced. The storage capacity of these pits has been estimated to be 6,000 acre-feet. The 100-year design storm in the Arroyo Mocho is 5,200 c.f.s. and would produce a total runoff of approximately 3,500 acre-feet in a 24-hour period. The peak portion of this runoff could be diverted from the Arroyo Mocho to the Cal Rock quarry pits through a tunnel under the railroads and Stanley Boulevard. By diverting flood flows in such a manner, the Arroyo Mocho would not be required to be re-routed around the Rhodes & Jamieson quarries, and the flood flows remaining in the existing stream could be limited to the capacity of the existing channel. Such diversions would also reduce the flood flows in critical areas downstream, such as the Arroyo de la Laguna. For example, if a peak flood reduction of 3,000 c.f.s. can be effected, the flood flows of Arroyo Mocho below the junction

with Arroyo las Positas could be reduced by approximately one quarter. If installed at the proper location and grade, the tunnel under the railroad and Stanley Boulevard could be used to convey the flood waters south until 1995 and then to convey gravel north until the Cal Rock pits have been totally mined. After that, the tunnel could be used as a part of the project to manage the groundwater basin to convey waters north or south as required during certain periods of the year or wet or dry cycles. By 1995, when Rhodes & Jamieson will need the tunnel for gravel conveyance, the quarrying of the Johnson property will be completed, and pit storage will be available at that location to provide the same degree of flood protection as available in the Cal Rock pits. The cost of constructing the tunnel could be shared by Rhodes & Jamieson and Zone 7 based on the relative use of each and the relative size requirement for each.

As the quarrying operations proceed, more depleted quarries will become available for use as flood control reservoirs or water conservation basins. A brief analysis of the cost of the flood control storage in the Del Valle Reservoir reveals that when constructed it cost $225 per acre-foot. To provide this storage today would cost approximately $600 per acre-foot. Using the same criteria, the value of 6,000 acre-feet of flood control storage in the quarry pits would have a comparative value of $3,600,000. The true value of such storage is measured by the reduction in flood damage resulting

from its use. If studies prove that it is feasible to use such storage, specific conditions for making it available can be negotiated with each individual operator.

4. The Reclamation Plan should be modified to include fish farming as an alternative land use for the depleted quarries. Most of the land proposed to be harvested for gravel is currently being used for agriculture. After completion of gravel harvesting, it is possible to return this land to agricultural use by raising fish. Fish have the ability to convert feed to meat at a ratio of about 1.5:1 while beef uses a ratio of about 5:1.

   At the conclusion of gravel harvesting, there will be approximately 2,000 acres of water available for fish farming. Assuming 2,500 fish per acre, 5,000,000 fish could be harvested per year if 6-inch fingerlings were stocked. If smaller fingerlings or a hatchery were a part of operations, a continuing harvest of 2,500,000 fish could be realized each year.

   Fish farming could be conducted in conjunction with water conservation and some flood control if controlled to prevent damage to fish or facilities.

   Over the past two years, Kaiser Sand and Gravel Company has conducted experiments with raising fish in cages. Both rainbow trout

and channel catfish have been raised to a marketable size. Although the experiments were too limited to determine the profitability of such a venture, they do indicate that fish farming is viable under certain conditions. The need is certainly demonstrated by the shortage of protein to feed the ever increasing world population. Experiments with canning catfish are continuing and some predict that canned catfish may someday rival tuna fish.

APPENDIX B

ALAMEDA COUNTY SURFACE MINING ORDINANCE

Adopted July 14, 1979

ALAMEDA COUNTY SURFACE MINING ORDINANCE

Adopted by Board of Supervisors on July 14, 1977

TITLE 8
CHAPTER 2 - PART II

Surface Mining and Reclamation of Mined Lands

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8-127.0 Citation of Part II of this Chapter

TITLE 8
CHAPTER 2, PART II

Surface Mining and Reclamation of Mined Lands

Article 1
General Provisions

8-111.0. Purpose and Authority. This ordinance shall regulate surface mining and reclamation of mined lands within the unincorporated area of the County of Alameda pursuant to the California Surface Mining and Reclamation Act of 1975, Division II, Chapter 9, Public Resources Code.

8-111.1. Intent. Mining of the mineral resources of Alameda County is important to the economic well-being of the County and Bay Region and is essential to the needs of society. Mining improperly conducted, however, may result in adverse environmental effects and limit the utilization of other land and water resources important to present and future needs; therefore, it is the intent of this Part to regulate surface mining activities in a manner to assure:

(a) Prevention or mitigation of adverse effects on the environment, including air pollution, impedence of groundwater movement and water quality degradation, damage to aquatic or wildlife habitat, flooding, erosion, sedimentation effects, and excessive noise;

(b) Progressive reclamation concurrent with mining so that mined lands are returned to a condition adaptable for alternate land uses, with no residual hazards to public health or safety and with land and water resources maintained in a state beneficial to society; and

(c) Consistency with mineral resource management policies of the General Plan.

8-111.2. Surface Mining Permit and Reclamation Plan Required. Except as specified in Section 8-111.3, no person shall conduct surface mining operations unless a surface mining permit is obtained and a reclamation plan is approved as provided by this Part and the California Surface Mining and Reclamation Act of 1975.

8-111.3. Exceptions.

(a) General. The provisions of this Part are not applicable to:

(1) Excavations or grading conducted for farming or on-site construction or for the purpose of restoring land following a flood or natural disaster.

(2) Prospecting for, or the extraction of, minerals for commercial purposes or the removal of overburden in total amounts of less than 1,000 cubic yards on any property shown as a unit on the latest County Assessment Roll.

(3) Surface mining operations that are required by federal law in order to protect a mining claim, if such operations are conducted solely for that purpose.

(4) Such other surface mining operations categorically identified by the State Board pursuant to Sections 2714(d) and 2758(c) of the Public Resources Code as involving only minor and infrequent surface disturbances, provided the Planning Director has determined that such exemption would be consistent with Section 8-111.1 of this Part.

(b) Existing operations, mining permits. Any surface mining operation authorized to operate under a quarry or sand and gravel pit permit issued pursuant to Ordinance No. 67-119 and Ordinance No. 18 N.S. shall not be required to obtain a surface mining permit so long as such quarry or sand and gravel pit permit remains in effect and surface mining is conducted in accordance with regulations in effect at the time the permit was issued, including any permit conditions imposed.

(c) Existing operations, reclamation plans. Any surface mining operation operating under a quarry or sand and gravel permit granted prior to January 1, 1976, shall be required to have an approved reclamation plan only for that portion of the mining site on which surface operations have been conducted after January 1, 1976. Such approval shall be obtained within one year after the effective date of this Section; provided, however, that the Planning Commission may authorize additional time for compliance with this provision in increments of six months or less upon determination that the preparation of the reclamtion plan has been undertaken in good faith by permittee, or that additional time is required for review of a submitted reclamation plan, and continuation of mining operations would not be detrimental to successful reclamation. Reclamation plans approved by the Alameda County Board of Supervisors prior to January 1, 1976, shall be exempt from the provisions of this Part.

8-111.4. Violation a Misdemeanor. Any person who operates or maintains, or causes to be operated or maintained, any surface mining operation which is not in conformance with the provisions of this Part is guilty of a misdemeanor.

8-111.5. Uses Permitted Other than Mining.

(a) If a mining operation is being conducted in an A (Agricultural) District, all other uses permitted pursuant to the District regulations may be conducted on the site provided such uses do not interfere with meeting any of the requirements of this Part and provided any such uses are not prohibited by conditions of the surface mining permit or approved reclamation plan.

(b) If a mining operation is being conducted in any other district, uses permitted pursuant to such other district regulations may be conducted on the site only if also permitted by the surface mining permit or approved reclamation plan.

(c) Sorting, crushing, reducing, refining or other processing of minerals, or the operation of an asphalt or concrete batch plant, may be permitted in conjunction with mining operations if conducted within an A, M-1 or M-2 district, as such districts are defined by this Chapter, upon securing of a surface mining permit, when such uses are found by the Planning Commission to be a necessary adjunct to the mining operations and when the Planning Commission finds that the effects of such processing, including noise, odor, smoke, dust, bright lights, vibration, traffic, and production of waste, can be controlled so as to be compatible with adjacent uses and so as not to degrade natural resources.

(d) Accessory uses to mining operations and processing of minerals.

Article 2
Definitions

8-113.0. Critical Gradient. The maximum stable inclination of an unsupported slope under the most adverse conditions that it will likely experience, as determined by current engineering technology.

8-113.1. Bench. A level area that interupts a slope, constructed for such purposes as to retain or limit rock falls, provide working surfaces or access, and to control erosion.

8-113.2. Exploration or Prospecting. Exploration or prospecting is defined as the search for minerals by geological, geophysical, geochemical or other techniques, including, but not limited to, sampling, assaying, drilling, or any surface or underground works needed to determine the type, extent, or quantity of mineral present.

8-113.3. Mine. Mine is defined to include all mineral bearing properties of whatever kind or character, whether underground, or in a quarry or pit, or any other source from which any mineral substance is or may be obtained.

8-113.4. Mined Lands. Mined lands is defined to include the surface, subsurface, and groundwater of an area in which surface mining operations will be, are being, or have been conducted, including private ways and roads appurtenant to any such area, land excavations, workings, mining waste, and areas in which structures, facilities, equipment, machines, tools, or other materials or property which result from, or are used in, surface mining operations are located.

8-113.5. Minerals. Minerals is defined as any naturally occurring chemical element or compound, or groups of elements and compounds, formed from inorganic processes and organic substances, including, but not limited to, coal, peat, and bituminous rock, but excluding geothermal resources, natural gas, and petroleum.

8-113.6. Mining Waste. Mining waste is defined to include the residual of soil, rock, mineral, liquid, vegetation, equipment, machines, tools, or other materials or property directly resulting from, or displaced by, surface mining operations.

8-113.7. Operator. Operator is defined as any person who is engaged in surface mining operations, or who contracts with others to conduct operations on his behalf.

8-113.8. Overburden. Overburden is defined as soil, rock, or other materials that lie above a natural mineral deposit or in between deposits, before or after their removal by surface mining operations.

8-113.9. Person. Person is defined as any individual, firm, association, corporation, organization, partnership, or any local agency as defined by Government Code Section 53090 et seq.

8-113.10. Reclamation. Reclamation is defined as the combined process of land treatment that minimizes disruption or alteration of groundwater movement, water quality degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion, sedimentation, and other adverse effects from surface mining operations, including adverse surface effects incidental to underground mines, so that mined lands are reclaimed to a usable condition which is readily adaptable for alternate land uses, and so that adverse impacts on groundwater resources are mitigated, and no danger to public health or safety is created. The process may extend to affected lands under the control of the operator surrounding mined lands, and may require backfilling, grading, resoiling, revegetation, soil compaction, erosion and sediment control, stabilization, restoration of groundwater recharge areas, or other measures.

8-113.11. State Policy. State policy is defined as the state policy for the reclamation of mined lands adopted pursuant to Section 2755 of the Public Resources Code.

8-113.12. Surface Mining Operations. Surface mining operations is defined as all, or any part of, the process involved in the mining of minerals on mined lands by removing overburden and mining directly from the mineral deposits, open-pit mining of minerals naturally exposed, mining by the auger method, dredging, quarrying, or surface work incident to an underground mine. Surface mining operations include, but are not limited to:

(a) Inplace distillation, retorting or leaching;

(b) The production and disposal of mining waste;

(c) The removal of overburden;

(d) Prospecting and exploratory activities.

8-113.13. Topsoil. The upper part of the soil profile that is relatively rich in humus, which in the field of agronomy is known as the A-1 horizon of the soil profile.

Article 3
Application Procedure

8-115.0. Filing. Application for a surface mining permit and for approval of a reclamation plan shall be filed with the County Planning Department. The reclamation plan shall be filed with the surface mining permit application. In the case of a pre-existing surface mining operation described under Section 8-111.3(c) of this Chapter the reclamation plan will be filed alone.

8-115.1. Form of Application. The form of the application for a surface mining permit or approval of a reclamation plan shall be as prescribed by the Planning Commission.

8-115.2. Application Fees. The application fees for a surface mining permit or approval of a reclamation plan, or for modification of an existing permit or approved reclamation plan, shall be as established by Resolution by the Board of Supervisors and shall be submitted at the time of application.

8-115.3. Referral. Surface mining permit applications and proposed reclamation plans shall be referred to the State Geologist, the Alameda County Director of Public Works, the Alameda County Flood Control and Water Conservation District and to such other agencies, groups or individuals that in the opinion of the Planning Director need to know of such proposals or can contribute information necessary to complete evaluation.

8-115.4. Application to Modify a Surface Mining Permit or Approved Reclamation Plan. Applications to modify the terms or conditions of, or uses permitted under, a surface mining permit or an approved reclamation plan shall be in accord with the provisions of this Section, except that minor changes in dimensions, volumes or timing of the staging plans that will not affect implementation of the reclamation plan may be approved by the Planning Director. Applications to expand the land area affected by an existing permit or approved reclamation plan shall be in accord with Article 3 of this Part.

(a) Application shall be in letter or graphic form sufficient to accurately and completely describe the modification requested.

(b) Investigation and action on an application shall be in accord with the provision of Article 4 of this Part.

8-115.5. Urgency Modification in Public Interest: Issuance by Building Official. The Alameda County Building Official may modify the terms of any surface mining permit heretofore granted and in effect, where there is neither time nor opportunity for such modification to be granted pursuant to section 8-115.4 and subject to the following further limitations, to wit:

(a) The modification shall be effective for not more than three (3) days, as specified by the Building Official.

(b) The modification shall apply only to such mining operations as related to the emergency.

(c) The modification is in the public interest.

Article 4
Investigation and Action

8-117.0. Investigation. Upon the filing of a surface mining application or a reclamation plan, the Planning Commission shall make such investigations as are necessary to determine whether or not the proposed mining and reclamation operations conform to this Part.

8-117.1. Hearing. The Planning Commission shall conduct a public hearing, notice of which shall be given as provided in Section 8-103.3 of Part I of this Chapter, prior to taking action on a surface mining application or reclamation plan.

8-117.2. Findings. At the conclusion of such investigation and public hearing, the Planning Commission shall make a specific finding as to whether or not the application or reclamation plan conforms, or can be made to conform by proper conditions, to the requirements of: (1) this Chapter; (2) the Alameda County General Plan; (3) any Specific Plan adopted by the Board of Supervisors; rand (4) the public health, safety and welfare. The Planning Commission shall state the basis for its determinations regarding such finding.

8-117.3. Action. If its finding as to Section 8-117.2 of this Part is positive, the Planning Commission shall issue the surface mining permit or approve the reclamation plan, applying such conditions to either as may be necessary to effect the conformance specified in said Section 8-117.2. If its finding is negative, the Planning Commission shall deny such issuance or approval.

8-117.4. Conditions. Such conditions shall include:

(a) That one of the following types of security, in an amount determined by the Planning Commission, be furnished to guarantee faithful performance of the work to be done under the terms of the surface mining permit and reclamation plan:

(1) Bond or bonds by one or more duly authorized corporate sureties.

(2) A deposit, either with the local agency or a responsible escrow agent or trust company, of money or negotiable bonds of the kind approved for securing deposits of public moneys.

(b) The term of the permit.

(c) A schedule for periodic review of the surface mining permit and the reclamation plan by the Planning Commission at time invervals not to exceed five (5) years for the reclamation plan and at such interval as the Planning Commission determines appropriate for the surface mining permit.

In addition to the conditions herein specified, the Commission may impose other conditions related to the public health, safety and welfare, including, but not limited to, such matters as hours of operation, limitations on hauling and the use of public roads and streets.

8-117.5. Periodic Review of Surface Mining Permit and Reclamation Plan. Surface mining permits and approved reclamation plans shall be reviewed by the Planning Commission, in accordance with the schedule adopted at the time of approval, to consider new or changed circumstances within the general area of the mining operations that should be accommodated by the permit or plan. The review shall include a public hearing as specified by Section 8-117.1 of this Part. At the conclusion of the public hearing, the Planning Commission may modify the permit or reclamation plan to conform with this Chapter, and such modified permit or plan shall be binding upon the operation.

8-117.6. Appeal. The action taken by the Planning Commission to issue, approve, deny, or modify a surface mining permit or a reclamation plan may, within 10 days of that action, be appealed to the Board of Supervisors by any person. Such appeal shall be filed with and heard by the Board of Supervisors in the manner specified by Section 8-102.0 of Part 1 of this Chapter. If the Board of Supervisors determines the findings made and action taken by the Planning Commission to be satisfactory, the appeal shall be denied. If it determines otherwise, the Board of Supervisors shall make its own findings and take action in accordance with Section 8-117.2, 8-117.3 and 8-117.4 of this Part.

As provided by the State of California Public Resources Code, an applicant whose request for a surface mining permit to conduct operations in an area of statewide or regional significance has been denied by the Board of Supervisors on appeal, may within 15 days of such denial, appeal to the State Mining and Geology Board. If the State Board determines the decision of the Board of Supervisors is not supported by substantial evidence in the record, the Board of Supervisors shall hold a public hearing to reconsider its action.

Article 5
Regulations

8-119.0. Mining. Surface minining operations shall be conducted and the site maintained in accordance with the following requirement:

(a) Slopes:

(1) Finished slopes shall conform to the requirements of Section 8-119.3(e).

(2) Temporary slopes steeper than the finished slopes, in areas where finished slopes are to occur, shall be constructed and maintained in accordance with the recommendations, as approved by the Building Official, of a soil engineer or a civil engineer registered in the State of California or an engineering geologist registered and certified in the State of California. Temporary slopes shall not be created or maintained in a manner that will interfere with the construction of finished slopes conforming to part (1) of this subsection, and the soil engineer or engineering geologist shall make specific recommendations for the conversion of such temporary slopes to finished slopes.

(b) Benches. Benches shall be provided where necessary to control drainage on slopes or to provide for access or public safety.

(c) Setbacks:

(1) Surface mining excavations shall not be conducted closer than:

a) Twenty-five (25) feet of the common property line of any parcel, except where the adjacent property is being mined in the same manner with respect to such line;

b) Fifty (50) feet of the right of way or Future Width Line of any street.

(2) Mining excavations shall be set back from water courses, flood control channels, reservoirs and water conservation facilities a distance as may be determined by the Planning Commission on recommendation of Alameda County Flood Control and Water Conservation District to be sufficient to protect existing or planned facilities.

(d) Screening of operations. Where the Planning Commission determines that mining operations may conflict with visual qualities that should be maintained for adjacent areas, such operations shall be screened by the operator by the planting and maintenance of appropriate landscape materials.

(e) Fencing. Prior to the commencement of mining operations, a fence shall be constructed enclosing the area authorized by permit to be excavated. Said fence shall be located not less than ten (10) feet from the top edge of any exterior cut slope. Where excavation is authorized to proceed in stages, only the area excavated plus the area of the stage currently being excavated need be fenced. Fences shall be at least five and one-half (5½) feet in height and constructed of woven wire fabric and barbed wire on metal posts. Details of fence construction and materials shall conform to the applicable provisions of Section 80, Subsection 80-2.01 through 80-2.02, of the California Division of Highway Specification, 1971 Edition. The bottom strand of the woven wire mesh shall be two inches from the ground and the small mesh openings of the woven wire fabric near the ground. The fence shall have four strands of barbed wire as specified above the woven wire fabric, the first strand being four inches above the top of the woven wire mesh. The second strand of barbed wire shall be spaced seven inches above the first. The third and fourth strands of barbed wire shall be spaced nine inches and eighteen inches, respectively, above the second strand of barbed wire. Gates, the same height as the fence, shall be installed at all points of vehicular or pedestrian ingress and egress, and shall be kept locked when not in regular use.

(f) Use of explosives. No explosives shall be used except as authorized by the surface mining permit. When authorized, the specific times of use shall be approved by the Building Official.

(g) Drainage; water quality and conservation:

(1) Provision shall be made to protect mining operations from overflow from adjacent streams or from slope failures caused by infiltration and seepage from surface water bodies by the construction of levees or other devices to prevent flooding. No obstruction shall be placed in stream channels without obtaining a permit allowing such obstruction from the Alameda County Flood Control and Water Conservation District.

(2) Grades in areas being mined shall be maintained so as to avoid accumulations of water that could serve as breeding areas for mosquitoes.

(3) Excavations which may penetrate near or into usable water bearing stratas shall not reduce the transmissivity or area through which water may flow unless approved equivalent transmissivity or area has been provided elsewhere, nor subject such groundwater basin or subbasin to pollution or contamination.

(4) Nothing in this Part shall be construed to prevent the use of mined lands for the conservation or storage of water, or for the control of flood or strom waters, by a public agency duly authorized to engage in such work, provided that any such use will not conflict with nor prevent reclamation required under an approved reclamation plan, and provided such use is approved by the Alameda County Flood Control and Water Conservation District.

(5) Any waters discharged from the site to adjacent lands, streams, or bodies of water or to any groundwater body shall meet all applicable water quality standards of the Regional Water Quality Control Board and any other agency with authority over such discharges. Records of any water quality monitoring conducted in conjunction with the requirements of such agency or agencies shall be made available to the Building Official on request. Discharges of water to designated on-site settling ponds or desilting basins shall not be deemed to be in violation of this part solely on the basis of sediment content.

(h) Erosion, sedimentation and pollutant discharge:

(1) During the period mining operations are being conducted, and prior to final reclamation of mined lands, measures shall be taken to prevent erosion of adjacent lands from waters discharged from the site of mining operations and the off-site discharge of sediment. Such measures may include the construction of properly designed retarding basins, settling ponds and other water treatment facilities, ditches, diking and revegetation of slopes. No discharge of sediment to off-site bodies of water shall be permitted that will result in higher concentrations of silt than existed in off-site waters prior to mining operations.

(2) Stockpiles of overburden and minerals shall be managed to minimize water and wind erosion.

(3) The removal of vegetation and overburden in advance of surface mining shall be kept to a minimum.

(i) Control of noise, dust and bright lights. All activities of mining and processing minerals shall be conducted in a manner that noise, dust and bright lights do not exceed levels compatible with the uses of adjacent lands as determined by the Planning Commission in the issuance of the surface mining permit or as a result of its periodic review of any permit.

(j) Salvage of topsoil. Topsoil suitable for use in revegetation shall be stockpiled at the site of mining operations in an amount up to that necessary for future reclamation.

(k) Hours of operation. Hours during which mining operations and processing of minerals may be conducted shall be established by the Planning Commission in approving any permit. Such hours of operation shall be set to minimize conflict between the operations and other uses conducted in the immediate area.

(l) Boundary markers. The property approved for mining operations shall be prominently and permanently marked. Where property lines cannot otherwise be determined their location shall be established by survey by a registered civil engineer or licensed surveyor. The requirement for boundary markers may be waived by the Planning Commission where excavations will not occur within one thousand (1000) feet of the property boundary.

(m) Groundwater use. All groundwater lost by pond evaporation and by export with the product in the mining operation and related activities shall be determined with reasonable accuracy and recorded annually. Said information shall be made available to the Building Official if required.

8-119.1. Ingress, Egress and Traffic Safety. Access roads used for transporting minerals from areas of mining operations to County roads shall be located only at points designated by the Planning Commission.

A complete plan or plans of the proposed construction at the intersection of each access road with a County road shall be submitted to the Road Department for review and recommendation to the Planning Commission. An encroachment permit shall be obtained from the Road Department prior to performing any work within a County road right of way.

Adequate sight distances shall be maintained, turning radii shall be sufficient to facilitate turning of the largest anticipated trucks, and, where necessary, a deceleration lane from the County road shall be provided for right turn movements into an access road, and a left turn lane provided to facilitate turns from the County road into the access road. A length of not less than one hundred (100) feet of the access road shall be paved to County standards from its intersection with a County road. The width of the paved area shall not be less than twenty-four (24) feet.

Traffic control devices, including signs and pavement markings at the access road entrance, and additional signing or marking on the County road to warn of the approaching access road, shall be provided as determined necessary. All such work shall be provided, and may be required to be maintained, at the operator's expense.

During hauling operations, any spillage of materials on County roads shall be promptly and completely removed.

8-119.2. Intermittent Operation. Whenever surface mining operations are conducted on an intermittent basis, with one (1) or more years between operating periods, the following procedures shall be followed:

(a) Closing down. The operator shall notify the Building Official of his intention to close down operations at least thirty (30) days prior to such action. The Building Official shall inspect the site, notify the operator of what protective devices or structures and what corrective measures are or may be necessary for the protection of adjacent properties, environmental resources, and the general public, and take appropriate steps to see that necessary corrections are made.

(b) Starting up. At least thirty (30) days before starting up inoperative mining operations, the operator shall notify the Building Official who shall inspect the site. Operations shall not recommence until the Building Official has determined that all requirements of the operation's surface mining permit and this Part are met and has authorized such commencement.

8-119.3. Reclamation.

(a) General requirements. Reclamation of mined lands shall be carried out in accordance with the requirements of this Part, the approved reclamation plan and State Policy. The operator shall guarantee all reclamation work accomplished for a period of two years or such greater period as may be determined necessary by the Planning Commission to assure the permanency of any or all physical reclamation features,

(b) Progressive reclamation. Reclamation of mined areas shall take place as soon as practical following completion of mining operations at successive locations within the mining site as specified by the Planning Commission in the approval of the reclamation plan.

(c) Disposal of overburden and mining waste.

(1) Permanent piles or dumps of overburden and waste rock placed on the land surface shall be made stable, shall not block natural drainage without provision for diversion, shall have an overall smooth or even profile and, where practical, shall be placed in the least visible location. Old equipment and similar inert mining wastes shall be removed or buried. Toxic materials shall be removed or protected to prevent leaching.

(2) Overburden and mining waste placed below the existing or potential groundwater level shall not reduce the transmissivity or area through which water may flow unless approved equivalent transmissivity or area has been provided elsewhere.

(d) Drainage, erosion and sediment control.

(1) Any temporary stream or watershed diversion shall be restored in final reclamation unless determined unnecessary by the Planning Commission based on recommendation of the Alameda County Flood Control and Water Conservation District

(2) Regrading and revegetation shall be designed and carried out to minimize erosion, provide for drainage to natural outlets or interior basins designed for water storage, and to eliminate potholes and similar catchments that could serve as breeding areas for mosquitoes.

(3) Silt basins which will store water during periods of surface runoff shall be equipped with sediment control and removal facilities and protected spillways designed to minimize erosion when such basins have outlet to lower ground.

(4) Final grading and drainage shall be designed in a manner to prevent discharge of sediment above natural levels existent prior to mining operations.

(5) Upon reclamation, no condition shall remain which will or could lead to the degradation of water quality below applicable standards of the Regional Water Quality Control Board or any other agency with authority over water quality.

(e) Final slope gradient. Final slopes shall be of such gradient as necessary to provide for slope stability, maintenance of required vegetation, public safety and the control of drainage, as may be determined by engineering analysis of soils and geologic conditions and by taking into account probable future uses of the site. Final slopes shall not be steeper than two (2) feet horizontal to one (1) foot vertical (2:1) unless the applicant can demonstrate to the satisfaction of the Planning Commission that any such steeper slope will not:

(1) Be incompatible with the alternate future uses approved for the site;

(2) Be hazardous to persons that may utilize the site under the alternate future uses approved for the site; and

(3) Reduce the effectiveness of revegetation and erosion control measures where such are necessary.

In no event shall the steepness of slopes exceed the critical gradient as determined by an engineering analysis of the slope stability.

(f) Backfilling and grading. Backfilled and graded areas shall be compacted to avoid excessive settlement and to the degree necessary to accommodate anticipated future uses. If future use of the site contemplates structures for human occupancy, fill placement shall conform to the Uniform Building Code except that alternate methods of backfilling and grading may be utilized when incorporated in the approved reclamation plan. Material used in refilling shall be of a quality suitable to prevent contamination and pollution of groundwater.

(g) Resoiling. Resoiling shall be accomplished in the following manner: coarse, hard material shall be graded and covered with a layer of finer material or weathered waste and a soil layer then placed on this prepared surface. Where quantities of available soils are inadequate to provide cover, native materials should be upgraded to the extent feasible for this purpose.

(h) Revegetation. All permanently exposed lands that have been denuded by mining operations shall be revegetated unless any such revegetation is determined by the Planning Commission to be technically infeasible or not beneficial with respect to the intent of this Part. Revegetation methods and plant materials utilized shall be appropriate for the topographical, soil and climatic conditions present at the site. Native species shall be used wherever practical.

(i) Ponds, lakes or bodies of water created as a feature of the reclamation plan shall be approved by the Alameda County Flood Control and Water Conservation District, the Health Care Services Agency and the Mosquito Abatement District.

Article 6
Compliance

8-121.0. Responsibility to Comply. The permittee, operator, property owner and their authorized agents, and any other person in control of the property, individually or collectively, are responsible for the observation and compliance with all the provisions of this Part. Such responsibility shall include the correction of any unsafe condition and the construction and continued maintenance of all fences and other protective devices required.

In case the owner or other responsible person shall fail, neglect or refuse to perform the required corrections, maintenance or repairs after being notified in writing to do so by the Building Official, the Building Official shall have recourse to all remedies permitted by law to secure compliance.

8-121.1. Enforcement.

(a) Duty of Building Official. It is the duty of the Building Official of Alameda County to enforce the provisions of this Part. For such purpose, he shall have the powers of a police officer.

(b) Periodic inspection of operations. As a condition of issuing a surface mining permit and approving a reclamation plan, the Planning Commission shall establish a schedule for periodic inspection by the Building Official of the mining operations and reclamation to determine and assure continuing compliance with these regulations. Such periodic inspection schedule for mining operations being conducted under a quarry or sand and gravel permit issued pursuant to Ordinance 67-119 or Ordinance 181 N.S. shall be established by the Planning Commission before June 1, 1978. The interval between inspection shall not be greater than one year, except that during such time as the mining operations are closed down, pursuant to Section 8-119.3 of this Part, no inspection need be made. The Building Official may require the operator to submit such information to him as may be necessary to determine compliance.

Whenever the Building Official determines that the mining operations are not in compliance with the terms of the surface mining permit or the approved reclamation plan, or that the soil or other conditions are not as stated on the permit, he shall notify the permittee of such fact in writing demanding compliance within a reasonable time from the date of such notice. If the permittee has not, within the stated time, complied with the terms of the permit or the approved reclamation plan or the requirements of this Part, or given reasonable assurances that such steps are being taken to comply, the Building Official may order the cessation of all work or any portion thereof, and such work shall cease until the requirements of the permit or reclamation plan or this Part are met. The Building Official also shall have recourse to any other remedy permitted by law to secure compliance.

(c) Inspection fee. The operator shall pay to the County the actual cost, as determined by the Building Official, of conduting the periodic inspection of operations.

8-121.2. Revocation or Suspension of Permit. Any surface mining permit granted under the provisions of this Part shall be subject to revocation or suspension by the Planning Commission, for cause, and in the following manner:

(a) Notice. The matter of revocation or suspension shall be set for a public hearing not less than ten (10) days nor more than thirty (30) days thereafter, notice of which shall be posted on said property and a copy thereof shall be served upon the permittee, either personally or by certified mail to his last known address, not less than ten (10) days prior to the said hearing, which said notice shall specify wherein the permittee has failed to comply with this Part or conditions specified in the surface mining permit or the approved reclamation plan, and shall require him to appear at said hearing on the date and hour specified at which time evidence both for and against the revocation of said permit may be offered and shall be considered by the Commission.

(b) Hearing. Upon the date set for hearing, the Planning Commission shall hear all charges against said permittee. At the hearing, the permittee shall have the right to appear in person or by counsel and to introduce evidence in opposition to such revocation or suspension.

(c) Action by Planning Commission and Board of Supervisors. After said hearing, the Planning Commission shall report in writing to the Board of Supervisors that it has held the hearing; said report shall contain a statement of any and all findings and recommendations made by said Commission. The Board of Supervisors shall set the matter for hearing and shall give written notice thereof to the permittee. After the conclusion of its hearing, the Board may affirm, modify, or reject the recommendation of the Planning Commission. Any action of the Board shall be based upon the Commission's report and any other evidence produced at the Board's hearing. Where appropriate, a further appeal may be taken by the permittee to the State Mining and Geology Board as specified by Section 8-117.6.

Article 7
Penalties

8-123.0. Penalties. Any person convicted of a misdemeanor under the provisions of this Part shall be punished by a fine not exceeding five hundred (500) dollars or by imprisonment in the County jail not exceeding six (6) months, or by both.

8-123.1. Each Violation a Separate Offense. Each person violating or contributing in any way to the violation of any of the provisions of this ordinance shall be deemed guilty of a separate offense for each day during which such violation continues, and such violation shall be deemed to be a misdemeanor and shall be punishable therefore as herein provided.

Article 8
Severability Clause

8-125.0. Severability Clause. If any provision of this Part or the application thereof to any person or circumstance, is held invalid, the remainder of this Part, or the application of such provisions to other persons or circumstances shall not be affected thereby.

Article 9
Citation of Part 2 of This Chapter

8-127.0. Citation of Part 2 of This Chapter. Part 2 of this Chapter may be referred to and cited as the Alameda County Surface Mining Ordinance.