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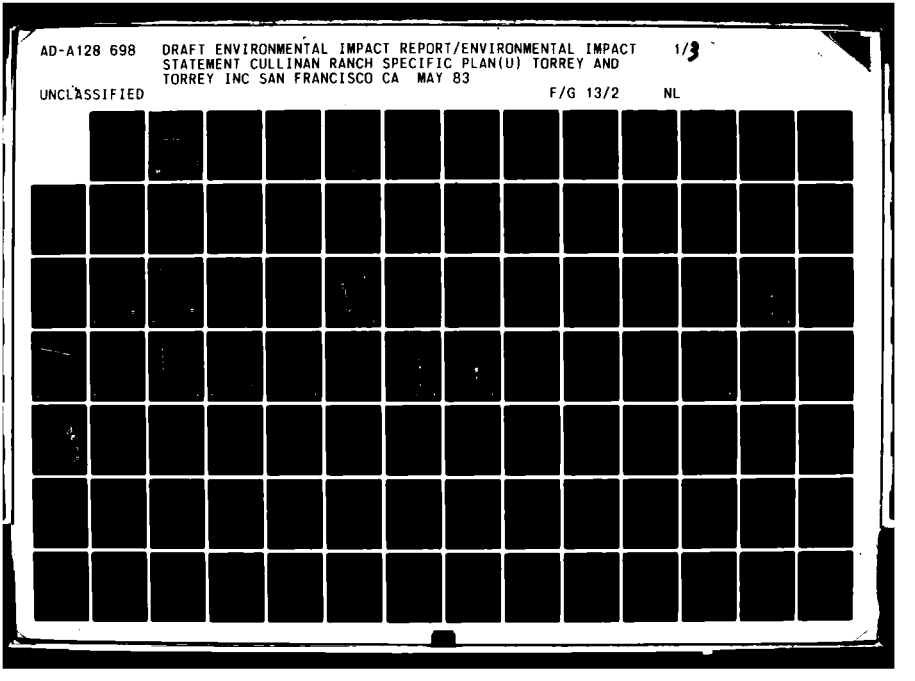

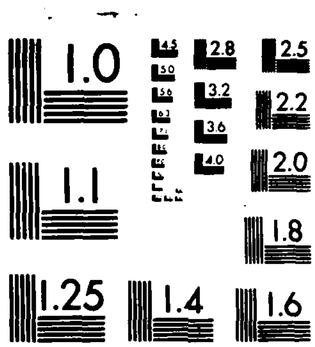

DRAFT
ENVIRONMENTAL IMPACT REPORT/
ENVIRONMENTAL IMPACT STATEMENT

CULLINAN RANCH

City of Vallejo

U.S. Army Corps of Engineers

May 1983

TORREY & TORREY INC.
environmental/urban planning and design

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

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- Prepared in cooperation with the City of Vallejo Planning Department Solano County, California
- Appendices are bound in a separate volume

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Environmental Impact
Excavation/Fill
Waterfront residential/commercial development
Recreational Boating

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Joint State/Federal environmental impact document concerning a regulatory permit application by Pan Pacific and Redwood Realty under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. The proposed projectinvolves a water-oriented predominantly residential community with public and private marina facilities.

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

Draft

ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT

CULLINAN RANCH SPECIFIC PLAN

Regulatory Permit Application Number 14775E57
City of Vallejo, Solano County, California
SCH #82083110

Prepared for

City of Vallejo Planning Department
U. S. Army, Corps of Engineers, San Francisco District

By

Torrey & Torrey Inc.
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May 1983

This Environmental Impact Report/Environmental Impact Statement (EIR/EIS) was prepared by Torrey & Torrey Inc., San Francisco, California, to conform to the National Environmental Policy Act (NEPA), Council on Environmental Quality Regulations, Corps of Engineers' EIS Regulations, California Environmental Quality Act (CEQA) and State and City of Vallejo EIR Guidelines. Torrey & Torrey Inc. has used its best efforts to prepare an inclusive environmental impact report by identifying and evaluating possible environmental impacts and possible measures to mitigate adverse impacts of the proposed project, and considering alternatives to the project as proposed.

This EIR/EIS is intended to be a full disclosure document and is provided solely to assist in the evaluation of the proposed project. Torrey & Torrey Inc. shall not be liable for costs or damages of any client or third parties caused by use of this document for any other purposes, or for such costs or damages of any client or third parties caused by delay or termination of any project due to judicial or administrative action, whether or not such action is based on the form or content of this report or portion thereof prepared by Torrey & Torrey Inc.

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ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT
CULLINAN RANCH SPECIFIC PLAN, CITY OF VALLEJO, SOLANO COUNTY, CALIFORNIA
REGULATORY PERMIT APPLICATION BY PAN PACIFIC AND REDWOOD REALTY
PUBLIC NOTICE NO. 14775E57

COVER SHEET

A. ABSTRACT

Pan Pacific and Redwood Realty has applied to the U. S. Army Corps of Engineers, San Francisco District, for a permit under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act to construct a water-oriented residential community on 1493 acres with public and private marina facilities. Approximately 3 million cubic yards of material would be excavated from the site to form channels and waterways. An additional 13.2 million cubic yards of material would be imported to create enough fill for the construction of 4500 dwelling units, schools, roads, parks, and commercial services. The applicant proposes deep-water access to San Pablo Bay via Dutchman Slough, the Napa River, and Mare Island Strait. The proposed project would be annexed to the City of Vallejo.

The City of Vallejo and the Corps of Engineers are the designated lead agencies for the preparation of a joint Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to identify the potential environmental consequences of the proposed project and several alternatives which were developed by the City of Vallejo and the Corps of Engineers.

B. LEAD AGENCY CONTACTS

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C. REVIEW PERIOD

This Draft EIR/EIS has a 45-day period for public review. All written comments must be submitted to either of the designated lead agency contacts by 11 JUL 1983 (or the end of the 45-day comment period specified by the Notice of Availability published in the Federal Register or specified by the City's Notice of Completion, whichever is later. Oral and written comments may also be presented at the City's public hearing scheduled for July 6, 1983, on this document.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF EXHIBITS

LIST OF TABLES

SUMMARY

A. PURPOSE OF AND NEED FOR THE PROPOSED ACTION

Each permit application has both an applicant's purpose and need as well as a public purpose and need. When the permit applicant is a governmental body or agency the applicant's purpose and need may be the same as the public purpose and need. Often when the permit applicant is not a governmental body or agency the permit applicant is a member of the private sector engaged in a good or service for profit. This is the case with the Cullinan Ranch proposed development where along with the permit applicant's profit oriented purpose there is also considered to be a public interest purpose of providing a public benefit, if the permit is approved. The public benefit associated with the proposed Cullinan Ranch development is additional housing.

This Environmental Impact Report/Environmental Impact Statement (EIR/EIS) has been prepared to meet the requirements of both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) as part of the perm ·g process for the proposed project.

The project applicants have applied for a U. S. Army Corps of Engineers perm ·or Cullinan Ranch. A Corps permit is required for the project pursuant to Section 10 ·e River and Harbor Act of 1899 and Section 404 of the Clean Water Act. The Corp required the preparation of an EIS based on its determination that the proposed p ·c would have significant effects on the environment.

Conformance with NEPA is required due to the Federal permitting activity of the U. S. Army Corps of Engineers. The Army's authority over the proposed project is based upon Section 10 of the River and Harbor Act (RHA) of 1899 (33 U.S.C. Section 403) and upon Section 404 of the Clean Water Act (CWA) (33 U.S.C. Section 1344) which pertains to the discharge of dredged or fill material into the waters of the United States. In Leslie Salt Co. vs. Froehlke 578 F 2d 742, 753 (9th Cir. 1978), the court held that the Corps' jurisdiction under the RHA extends to all lands covered by the ebb and flow of the tide to the mean high water (MHW) mark in its unobstructed, natural state, including diked areas below former MHW. Section 10 of the RHA of 1899 regulates any work or structure placed within its jurisdiction.

The City of Vallejo has determined that a program EIR would be required for the proposed 1551-acre residential and commercial project on the basis of an Initial Study completed on August 4, 1982. The regional location and project location are indicated on Exhibits I-1 and I-2.

The Draft EIR/EIS will be circulated through the State Clearinghouse to all permitting and review agencies for review and comment. In accordance with CEQA and NEPA requirements, this document will be available to the public with public hearings provided for comment.

B. ALTERNATIVES INCLUDING THE PROPOSED ACTION

ALTERNATIVE A - PROJECT AS PROPOSED

Pan Pacific and Redwood Realty are proposing development of the 1493 acre Cullinan Ranch in Solano County, near the City of Vallejo. For the purpose of continuity in areawide planning, a Specific Plan is being proposed by the project applicants for an entire planning area which consists of 1551 acres. This area includes the Guadalcanal

Village property, consisting of 53 acres, which is owned by the City of Vallejo and two small properties, owned by the State of California, which total 5 acres.

The present permit application under review by the Corps of Engineers includes only the 1493 acre Cullinan Ranch portion of the Specific Plan. The Corps of Engineers will require separate permit applications from the other property owners (i.e., City of Vallejo and the State of California) within the area covered by the Specific Plan.

The Cullinan Ranch development proposal is to transform a property that is now diked and used for dry farming into a complex of waterways and land areas for a water-oriented residential community.

At the present time, the Cullinan Ranch area is comparatively level farmland, with the elevation of the levee along Dutchman Slough defining the northerly perimeter. After transformation into a residential marina community, approximately one-third of the site would be water (i.e., boat channels and marinas), and the remaining two-thirds would be devoted to wetland areas and to residential, commercial, and public facility uses.

The site now has an average elevation of 2.5 feet Mean Lower Low Water (MLLW). After transformation, the average elevation will be 14.5 feet MLLW, which will accommodate minimum floor elevations of 13.5 feet MLLW and a maximum street differential of 4 feet.

The center of the boat channels will be excavated to a minimum -20 feet MLLW, except for the commercial marina area, which may be excavated to -30 feet MLLW. These elevations were determined on the basis of navigational and water flow criteria and also the need for fill material to provide building pads.

Earthwork during site transformation will serve to 1) establish the planned configuration of land and water areas, 2) stabilize geotechnical conditions involving soft bay mud and peat deposits, and 3) raise the surface level of the project to accommodate planned settlement and provide protection against possible flooding during a major 100-year storm. Since the site does not contain sufficient fill material to accomplish all of this earthwork, import of fill material is required.

Earthwork for the total site transformation will involve approximately 16.2 million cubic yards of fill. This will include about 3.0 million cubic yards of bay mud excavated on site from the proposed channel areas and about 13.2 million cubic yards of imported material. In addition, large quantities of peat will have to be removed from the proposed channel areas and used for fill in areas that will not support structures.

After transformation, the approximate site composition will be:

o Water areas (i.e., channels and marinas)	423.5	acres
o Open space - wetlands (i.e., intertidal area, levee and other open space in northwest area of site)	250.0	acres
o Urban areas (i.e., residential, commercial, public facilities, circulation, and recreational land uses)	819.5	acres
TOTAL	1493.0	acres

Proposed residential use of the site includes 3000 single family units (low density) on 457.5 acres and 1500 multiple-family units (medium density) on 111.09 acres for a total of 4500 dwelling units. Commercial uses include water-oriented specialty shops (hotel, restaurants, shops, offices, marina service and storage facilities) in the Guadalcanal Village area, a 400-500 berth commercial marina, and a small neighborhood commercial center (supermarket, convenience stores, etc.) located adjacent to the medium density housing. Alternative A residential density is 3.3 units per gross acre (Vallejo calculation method).

A summary of all the proposed land uses with the associated acreages is given in Table II-1, and project details are shown on Exhibits II-1 through II-6. Phasing for the project is expected to extend over twenty years with initial construction to begin at the eastern boundary of the property and move to the western boundary as indicated on Exhibit II-7.

ALTERNATIVE B - REDUCED PROJECT

This alternative would have the same number of residential units, developed on a smaller land area. Thus the number of single family units would be reduced from 3000 to 1525 and the number of multi-family units would be increased from 1500 to 2975. The total developed area would be reduced by 117.5 acres. The 117.5 acres excluded from development would become a buffer zone of open space-wetland between the new development and the Leslie salt pond to the west. A schematic representation of this alternative is shown on Exhibit II-8. All other land uses would be the same as those proposed in the Specific Plan, Alternative A.

ALTERNATIVE C - GENERAL PLAN ALTERNATIVE

This alternative comes closer to the high density range designated for the site in the Vallejo General Plan (1-8 units per gross acre). The assumed 10,000 residential units result in a density of about 7.8 units per gross acre (Vallejo calculation method). A schematic representation of this alternative is shown on Exhibit II-9.

In this alternative, in addition to the difference in residential units, the neighborhood commercial area is larger than in Alternatives A and B, the Guadalcanal area is designated for industrial use, as shown in the City of Vallejo General Plan and the specialty commercial use is smaller than in Alternatives A and B. A comparison of the identified land use acreages for each alternative is given in Table II-2 and a comparison of the total number of dwelling units is given in Table II-3.

The lagoon system proposed in this alternative would have tidal exchange with Dutchman Slough but would not have deep-water access for boats to Dutchman Slough, the Napa River or San Pablo Bay. The shoreline around this lagoon would be a reinforced vertical bulkhead to minimize erosion and provide stability for building foundations.

ALTERNATIVE D - NO PROJECT

The no project alternative would mean that no new development would be undertaken on the site, and that the existing land uses would remain, namely agriculture and vacant land.

If agricultural operations were to become economically infeasible, the area could be returned to tidal action by breaching the levee along Dutchman Slough and by implementing a salt marsh restoration plan. At that time a public agency could acquire the site for this purpose and could prepare a marsh restoration plan for the area.

The Corps of Engineers considers the No Project Alternative to be permit denial.

C. ISSUES

The proposed project raises many issues and concerns regarding land development. The basic issues are briefly summarized here and are discussed in detail throughout the text of the EIR/EIS. Many of these issues are controversial and have significant adverse impacts associated with them. These impacts are summarized in Section D of the summary. Other issues are still under investigation and will require further review by various local, state and federal agencies as additional data becomes available. These issues are indicated with an asterisk (*).

1. Growth inducement with required expansion of infrastructure to support additional population.

2. Residential use of diked historic baylands.

3. Loss of agricultural use of the site.

*4. Annexation to the City of Vallejo.

*5. Jurisdiction of certain permitting and review agencies (Department of Fish and Game, Bay Conservation and Development Commission).

6. Marina function, design and construction.

7. Water quality within the Napa River, adjoining sloughs, and new channels.

8. Sedimentation within excavated channels.

*9. Settlement of bay mud soils.

*10. Importation of large amounts of fill.

11. Insufficient capacity of Highway 37.

*12. Conversion of dredged material disposal site to tidal salt marsh.

*13. Endangered plant and animal species on adjacent property.

*14. Financing for needed infrastructure.

D. SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATIONS

The following section presents a summary of the environmental impacts with recommended mitigation measures for the proposed project and alternatives to the proposed project. It also includes a summary of impact conclusions as required by the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

SUMMARY OF BENEFICIAL IMPACTS

Alternatives A, B and C would have the following beneifical impacts:

1. Additional housing units would supply housing needed in the San Francisco Bay Area.

2. Excavation of a lagoon area would result in greater tidal flows, increased water surface area, increased aquatic habitat and additional shoreline.

3. Development of parks, trails, day use areas, and parking areas would provide public and private waterfront access and recreation.

Alternative D (no project) would preserve the existing agricultural use of the site and maintain the potential for salt marsh restoration.

SUMMARY OF ADVERSE IMPACTS AND RECOMMENDED MITIGATIONS

The following table presents a summary of the environmental impacts which would be associated with the proposed project (Alternative A) and/or the project Alternatives B through D and the recommended mitigations. For detailed discussions of these impacts and mitigation measures, please refer to the appropriate sections of the text following this chapter. The letters in parentheses after each recommended mitigation indicate who would have responsibility for implementing the mitigation. The letters are keyed to the following code:

DR: Developer Responsibility

CR: City Responsibility

JCDR: Joint City and Devleloper Responsibility

SIGNIFICANT ADVERSE IMPACTS AND MITIGATIONS

ADVERSE IMPACTS	ALTERNATIVES AFFECTED	RECOMMENDED MITIGATION
Land Use		
School site and street patterns conflict with overhead flight operations from Napa Airport	A,B,C	Provide curved streets where possible; direct street lights downward; relocate school; incorporate easement in future deeds for the property (DR)
Marina Function and Design		
Fuel and oil spills would affect water quality	A,B,C	Install automatic shut-off on fuel dock; institute emergency service provisions for containment of spills (Contingency Plan) (DR)
Boat sewage may affect water quality	A,B,C	Install sewage pump-out facility; prohibit the flushing of boat holds in waterways (DR)
Potential explosion hazard associated with fuel dock	A,B,C	Install only explosion-proof fixtures; all fixtures provided with spark protection safety equipment. Isolate fuel dock. (DR)
Design of float facilities may affect public safety relative to navigation	A,B,C	Design according to Cal-Boat Guidelines (DR)
Increased fire hazard for floating structures	A,B,C	Install fire hoses and reels in conformance with stricter of Cal-Boat Guidelines or requirements of local fire officials (DR)
Hydrology, Water Quality and Sedimentation		
High potential for reduced water quality in lagoon system during construction (short-term impact)	A,B	Place tide gates as far from channel entrances as possible; conduct additional model simulations for construction phases (DR)

SIGNIFICANT ADVERSE IMPACTS AND MITIGATIONS

ADVERSE IMPACTS	ALTERNATIVES AFFECTED	RECOMMENDED MITIGATION
High potential for reduced water quality in lagoon with limited tidal exchange	C	Install tide gates at opposite ends of main channel; conduct water quality monitoring studies (DR)
High potential for nonpoint source pollution due to urban runoff	A,B,C	Implement preventative measures which reduce discharge of pollutants to lagoon (see Water Quality Mitigations); discharge storm drains to main channel (DR)
Increased potential for water quality problems in Dutchman and South Sloughs	A,B,C	Conduct field sampling program in Dutchman and South Sloughs to establish base data and detect potential problems during project phasing; develop contingency plan for detected problems (DR)
Cumulative sedimentation within the proposed waterways	A,B,C	Design maintenance dredging program to keep waters navigable (DR)
Loss of dredged material disposal site after reaching ultimate elevation	A,B	Excavate dredged material disposal site periodically to allow indefinite use (DR)
Dredged material disposal site not identified	C	Identify long-term disposal site (DR)
Sedimentation due to 20 year construction period (periodic short-term impact)	A,B,C	Implement erosion and sediment control plan during grading operations (DR)
Soils and Agriculture		
Loss of about 1300 acres of farmable land and about 6.7 percent of locally supplied oat hay	A,B,C	(Unavoidable Cumulative Adverse Impact)

SIGNIFICANT ADVERSE IMPACTS AND MITIGATIONS

ADVERSE IMPACTS	ALTERNATIVES AFFECTED	RECOMMENDED MITIGATION
Geology and Sesimicity		
High potential for slope instability, differential and total settlement on filled areas	A,B,C	Prepare detailed geotechnical engineering study; implement measures to compensate for settlement and reduce slope instability (see specific recommendations under settlement and slope stability mitigations) (DR)
High potential for deformation of bank slopes during an earthquake	A,B,C	Prepare detailed geotechnical evaluation to determine safe setback for buildings from slopes (DR)
Source of fill material not identified	A,B,C	Identify fill source and ensure measures to mitigate impacts of transportation to site (JCDR)
Vegetation and Wildlife		
Loss of dense marsh vegetation at proposed entrance breach in levee	A,B	Reduce width of breach or move entrance further north (DR)
Possible impacts to rare/endangered species	A,B,C	Preserve all existing levee areas; complete field surveys for designated rare/endangered species (DR)
Possible difficulty in establishing marsh vegetation on new levees	A,B	Investigate possibility of designing islands near the inside of the levee to reduce wave action and increase habitat for aquatic plants (DR)
Eliminated potential for salt marsh restoration on more than 1300 acres	A,B,C	Mitigation Alternatives (DR) a. Complete a Habitat Evaluation Procedure (HEP) and modify project to provide greater habitat values b. Negotiate agreement for off-site mitigation to compensate for habitat losses c. Contribute funds to land trust for offsite mitigation

SIGNIFICANT ADVERSE IMPACTS AND MITIGATIONS

ADVERSE IMPACTS	ALTERNATIVES AFFECTED	RECOMMENDED MITIGATION
Aesthetics		
Restricted views from State Route 37; visually obtrusive structural elements	A,B,C	Design noise wall with landscaped berms and masonry; create "view corridors" through development (DR)
High potential for monotonous architecture	A,B,C	Generate design diversity by employing several different architectural firms (DR)
Unattractive residential views from neighborhood commercial area	A,B,C	Incorporate landscaped buffer into design of neighborhood commercial area (DR)
Excessive length of pedestrian trail on levee	A,B	Design bicycle path on levee (DR)
Traffic		
State Route 37 would operate at LOS "F" in year 2005	A,B,C	(Unavoidable adverse impact even with design of six lane arterial)
Reduced LOS for Redwood, Sacramento and Wilson Streets	A,B,C	Design four lane arterials for these streets (JCDR)
Noise		
High noise levels adjacent to Highway 37	A,B,C	Construct noise barrier along Highway 37 (DR)
Jet aircraft noise over entire project	A,B,C	Mitigation Alternatives: a. Perform detailed study to determine noise impacts of jet aircraft (DR) b. Design buildings to reduce noise impacts (DR)
Utilities - Sanitary Sewer		
Insufficient capacity of VSFCD trunk line in Wilson Avenue	A,B,C	Renovate and upgrade trunk line on Wilson Avenue from Tennessee Street to Sears Point Road (JCDR)
Pump stations could be a potential maintenance problem to VSFCD	A,B,C	Use wet and dry well design to facilitate maintenance (DR)

SIGNIFICANT ADVERSE IMPACTS AND MITIGATIONS

ADVERSE IMPACTS	ALTERNATIVES AFFECTED	RECOMMENDED MITIGATION
Pump stations would be power dependent, causing potential sewage backup during power outage	A,B,C	Install auxiliary generators with independent power source (DR)
Standing sewage in pump stations would provide environment for breeding of mosquitos	A,B,C	Seal pump stations to prevent mosquito entry and production
Treatment plant may not have sufficient capacity	C	Enlarge capacity of treatment plant (DR)
Utilities - Water Supply		
Existing trunk system may not have sufficient capacity	A,B,C	Upgrade existing trunk system (JCDR)
Additional maintenance costs if water supply line placed under Napa River	A,B,C	Design and construct water lines to minimize need for maintenance (DR)
Increased demand for water supply	A,B,C	Install water conserving fixtures and landscaping (DR)
Utility energy usage would increase	A,B,C	Perform maximum pumping during off-peak electrical demand periods (DR)
Major improvements may be required	A,B,C	Require developer to bear cost of major improvements, consistent with water department policy (DR)
Larger water tanks may be required	C	Install larger water tanks as required (DR)

SIGNIFICANT ADVERSE IMPACTS AND MITIGATIONS

ADVERSE IMPACTS	ALTERNATIVES AFFECTED	RECOMMENDED MITIGATION
Schools		
Insufficient capacity at existing schools (short-term impact)	A,B,C	Mitigation Alternatives: (JCDR) a. Provide additional capacity at existing schools; e.g., double or year-round sessions and/or portable classrooms b. *Revise construction phasing* to provide new school
Gas and Electricity		
No gas or electric service to the site	A,B,C	Extend gas and electric lines to the site with substation and gas regulator station (DR)
Police and Fire		
Insufficient police and fire service	A,B,C	Provide combined police and fire facility (JCDR)
Air Quality		
Construction dust generation	A,B,C	Require all construction contracts to include dust control provisions (DR)
Increased carbon monoxide levels near intersections along S. R. 37	A,B,C	Require that phased development coincides with planned and recommended capacity improvements along S. R. 37 (CR)
Increase in regional emissions caused by project auto traffic	A,B,C	Develop and implement a transportation system management (TSM) program (JCDR)
Energy		
Street patterns do not maximize solar access	A,B,C	Reorient street patterns to increase solar access, if possible; design buildings for both active and passive solar needs (DR)

SIGNIFICANT ADVERSE IMPACTS AND MITIGATIONS

ADVERSE IMPACTS	ALTERNATIVES AFFECTED	RECOMMENDED MITIGATION
Cumulative demand for energy to meet heating, cooling, lighting and transportation needs	A,B,C	Provide energy conservation measures as indicated in Section M. Energy (DR)
Archaeology		
Low potential for archaeological resources on the site	A,B,C	Consult with qualified archaeologist if resources are encountered during excavation (DR)

SUMMARY COMPARISON OF ALTERNATIVES AND IMPACTS

Impact Category		Alternatives A	B	C	D
1.	Land Use	+/-m	+/-m	+/-m	0
2.	Marina Function and Design	-m	-m	-m	0
3.	Hydrology, Water Quality, Sedimentation	+/-m	+/-m	+/-m	0
4.	Soils and Agriculture	-u	-u	-u	0
5.	Geology and Seismicity	-m	-m	-m	0
6.	Vegetation and Wildlife	-m	-m	-m	0
7.	Aesthetics	+/-m	+/-m	+/-m	0
8.	Traffic	-u	-u	-u	0
9.	Utilities and Services	-m	-m	-m	0
10.	Air Quality	-m	-m	-m	0
11.	Noise	-m	-m	-m	0
12.	Energy	-m	-m	-m	0
13.	Archaeology	-m	-m	-m	0

Beneficial Impacts: +

Adverse Impacts (mitigation recommended): -m

Adverse Impacts (unavoidable): -u

No Impacts: 0

Alternative A - Project as Proposed

Alternative B - Reduced Project

Alternative C - General Plan Alternative

Alternative D - No Project Alternative

E CEQA/NEPA-REQUIRED IMPACT CONCLUSIONS

1. Any Significant Environmental Effects Which Cannot Be Avoided

Significant environmental effects which can be reduced to a level of insignificance through mitigations have been discussed in each section of this report.

The proposed project (Alternative A) and Alternatives B and C would have some unavoidable significant adverse impacts which cannot be mitigated to a level of insignificance. These impacts are summarized as follows:

Soils and Agriculture

- Alternatives A, B and C would result in the loss of about 1268 farmable acres currently in oat hay production. The yield from this acreage which would be lost is about 6.7 percent of the total oat hay produced in the area. This loss is significant primarily as a cumulative adverse impact due to the total projected loss of acreage for hay production and the resulting impacts on the Marin and Sonoma County dairy industries.

Air Quality

- Alternatives A, B and C would result in a regional and local reduction in air quality, due primarily to automobile emissions, that would be significant as a cumulative impact.

Vegetation and Wildlife

- Alternatives A, B and C would eliminate the agricultural field habitat on the site and would eliminate the potential for tidal salt marsh restoration.

- From the standpoint of marsh preservation, Alternatives A, B and C would contribute to the cumulative adverse impacts of increased visitor use of the Napa Marsh.

Energy

- Alternatives A, B and C would add to the cumulative demand for energy to meet heating, cooling, lighting, transportation and other energy needs.

Traffic

- Alternatives A, B and C would result in Level of Service Ratings of "F" along State Route 37 given the presently proposed roadway system.

2. The Relationship Between Local Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

Land Use

- For Alternatives A, B and C, the construction of residential units on the flight path of the Napa Airport would place constraints on flight operations because of public concerns regarding safety and noise. The possibilities for increasing flight operations would decrease. Alternative D would not affect future flight operations.

Air Quality

- Alternatives A, B and C would contribute to cumulative long-term air quality impacts due to increased motor vehicle emissions.

Soils and Agirculture

- Alternatives A, B and C would result in an annual decrease in oat hay production of about 6.7% of the total produced in the area. This loss of long-term productivity is an unavoidable cumulative adverse impact.

Vegetation and Wildlife

- Alternatives A, B and C would eliminate the restoration potential of 1493 acres of diked agricultural land within the historic marsh margin of San Francisco Bay due to the construction of lagoons and developed areas.

Energy

- Alternatives A, B and C would have long-term commitments of energy resources to provide for the local population increase.

Traffic

- Alternatives A, B and C would contribute to the long-term cumulative impacts of increased traffic and congestion especially along State Route 37.

3. Irreversible and Irretrievable Commitments of Resources Which Would Be Involved in the Proposed Action Should It Be Implemented

The following irreversible and irretrievable commitments of resources would be involved in implementing Alternatives A, B or C as indicated.

- Elimination of currently farmed agricultural land in favor of residential and recreational use (Alternatives A, B and C)

- Use of building materials, fill materials, and energy during project construction and maintenance (Alternatives A, B and C)

- Consumption of energy, water and services during project operation (Alternatives A, B and C)

- Elimination of the potential for salt marsh restoration on about 1240 acres (Alternative A), 1123 acres (Alternative B) or 1393 acres (Alternative C)

4. Growth Inducing Impacts

Project alternatives A, B and C, in and of themselves are growth inducing. The addition of 4500 dwelling units to the City of Vallejo with the accompanying population increase would contribute to the need for goods and services in the area. Alternatives A through C would stimulate growth of additional (off-site) commercial centers to provide for the population increase, require expansion of public services and utilities, and require construction and improvement of roadways. Increased capacities may then be considered growth inducing. Development of the project would also result in increase in revenues to

the City and Solano County. For a detailed discussion of revenue distribution please see Section III L. Economic/Fiscal. In addition, implementation of any of the Alternatives A through C would continue the precedent already set elsewhere permitting residential development on diked agricultural land within the historic marsh margin of San Francisco Bay. This could contribute to further development demand for surrounding diked lands.

The availability of housing could help to generate some additional employment opportunities in the City of Vallejo and in nearby communities. Housing availability would therefore contribute to economic growth in the subregion.

I. PURPOSE OF AND NEED FOR THE PROPOSED ACTION

A. PURPOSE AND NEED FOR THE PROJECT

Each permit application has both an applicant's purpose and need as well as a public purpose and need. When the permit applicant is a governmental body or agency the applicant's purpose and need may be the same as the public purpose and need. Often when the permit applicant is not a governmental body or agency the permit applicant is a member of the private sector engaged in a good or service for profit. This is the case with the Cullinan Ranch proposed development where along with the permit applicant's profit oriented purpose there is also considered to be a public interest purpose of providing a public benefit, if the permit is approved. The public benefit associated with the proposed Cullinan Ranch development is additional housing.

B. PURPOSE AND NEED FOR AN EIR/EIS

This Environmental Impact Report/Environmental Impact Statement (EIR/EIS) has been prepared to meet the requirements of both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) as part of the permitting process for the proposed project.

The project applicants have applied for a U. S. Army Corps of Engineers permit for Cullinan Ranch. A Corps permit is required for the project pursuant to Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. The Corps has required the preparation of an EIS based on its determination that the proposed project would have significant effects on the environment.

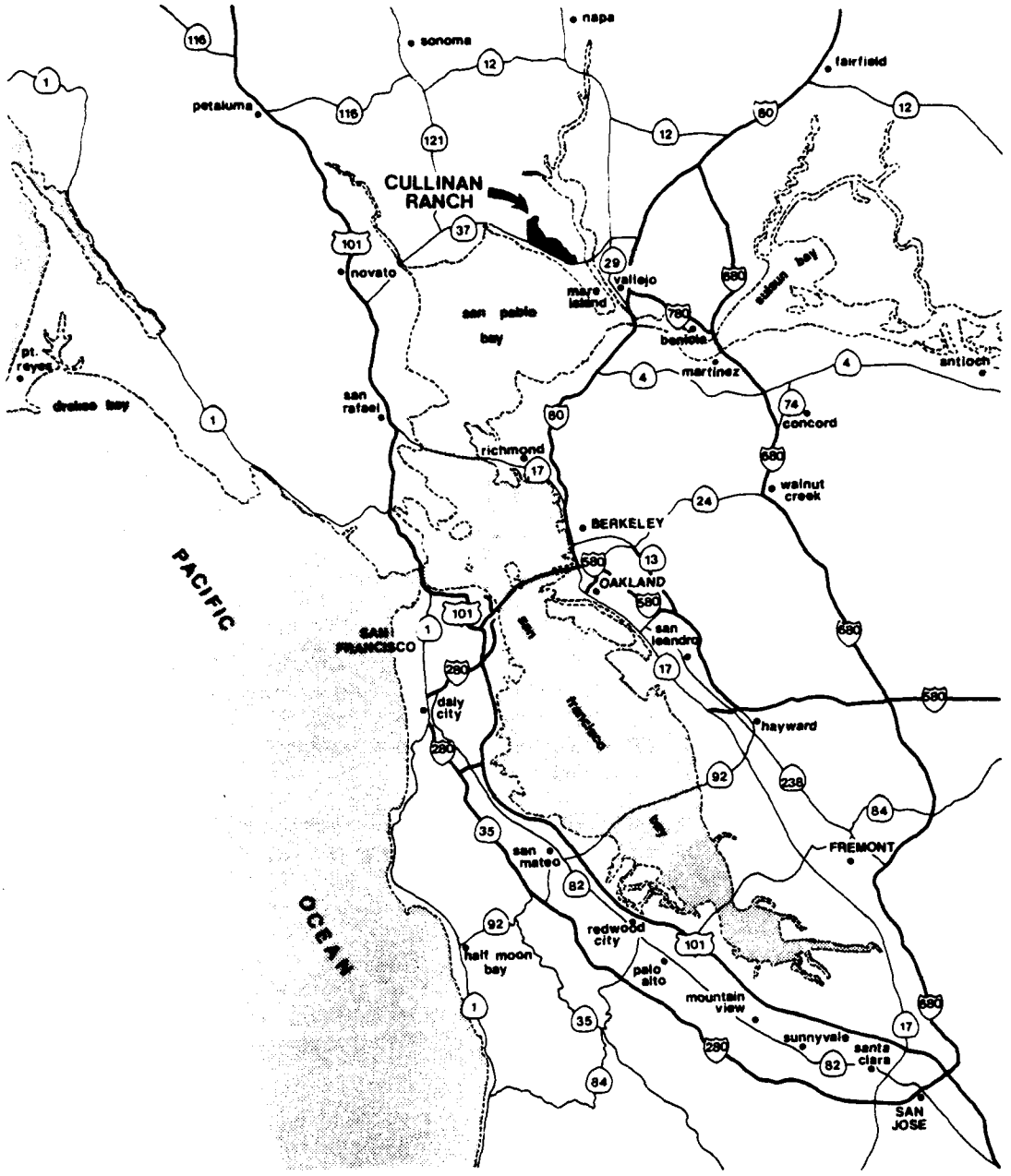
Conformance with NEPA is required due to the Federal permitting activity of the U. S. Army Corps of Engineers. The Army's authority over the proposed project is based upon Section 10 of the River and Harbor Act (RHA) of 1899 (33 U.S.C. Section 403) and upon Section 404 of the Clean Water Act (CWA) (33 U.S.C. Section 1344) which pertains to the discharge of dredged or fill material into the waters of the United States. In Leslie Salt Co. vs. Froehlke 578 F 2d 742, 753 (9th Cir. 1978), the court held that the Corps' jurisdiction under the RHA extends to all lands covered by the ebb and flow of the tide to the mean high water (MHW) mark in its unobstructed, natural state, including diked areas below former MHW. Section 10 of the RHA of 1899 regulates any work or structure placed within its jurisdiction.

The City of Vallejo has determined that a program EIR would be required for the proposed 1551-acre residential and commercial project on the basis of an Initial Study completed on August 4, 1982. The regional location and project location are indicated on Exhibits I-1 and I-2.

The Draft EIR/EIS will be circulated through the State Clearinghouse to all permitting and review agencies for review and comment. In accordance with CEQA and NEPA requirements, this document will be available to the public with public hearings provided for comment.

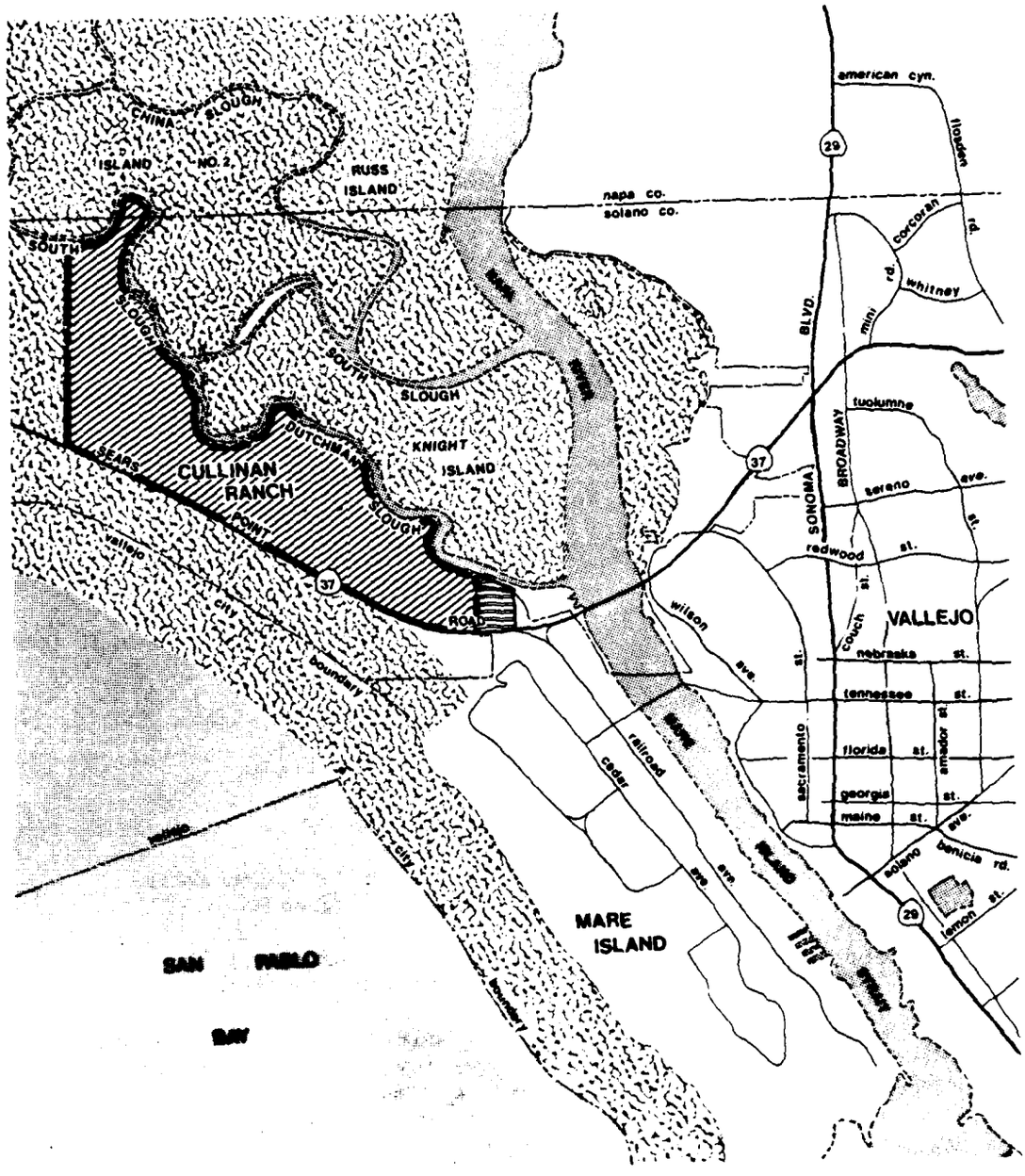
C. REGULATORY PERMIT REQUIREMENTS

The permit requirements for the proposed project involve local, state and federal agencies. These agencies must issue permits based upon the specific laws, regulations and policies in effect within each jurisdiction. A listing of the agencies involved and the associated permit action is as follows:



SOURCE: Cullinan Ranch Specific Plan

TORREY & TORREY INC. environmental/urban planning and design	Regional Location	EXHIBIT I-1



SOURCE: Cullinan Ranch Specific Plan

TORREY & TORREY INC. environmental/urban planning and design	Project Location	EXHIBIT I-2

Agency	Permit Action
U. S. Army Corps of Engineers	- Section 10 Permit - Section 404 Permit
City of Vallejo	- EIR/EIS Certification - General Plan Amendment - Specific Plan Approval - Zoning Approval - Annexation Approval - Tentative Map and Final Map Approval - Grading and Building Permits
Solano County Local Agency Formation Commission (LAFCO)	- Annexation Approval
Napa County	- Grading Permit - Flood Plain Management Permit
Federal Aviation Administration	- Approval for Development Close to the ILS Facility
State Lands Commission	- Amendment to Boundary and Exchange Agreement - Permit to Breach Levee
CalTrans	- Encroachment Permit
Regional Water Quality Control Board (RWQCB)[1]	- Waste Discharge Requirements - Water Quality Management Plan
San Francisco Bay Conservation and Development Commission (BCDC)[2]	- Permit to Breach Levee - Marina and Boat Dock Permit

In addition to these permit actions, other property owners on (or adjacent to) the site will be required to apply for permits. CalTrans will be required to apply for a permit from the Bay Conservation and Development Commission to allow highway construction within the 100-foot shoreline band along San Pablo Bay. The State of California and City of Vallejo must both apply to the Corps of Engineers for a permit to allow work on their lands within Corps jurisdiction. None of these applications have been submitted at this time.

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1 The RWQCB may waive certification of the project and may also waive the Waste Discharge Requirements and Water Quality Management plan requirement.

2 Actual permit authority for BCDC has not been resolved. See discussion under Section III A. Land Use.

D. POLICY CONTEXT

The following paragraphs summarize the applicable portions of Federal/State law, policies and regulations which must be considered by the U. S. Army Corps of Engineers prior to issuance of a permit for the project. Corps of Engineers' regulatory jurisdiction is indicated on Exhibit I-3.

Clean Water Act

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into the waters of the U. S. by requiring a permit from the Department of the Army. The Army bases its evaluation on 404(b)(1) guidelines set forth by the Environmental Protection Agency which give specific requirements for the use of disposal sites for dredged or fill materials. These guidelines (40 CFR Part 230), which are regulatory, prohibit "the discharge of dredged or fill material if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other adverse environmental consequences." The practicability of an alternative must take into account cost, existing technology and logistics in light of overall project purposes, but need not require ownership of an alternative site by the project applicant. For projects which are non-water- dependent, it is presumed that alternative sites located in non-aquatic areas would be available and would have a less severe impact on the aquatic ecosystem. A final field investigation to determine the parameters of the wetland areas will be conducted in April or May 1983. A revised Public Notice will be prepared detailing these specific wetland areas of the Cullinan Ranch site. The information required by the 404(b)(1) guidelines has been integrated into the text of this EIR/EIS to the extent that it is currently available.

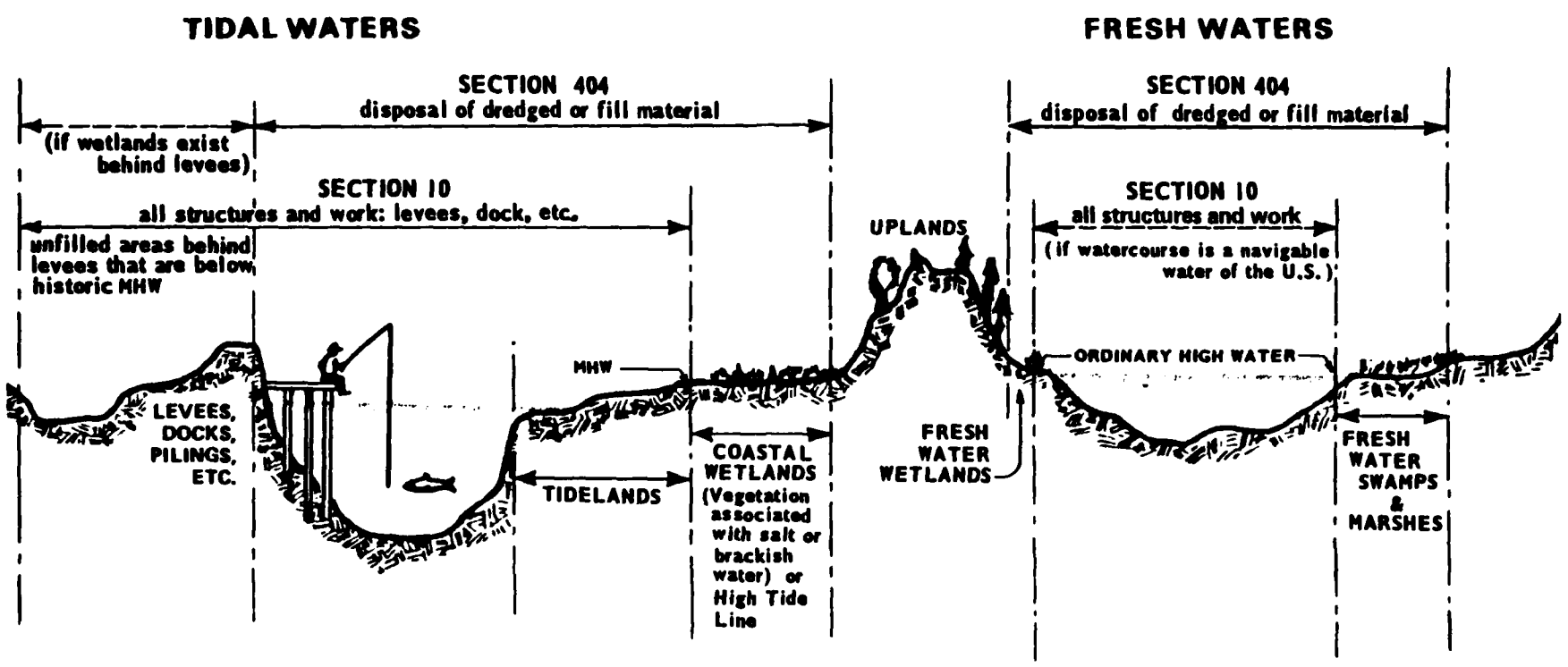
Coastal Zone Management Act of 1972, as Amended, 16 U.S.C. 1451 et seq.

Section 307(c) of this Act, as amended, prohibits the Corps of Engineers from issuing a Department of the Army permit in a coastal zone unless the permit applicant has furnished certification that the proposed activity complies with and will be conducted in a manner that is consistent with the approved Coastal Zone Management Program, in this case, the Bay Conservation and Development Commission (BCDC) Bay Plan. Section 307(c)(3)(A) of the Coastal Zone Management Act requires any proposed activity requiring a Federal permit to be consistent with the State's program (Bay Plan) if it should affect land or water uses within the coastal zone, regardless of the project location.

Priority uses for specific shoreline areas are indicated on Bay Plan maps. Bay Plan Map 15, Eastern San Pablo Bay, does not designate the project site for a priority use; therefore, the proposed development does not appear to be in conflict with the Bay Plan. However, BCDC must make a final determination of conformance with the Bay Plan and actual jurisdiction of the Commission over the project. BCDC jurisdiction and policies are discussed in Section III A. Land Use.

Fish and Wildlife Coordination Act, 16 U.S.C. 661 et seq.

This Act requires the Corps to consult with the U. S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Game during preparation of an environmental study prior to issuance of a Department of the Army permit. Formal consultation with these agencies will occur through their review of the Corp's Public Notice and this EIR/EIS. The Corps of Engineers' regulatory program requires the District Engineer to give great weight to the views of these agencies in evaluating a permit application.



NOTE:

IN ADDITION TO SECTIONS 10 AND 404 JURISDICTIONS, THE CORPS REGULATES THE TRANSPORTATION OF DREDGING MATERIAL FOR THE PURPOSE OF DISPOSING INTO OCEAN WATERS (SECTION 103).

source:

United States Army Corps of Engineers
...Serving the Army
...Serving the Nation

San Francisco District

TORREY & TORREY INC. environmental/urban planning and design	Corps of Engineers Regulatory Jurisdiction	EXHIBIT I-3

All three agencies have expressed preliminary concerns which are discussed in Section III F. of this report.

Endangered Species Act, 16 U.S.C. 1531 et seq.

This Act was passed in 1973 to provide protection for animal and plant species that are currently in danger of extinction ("endangered") and those that may become so in the foreseeable future ("threatened"). Section 7 of this Act requires federal agencies to ensure that their actions do not have adverse impacts on the continued existence of threatened or endangered species or on the designated areas (critical habitats) that are important in conserving those species. The U. S. Fish and Wildlife Service maintains current lists of species which have been designated as threatened or endangered. A formal Section 7 consultation has been initiated with the Fish and Wildlife Service. Section III F. Biota of this report discusses the implications of the project and the alternatives on endangered species.

National Historic Preservation Act of 1966, as Amended, 16 U.S.C. 470 et. seq. and Executive Order 11593, Protection and Enhancement of the Cultural Environment (May 13, 1971)

This Act established the National Register of Historic Places and requires the Corps of Engineers to consider the impacts of proposed activities on properties included in the National Register. Executive Order 11593 requires the Corps, when considering issuance of a permit, to identify in consultation with the state historic preservation agency any property potentially affected by the proposed action which is eligible for listing in the National Register. No properties listed or proposed for listing in the National Register, State Historic Landmarks or other known cultural resources are located within or adjacent to the project site.

Executive Order 11988, Floodplain Management (May 24, 1977)

In order to reduce the risk to human safety health, welfare and property associated with floods and in order to preserve the natural and beneficial values served by floodplains, federal agencies are directed by this Order to evaluate the potential effects of actions, including the granting of permits, which they may take in floodplains. This EIR/EIS evaluates these effects, including the effects of other practicable alternatives as required by the Order.

Most of the Cullinan Ranch property including the entire fill area for Alternatives A, B, and C, is located within the flood hazard area, Zone A, indicated by the HUD Flood Insurance Rate Map, dated 2 August 1982, prepared for Solano County.

Executive Order 11990, Protection of Wetlands (May 24, 1977)

This Order calls for Federal agencies to "preserve and enhance the natural and beneficial values of wetlands" in carrying out agency activities which involve wetlands. Because the Order specifically exempts issuance of Federal permits to private properties on non-Federal property, this authority would not be considered by the Corps of Engineers during review of the proposed project application for a Department of the Army permit. However, the U. S. Fish and Wildlife Service frequently cites Executive Order 11990 as one authority for making formal comments on non-Federal projects to the Corps of Engineers during the review period, under provisions of the Fish and Wildlife Coordination Act.

CEQ Memorandum, August 11, 1980, Analysis of Impacts on Prime or Unique Agricultural Lands

This memorandum from the Council on Environmental Quality, dated August 11, 1980, instructs all Federal agencies to determine the effects of agency or agency-permitted actions on prime or unique agricultural lands, and to examine alternatives to these actions, in the preparation of environmental documents under NEPA. Federal agencies are also instructed to cooperate with state and local governments in their efforts to help retain these lands.

The land proposed for the project is not considered prime or unique as defined by the U. S. Department of Agriculture. A complete discussion of agricultural impacts is included in Section D. Soils and Agriculture.

California Wetlands Policy

The Resources Agency of California issued a Basic Wetlands Protection Policy (19 September 1977) which is used by all Departments, Boards and Commissions (except BCDC) when reviewing proposed projects. The Policy prohibits authorization or approval of projects that fill or otherwise harm or destroy coastal, estuarine or inland wetlands unless specific conditions are met. The Basic Wetlands Protection Policy was not in effect at the time the State Lands Commission authorized the Boundary and Exchange Agreement for the site in 1974. However, according to the State Lands Commission staff, any authorized Department, Board, or Commission within the Resources Agency may review the proposed project and alternatives under this policy. A discussion of this subject is included in Section III A. Land Use and III F. Vegetation and Wildlife.

Footnotes

1 BCDC "Diked Historic Baylands of San Francisco Bay", April 1982, Technical Reports: "Ecological Values", "Recreational Values", "Agricultural Values", "Summary of Powers Exercised by Regulatory Agencies", "Guidelines for Enhancement and Restoraton".

2 Mr. Mike Balentine, Staff Counsel, State Lands Commission, Telephone Conversation, 28 April 1983.

II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes in detail the project as proposed by the applicant (Alternative A) and the Alternatives B through D which were defined by joint agreement between the City of Vallejo Planning Department and the Corps of Engineers. A summary of the alternatives is as follows:

Alternative A - Project as Proposed by Applicant
Alternative B - Reduced Project Alternative
Alternative C - General Plan Alternative
Alternative D - No Project

Corps of Engineer regulations on EIS's state that an in-depth evaluation will normally be limited to those reasonable alternatives which are both practical and:

i Within the capability of applicant and within the jurisdiction of the Corps of Engineers

ii Within the capability of applicant but outside the jurisdiction of the Corps of Engineers

iii Reasonable, foreseeable but outside capability of applicant and within jurisdiction of the Corps of Engineers

iv Reasonable, foreseeable but outside capability of applicant and outside jurisdiction of the the Corps of Engineers.

Alternatives A, B, and C and D are all within the first category (i).

A. ALTERNATIVE A - PROJECT AS PROPOSED

Pan Pacific and Redwood Realty are proposing development of the 1493 acre Cullinan Ranch in Solano County, near the City of Vallejo. For the purpose of continuity in areawide planning, a Specific Plan is being proposed by the project applicants for an entire planning area which consists of 1551 acres. This area includes the Guadalcanal Village property, consisting of 53 acres, which is owned by the City of Vallejo and two small properties, owned by the State of California, which total 5 acres.

The present permit application under review by the Corps of Engineers includes only the 1493 acre Cullinan Ranch portion of the Specific Plan. The Corps of Engineers will require separate permit applications from the other property owners (i.e., City of Vallejo and the State of California) within the area covered by the Specific Plan.

The Cullinan Ranch development proposal is to transform a property that is now diked and used for dry farming into a complex of waterways and land areas for a water-oriented residential community.

At the present time, the Cullinan Ranch area is comparatively level farmland, with the elevation of the levee along Dutchman Slough defining the northerly perimeter. After transformation into a residential marina community, approximately one-third of the site would be water (i.e., boat channels and marinas), and the remaining two-thirds would be devoted to wetland areas and to residential, commercial, and public facility uses.

The site now has an average elevation of 2.5 feet Mean Lower Low Water (MLLW). After transformation, the average elevation will be 14.5 feet MLLW, which will accommodate minimum floor elevations of 13.5 feet MLLW and a maximum street differential of 4 feet.

The center of the boat channels will be excavated to a minimum -20 feet MLLW, except for the commercial marina area, which may be excavated to -30 feet MLLW. These elevations were determined on the basis of navigational and water flow criteria and also the need for fill material to provide building pads.

Earthwork during site transformation will serve to 1) establish the planned configuration of land and water areas, 2) stabilize geotechnical conditions involving soft bay mud and peat deposits, and 3) raise the surface level of the project to accommodate planned settlement and provide protection against possible flooding during a major 100-year storm. Since the site does not contain sufficient fill material to accomplish all of this earthwork, import of fill material is required.

Earthwork for the total site transformation will involve approximately 16.2 million cubic yards of fill. This will include about 3.0 million cubic yards of bay mud excavated on site from the proposed channel areas and about 13.2 million cubic yards of imported material. In addition, large quantities of peat will have to be removed from the proposed channel areas and used for fill in areas that will not support structures.

After transformation, the approximate site composition will be:

o Water areas (i.e., channels and marinas)	423.5	acres
o Open space - wetlands (i.e., intertidal area, levee and other open space in northwest area of site)	250.0	acres
o Urban areas (i.e., residential, commercial, public facilities, circulation, and recreational land uses)	819.5	acres
TOTAL	1493.0	acres

Proposed residential use of the site includes 3000 single family units (low density) on 457.5 acres and 1500 multiple-family units (medium density) on 111.09 acres for a total of 4500 dwelling units. Commercial uses include water-oriented specialty shops (hotel, restaurants, shops, offices, marina service and storage facilities) in the Guadalcanal Village area, a 400-500 berth commercial marina, and a small neighborhood commercial center (supermarket, convenience stores, etc.) located adjacent to the medium density housing. Alternative A residential density is 3.3 units per gross acre (Vallejo calculation method).

A summary of all the proposed land uses with the associated acreages is given in Table II-1, and project details are shown on Exhibits II-1 through II-6. Phasing for the project is expected to extend over twenty years with initial construction to begin at the eastern boundary of the property and move to the western boundary as indicated on Exhibit II-7.

B. ALTERNATIVE B - REDUCED PROJECT

This alternative would have the same number of residential units, developed on a smaller land area. Thus the number of single family units would be reduced from 3000 to 1525 and the number of multi-family units would be increased from 1500 to 2975. The total developed area would be reduced by 117.5 acres. The 117.5 acres excluded from

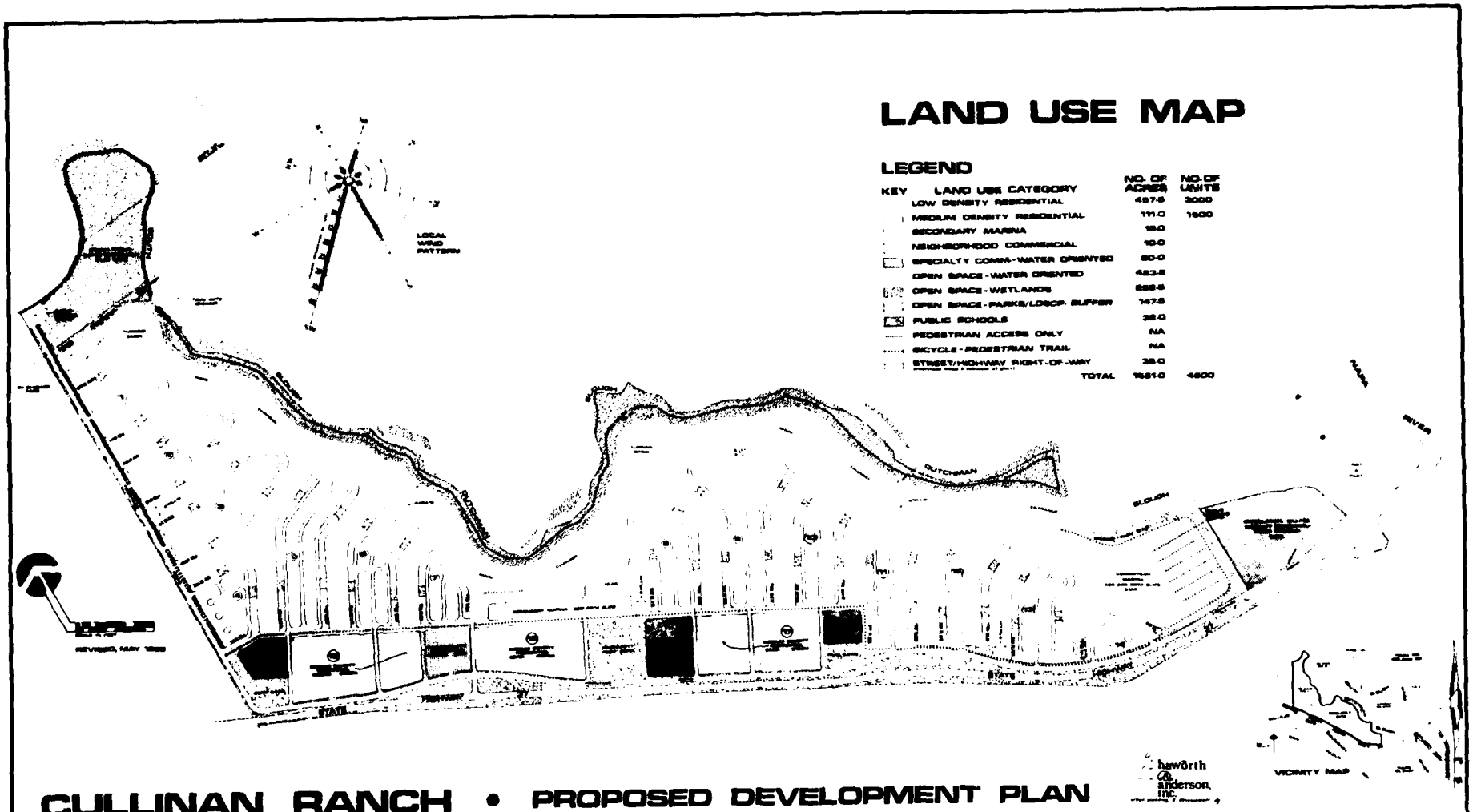
TABLE II-1. ALTERNATIVE A: PROPOSED SPECIFIC PLAN
SUMMARY OF USES

CATEGORY OF USES	ACRES	DESCRIPTION
RESIDENTIAL		
Low Density	457.5	3000 units
Medium Density	111.0	1500 units
Subtotal	568.5	4500 units
COMMERCIAL		
Specialty-Water Oriented	60.0[1]	Hotel, restaurants, shops, offices, marina service & storage facilities
Neighborhood Center	10.0	Supermarket, convenience stores, etc.
Subtotal	70.0	
OTHER LAND USES		
Private Marina	19.0	200 Private berthing spaces
Open Space-Wetlands		
Levee Area	78.0	Above +6.2 feet MLLW
Dredge Spoils Site	88.0	Potential Wetlands
Inter-Tidal Area	86.	-2.5 feet MLLW to +6.2 feet MLLW
Open Space-Parks		
Neighborhood Parks	13.0	Adjacent to elementary schools
Community Park	20.0	Adjacent to junior high school
Marina Park	10.0	Adjacent to commercial marina
View Parks	15.5	On residential peninsulas
Bicycle/Pedestrian Corridor	37.0	50-100 feet wide
Open Space-Other		
Landscape Buffer	52.0	Along roadways
Public Schools	32.0	Elementary and junior high facilities
Bicycle/Pedestrian Trails	--	8.5 linear miles of trails
Streets/Highways	38.0	Includes frontage road and Highway 37,
Subtotal	489.0	only
OTHER USES[2]		
Commercial Marina Area	57.0	400-500 berthing spaces[3]
Open Channel and Other Waterways	366.5	+1000 berthing spaces surrounding resi-
Subtotal	423.5	dential peninsulas
TOTAL ALL USES	1551.0[1]	1600-1700 total berthing spaces

1 Includes 53 acres at Guadalcanal Village and 5 acres owned by State of California

2 Excludes inter-tidal area between -2.5' MLLW and +6.2' MLLW (86.5 acres)

3 Expansion capabilities to 500 additional berthing spaces

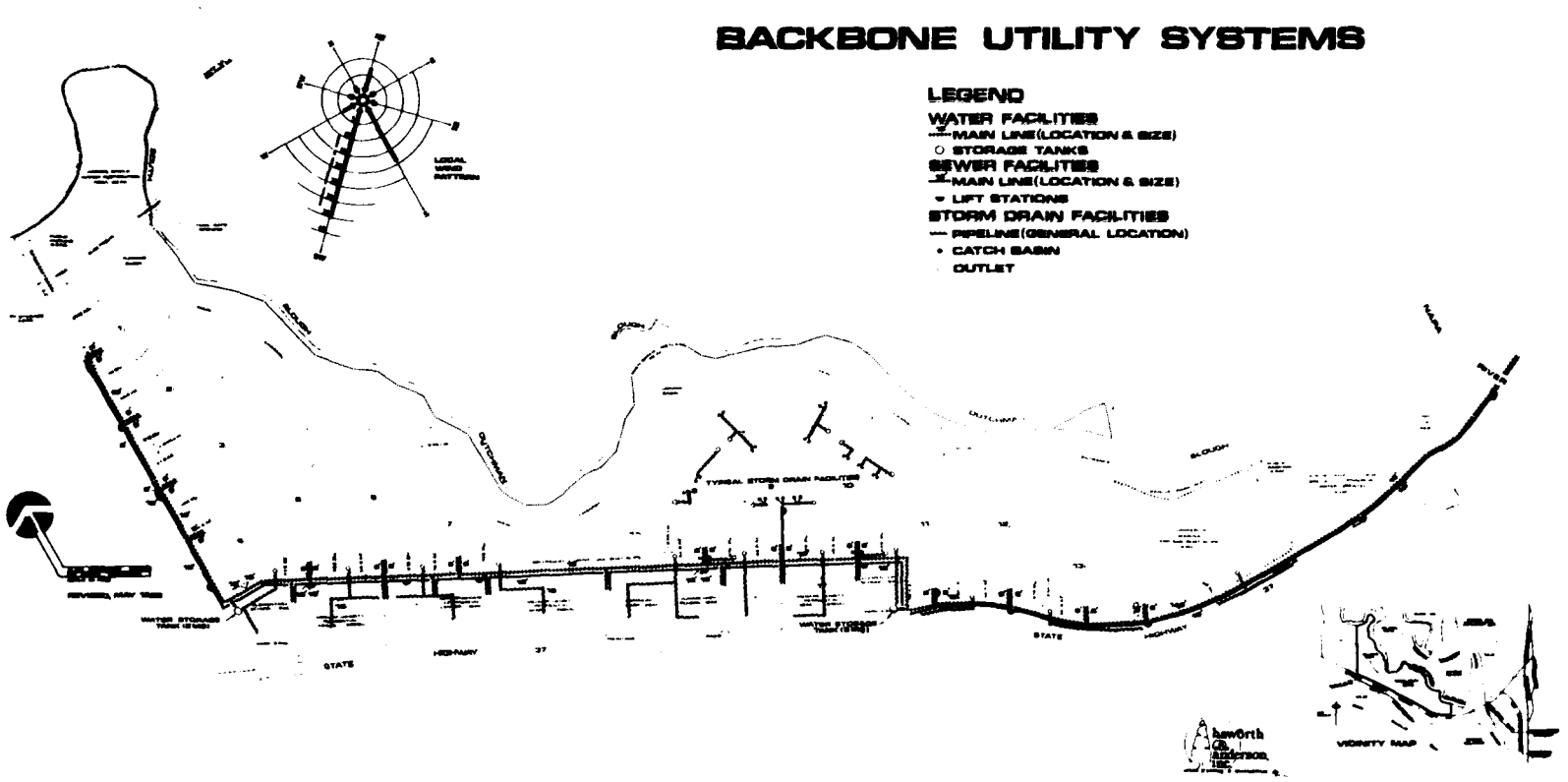


CULLINAN RANCH • PROPOSED DEVELOPMENT PLAN

ALTERNATIVE A

SOURCE: Cullinan Ranch Specific Plan

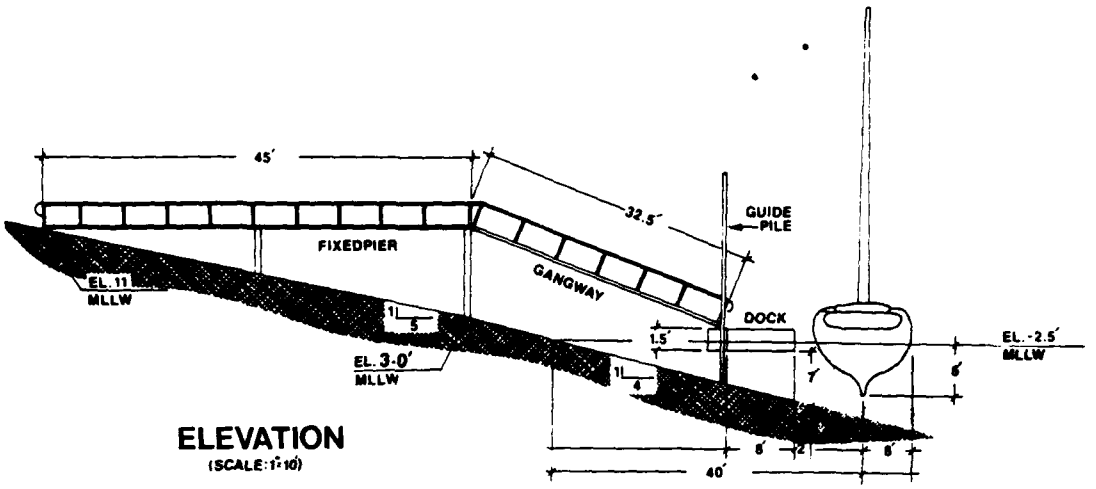
TORREY & TORREY INC. environmental/urban planning and design	Proposed Development Plan	EXHIBIT II-1



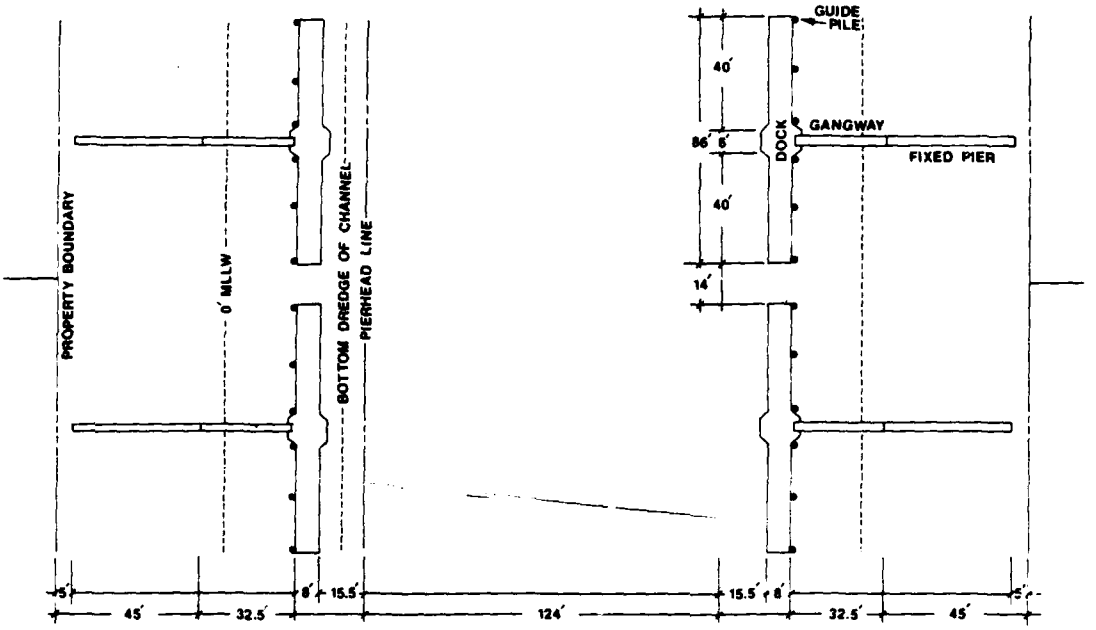
ALTERNATIVE A

SOURCE: Cullinan Ranch Specific Plan

TORREY & TORREY INC. environmental/urban planning and design	Proposed Utility System	EXHIBIT II-2



ELEVATION
(SCALE: 1"=10')

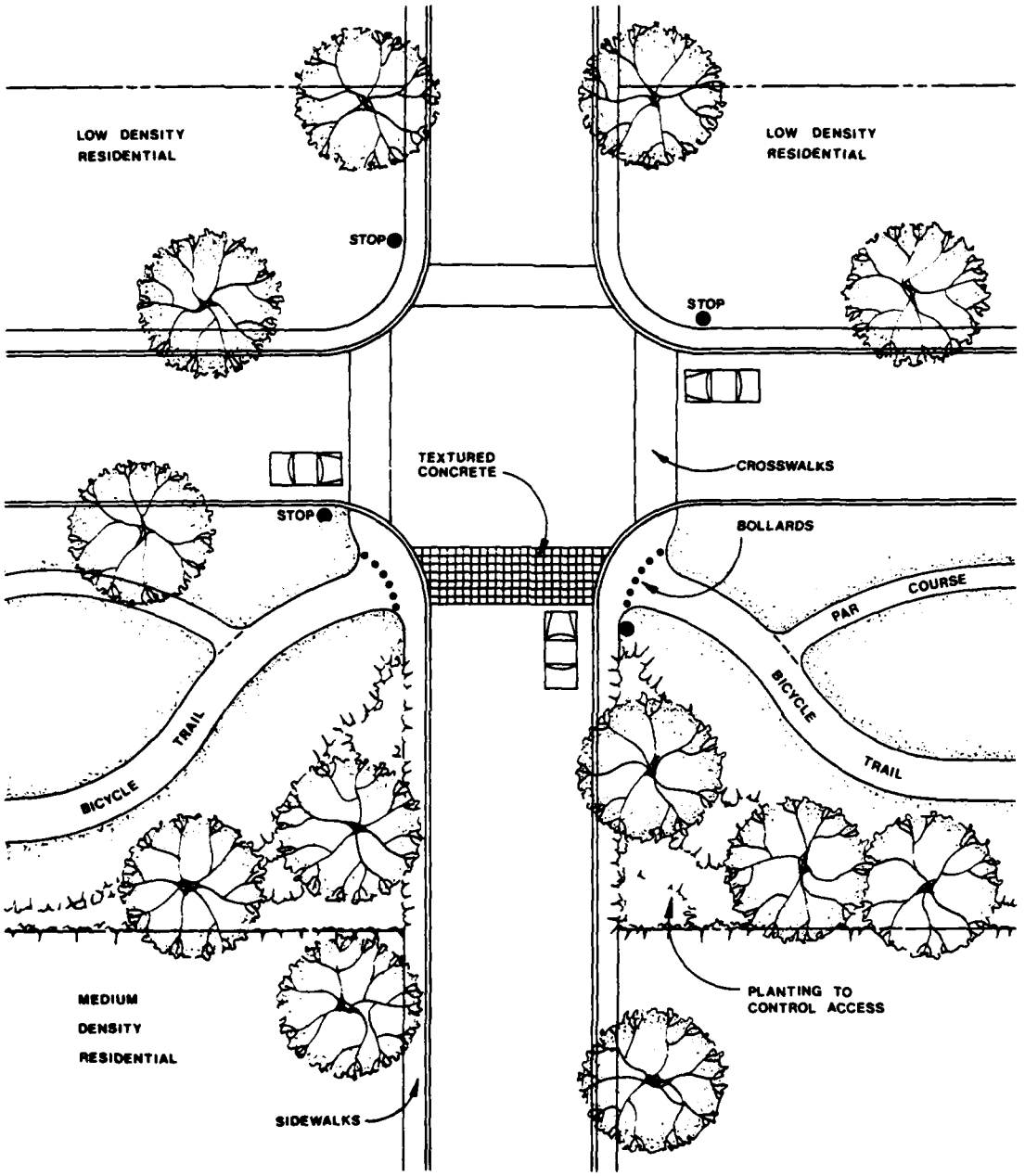


PLAN VIEW

Source: Cullinan Ranch Specific Plan

ALTERNATIVE A

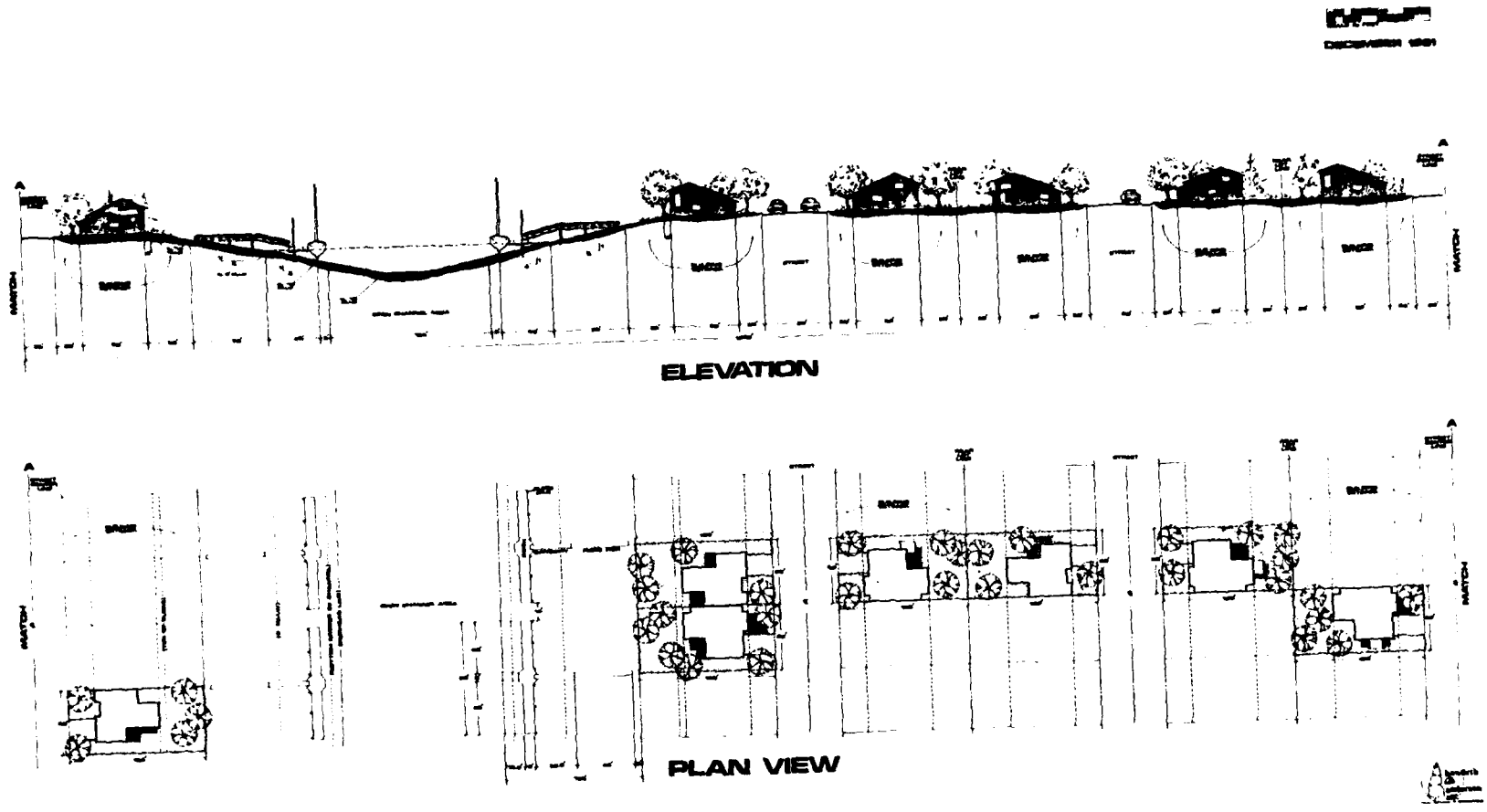
TORREY & TORREY INC. environmental/urban planning and design	Typical Berthing Plan	EXHIBIT II-3



Source: Cullinan Ranch Specific Plan

ALTERNATIVE A

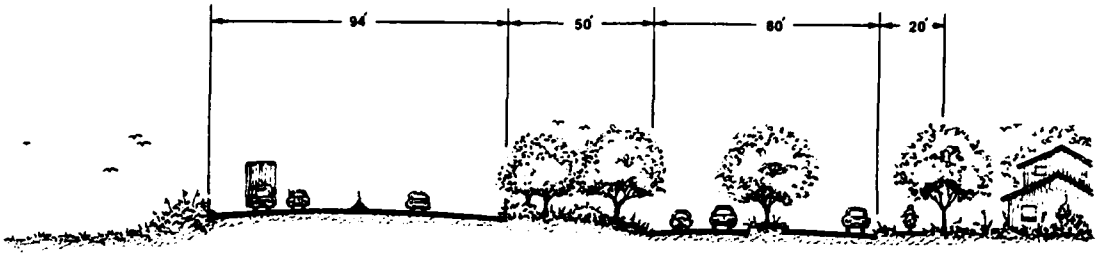
TORREY & TORREY INC. environmental/urban planning and design	Typical Bicycle-VehicularCrossing	EXHIBIT II-4



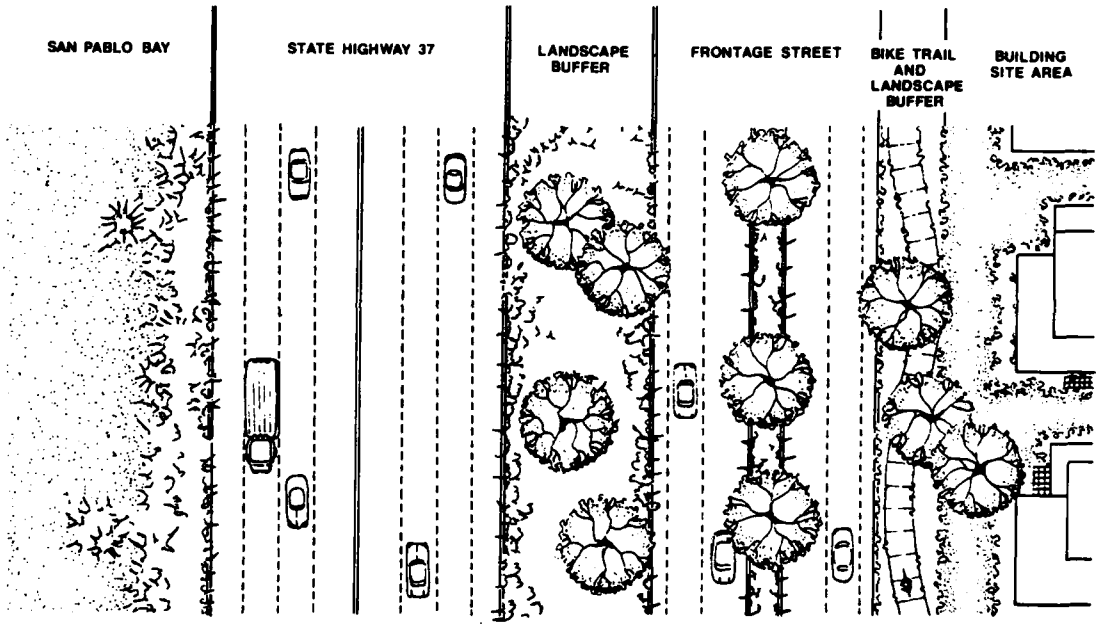
SOURCE: Cullinan Ranch Specific Plan

ALTERNATIVE A

TORREY & TORREY INC. environmental/urban planning and design	Typical Interior Channel & Residential Peninsula Cross Section	EXHIBIT II-5



ELEVATION

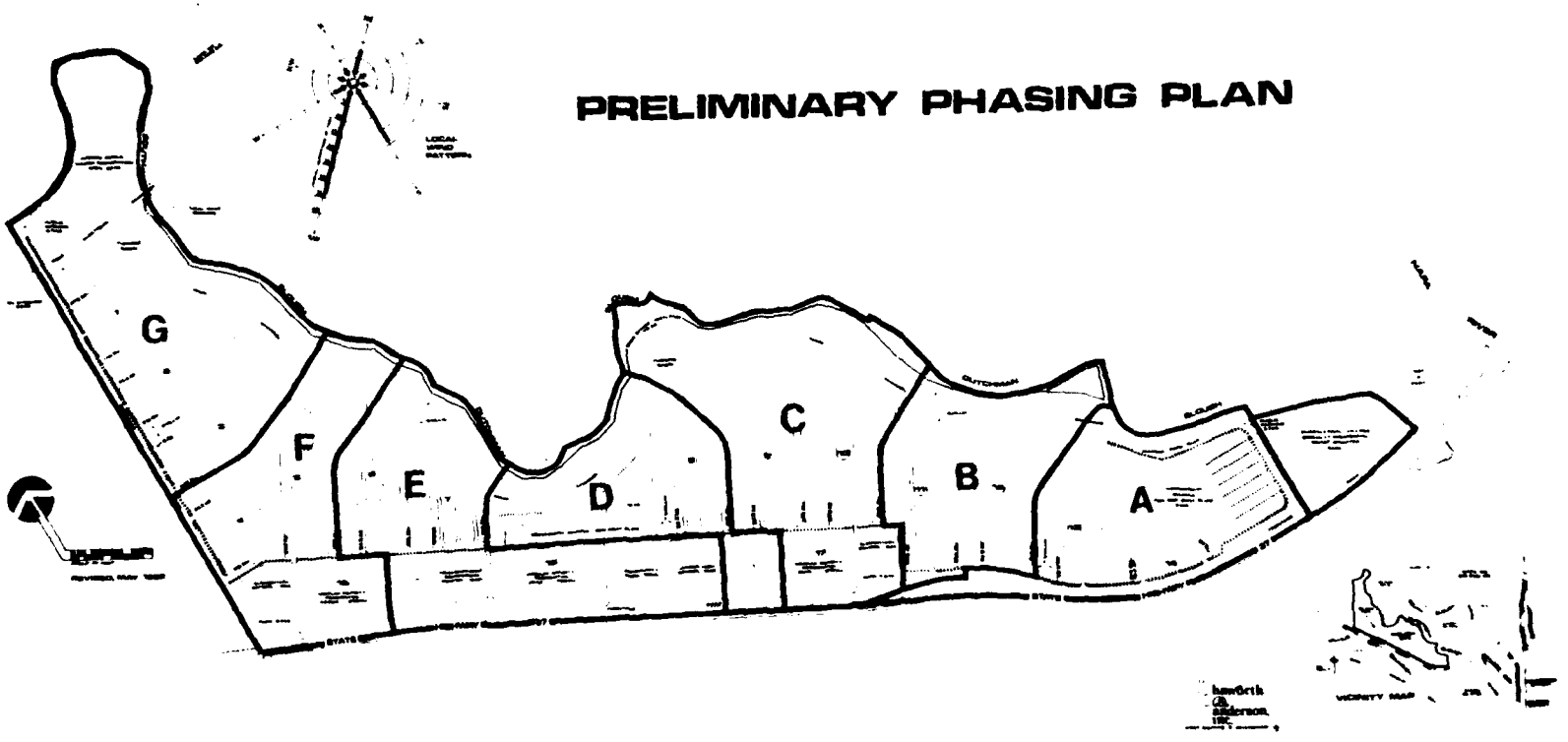


PLAN VIEW

Source: Cullinan Ranch Specific Plan

ALTERNATIVE A

TORREY & TORREY INC. environmental/urban planning and design	Typical Road Section– Highway 37 & Frontage Street	EXHIBIT II-6



SOURCE: Cullinan Ranch Specific Plan

ALTERNATIVE A

TORREY & TORREY INC. environmental/urban planning and design	Project Phasing	EXHIBIT II-7

development would become a buffer zone of open space-wetland between the new development and the Leslie salt pond to the west. A schematic representation of this alternative is shown on Exhibit II-8. All other land uses would be the same as those proposed in the Specific Plan, Alternative A.

C. ALTERNATIVE C - GENERAL PLAN ALTERNATIVE

This alternative comes closer to the high density range designated for the site in the Vallejo General Plan (1-8 units per gross acre). The assumed 10,000 residential units result in a density of about 7.8 units per gross acre (Vallejo calculation method). A schematic representation of this alternative is shown on Exhibit II-9.

In this alternative, in addition to the difference in residential units, the neighborhood commercial area is larger than in Alternatives A and B, the Guadalcanal area is designated for industrial use, as shown in the City of Vallejo General Plan and the specialty commercial use is smaller than in Alternatives A and B. A comparison of the identified land use acreages for each alternative is given in Table II-2 and a comparison of the total number of dwelling units is given in Table II-3.

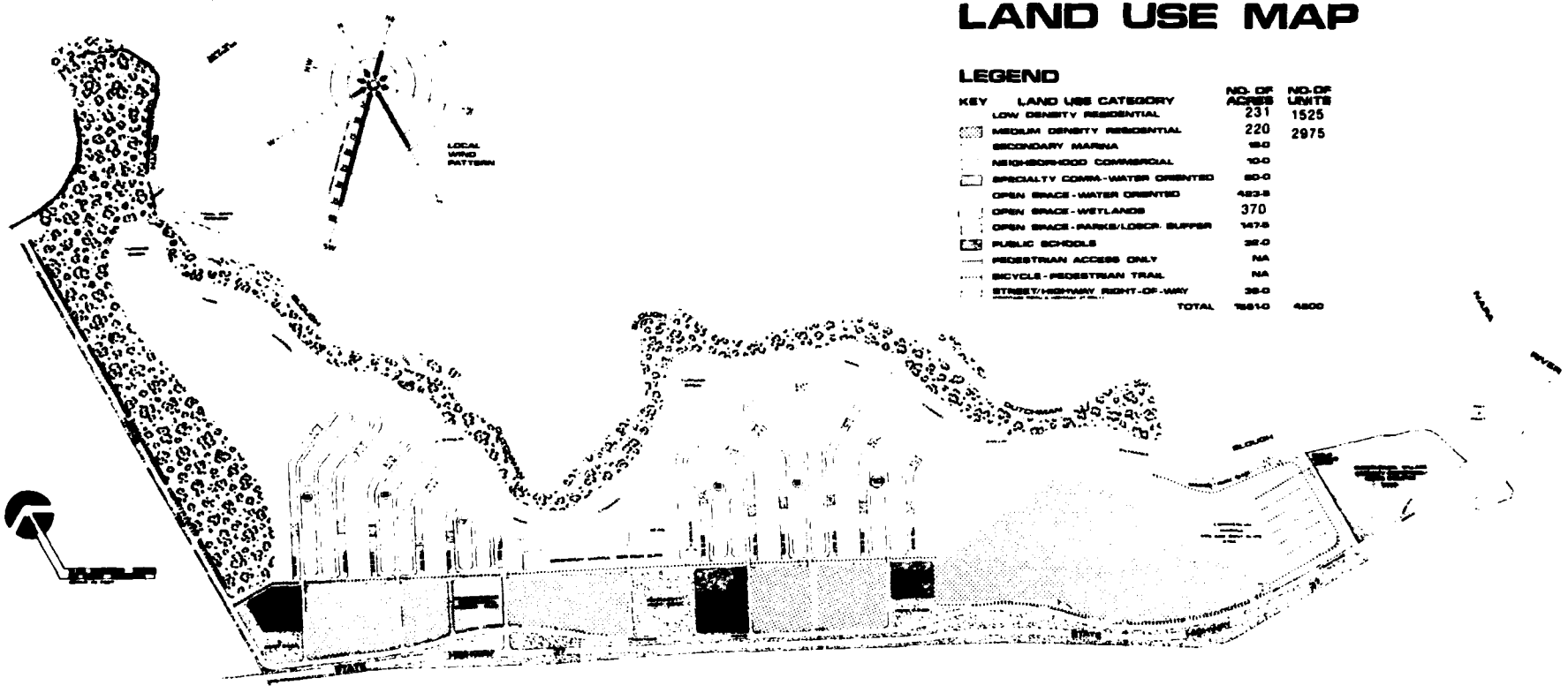
The lagoon system proposed in this alternative would have tidal exchange with Dutchman Slough but would not have deep-water access for boats to Dutchman Slough, the Napa River or San Pablo Bay. The shoreline around this lagoon would be a reinforced vertical bulkhead to minimize erosion and provide stability for building foundations.

D. ALTERNATIVE D - NO PROJECT

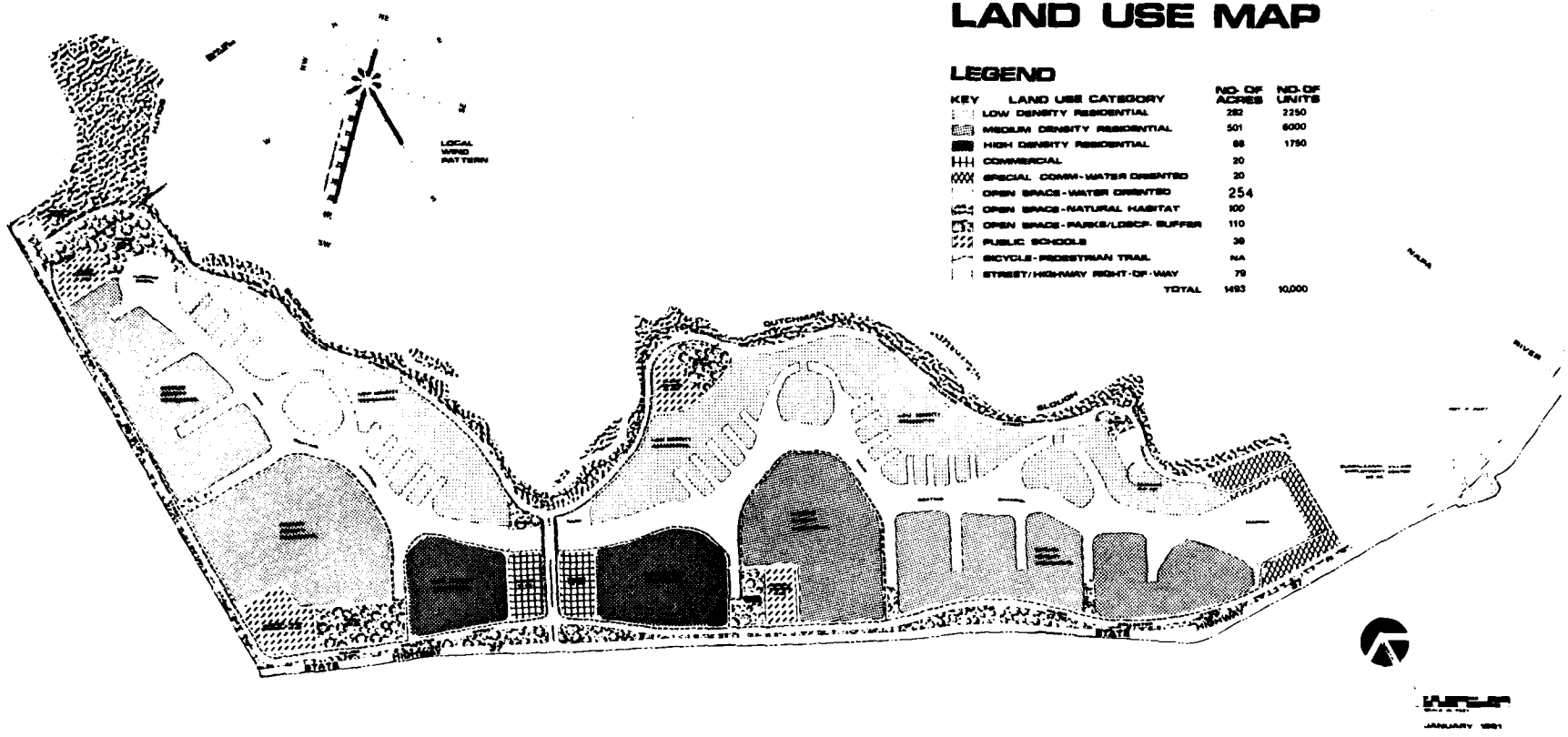
The no project alternative would mean that no new development would be undertaken on the site, and that the existing land uses would remain, namely agriculture and vacant land.

If agricultural operations were to become economically infeasible, the area could be returned to tidal action by breaching the levee along Dutchman Slough and by implementing a salt marsh restoration plan. At that time a public agency could acquire the site for this purpose and could prepare a marsh restoration plan for the area.

The Corps of Engineers considers the No Project Alternative to be permit denial.



TORREY & TORREY INC. environmental/urban planning and design	Alternative B- Reduced Project	EXHIBIT II-8



SOURCE: W.R. Williams & Associates

TORREY & TORREY INC. environmental/urban planning and design	Alternative C- General Plan Alternative	EXHIBIT II-9

TABLE II-2. COMPARISON OF DESIGNATED ACREAGES FOR PROJECT ALTERNATIVES

CATEGORY OF USES	Alternative A- Proposed Project	Alternative B- Reduced Project	Alternative C- General Plan Project
RESIDENTIAL			
Low Density	457.5	231.0	282.0
Medium Density	111.0	220.0	501.0
High Density	0.0	0.0	88.0
Subtotal	568.5	451.0	871.0
COMMERCIAL			
Specialty-Water Oriented	60.0[1]	60.0[1]	20.0[2]
Light Industry	0.0	0.0	53.0
Neighborhood Center	10.0	10.0	20.0
Subtotal	70.0	70.0	93.0
OTHER LAND USES			
Private Marina	19.0	19.0	--
Open Space-Wetlands			
Levee Area	78.0	78.0	
Dredge Spoils Site	88.0	88.0	100.0
Inter-Tidal Area[3]	86.5	204.00	--
Open Space-Parks			
Neighborhood Parks	13.0	13.0	28.0
Community Park	20.0	20.0	20.0
Marina Park	10.0	10.0	
View Parks	15.5	15.5	
Bicycle/Pedestrian Corridor	37.0	37.0	67.0[4]
Open Space-Other			
Landscape Buffer	52.0	52.0	
Public Schools	32.0	32.0	39.0
Streets/Highways	38.0	38.0	79.0
Subtotal	489.0	606.5	333.0
OTHER USES[5]			
Commercial Marina Area	57.0	57.0	25.0
Open Channel/Waterways	366.5	366.5	229.0
Subtotal	423.5	423.5	254.0
TOTAL ACREAGE - ALL USES[1]	1551.0	1551.0	1551.0

1 Includes 53 acres at Guadalcanal Village and 5 acres owned by State of California

2 The existing General Plan designates the Guadalcanal Village area for light industrial use

3 Area between -2.5' MLIW and +6.2' MLLW

4 Includes 5 acres owned by State of California

5 Excludes inter-tidal area.

TABLE II-3. COMPARISON OF NUMBERS OF DWELLING UNITS FOR PROJECT ALTERNATIVES

Residential Density	Alternative A- Proposed Project	Alternative B- Reduced Project	Alternative C- General Plan Project
Low	3,000	1,525	2,250
Medium	1,500	2,975	6,000
High	0	0	1,750
Total Dwelling Units	4,500	4,500	10,000

III. AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES AND RECOMMENDED MITIGATIONS (SETTING, IMPACTS, MITIGATIONS)

A. LAND USE

1. Existing Land Use

Setting - On-Site

The Cullinan Ranch property which was originally marshland, was partly reclaimed in the early 1900's by the construction of permanent dikes. Additional dikes, built in the 1940's, resulted in the site's present configuration. A few drainage channels still exist as remnants of old sloughs, but they are no longer subject to tidal fluctuations. The site is relatively level and slightly lower than Highway 37.

The site has been used for dry farming, almost continuously since the late 1800's, primarily for hay, oats and other grain crops. For a specific description of the area used for farming now and the amounts of oat hay produced, please see Section D, Soils and Agriculture, in this report.

Guadalcanal Village, which comprises 53 acres of the specific plan, was used for temporary housing during World War II, and is now vacant. Partial foundations and roads from the old development remain. The 5 acres which are owned by the State of California and are under the jurisdiction of the State Lands Commission are also vacant.

Most of the site is in Solano County and within the Sphere of Influence of the City of Vallejo. At the northwestern edge of the site, 40 acres are within the jurisdiction of Napa County. Please see Exhibit III-1 for jurisdiction and ownership details.

Impacts - On Site

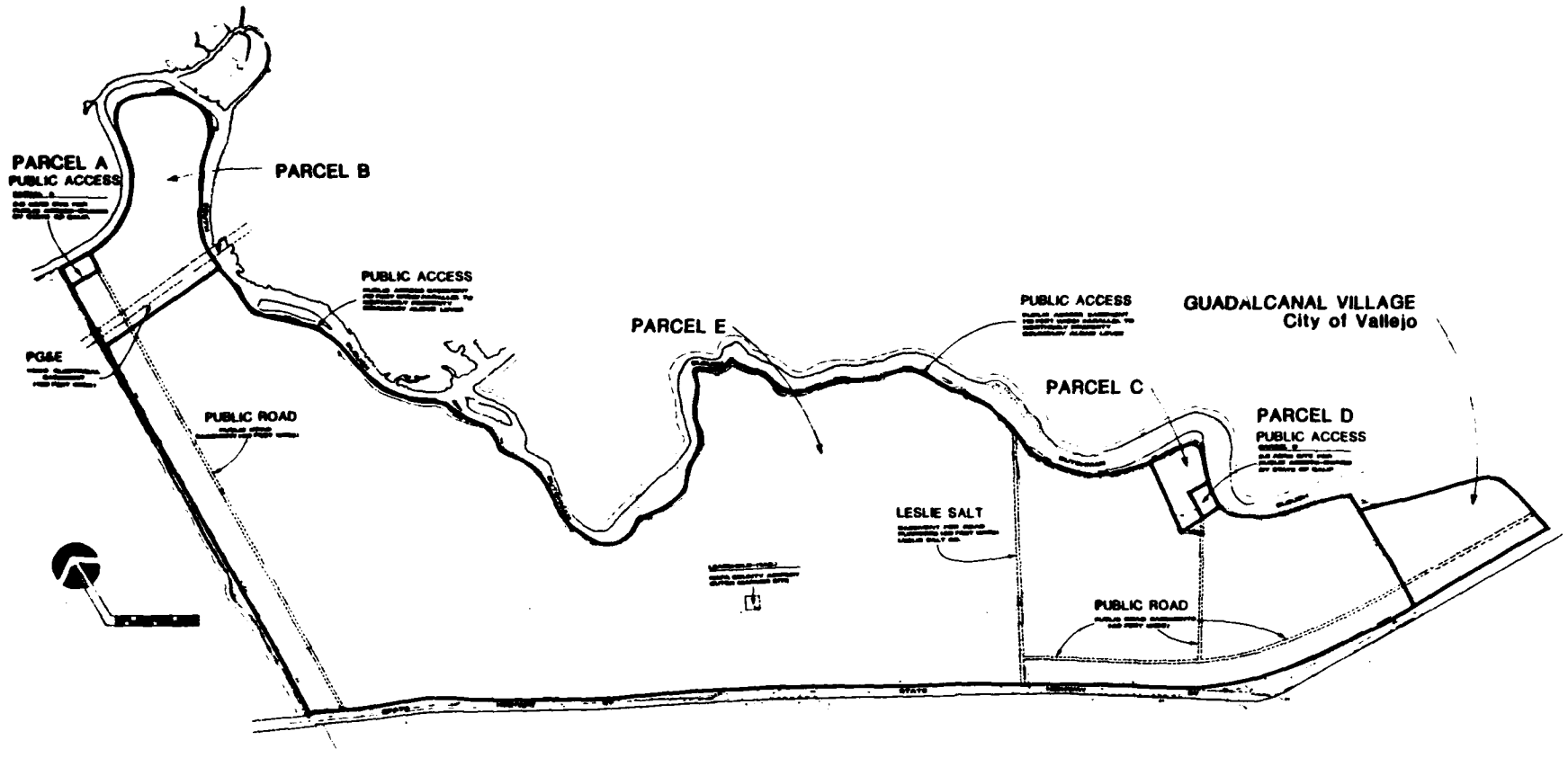
The impacts of displacing agricultural land are discussed in Section III.D of this report. For the 53 acre Guadalcanal portion of the site, planned development could be an improvement over the present under-utilized and neglected appearance of the abandoned housing area. Please see the section below on legal, policy and institutional constraints for a discussion of the consistency of the Specific Plan to adopted City plans for this area.

Setting - Surrounding Area

Surrounding land uses include:

- San Pablo Bay and the San Pablo Bay National Wildlife Refuge across Highway 37 to the south;
- Mare Island Naval Reserve across Highway 37 to the south;
- Salt evaporation ponds on the western periphery of the site and to the north beyond South Slough and Dutchman Slough, and
- The City of Vallejo across the Napa River to the east.

Also, the site is directly south of the Napa County Airport, and an airport marker used by pilots for orientation, is located on the project site (see Exhibit III-1).



SOURCE: Cullinan Ranch Specific Plan ; Boundary and Exchange Agreement

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Impacts - Surrounding Area

For impacts on fishing and hunting in the Napa Marsh area, please see Section F of this report.

The Mare Island Naval Command, which does not have jurisdiction over the site, but which may be affected as a neighbor has expressed a number of concerns, and these are discussed in appropriate sections of the report as follows: siltation - Section C; oil spills - Section K; traffic - Section H; schools - Section L; fire protection - Section K; boat traffic - Section B; fresh water supply - Section K; sanitary sewerage - Section K; utilities routing - Section K.

The proposed project may have impacts on wildlife and hunting associated with the salt ponds north and west of the site due to the close proximity of residences and activities affiliated with an urban environment. Impacts on the wildlife are discussed in Section F of this report.

For a discussion of impacts on the Napa County Airport, see the section below on legal, policy and institutional constraints.

For a discussion of the impacts of excavation and fill on the site, please see Section E of this report.

In summary, no other direct land use impacts on the site or on the surrounding area, can be identified as a result of the alternatives under consideration.

2. Legal, Policy, and Institutional Constraints

This section includes a discussion of the legal, policy and institutional constraints dealing with urban land use matters. Other legal documents and policy constrains, such as agriculture, vegetation and wildlife, air quality, etc., are discussed in other sections of this report.

The City of Vallejo

The City of Vallejo has local jurisdiction over the project site by virtue of the project's location at the city limits and the recent extension of the City's Sphere of Influence by the Solano County's Local Agency Formation Commission (LAFCO). The sphere was extended and a Negative Declaration was approved by the LAFCO on June 3, 1982. The property has not yet been annexed to the City. However, Vallejo typically approves projects prior to (or simultaneously with) annexation.

Several legal documents and policies as well as current development trends are of importance to the land use analysis of the proposed project from the City's point of view: the City of Vallejo General Plan, the Zoning Ordinance, and the location and number of projects now planned or under construction in the City.

Setting - The City of Vallejo General Plan

The City's General Plan Map[2] designates the Cullinan Ranch area for Urban Low Density residential (1-8 units per gross area) use.* See Exhibit III-2.

The City's recently revised Land Use and Circulation Element[3,4] of the General Pain refers to the Cullinan Ranch site specifically in stating as follows:

> "Approximately 1411 acres north of Sears Point Road and west of the Napa River are used for agricultural purposes...Its high water table and poor seismic response make this area, unless extensively filled, unsuitable for urban development. An additional 55 acres, the original North Housing and Guadalcanal Village housing sites, were recently purchased by the City for industrial use. Proximity to wetlands will necessitate buffering the wetlands from more intense urban uses."

The City's purchase of the Guadalcanal and North Housing sites implemented the General Plan, which designates these sites for industrial use An EIR/EIS was completed for the City's action and certified by the Vallejo City Council on April 12, 1976[5]. (Resolution #76-306 N.C.) The City's intention is to increase employment opportunities in Vallejo, by creating an area for light industrial uses, such as distribution warehousing and wholesaling.

Vallejo's Land Use and Circulation Element requires that industrial designations not be changed, unless compelling reasons can be found. This is because the City lacks sufficient appropriate sites for industry, i.e., large flat sites[6] with good freeway access, and with public services and utilities, are not available. There are two other areas designated for industrial use in the City: the South Vallejo Business Park three miles southeast of Cullinan Ranch at Sonoma Blvd. and Solano Ave, which consists of 24 acres in the 100 acre Redevelopment Area, and the site at Highway 37 and Mini Drive, which consists of 18 acres. The South Vallejo Business Park is in construction now, and it is anticipated to be completed within two years.

The Lundeberg Properties Master Plan for a site adjacent to I-80 at Columbus Parkway (five miles east of Cullinan Ranch) includes plans for a 120-acre business park, in addition to 134 acres of office development. Although business park uses are not industrial uses, they represent additional employment opportunities in Vallejo.

It is likely that the Business Park on the Lundeberg site would be developed earlier than outlying sites because of that site's direct connection to Route I-80.

The Housing Element of the Vallejo General Plan describes eight goals to make adequate provision for the housing needs of all economic segments of the community. These goals are as follows:

1. To provide sufficient affordable housing to meet a fair share of the market area housing need.

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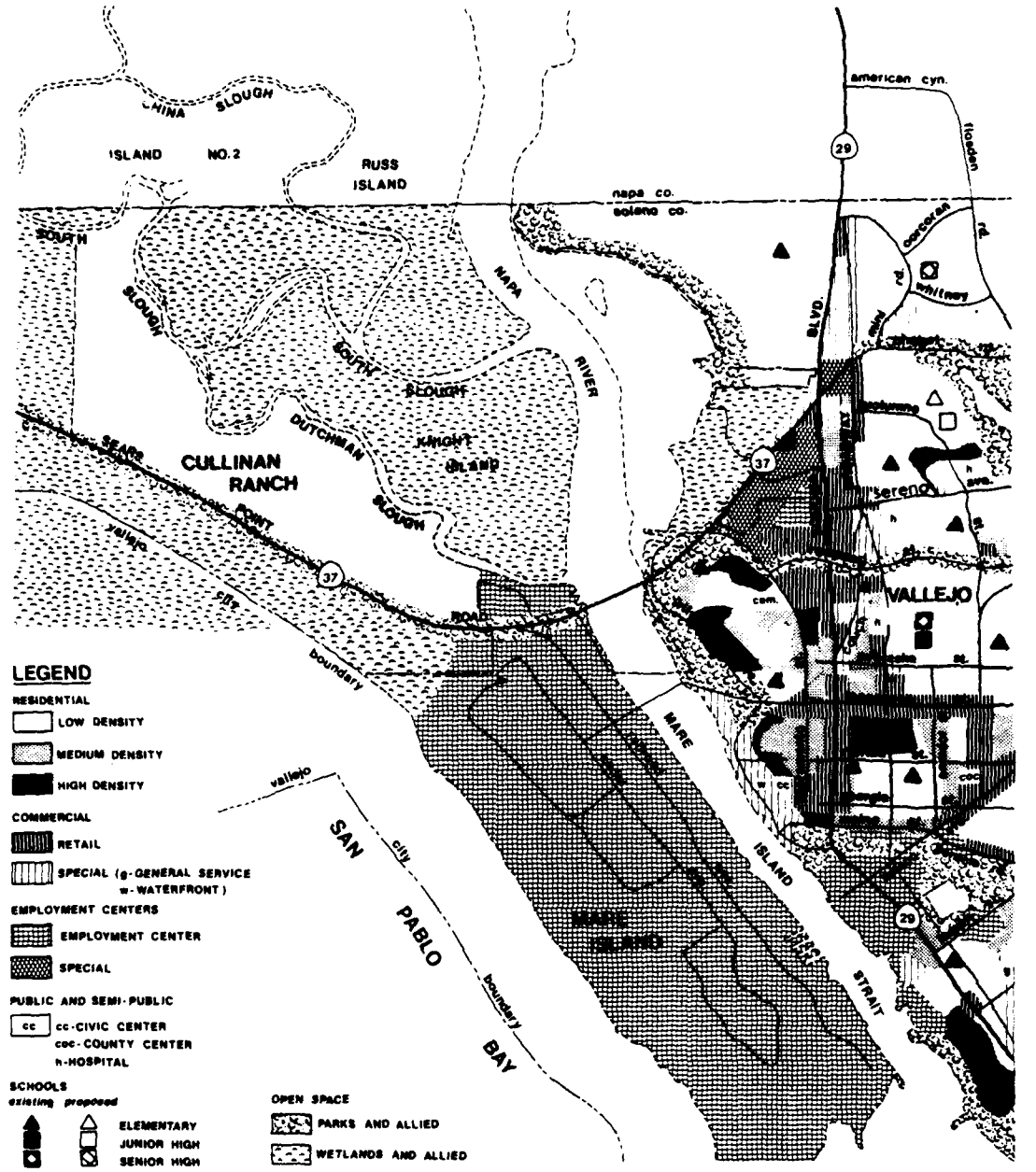
* The calculation of gross acreage in Vallejo includes not only the net areas required for actual residential use, but also the area required for recreation corridors, required to serve the housing area involved. Uses such as major streets, schools, neighborhoods and community parks, churches, commercial areas and other uses which serve several neighborhoods or the community at large are not included in the term "gross acreage" for purposes of calculating the allowable number of housing units in a given area.



SOURCE: Cullinan Ranch Specific Plan

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2. To provide adequate housing to meet the special needs of senior citizens, physically disabled, large families and heads of households.

3. To conserve the existing housing stock and to maintain residential areas as safe, attractive and diversified neighborhoods with distinct identities serving a social and economic mix of residents.

4. To develop a balanced residential environment with access to employment opportunities, community facilities and adequate public and commercial services.

5. To provide an adequate selection of housing by location, type, tenure and price.

6. To provide decent housing and a satisfying environment for all persons, regardless of age, race, sex, marital status, ethnic background, sources of income and other arbitrary factors.

7. To protect the architectural integrity and character of historically and architecturally significant homes and neighborhoods.

8. To develop and implement a continuing housing program to carry out the Housing Element.

Proposed residential developments are generally evaluated to determine conformance with these goals.

Impacts - The City of Vallejo General Plan

The Guadalcanal Village property with marina-related commercial uses and a neighborhood shopping center would require a General Plan Amendment. The Cullinan Ranch portion, Alternative A, is consistent with the General Plan.

The Cullinan Ranch site would be filled and thus the development would be consistent with the City's Land Use and Circulation Element of the General Plan with regard to the need for extensive filling.

Alternative A would have a density of 3.3 units per gross acre, according to Vallejo's density calculation formula. This is within the allowable density of up to 8 units per acre, and therefore no adverse impact is foreseen. Alternatve B, which would have reduced acreage, would result in a density of 3.5 units per gross acre, and Alternative C would result in a density of 7.8 units per gross acre. No adverse impacts are foreseen for Alternative B or Alternative C, with respect to the General Plan. Considering the three alternatives from a regional land use point of view, Alternative C, the higher density alternative, could be preferable to the others, on the assumption that a greater concentration of population near existing urban centers may prevent additional low density growth in outlying rural areas. Alternative D, the No Project Alternative, would reduce the amount of land designated for housing, thereby limiting availability of housing. Please see Table II-2 for acreage and density comparisons for Alternatives A-C.

The proposed General Plan Amendment needed in Alternatives A and B, would remove the potential for development of 53 acres in Guadalcanal Village as industrial use. This is considered to be an adverse impact, because of the lack of other vacant land suitable for industrial development in Vallejo. The main advantage of the Guadalcanal site for

industrial use is its size, which would be conducive to development by large industrial users. Alternative C, the General Plan Alternative, contains industrial use on this site, and this is considered to be a positive feature of this alternative.

Whether or not an amendment of the General Plan will create a significant adverse impact requiring mitigation (e.g., by keeping the Guadalcanal Village industrial designation intact) is a policy decision for the City of Vallejo.

The following implications of the General Plan Amendment may be considered in making this decision:

1. The proposed use in the Specific Plan is for specialty commercial, related to the development of a residential waterfront community. The residential, marina, and specialty commercial uses may be mutually reinforcing and thus may result in more successful marketing and development of the entire proposed project. It may be, therefore, that if the Guadalcanal site is developed as part of the proposed Specific Plan, it would develop sooner, and thus result in new jobs earlier than the designated industrial use.

2. Although specialty commercial use is not likely to generate as many jobs as industrial use, some new service jobs would be generated.

3. Since the City owns the Guadalcanal site, a General Plan Amendment could be accomplished in the future, if after a certain designated period of time the City is unsuccessful in attracting industrial development to the site.

Alternatives A, B, and C are in conformance with the eight goals of the Housing Element of the General Plan with the possible exception of providing housing for people with special needs (i.e., senior citizens, physically disabled, large families and female heads of households). Because the medium density housing areas have not yet been the subject of detailed planning, these areas could be designed to accommodate these special needs. Requiring this type of housing within Cullinan Ranch would be a policy decision for the City of Vallejo.

Setting - Vallejo Municipal Code

The designation of the project site in the Solano County Zoning Ordinance is Agricultural. The applicant is requesting annexation to the City of Vallejo and review of the project as a PUD (Planned Unit Development). According to the City's PUD procedures, the developer submits a concept plan to the City for review, followed by a development plan.[7,8] Following completion of the EIR on the project, the City Planning Commission determines if the development plan satisfies the findings of the conditional use permit procedure. At this time a PUD permit may be granted, subject to conditions for minor revisions.

Since the developer is proposing a Specific Plan for the site, review of the Specific Plan may precede zoning approval, or may be carried on simultaneously.

Impacts - Vallejo Municipal Code

Since a Specific Plan is proposed for the site, the low density residential designation and a PUD permit is appropriate for the site. The development and specifications standards should conform to City requirements. Discussion of road alignments and widths, utility

connections, and the design standards proposed by the developer, can be found in the appropriate sections of this report.

Since no adverse impacts are foreseen, no mitigations are necessary.

Setting - Citywide Development Trends and Policies

The City of Vallejo grew significantly between the years of 1977 and 1982. About 4485 units have been built in this period of time.[9,10,11] At the present time there are 1610 residential units under construction in Vallejo. The majority of these developments are in the northern and eastern parts of Vallejo, and all of them are east of the Napa River. Most of the developments which are now in the planning stages are in the southern part of the City, south of Route 80. In addition, 3365 units also to the south and east, are in varous stages of planning and/or review by the City. A major project in the City's northeast quadrant, the Lundeberg Properties Master Plan,[12] is still in the planning stage. This plan includes 191 acres of high medium density residential use, which could result in up to 732 additional residential units.

The City policy has been to encourage growth, as long as projects meet environmental protection criteria. Vallejo and the Special Districts which provide services within the City boundary have development fees to ensure that appropriate services can be provided.

The City of Vallejo recently adopted an update of its Land Use and Circulation Element and EIR in September 1980. The Land Use Element is based on a projected population of 114,636 by the year 2000, and takes into acount all of the development presently under construction or in planning, including the Cullinan Ranch project. Vallejo's current population is estimated to be 83,100. This means that 12,716 more dwelling units could be built within the Land Use Element's projection, between now and the year 2000.

Impacts - Citywide Development Trends and Policies

Accounting for the units which are now under construction or in planning, the 4500 units proposed in Alternative A and Alternative B would be within the total number of dwelling units planned in the Land Use Element.

Two factors should be considered in evaluating the impacts of Alternatives A, B, and C in relation to the development projects under construction or planned currently in Vallejo: Alternatives A, B, and C are remote from the largest concentrations of new units to the north, east, and south, and Alternatives A, B, and C are unique to the City, in its combination of marina use with residential development. Because the project is remote, it is not likely to impact the same facilities which would serve other developments, with the exception of state highways and major roads. Facility extensions would be paid for by the developer, as needed. Because the project character is special, it is not likely to compete in the same housing market with the other units. Rather, this waterfront residential community would create a new market and add to the diversity of housing available in Vallejo. In any case, the project would be developed in seven to eight phases, according to market demand.

Therefore, assuming that mitigations proposed in the City's EIR for the total "buildout" foreseen in the City's Land Use and Circulation Element are implemented, no adverse impacts are foreseen as a result of Alternatives A and B. Alternative D, no project, would not attain the goals of the City's Land Use Element; however, it would not preclude another project from being proposed for the site.

Considering other projects currently in the planning stage, Alternative C, with its proposed 10,000 residential units, would surpass the 12,716 units estimated for the year 2000 in the City's Land Use Element. This is considered to be a significant adverse impact.

Alternatives A, B, and D would not require mitigation. The mitigation for Alternative C is reduced density, and since this is accomplished in Alternatives A and B, these alternatives would be preferred.

Solano County

There are two concerns about the project from the point of view of Solano County: conformance of the proposed land use to the County's General Plan[13] and Zoning Ordinance, and the appropriateness of the site's annexation to the City. The County's LAFCO has already approved extension of the City's Sphere of Influence on August 2, 1982.[14,15,16]

The County's General Plan, Zoning Ordinance, and LAFCO concerns are discussed below. Other concerns of the County[17] related to continued agricultural use, traffic, public services, vegetation, etc., are treated in the appropriate sections of this report.

Setting - Solano County General Plan and Zoning Ordinance

Both the County General Plan and the County Zoning Ordinance designate the site for agricultural use. Approximately 95% of Solano County is in agricultural use, and the County's General Plan states that it is the County's intent to preserve its agricultural lands, both intensive and extensive such as the Cullinan Ranch. A description of the current crop yields of the site is presented in Section D of this report.

The Plan policy for urban development is that it should be confined to patterns that do not conflict with essential agricultural lands. Another policy states that rural and suburban development shall be confined to non-essential marginal agricultural lands with a low capability of agricultural production and in a manner which minimizes conflicts with surrounding agricultural activities.

Also, another policy states that non-essential agricultural lands should be protected and retained in agricultural use until land conversion to non-agricultural uses becomes necessary.

Impacts - Solano County General Plan and Zoning Ordinance

Alternatives A, B, and C are inconsistent with Solano County's General Plan and Zoning Ordinance. However, since the County's LAFCO has extended the City's Sphere of Influence to include the project site, the city's designated General Plan use would take precedence over the County's designation. Therefore this is not considered to be a significant adverse land use impact.

Setting - LAFCO

The annexation request for the project would require approval by the LAFCO. The LAFCO must consider 8 factors before granting annexation according to Section 54796 of the Government Code.[18]

Impacts - LAFCO

The decision on annexation of the project must be made by the City of Vallejo and is a policy deicison for the City of Vallejo and LAFCO. The relevant subsections of the Government Code are discussed.

(a) Population, population density; land area and land use; per capita assessed valuation; topography, natural boundaries, and drainage basins; proximity to other populated areas; the likelihodd of significant growth in the area, and in adjacent incorporated and unincorporated areas, during the next 10 years.

The main issue of concern is the definition of need for the development, i.e., is there sufficient vacant land available for new development within the city limits, which would obviate the need for annexation of additional land to the City? Based on a current survey, there are presently 2335 vacant acres suitable for rsidential use within the City of Vallejo. These sites are scattered in various parts of the city, and none of the sites are of a size comparable to Alternatives A, B, and C. The largest area, consisting of 1175 acres is in Specific Area 3, and is the site of the Lundeberg Master Plan discused above. Most of the vacant sites are now in the planning stage for development. Therefore, although there is land available for future growth within the City of Vallejo, no site is available which offers the same physical design opportunities, allowing for the creation of a major waterfront residential community. Alternative D, no project, would not require annexation or LAFCO action.

(b) Need for organized community services; the present cost and adequacy of governmental services and controls in the area; probable future needs for such services and controls; probable effect of the proposed incorporation, formation, annexation, or exclusion and of alternative courses of action on the cost and adequacy of services and controls in the area and adjacent areas.

(c) The effect of the proposed action and of alternative actions, on adjacent areas, on mutual social and economic interests and on the local governmental structure of the county.

The City of Vallejo applied for expansion of the Sphere of influence with the intention of annexing the Cullinan Ranch site to the City of Vallejo. The City policy makers are encouraging diversity in housing construction in Vallejo in the future. It is not anticipated that the project would result in adverse social impacts in the City of Vallejo. On a regional level, loss of agricultural land represents an adverse economic and social impact, and the potential loss of vegetation and wildlife, also represents an adverse social impact.

Alternative B would result in the same type of impacts as Alternative A, but the impacts would be reduced, because of the reduced project.

Although Alternative C would have a higher density of development, it would convert no more agricultural land to urban use that would Alternative A. From a regional perspective, urban level density development adjacent to an existing city is preferable to creation of a larger number of low density subdivisions in outlying areas.

Alternative D would not have significant effects on adjacent areas, on mutual social and economic interests, or on the local governmental structure of the county.

(d) The conformity of both the proposal and its anticipated effects on both the adopted commission policies for providing planned, orderly, efficient patterns of urban development and the policies and priorities set forth in Section 54790.2 of the Government Code.

Section 54790.2 states the following: In reviewing and approving or disapproving proposals which could reasonably be expected to induce, facilitate or lead to the conversion of existing open-space lands to uses other than open-space uses, the commission shall consider the following policies and priorities:

(a) Development or use of land for other than open-space uses shall be guided away from existing prime agricultural lands in open-space use toward areas containing nonprime agricultural lands, unless such an action would not promote the planned, orderly, efficient development of an area.

(b) Development of existing vacant or nonprime agricultural lands for urban uses within an agency's existing jurisdiction or within an agency's sphere of influence should be encouraged before any proposla is approved which would allow for or lead to the development existing open-space lands for non-open-space uses which are outside of the agency's existing jurisdiction or outside of an agency's existing sphere of influence.

The agricultural land on the Cullinan Ranch site is non-prime (see Section D of this report), and therefore the paragraph (a) is satisfied. The Cullian Ranch site is already in the City's Sphere of Influence; and, therefore, paragraph (b) is also satisfied.

(e) The effect of the proposal on maintaining the physical and economic integrity of lands in an agricultural preserve in open-space uses.

If implemented, Alternatives A, B, and C would remove land from active agricultural cultivation, and this is considered to be a significant adverse impact. Alternative D, no project, would have no impacts on agriculture.

(f) The definiteness and certainty of the boundaries of the territory, the nonconformance of proposed boundaries with lines of assessment or ownership, the creation of islands or corridors in unincorporated territory, and other similar matters affecting the proposed boundaries.

Alternatives A, B, C and D do not have awkward property lines, nor would they create an island of unincorporated territory, and therefore no adverse impact is foreseen.

(g) Conformity with appropriate city or county general and specific plans.

Alternatives A, B, and C are in conformance with the City of Vallejo General Plan except for the uses proposed of Guadalcanal Village. Since the site is already in the City's Sphere of Influence it is appropriate for that document to govern the site's uses. Alternative D (no project) would not meet residential and industrial use goals of the General Plan, but would not prevent attainment of those goals.

(h) The "sphere of influence" of any local agency which may be applicable to the proposal being reviewed.

Alternatives A, B, D, and D are within the City of Vallejo's Sphere of Influence.

Napa County

Napa County has jurisdiction over 40 acres at the northwestern tip of the Cullinan Ranch site (see Exhibit III-1). This represents approximately 2% of the proposed project site area.

Under Alternatives A, B, and D, this part of the Cullinan Ranch site is proposed for use as a dredged material disposal area, and may eventually be returned to marsh. The project applicants intend to first excavate the area, then to use the fill on the site, and to place the dredged material in the excavated area.

The County has expressed its concerns with seismic impacts, mitigations for dredging and spoils disposal, traffic, water quality, air quality, wildlife and other impacts.[19] These subjects are discussed in the appropriate sections of this report.

The expansion plans for Napa County Airport will require 75 acres of land, immediately adjacent to the south side of the airport boundary. Only jet flights would have an impact on the Cullinan Ranch site, because the main jet approach runway, when extended, runs through the middle of the project site. The airport now has six to seven small business jet flights per day and two to three flights per night. These are expected to increase up to 28 flights per day and 12 flights per night by 1990.

The Napa County Airport administrators and the Napa County Planning Department staff[24,25] are concerned about the impacts of development on their Partial Instrument Landing System (ILS) which is located on the project site along the extended runway centerline, the potential effect of street lighting on flight safety, the possible risk involved in locating a school in the extended jet approach zone, and the possible need for mitigations for overflight noise. The ILS is a marker which gives vertical signal location. The pilot begins his descent when he receives the ILS signal. This marker, which is considered critical for aircraft safety, can only be relocated with the concurrence of the FAA. The Napa County Planning Department has expressed some concern about potential interference with the operation of the ILS from electrical appliances in the new development. The Airport has established a Safety Zone which is defined by Ordinance 416[26] in Napa County and by Ordinance 855[27] in Solano County. The Napa Airport has requested that future residents in this area grant an easement over the Safety Zone, as well as over the approach and departure zones, thus acknowledging that there may be some impacts from their proximity to the airport in the future.[28]

The pattern of street lights in the new development is also of concern to the airport, since a pilot may confuse a straight street pattern with an airport runway.

Impacts - Napa County Airport

For a discussion of impacts resulting from overhead jet flights, please see Section I.

According to the FAA spokesman,[29] there is no danger of interference by home appliances for the ILS facility. The marker is completely fenced and protected from public access. Therefore, no adverse impacts are foreseen under Alternatives A, B, C, and D.

Since there are long stretches of straight streets in the proposed plan, there is a potential adverse impact of reduced safety related to overhead aircraft flights, particularly within the main approach pattern. This is considered to be an adverse impact.

Because development under Alternatives A, B, and C is within the flight path area, there is a potential adverse impact in case of aircraft failure on approach to the airport. In particular, location of the school in the main approach path represents a potential adverse impact. Alternative D would have no impacts.

Mitigations - Napa County Airport

The following mitigation measures apply to Alternatives A, B, and C:

- (Developer Responsibility) The pattern of streets should be curved to the extent possible, especially those within the aircraft approach path (i.e., the middle of the site) and street lights should be installed to reflect illumination downward rather than upward.

- (Developer Responsibility) The location of the school should be changed to move it away from the main aircraft flight path.

- (Developer Responsibility) An easement should be granted in any future deeds for the property according to the Napa County Ordinance.

- (Developer Responsibility) The developer should submit FAA Form 7460 (Obstruction Evaluation Form) prior to construction to receive FAA clearance for development close to the ILS facility.

Setting - San Francisco Bay Conservation and Development Commission (BCDC)

The BCDC Commission has several types of jurisdiction over the project. It will have "certain waterway jurisdiction" over the water that flows onto the site once the dikes are breached and new lagoons created. The marina, all boat docks and any structures that extend over the water (line of highest tidal action) may require a permit. The Commission has 100-foot shoreline band jurisdiction inland from the line of highest tidal action in San Pablo Bay. The CalTrans easement for Highway 37 is within the 100-foot shoreline band, and portions of the Cullinan Ranch site along the CalTrans easement may also be within the band. A final determination of which lands would be within the 100-foot shoreline band must be made by BCDC, and any construction within it would require a permit. For example, widening of Highway 37 or construction of new turn-outs would require BCDC authorization.[30]

The Commission also has jurisdication over the Napa River and its tributaries. Any physical improvements that would include these waterways would require a permit.

The Bay Plan[31] does not designate the project site for a priority use (i.e., water related industry, waterfront park, wildlife area, tidal marsh or managed wetland). Route 37 is shown as a scenic drive. However, development of shoreline areas not proposed for a specific use must be consistent with Bay Plan policies for other shoreline uses.

The Bay Plan Policies on Marinas state that marinas should not be built on sites that tend to fill up unusually rapidly with silt or mud. Proposed new marina policies now under consideration by the Commission further provide that new marinas should be constructed only where water quality and circulation are protected, and if possible, improved. The Bay Plan Policies on Dredging state that mud from dredging should be disposed on dry lands (lands that are dry year round), or should be placed in an approved Bay aquatic disposal site where the maximum possible amount will be carried out the Golden Gate on ebb tides.

The Bay Plan policies discourage the placement of fill in the marshes of the San Pablo Bay Wildlife Refuge.

Because a public access easement along the northern boundary (South Slough and Dutchman Slough) has been granted to the state, BCDC would encourage that such public access not be disrupted by the proposed development.

In BCDC's recently completed Diked Historic Baylands Study, the Cullinan Ranch site is designated as an agricultural area. The study's findings and policies were adopted by the Commission on October 21, 1982.[32,33] However, some of these policies refer to lands outside of the BCDC authority provided in the McAteer-Petris Act and San Francisco Bay Plan.

The policies in the diked historic baylands study state that the baylands in agriculture should stay in agriculture for as long as feasible. The policies define "feasible" as not only the feasibility of farming a specific parcel alone but also whether it is feasible to farm it as part of a larger agricultural unit. In other words, according to this policy, even if it may not be feasible to farm the Cullinan Ranch itself, a change in use should not be permitted if it could be farmed as part of a larger agricultural unit.[34]

To further protect diked baylands in agricultural uses, the policies discourage the extension of urban services into these areas, and encourage measures that would increase agricultural productivity.

Impacts - BCDC

The development proposed in Alternatives A, B, and C are all north of the San Pablo Bay Wildlife Refuge and are, therefore, consistent with the BCDC policy on prohibiting development in the refuge. The developer plans to construct the marina and boat docks "in the dry" prior to breaching the levee which may remove the BCDC permit requirement for these facilities. The BCDC staff has indicated that a permit may be necessary to breach the levee in Dutchman Slough because it includes the surface waters of the slough (a tributary to the Napa River). The owners of land within the 100-foot shoreline band (CalTrans and possibly the applicant) would also have to apply to BCDC for a permit to improve Highway 37. However, BCDC staff has not reviewed the plans for how the levee would be breached, the plans for marina construction "in the dry", or plans for Highway 37 improvements. A final determination of BCDC permit authority and the application of diked historic bayland policies to the site must be made by BCDC staff before construction begins.

The proposed project's impacts on siltation and water quality and its dredging impacts are discussed in Section C of this report. Discussion of the proposed placement of fill can also be found in that section. Discussion of the agricultural impacts can be found in Section D. With respect to public access, the proposed plan includes provisions for public parking, a waterfront park, and a pedestrian path along the northern perimeter of the property. The facilities are considerd to provide adequate public access and, therefore, no additional mitigations are required at this time.

Setting - State Lands Commission

The State Lands Commission authorized a Boundary and Exchange Agreement (B.L.A. 142) for Cullinan Ranch which was recorded June 17, 1974. Under the provisions of the Public Resources Code, the agreement gave certain parcels within Cullinan Ranch to the State of California in exchange for the State's right, title, and interest within the remainder of

the Ranch property. The agreement established five parcels on the site and the property line between those parcels and the adjoining sloughs. See Exhibit III-1. These were identified as Parcels A, B, C, D, and E. The State of California retained ownership of Parcels A (2.5 acres), B (85.0 acres), C (15.0 acres) and D (2.5) for a total of 105 acres. Parcel E (1393 acres) was established in private ownerhsip, except for (a) public road easements; (b) public water access easement; (c) any and all right, title, and interest of the State of California, held for State highway purposes under the jurisdiction of CalTrans; (d) the public trust easement for the purpose of commerce, navigation, and fisheries over and across any portions of the lands within a 19-foot wide strip laying south of and parallel to the northerly property boundary along Dutchman and South Sloughs.

The agreement also provided for the exchange of another identified piece of property for Parcels B and D. The land to be exchanged for Parcels B and C was identified as Coon Island consisting of about 200 acres in Napa County. The exchange privilege extended two years from the effective date of the agreement. The owners of Parcel E exercised the exchange privilege by acquiring Coon Island and dedicating it to the State, and the State quitclaimed Parcels B and C on April 15, 1975.

The 19-foot water access easement on the levee extends the entire length of the Cullian Ranch property. This easement may be interrupted at the option of the private landowners for no more than 150 feet per interruption along the sloughs to a cumulative total of 2000 feet. The agreement also states that in no event shall interruption fail to provide a continuous path for the public or extend into the slough area.

The Boundary and Exchange Agreement (including the Coon Island exchange privilege) was reviewed by a representative from the California Department of Fish and Game (DFG) at the State Lands Commission hearing on February 28, 1974. The DFG encouraged the Commission to authorize the agreement which would benefit fish and wildlife in the areas involved.

A development proposal for a residential marina at Cullinan Ranch (to be called Valnaples) was prepared at the time the Boundary and Exchange Agreement was authorized by the Commission. However, the agreement does not refer to proposed uses of the site or to the Valnaples development proposal.

The Land Agent for the State Lands Commission has stated that there is a strip of land waterward of the agreed upon boundary line that exists from the southerly line of Parcel D to the easterly terminus of the ranch boundary. This strip of land is owned by the State of California and is under the jurisdiction of the State Lands Commission, as is all land waterward of the levee. Recent surveys by the developer indicate that there is no area free of tidal action located waterward of the agreed upon boundary line. The State Lands Commission has not made a final determination regarding this strip of land which may provide uninterrupted public water access along the entire Cullinan Ranch property.

Impacts - State Lands Commission

For Alternatives A, B, and C, the developer contends that the Boundary and Exchange Agreement with the State Lands Commission relinquishes state interest in the property except for certain rights of public access in the form of vehicular and pedestrian easements and two small parcels to be retained for vehicular parking. The State Lands Commission and other agencies of the State (i.e., Department of Fish and Game and Bay Conservation and Development Commission) contend that the agreement does not

guarantee development rights to the site, and that state policies (such as the Basic Wetlands Protection Policy and the San Francisco Bay Management Guidelines) must still be applied to development proposals. The issue is currently unresolved.

According to the State Lands Commission's Agent[35] a levee opening in the area to allow for boat traffic, Alternatives A and B, would not violate the specific provisions of the agreement pertaining to public water access. However, a break in the levee would require a permit from the Commission, and the relocation of Parcel D and Road Easement B may necessitate an amendment to the agreement with the State Lands Commission. The Commission is concerned with expansion of adequate usable developed public area on the site. Suggested uses by the Commission include development of a marina public park area; public boat launching facility; development of the public water access easement, Public Road Easements A and B, Parcels A and D together with access to and another parking area northerly of the tidal gates opening; and restroom facilities, barbeque areas, tables and benches to be located in and about the various parcels of State-owned land and the marina public park area.

Mitigations - State Lands Commission

Mitigations already incorporated in the Specific Plan are as follows: marina public park including the recreation facilities listed above, a public water access easement and parking areas at both corners of the site. The City of Vallejo believes that a public boat launching facility would probably be inappropriate for this location given other nearby facilities within the city.

Footnotes

[1] E. J. Scheyder, Department of the Navy, letter dated October 15, 1982.

[2] City of Vallejo, General Plan Map, as amended November 3, 1975.

[3] City of Vallejo, Final EIR, Land Use - Circulation Element of the General Plan, September, 1980.

[5] City of Vallejo, Guadalcanal Village EIR.

[6] da Silva, Al, Community Development Department, City of Vallejo, telecon.

[7] City of Vallejo Municipal Code, 1982 (Title 16).

[8] City of Vallejo, Ordinance No. 649 N.C., Amending Ordinance 558 N.C., The Land Use Zoning Ordinance of the City of Vallejo.

[9] Huddle, Christy, Assistant Planning Director, City of Vallejo Planning Department, telecon.

[10] City of Vallejo Planning Department, Subdivision Activity List, 10/22/82.

[11] City of Vallejo Planning Department, Preliminary Study for Specific Area 6, White Slough, January 1982.

[12] Lundeberg Maryland Seasmanship School, Inc., Lundeberg Properties Master Plan, Vallejo, undated.

[13] Solano County, Land Use and Circulation Element adopted, December 19, 1980.

[14] Solano County, Minutes of the LAFCO, (on Expansion of City of Vallejo's Sphere of Influence), August 2, 1982.

[15] City of Vallejo, Public Notice, Negative Declaration on Proposed Sphere of Influence Expansion, posted June 3, 1982.

[16] City of Vallejo, Resolution No. 82-390 N.C., on the Negative Declaration on Resolution 82-339 N.C. requesting expansin of City of Vallejo Sphere of Influence, June 21, 1982.

[17] Hubble, David W., Planner III, Solano County Planning Department, letter and telecon.

[18] California Administrative Code, Section 54796.

[19] Hickey, James, Director, Napa County Planning Department, letter dated September 27, 1982.

[20] Napa County, General Plan Land Use Element, updated 1982.

[21] Napa County, Proposed Napa County Land Use Plan 1982-2000, updated/amendment, to be approved by the Napa County Board of Supervisors.

[22] Napa County, Conservation and Open Space Element, as amended June 11, 1973.

[23] Napa County Zoning Ordinance, Title XII of the Napa County Code of Ordinances.

[24] O'Laughlin, James, Senior Planner, Napa County Planning Department, telecon.

[25] Partain, William, Director, Napa County Airport, letter and telecon.

[26] Napa County, Ordinance #416, Height Limitations and Land Use Restrictions for the Napa County Airport and Affected Lands.

[27] Solano County, Ordinance 855, Providing for Recognition as a Flight Obstruction and Imposing Height Limitations to the Precision Instrument Approach Zones of the Napa Airport.

[28] Napa County Conservation Development and Planning Commission, Sample Lase Aviation and Hazard Easement Deed.

[29] Scott, Marrill, Assistant Manager, Technical Support Division, San Francisco Sector, FAA, telecon.

[30] Wilmar, Michael, BCDC, letter dated October 1, 1982.

[31] San Francisco Bay Conservation and Development Commission, San Francisco Bay Plan, as amended July 1979.

[32] BCDC, Diked Historic Baylands of San Francisco Bay, Staff Report, April 1982.

Also, Recreational Values of Diked Historic Baylands, Ecological Values of... Agricultural Values of...Guidelines for Enhancement and Restoration of...Summary of Powers Exercised by Regulatory Agencies over...

[33] San Francisco Bay Conservation and Development Commission, Resolution 82-18 Concerning Diked Historic Baylands, with Attachment A, Adopted Findings and Policies, September 12, 1982./

[34] Wakeman, Nancy, BCDC.

[35] Reese, Don, Land Agency State Lands Commission, letter dated January 19, 1983 and telecon.

B. MARINA FUNCTION AND DESIGN

Setting - Marina Function and Design

The Cullinan Ranch project site is bounded to the north by both Dutchman and South Sloughs. Cullinan Ranch lies entirely below the high water mark 6.2 ft. Mean Lower Low Water (MLLW) and is protected by a series of peripheral dikes.

Throughout the EIR/EIS document, elevations are referred to in Mean Lower Low Water Datum, which holds the following relationship to other applicable datums.

0 MLLW = (-10.00) Vallejo Datum

0 MLLW = (-3.66) National Geodetic Datum (formerly 1929 Mean Sea Level)

The Developer proposes to breach the dike at Dutchman Slough, creating 423 acres of navigable waterways with facilities to ultimately moor 1600-1700 recreational vessels. Expansion capability would exist for an additional 500 berths, and possible dry land storage. Alternatives A, B and C provide for three kinds of berthing facilities: A primary marina with 400-500 berths, situated at the eastern end of the project; a centrally located secondary marina with 200 berths; and private residential berths for 1,000 vessels are located around the perimeter of each residential peninsula. An entrance channel of 250 feet in width at Mean Lower Low Water would be provided in Alternatives A and B. This channel will provide navigable access to the Napa River and San Pablo Bay. Channel width has been analyzed for the developer in a study prepared by Moffat & Nichol, Engineers, entitled "Cullinan Ranch Boat Traffic Study", dated December 1981. Alternative C does not have boat access to the Napa River. Alternative C marina plans are not available, but presumably would be designed for smaller sized vessels, since the lagoon is closed.

No specific layout for berthing facilities in main marinas has been offered for the project. In general, prevailing winds exceeding 70 mph or significant wave heights in excess of 1.5 feet, will require additional protection for moored craft or floats, depending on the specific design. It is not anticipated, however, that these values will be exceeded at Cullinan Ranch.

The navigable waterways would be subject to tidal action in Alternatives A, B and C, with extreme high tide at 6.2 feet MLLW. The highest observed tide reached 9.5 MLLW on February 13, 1938, at the Mare Island Naval Shipyard. The highest tide experienced during winter 82/83 is estimated at 9.0 MLLW. Extreme low tide is projected to reach -2.5 feet MLLW. The various berthing faciities are connected by a series of channels and turning basins. The main channel varies in width from 300 to 400 feet at MLLW, with wider dimensions for the turning basins. The turning basins are the subject of a study prepared for the developer by Moffatt & Nichol, Engineers, entitled "Evaluation of Proposed Cullinan Ranch Development Turning Basins for Dinghy Sailing", dated January 1982. Secondary channels have an average width of 220 feet at MLLW.

Both fuel and sewage pumpout facilities are proposed for Alternatives A, B and C, but neither have been specifically located on the site plan.

Impacts - Marina Function and Design

Moored vessels of Alternatives A and B, would be provided access to the Napa River via an entrance channel merging into Dutchman Slough. The developer's engineers have

performed a Boat Traffic Study[2] in order to determine the adequacy of the proposed entrance channel. The study was based on traffic projections determined by observation of several similar Southern California marinas. In order to verify that these projections adequately represent Northern California traffic, a brief phone survey of Sacramento Delta marinas was conducted. Based on the estimates of the Harbor Masters representing those facilities, the traffic projections offered by the study are considered satisfactory for the proposed Cullinan Ranch installation.[3] Alternative C is a closed lagoon with no entrance channel.

The Boat Traffic Study indicates that an entrance channel of 250 feet in width will adequately facilitate traffic without undue congestion. The proposed entrance channel is 250 feet in width at the surface 0.0 MLLW, and therefore only 170 feet at depth (-10.0 MLLW) per Cal-Boat Guidelines,[4] due to the 4:1 side slopes indicated. Since only the "at-depth" portion of the channel is usable by boats, the size of the entrance channel poses an adverse impact relative to traffic congestion.

The introduction of 1700 boats (expandable to 2200, plus dry storage) where none currently exist, as in Alternatives A, B, and C, creates the potential for oil and gasoline spills into the waterways, an adverse impact on water quality. There are only two ways for this to happen; breakage of fuel lines serving the fuel dock, and boat collisions. If fuel lines are severed undetected, the entire contents of the storage tanks could be discharged, normally 10,000 gallons for this size facility. Spillage resulting from the collision of one or more vessels would be limited to the quantity in their holds, up to 100 gallons for larger vessels. Although statistics for the rate of occurance are not available, such events are anticipated on an extremely infrequent basis, if at all. Finally, the sewage generated by 1700 boats, if allowed to be flushed at sea, would create an additional adverse impact to water quality. Sewage pumpout facilities would allow the introduction of septic chemicals into sewer lines. Based on discussions with the Vallejo Sanitation and Flood Control District, however, the plant facilities are designed to process the effluents with no detrimental effect on plant bacteria levels. Thus, this is not considered to be an adverse impact. The presence of the fuel dock proposed for Alternatives A, B, and C, creates a potential explosion or fire hazard to moored craft and boaters. Although statistics are not available, the likelihood of such an event is considered remote.

The berthing facilities proposed in Alternatives A, B, and C, if not properly designed, could have an impact on public safety in terms of navigability. Although specific marina layouts are not yet available, the developer proposes to conform to Cal-Boat Guidelines,[4] which would ensure the basic navigability of the layout. Alternative C, the closed lagoon alternative, presents greater risks of collision or congestion, due to the limited size of waterways available for boaters.

The berthing facilities proposed in Alternatives A, B, and C would also create a potential fire hazard in that floating facilities do not lend themselves easily to conventional fire fighting methods.

The increased boat traffic on the Napa River, generated by Alternatives A and B, would require that the Mare Island Causeway lift span be raised with increased frequency, to allow passage for vessels bound for the San Pablo Bay. However, since any number of boats may pass at a given raising of the span, the number of additional raisings required would be minimal. Additionally, since peak boat traffic occurs on summer weekends, and peak vehicular traffic over the Causeway would occur during commute hours, only minor impedance to vehicular traffic is anticipated.

According to the U. S. Coast Guard[5] legal section, this is not in fact a legitimate impact. "Navigability Servitude", a common law doctrine, which has been tested in Federal Courts, basically states that the navigability of waterways is paramount to all other uses. Stated simply, it is the Causeway that impedes boat traffic.

There are no adverse impacts associated with Alternative D.

Mitigations - Marina Function and Design (All Developer Responsibility)

- o Dutchman Slough entrance channel in Alternatives A and B should be widened to 250 feet at depth (-10.0 MLLW), or 330 feet at the surface (0.0 MLLW) by dredging. Alternate measures include:
  - o Re-evaluation of the suitability of the channel at depth
  - o Prohibit sailboat tacking through the channel
  - o Reducing the number of boats in the marina

The following measures apply to Alternatives A, B and C

- o Install automatic shut-off valves on fuel lines serving the fuel dock, to reduce spill size resulting from potential breakage to fuel contained in the lines.
- o Implement emergency service provisions for the containment of any marine related oil or gasoline spills (e.g., boat collisions). Some specific measures could be:
  - o Isolation of the fuel docks from berthed craft
  - o A fuel spill plan and implementation program
  - o Adequate nighttime lighting
  - o Naviagational markers
- o As the developer proposes, install a sewage pumpout facility and institute requirements that all vessels using the marina facilities be prohibited from open-water discharge of sewage holds. Vessels found in violation could be fined.
- o All electrical fixtures on docks should be watertight and explosion proof and be U.L. approved. Fuel pumps and dispensers should be provided with spark safety equipment. The fuel float should be isolated to the extent that fire or explosion would have minimal opportunity to spread from fuel dock to berths and vice versa. This would reduce fire and explosion hazards.
- o As the developer proposes, berthing layouts should conform to Cal-Boat Guidelines.
- o Fire protection hoses and reels should be provided to all floating structures and boats in the marinas. Fire protection measures should conform to Cal-Boat Guidelines.

Footnotes

1 Cullinan Ranch Specific Plan, August 1982

2 Cullinan Ranch Boat Traffic Study prepared by Moffatt & Nichol Engineers, December, 1981.

3 Sacramento Delta Boat Traffic Phone Survey. There were six (6) respondents whose estimates of peak daily boat usage averaged to 18.2%. The Cullinan Ranch Boat Traffic Study[6] is based on a peak daily usage of 25%.

4 Layout & Design Guidelines for Small Craft Berthing Facilities, State of California, The Resources Agency, Department of Boating & Waterways, January 1980.

5 Interview with Mr. Ken Johnson of the U. S. Coast Guard legal section in San Francisco, January 17, 1983.

C. HYDROLOGY, WATER QUALITY AND SEDIMENTATION

Setting - Hydrology

The hydrologic environment of the Cullinan Ranch area has been highly modified by man during the past 100 years. These modifications include the construction of levees to exclude tidal flow and to permit additional land uses in place of the previous salt marsh. The Napa River, Dutchman and South Sloughs are the remnants of the marsh ecosystem which maintain connections with San Francisco and San Pablo Bays. Tidal action creates daily fluctuations in water levels, and provides water circulation.

The water level within the river and adjoining sloughs is highly dependent upon tides and water volumes within the Napa River. The project site with current elevations between 1.1 feet MLLW (-2.0 feet MSL) and 6.1 feet MLLW (3.0 feet MSL) would be subject to tidal flooding by normal tidal inundation of the perimeter dikes at about elevation +11.1 MLLW (+8.0 MSL).

A recent flood insurance study for the City of Vallejo indicates a 100-year flood elevation of 8.9 feet MLLW (5.8 feet MSL) on the Napa River at Sears Point Road, about 400 yards downstream from the entrance to Dutchman Slough.[1] The 500-year flood elevation at the same site is 9.2 feet MLLW (6.1 feet MSL). These estimates are based on an analysis of historical tide records and should include the effects of extreme tides, wind set-up from storms, and flooding of the Napa River. The Public Works Office on Mare Island estimates a maximum flood tide of 10.5 feet MLLW (7.4 feet MSL) in the Mare Island Channel due to an extreme high tide combined with southerly winds (wind set-up) and flood flows on the Napa River.[2]

Tidal flow is the primary force that provides water circulation in the slough areas. The diurnal maximum tide range averages 6.2 feet with a mean range of 4.6 feet. A report, prepared by R. B. Krone and Associates and Resources Management Associates (February 1982) for the developer provides a computer model estimate of existing tidal velocities in Dutchman and South Sloughs.[3] See Appendix B for the complete report. These estimates indicate that the present tidal movement within these sloughs reaches peak velocity four times each day within the range of .5 to 1.5 feet per second. Two of these peaks are during flood tide when water is moving into the sloughs from San Pablo Bay, and two are during ebb tide when water flows back into the Bay. These flows are probably smaller today than they were before levees were constructed along the Slough channels. Prior to levee construction, the waters that flooded the higher areas flowed in and out through the slough channels, which were probably deeper; and the flows probably varied over a wider range.

The ground water table ranges from a depth of about 4 feet to almost 20 feet in some locations.[4] Several wells on the Cullinan Ranch property were drilled to produce water for livestock and dairy operations in the past. Only one has produced water of suitable quality for livestock. A recent (1982) sample from this well was analyzed and showed a pH of 7.5 and electrical conductivity, a measure of salinity, of 1.75 mmhos per cm, and was reported to have a brackish taste.

Impacts - Hydrology

The entrance to the project waters is via Dutchman Slough, which connects with the Napa River above Mare Island about one mile east of the project. The junction of Carquinez Strait and San Pablo Bay is four miles to the south along the Napa River through Mare Island Strait.

The project waterways for Alternatives A and B will encompass an area of 423.5 acres at MLLW. This includes a primary marina at the east end of the project (57 acres), and the secondary marina near the center of the project (19 acres). The main channel for Alternative A is about 3.4 miles long and averages about 300-400 feet wide (MLLW). A series of 13 lateral channels branches off the main channel to the south and west to form the residential peninsulas. The lateral channels range from 800 to 2400 feet in length, and are all about 220 feet wide (MLLW). The side slopes on all channels are 1:4 below MSL and 1:5 above. The project waterways will be excavated initially to -20 feet MLLW, and then allowed to fill in to a final bottom depth of -10 feet MLLW by sedimentation.

The configuration for Alternative B is similar to A, except that 117.5 acres of the residential peninsulas on the west end of the project and 109 acres of residential peninsulas on the east end of the project will be converted to different land uses. The lateral channels will be eliminated in these regions, but the width of the main channels will be increased so that the total area of the waterways at MLLW will remain the same as Alternative A. However, the 117.5 acres at the west end of the project will be converted to an open space wetland subject to tidal inundation, more than doubling the total intertidal area of the project.

The waterways for Alternative C are much smaller than for A or B (254 acres versus 423.5 acres). The main channel is about the same length, but somewhat narrower than the other alternatives. Lateral channels branch off both sides of the main channel, but they are generally narrower and shorter than those for Alternatives A and B. The shoreline around the lagoon will be a vertical bulkhead, rather than a sloping one. There is no opening for boat access to the adjacent sloughs and Napa River, although some tidal exchange with Dutchman Slough is planned for purposes of flushing the lagoon.

Tidal Circulation. Circulation within the project waters will be increased by the tidal flows in the adjacent sloughs. For Alternatives A and B, this results in a maximum tidal prism (MLLW to MHHW) of about 2800 acre-feet and a mean tidal prism of about 2100 acre-feet. Water will enter the lagoon during flood tide through the entrance on Dutchman Slough at the east end of the project, and will leave through the same entrance on ebb tide. Additional water from South Slough will enter the northwest end of the project through tide gates during ebb tide to enhance flushing of the lagoon. Two other configurations, (1) an open entrance to South Slough at the northwest end, and (2) a completely closed northwest end, were also considered by the developer in the preliminary planning stages, but the present plan with the tide gates was found to provide the maximum amount of flushing.[5]

The mean tidal prism and maximum tidal prism for Alternative C would be about 1200 acre-feet and 1600 acre-feet, respectively, if the waters within the lagoon were able to rise and fall freely with the tide. This would require a large enough opening so that flow between Dutchman Slough and the project was essentially unrestricted. The actual tidal range in the lagoon will probably be somewhat smaller, depending on the size of the opening between the two waterways.

The Cullinan Ranch waterways will have some impact on the tidal flows in the adjacent sloughs and Napa River due to the increased tidal prism associated with the project and the operation of the one-way tidal gates at the northwest end of the project. These effects have been studied in the report prepared by Resource Management Associates (RMA) and Ray B. Krone and Associates for the developer[6] (Appendix B). A computer model was used to simulate circulation in the project waters and in Dutchman Slough, South Slough, and the Napa River. This model, known as the link-node model, has been used for many years in analyzing similar types of systems both in San Francisco Bay and in

other estuaries throughout the United States. It is well developed, and provides the appropriate level of detail for the Cullinan Ranch project. The hydrodynamic model divides the waterways into a series of segments, and computes the tidal heights and velocities at each location. By simulating conditions in the adjacent sloughs and Napa River both with and without the project, the impacts of the project can be predicted.

The RMA/Krone model analysis was performed for Alternative A only. Several other possible configurations were also simulated, but they did not include Alternatives B and C. The results presented for Alternative A can be applied to Alternative B, since the two projects are very similar. However, they do not apply to Alternative C. Alternative C should be analyzed in detail using a similar approach if it is selected for the final design.

The effects of the Cullinan Rance development on the tidal flows in South Slough and Dutchman Slough are shown in Figures 8 through 10 of the RMA/Krone report.[7] The major effect is in the portion of Dutchman Slough between the Cullinan Ranch entrance and the Napa River. The peak velocities in this region will be increased by a factor of about 3 or 4 due to the increased tidal prism provided by Alternatives A and B. This is advantageous from a sedimentation standpoint, since the increased velocities of over 2 ft/sec will probably prevent sediment accumulation in that section of the channel. Since the increased tidal flows will tend to produce a larger equilibrium channel cross-section than the natural slough, the resulting velocities may not be quite as high as predicted by the model. The tidal velocities in Dutchman Slough would also be increased by Alternative C. However, the peak velocities would be smaller than for Alternatives A and B since the tidal prism is smaller.

A second effect on the tidal circulation occurs in South Slough between the junction with Dutchman Slough and the tide gates at the northwest end of the project. Under natural conditions the flow along that section is to the north during flood tide and to the south during ebb tide. With the tide gates in operation for Alternatives A and B, the flow will be reversed during ebb tide and will flow north before entering the project waters through the tide gates.

The tidal flows in other sections of Dutchman Slough and South Slough adjacent to the project will also be modified slightly, but these changes are not considered significant.

Tidal velocities within the project waters for Alternative A are shown in Figures 5 and 6 of the RMA/Krone report.[8] Maximum tidal velocities in the main channel are about 0.2 ft/sec in the northwestern portion of the project, 0.7 ft/sec in the central portion, and 1/3 ft/sec in the eastern portion near the entrance to the development.

It should be noted that the currently planned widths of the project channels have been somewhat enlarged since the original model analysis was performed. This will have some effect on the model results, although most of the effects are minor. For example, the peak tidal velocities in Dutchman Slough will be slightly higher due to the increased tidal prism. Similarly, the tidal flows within the project will also be increased slightly, particularly as the east end of the project is approached. However, the tidal velocities may not be affected significantly since the channel cross-sections will be larger.

It should also be mentioned that the model analyses were conducted for the final channel depths of -10 feet MLLW. During the initial development, the channels will be -20 feet MLLW deep. Although this will not affect the tidal prism or tidal flow rates, the velocities within the project will be lower due to the larger channel cross-sections.

The Cullinan Ranch plan proposes construction of the project channels in a series of seven phases over a period of about 20 years. Construction will begin at the eastern end of the project, gradually progressing toward the northwestern end. As each phase is completed (beginning with the third phase), tide gates will be installed at the northwestern end of the lagoon connecting the main project channel to Dutchman or South Slough. Since the partially completed project will have a smaller tidal prism than that of the final development, the impacts of the project phasing on the tidal velocities in the adjacent sloughs will be less than for the completed project. Similarly, the tidal velocities within the project will be less for the partial project than the completed project, particularly near the development entrance to Dutchman Slough.

Flooding. The proposed finished minimum floor elevations (10.4 feet MSL) are well above the maximum predicted flood elevations (7.4 feet MSL) so flooding due to both tidal inundation and flooding of the Napa River should not be a problem in the development. The planned ultimate elevation for streets and roads is also greater than the predicted flood elevation.

The maximum runoff associated with each alternative was estimated using the "rational method" and data obtained from the Vallejo Sanitation and Flood Control District. The rainfall intensities for a 100-year storm and a 15-year storm of 15 minute duration are 3.75 inches/hour and 2.25 inches/hour, respectively.[10] Using the appropriate areas and runoff coefficients for each type of land use within the development, the computed maximum runoff rates for the 100-year storm are about 1500 cfs for Alternatives A and B, and about 2200 cfs for Alternative C. For the 15-year storm, the runoff rates are about 900 cfs for Alternatives A and B, and 1300 cfs for Alternative C.

The maximum flood storage capacities required for each lagoon were calculated using the following conservative assumptions: (1) a rainfall intensity corresponding to a 10-year storm of 4 hour duration occurs over a 9 hour period (maximum time between low tide and the following high tide), resulting in a total rainfall of 6.75 inches; (2) all runoff generated by the 9 hours of rain is stored in the lagoon at once during maximum high tide; (3) runoff is estimated using the "rational method" approach, assuming all water areas and intertidal areas have a runoff coefficient of 1.0, and the remaining land areas have runoff coefficients based on the particular type of land use; (4) increased storage due to the channel side slopes for Alternatives A and B are ignored. Using these assumptions, the calculated increase in the water surface elevation of the lagoon would be about 12 inches for Alternative A, 11 inches for Alternative B, and 22 inches for Alternative C. These elevations should not create any flood hazards even if combined with the 100-year extreme flood tide levels. They are within the natural variation in tidal extremes, and should easily drop to normal tide levels during the following low tide for Alternatives A and B (and also for Alternative C if a large enough opening is provided between the lagoon and Dutchman Slough).

Mitigations - Hydrology

- The increased tidal velocities in Dutchman Slough between the project entrance and the Napa River resulting from Alternatives A, B, and C do not create any significant environmental problems. Similarly, the reversed tidal flows in South Slough due to the tide gate operations and the modified tidal flows in all adjacent portions of South Slough and Dutchman Slough are not significant. No mitigations are therefore necessary for these impacts.

Setting - Water Quality

Water quality in the Dutchman Slough, South Slough, and the Napa River is highly affected by tidal flows from San Pablo Bay which circulate through Mare Island Strait. However, during periods of high runoff, downstream flows from the Napa River may also be important.

Some water quality data is available for locations on the Napa River, upstream from the project site. Field sampling investigations (1966-1976) upstream in the Napa River[13] have indicated dissolved oxygen levels generally above 5.0 mg/l.[11,12] Chlorophyll-a levels between 30 and 60 ug/l for the Napa River and 10 ug/l for Dutchman Slough have been reported.[13] Dissolved nutrient levels are fairly high in the Napa River upstream of the project site, with total nitrogen levels frequently exceeding 1.0 mg-N/l and total phosphorus levels typically between 0.2 and 0.5 mg-P/l.[14] The water is fairly turbid with typical Secchi disc readings of about 1 to 3 feet. The water temperature ranges from about 8 degrees C in the winter to 23 degrees C in the late summer.[15] Salinity also fluctuates with the seasons depending upon runoff volumes. It ranges from about 0 ppt during the winter to a maximum of about 27 ppt in the fall.[16]

More recent water quality data has been collected by Harvey & Stanley Associates in Dutchman Slough. The physical factors which were measured are indicated on Table 2 in the Interim Report - Cullinan Ranch Wildlife Monitoring Program (February 1983). See Appendix D. This data indicates that salinity and water temperature in Dutchman Slough decrease during the winter months when there is high run-off due to rainfall. The dissolved oxygen concentrations tend to increase if there is an increase in water transparency (encouraging photosynthesis) or if there are strong winds and currents resulting in water agitation.[17]

Impacts - Water Quality

Water quality in the Cullinan Ranch waterways will depend on both the ambient water quality in the adjacent sloughs and Napa River which circulate into the project, and on the biological and chemical processes occurring within the lagoon. The total volume of water in the project will be about 5200 acre-feet at mean tide for Alternatives A and B (assuming an ultimate channel depth of -10 feet MLLW). A mean tidal prism of about 2100 acre-feet, which is 40 percent of the total water volume, will enter and leave the project twice daily (every 24.8 hours) through the entrance. An additional volume of about 1650 acre-feet (30 percent of the average tidal prism) will enter the project daily from South Slough through tide gates located at the northwest end of the main channel.[18]

The mean tide water volume in the lagoon for Alternative C would be about 3300 acre-feet (assuming a channel depth of -10 feet MLLW and vertical sides). If a large enough tidal entrance is provided so that the water level in the lagoon responds according to the external tide in Dutchman Slough, a mean tidal prism of about 1200 acre-feet, or 35 percent of the total water volume, will circulate through the lagoon twice during each 24.8-hour tidal cycle.

Even though about 90 percent of the lagoon volume for Alternatives A and B (and a maximum of 70 percent for Alternative C) circulates through the waterways daily with the tidal flows, it typically takes several days or weeks to completely flush a project of this type. Flushing is slower because the water quality constituents tend to be transported back and forth through the project channels with the tide, continually being diluted near the entrances by the inflowing waters from the adjacent sloughs. During ebb tide, some of the constituents are transported out of the project into the adjacent sloughs.

However, a certain fraction re-enters the lagoon as the tidal flows reverse during the next flood tide. The net circulation is generally lowest (and the residence times longest) in portions of the project which are dead ends, and which are furthest from the entrance of the incoming tidal waters.

The Cullinan Ranch development could result in three types of water quality impacts: (1) inadequate circulation and flushing within the project waters resulting in potential algal blooms or dissolved oxygen problems; (2) nonpoint source pollutant loadings from urban runoff entering the lagoon from the development; and (3) pollution of the waterways due to marina operations and potential oil spills. In addition, water quality problems occurring in the lagoon may have an impact on the waters of the adjacent sloughs and Napa River.

Flushing and residence times within the project waters were investigated for Alternative A in the RMA/Krone report.[19] These results are generally applicable to Alternative B, but not C. In fact, Alternative B may flush slightly faster than Alternative A since there are fewer "dead end" lateral channels. The water quality portion of the link-node computer model was used to predict residence times in different areas of the project. This model uses the tidal velocities and volumes computed at each segment in the link-node hydrodynamic model to evaluate the transport and dilution of water quality constituents throughout the project channels and adjacent sloughs.

The results of the model simulations are presented in Figures 11 through 15 of the RMA/Krone report.[20] These results show the benefits of installing one-way tide gates at the northwest end of the project to enhance flushing. With no tide gates and no connection to South Slough at the northwest end of the project, the maximum residence time would be about 22 days. An open connection to South Slough reduces the maximum residence time to about 14 days, while the installation of tide gates at the northwest end (Alternatives A and B) reduces maximum residence times to only 7 days.

Although Alternative C was not simulated with the model, a few general comments can be made concerning the residence times for that alternative. The residence times will be minimized by providing a large enough opening so that tidal flow between Dutchman Slough and the lagoon is not restricted. Assuming a single tidal opening at the east end of the project, maximum residence times of several weeks could be expected at the northwest end of the lagoon (based on the simulations for Alternative A with a closed northwest end).[21] These residence times could be reduced substantially by installing tide gates at both the northwest and east ends of the lagoon, as discussed in the following section on mitigations.

The current construction plan proposes to excavate the project waterways to an initial depth of -20 feet MLLW, and then allow them to fill in to -10 feet MLLW before maintenance dredging begins. The RMA/Krone study estimates that this will take about 20 years for Alternatives A and B. During this period, the residence times will be greater than predicted by the link-node model analysis which assumed a channel depth of -10 feet. Although the tidal flows will be about the same, the volumes of the waterways will be about 60 percent larger, so they will take longer to flush. However, since construction of the whole project will take about 20 years, many of the earlier construction phases will already be partially filled in by the time the project is completed.

The effect of construction phasing on residence times was also investigated in the RMA/Krone report. For a partial project configuration consisting of the first two phases plus half of the third phase without tide gates, the residence times were as high as 12 days (Alternatives A and B). These are almost twice as high as for the completed project. The current construction plan proposes to install tide gates at the far (northwest) end of the

development beginning with the third phase (Phase C), successively moving them back as each phase is completed. However, it is not clear whether the tide gates will be very effective in the earlier construction phases, since their successful operation is based on differences in the tidal heights (phase lag) between the project waters and the adjacent connecting sloughs. Since these tidal differences will be smaller for the partial project channel, the potential benefits of tide gates on increased flushing may not be realized during the earlier construction phases.

Algal blooms could occur within the project waters unless flushing and light limitation from turbidity restrict algal growth. The RMA/Krone study includes a steady-state analysis of potential algal blooms. For residence times of 7 days (Alternatives A and B) and 12 days (the partial project), maximum concentrations of phytoplantkton were computed for different levels of suspended solids. These values represent the concentrations of phytoplankton at which self-shading (plus light absorption by suspended solids) and flushing limit further growth. The tabulated results of the analysis (p. 26 of the RMA/Krone report) indicate that for suspended solids concentrations of about 50 mg/l, chlorophyll-a concentrations will be limited to about 10 ug/l for residence times from 7 to 12 days. However, if suspended solids levels dropped to about 10 mg/l due to settling in the project waters, chlorophyll-a levels as high as 50 ug/l could result. These levels have been observed previously above Dutton's Landing on the Napa River.[22] Such levels could create water quality problems if they persisted. Significant algal blooms are not likely to develop for Alternatives A and B, since the continual supply of suspended solids with the incoming tides and tide gate flows will probably keep turbidity high in the project waters. However, problems could develop for Alternative C unless adequate tidal flushing is provided.

No water quality parameters other than phytoplankton (and sedimentation) were included in the RMA/Krone analysis. However, simple steady-state calculations similar to those done for phytoplankton in the RMA/Krone study can be conducted to estimate the possibility of dissolved oxygen problems occurring in the project waters. A steady state computation of dissolved oxygen assuming average late summer conditions indicates that the lagoon waters should generally remain above 5 mg/l.

Nutrients are not expected to be a problem in the project waters for any of the alternatives, since phytoplankton growth will probably be light limited. Other water quality parameters such as temperature and salinity are not expected to vary significantly from the values found in the adjacent sloughs and Napa River as long as there is adequate tidal circulation.

Storm runoff will lead to some contamination of the project waterways as pollutants accumulated on land surfaces are washed into the lagoon. An estimate of nutrient and Biochemical Oxygen Demand (BOD) loading associated with a 10-year storm of 1 hour duration was computed for each alternative using a regression equation developed by Huber.[23] The total runoff volume was computed using the "rational method" with appropriate coefficients for the different land use types. The total nutrient loadings are estimated to be about 120 pounds of total nitrogen and 110 pounds of total phosphorus for Alternatives A and B. This would increase the average concentrations of both nutrients in the lagoon by only about 0.008 mg/l. Total nutrient loadings of about 170 pounds for both nitrogen and phosphorus are estimated for Alternative C, resulting in an increase of about 0.02 mg/l for both nutrients in the project waters. These increases are insignificant since values of nitrogen in excess of 1.0 mg/l and phosphorus in excess of 0.2 mg/l are common in the Napa River.[24]

The BOD Loadings for a 10-year storm runoff are estimated to be about 12,000 pounds for Alternatives A and B, and 18,000 pounds for Alternative C. This would increase the average BOD values in the lagoon by about 0.9 mg/l for Alternatives A and B, and about 2.0 mg/l for Alternative C. The BOD increases would be higher in the immediate vicinities of the storm drains. However, these increases should not persist as long as there is adequate circulation.

A small amount of contamination will occur in the project waters due to general boating activities and marina operations (Alternatives A, B, and C). The potential sources are the discharge of boat sanitary facilities, oil and fuel from marine engines (and minor accidental spills), small amounts of miscellaneous chemicals associated with boat maintenance, and trash discarded into the lagoon or marina. Some of this contamination can be prevented by implementing appropriate mitigation measures. However, a certain amount of it is unavoidable, and should be expected in any water body where boats are present. The unpreventable impacts should be insignificant as long as there is periodic flushing of the lagoon.

Since fuel docks will be provided in the primary marina (Alternatives A, B, and C) and secondary marina (Alternatives A and B), there is some possibility of fuel entering the lagoon during an accidental spill. This could occur, for example, from a s spill near the storage tank if it drained into the lagoon, or from a rupture in the fuel transfer line between the storage tank and boat. An oil spill contingency plan is required by Federal law if more than 1300 gallons are stored in fuel tanks about ground, or if more than 42,000 gallons are stored in underground fuel tanks.[25]

Mitigations - Water Quality (All Developer Responsibility)

- The lagoon for Alternatives A, B and C should be designed so that flushing is maximized in order to prevent water quality problems from developing. Flushing will be optimized for Alternatives A and B by placing the tide gates as far as possible from the project entrance. This will produce the largest phase lag in the tidal heights between the project waters and South Slough, and therefore provide maximum head differences and flows through the tide gates.

- Flushing could be optimized for Alternative C by installing tide gates at opposite ends of the main channel. The tide gates should be designed so that water enters the project at the northwest end from South Slough during flood tide, and leaves the project into Dutchman Slough at the east end during ebb tide. This will induce continual circulation from west to east across the lagoon. Further water quality modeling should be conducted if Alternative C is selected, both to predict the residence times in the project, and to determine the necessary size of the tide gates (or other tidal openings) for a given degree of flushing.

- Further model simulations should be conducted to evaluate the effectiveness of tide gates in the various project construction phases for each alternative. Since residence times will generally be longer without the tide gates, they should be installed as soon as the head difference between the lagoon and sloughs are large enough to result in significant flushing.

- Although nonpoint source pollution due to urban runoff will probably not be a serious problem, several preventive measures can be implemented to minimize these impacts. These measures will probably be more important for Alternative

C, since it has higher pollutant loading (due to the larger land area) and since it may not flush as rapidly as the other alternatives. The possible mitigation measures include:

a. Restrictions on fertilizer and pesticides use in areas near the lagoon.

b. Catch basins and filter traps in the drainage system to remove some of the pollutants in storm waters entering the lagoon.

c. Routine street sweeping to remove pollutants which accumulate on the streets.

d. Trash disposal facilities in public areas and open space areas, along with anti-litter ordinances and enforcement.

e. Periodic collection of debris from the lagoon shorelines and marina areas.

f. Possible restrictions on car washing to prevent soap and detergents from entering the lagoon.

- Since flushing is generally fastest in the main channel, storm drains should discharge from the ends of the residential peninsulas into the main channel, rather than into the closed ends of the lateral channels where circulation is minimim.

- Mitigation measures to minimize the water quality impacts of pleasure boats and marina operations (also discussed under Section B. Marina Function and Design) include:

  a. Restrictions prohibiting the flushing of boat sanitary facilities in project waters. Facilities should be provided in the marina area for pumping out sewage from the boat tanks.

  b. Adequate trash disposal and collection facilities in convenient locations throughout the marinas, and additional periodic collection of debris from these areas.

  c. Routine removal of debris in marina waters using small boats.

  d. Boating regulations and routine maitenance operations which minimize all boat pollutants entering project waters.

  The primary marina should be located (as proposed) close to the main entrance for Alternatives A and B so that marina related pollutants will tend to be flushed out of the project entrance without circulating through the rest of the lagoon. This location will also minimize boat traffic in the lagoon from boats traveling between the commercial marina and the Napa River.

- An oil spill contingency plan should be developed to deal quickly and effectively with potential spills if large amounts of fuel are stored in the marina areas. This should include different strategies depending on the magnitude and location of the spill. The U. S. Coas Guard should be notified immediately of any significant spills, and appropriate remedial measures should be taken as soon as possible. This would include deployment of floating booms to contain the spill, and the use of sorbents to remove the fuel from the water surface or channel

banks. Since spills will generally be limited to gasoline, they will tend to volatilize rapidly. For minor spills, the natural flushing of the tides may be sufficient to adequately disperse the fuel. Surface storage tanks should be surrounded by dikes, and subsurface storage tanks should be surrounded by impervious materials to restrict large spills, which occur at the tanks, from entering the project waters.

- A field sampling program should be conducted in Dutchman Slough and South Slough prior to development. This would establish pre-development baseline conditions in the sloughs, and provide more specific data for detailed water quality analyses. The water quality measurements should include dissolved oxygen, chlorophyll-a, nutrients, suspended solids, turbidity, and BOD, and should cover conditions from spring through fall when dissolved oxygen and phytoplankton blooms are most likely to be a problem.

- If Alternative C is selected and only limited circulation is provided, water quality modeling studies should be performed to investigate the possibility of dissolved oxygen or algal bloom problems developing. The model should simulate phytoplankton, light penetration and turbidity (suspended solids), nutrients, temperatures, dissolved oxygen, and BOD, and should include external loadings due to nonpoint sources and storm runoff. Model studies including Dutchman Slough, South Slough, and the lower Napa River should also be conducted to investigate the impacts of flushing poor quality lagoon waters into the adjacent sloughs.

- Periodic water quality monitoring should be conducted to detect potential water quality problems before they become severe. This will be especially important for Alternative C if tidal circulation is limited. The measurements should include dissolved oxygen, chlorophyll-a, and turbidity. It will be necessary to monitor nutrients and perform algal assays if algal blooms appear to be a problem.

Setting - Sedimentation

The major sources of sediment in the waters near Cullinan Ranch are the suspended solids carried downstream in the Napa River and the solids suspended in San Pablo Bay which move upstream through Mare Island Strait during flood tides.

Between 1960 and 1981, the Corps of Engineers dredged an average of 2,230,000 cubic yards annually from Mare Island Strait to maintain adequate channel width and depth.[26] Sediments are generally composed of about 60 percent (by weight) clay and 40 percent silt and fine sand. A sediment analysis of sample sites in Mare Island Strait conducted by the Corps of Engineers indicated that chemical concentrations were at or below State Water Quality Control Criteria for oil and grease, mercury, cadmium, lead, copper, zinc, polychlorinated biphenyls, and total identifiable chlorinated hydrocarbons.

Data on suspended solids within Dutchman Slough and/or near the project site are not available. Direct computation of sedimentation rates adjacent to the site would require data collection over at least one year to determine the seasonal variations in suspended sediment deposition.

Impacts - Sedimentation

The major impact associated with Alternatives A, B, and C is sediment accumulation in the project channels due to suspended solids carried into the lagoon with the tides. This will require a maintenance dredging program to deep the channels navigable, and a program for disposing of the dredged sediments.

A sedimentation analysis of the Cullinan Ranch project is presented in the RMA/Krone report. The analysis was performed for Alternative A. The results are generally applicable to Alternative B, but not to C. Sedimentation rates were predicted using a computer model which computes the suspended solids entering and leaving the project waters with the tides, and the suspended solids concentrations, settling rates, and sediment accumulation rates in the lagoon. All of these parameters are computed throughout an average tidal cycle to estimate the net accumulation rate in the project per year. The predicted sedimentation rate represents an average rate for the whole lagoon. The deposition rates will actually vary at different locations, depending on the proximity to the entrance, the tidal velocities, and the amount of circulation.

Sedimentation rates were estimated by comparison with observed rates at similar sites. By calculating the effective suspended solids concentrations from measured sedimentation rates in other harbors in San Francisco Bay, the RMA/Krone study estimated an effective suspended solids concentration of 180 mg/l for the project site. Using this value, along with a sediment deposit density of 1.270 g/cm^3, a mean tide range of 4.6 feet, and channel side slopes of l:4, an average sedimentation rate of 0.48 feet per year was predicted. The major uncertainty in this estimate lies in the value of the effective suspended solids concentration used in the analysis. If the actual effective concentration is higher or lower, then the the sediment deposition rate will be affected correspondingly. However, the only way to improve this estimate would be to conduct a field sampling program which measured the suspended solids concentrations in Dutchman Slough and South Slough over a one year period.

Although no sedimentation analysis was conducted for Alternative C, the deposition rates would probably be lower than Alternatives A and B. This is due to the following difference: (1) sediment laden flows entering the project will probably occur only during flood tide for Alternative C, while they will enter Alternatives A and B during both flood and ebb tides (through the northwest tide gates); (2) the lagoon for Alternative C will have vertical sides (bulkheads), so the sedimentation rates will be lower than for the gently sloping channels of Alternatives A and B; (3) the tidal prism for Alternative C represents a smaller fraction of the total water volume that the other alternatives (due to the vertical sides), so the relative volume of suspended solids entering with the tides will be smaller for Alternative C; (4) the sediment laden tidal flows may be more restricted for Alternative C, since Alternatives A and B have an open entrance on Dutchman Slough.

Dredging and sediment disposal requirements were estimated for Alternative A (and B) in the RMA/Krone study assuming the predicted deposition rate of 0.48 feet per year. However, as mentioned earlier, the proposed widths of the proposed channels have been enlarged since the initial analysis was performed. The RMA/Krone analysis predicts a sediment accumulation rate of 4.8 million cubic feet (178 thousand cubic yards) per year in the project waterways. This assumes a bottom area of about 230 acres. However, the current plan (Alternatives A and B) will have 423.5 acres of waterways at MLLW and an estimated bottom area of about 345 acres at -10 feet MLLW. Since this bottom area is 50 percent larger than that used in the RMA/Krone study, the total sediment volume can also be expected to be about 50 percent larger, resulting in an annual deposition rate of approximately 7.2 million cubic feet (267 thousand cubic yards).

The dredging requirements for Alternative C cannot be predicted without first performing a sedimentation analysis. However, the total sediment volume should be smaller than Alternatives A and B, both because the bottom area is about 35 percent smaller (assuming vertical sides) and because the sedimentation rate will probably be lower.

The dredged sediments from Alternatives A, B, and C will be deposited on an 88 acre site at the northwest end of the project. This area may eventually be converted to a marsh wildlife habitat. At this point, some other disposal alternative will be required. This would probably occur later for Alternative C since the anticipated sediment volumes are smaller than for A and B. An additional 117.5 acres is potentially available for Alternative B in the open space wetland directly south of the 88 acre disposal site.

The Cullinan Ranch project will have a small positive impact on sedimentation in Dutchman Slough, since the increased tidal prism associated with the project will maintain a larger equilibrium channel cross-section than the natural slough and sedimentation rates will probably decrease. The sedimentation impact on the Napa River and Mare Island Strait should be negligible since the project tidal prism is insignificant in comparison to the tidal prism of the Napa River.

A small amount of sedimentation may be generated within the project due to erosion of the channel banks by tidal currents, wind waves, and boat waves (Alternatives A and B). These impacts should not be significant as long as the channel banks are reasonably stable. This should not be a problem for Alternative C, since vertical bulkheads will form the perimeter of the lagoon.

Some sedimentation impacts should be expected in the adjacent waters during construction of the project when the levee is breached. All excavation would take place "in the dry" prior to breaching the levee. Nevertheless, these impacts are potentially significant since the earthmoving and grading involve an area of about 1500 acres, and since they will occur over a period of about 20 years. About 3.0 million cubic yards of bay mud will be excavated to form the project channels and an additional 13.2 million cubic yards of fill will be imported to raise the average elevation of the site. Groundwater will probably be encoutered during the excavation of the channels since the water table is currently between 4 feet and 20 feet below the surface.[27] If appropriate mitigation measures are implemented during the construction operations, the sedimentation impacts should be reduced to an acceptable level.

Mitigations - Sedimentation (All Developer Responsibility)

- o A maintenance dredging program should be designed using the RMA/Krone Study recommendations to keep the waters navigable for Alternatives A, B, and C.

- o For Alternatives A and B, the dredged materials should be periodically excavated from the disposal site allowing the same site to be used indefinitely. An additional area of 117.5 acres, proposed as open space wetland, is available directly to the south of the 88 acre disposal site for Alternative B.

- o For Alternative C, a sedimentation analysis should be conducted using estimated tidal circulation rates obtained from water quality modeling to determine anticipated sedimentation rates, dredging frequencies and volumes, and dredge disposal requirements. A dredged materials disposal site should also be identified.

- Periodic sounding surveys should be conducted to monitor the actual rates of sediment accumulation in waterways so that the dredging program can be adapted to meet the specific needs of the project (for Alternatives A, B, and C).

- A field sampling program should be conducted to measure the suspended solids concentrations in Dutchman Slough and South Slough over a one year period so that seasonal variations can be established, if more accurate sedimentation estimates are desired. Dutchman Slough should be dredged to provide sufficient depth for boats at low tide. (See additional mitigation alternatives under marina design and function).

- Sedimentation due to erosion of the project site during the 20 year construction period should be minimized by implementing an erosion and sediment control plan during the grading operations. This would include measures such as filling in the perimeters of each construction phase first before grading the interiors so that erosion will generally be contained, and planting vegetation on exposed perimeter dikes to minimize erosion along the project boundaries.

Footnotes

1 Federal Emergency Management Agency. "Flood Insurance Study for the City of Vallejo, California." April 1978. Revised February 1983.

2 Data sheet from Public Works Office, Mare Island.

3 Resource Management Associates and R. B. Krone and Associates. "Water Circulation, Sedimentation, and Algae Growth in the Cullinan Ranch Development Project." February 1982.

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5 Resource Management Associates and R. B. Krone and Associates, Op. cit.

6 Loc cit.

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10 Vallejo Sanitation and Flood Control District. Rainfall Intensity and Duration Graph. May 1979.

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13 U. S. Environmental Protection Agency, STORET Data Bases. Region IX. San Francisco, California.

14 U. S. Army Corps of Engineers. "Environmental Statement, Napa River." Flood Control Project. 1975.

15 U. S. Army Corps of Engineers. "Environmental Statement, American Canyon Sanitary Landfill Operation." March 1976.

16 Loc cit.

17 Harvey & Stanley Associates. "Interim Report - Cullinan Wildlife Monitoring Program." February 1983.

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20 Loc cit.

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22 Gustafson, J. F. and R. C. Carter. 1975. Op. cit.

23 Huber, W. C. "Urban Wasteload Generation by Multiple Regression Analysis of Nationwide Urban Runoff Data." In: Workshop on Verification of Water Quality Models. EPA-600/9-80-016. 1980.

24 U. S. Environmental Protection Agency. Op. cit.

25 Federal Register, 40 CFR 112, December 1973.

26 U. S. Army Corps of Engineers. "Environmental Statement, U. S. Navy. "Deepening of Pinole Shoal and Mare Island Strait." July 1981.

27 Harding Lawson Associates. Op. cit.

D. SOILS AND AGRICULTURE

Setting - Soils and Agriculture

A description of the soils and the current agricultural use of the Cullinan Ranch property is contained in two reports, "Technical and Economic Evaluation of the Cullinan Ranch Property for Agricultural Production" (August 1982) by Richard Bahme and "Economic Feasibility of the Cullinan Ranch for Agriculture Production" (October 1982) by A. Doyle Reed. See Appendix E. Both of these reports indicate that the surface soils (Reyes Series) have severe limitations for agricultural use. A brief summary of soil characteristics follows.

The Reyes clay on the site has a capability grouping of IV w-9 as determined by the USDA Soil Conservation Service. Capability grouping shows in a general way the suitability of soils for agircultural use. (See Appendix E for a complete description of capability grouping.) The Roman numeral (IV in this case) indicates the capability class. Class IV soils generally have severe limitations that reduce the choice of agricultural plants. They may also require very careful management. The "w" represents a capability subclass and indicates that water in or on the soil interferes with plant growth and cultivation. The "9" is a capability unit within the subclass and indicates a problem or limitation caused by low fertility, acidity, or toxicity.

The primary agricultural limitations of Reyes clay on the site are the seasonally high water table, high salt content, and highly acid soil conditions under altered drainage.[1] The pH soil reaction generally ranges from 3.6 to 6.5 and often results in toxic conditions (pH of 7.0 is neutral). Small grains and forage crops which can tolerate salt and acidity are the only crops suitable for this soil type. The main crop is usually oat hay, and the average expected yield is about 2.5 tons per acre.

The Class IV capability and the severe limitations of Reyes clay indicate that these soils would not be considered prime or unique agricultural lands as defined by the U. S. Department of Agriculture.[2] (Classes I and II are considered prime agricultural soils by the USDA Soil Conservation Service.) However, there are several factors which give the site local importance even though the soils have such limited capabilities. These include good surface drainage compared with other agricultural fields in the area and a relatively short hauling distance for harvested crops.

Drainage. The site has been in agricultural production on a leased basis to Mr. William Kiser for over 30 years. The cumulative result of continuous farming has been the creation of an extensive and effective system of drainage ditches. Surface runoff drains into the ditches and is pumped into Dutchman Slough. Many of the agricultural fields in the area do not have such an effective drainage system. Recent aerial surveys by Harvey & Stanley Associates during the winter of 1982-83 have provided confirmation that many agricultural fields in the north bay are seasonally flooded while Cullinan Ranch remains as "one of the best-drained properties in the area".[3]

Hauling Distances The site is within a relatively short hauling distance to local dairies in Marin, Sonoma, and Napa Counties. The short haul and the limitations of the soil which restrict the crop to oat hay give the site unique charactertistics for dairy feed production. Baled hay is usually stored on the site before it is transported to local dairies.[4]

Crop Yield. The present lessee has been farming the site for the past 30 years, and the site has yielded about 2.5 tons of dry hay per acre and 1 ton of oat grain per acre on the average.[5] The net farmable acreage has been estimated at 1268 acres (1493 total acres

less 15 percent for drains, levees, roads and farm site). About 18 percent, or 230 acres, of the net farmable acreage is suitable for oat seed which leaves about 1038 acres for oat hay production. The annual yields from the site are, therefore, 2595 tons of dry oat hay and 230 tons of oat grain. If all farmable acreage is used for oat hay, then about 3170 tons would be produced per year. According to one report, this is about 1.5 percent of the hay needed for dairy cows in Sonoma and Marin counties and 6.7 percent of the hay produced locally.

Impacts - Soils and Agriculture

For Alternatives A, B or C, agricultural operations on Cullinan Ranch would be eliminated.

The two previous studies have both concluded that continued agricultural operations on Cullinan Ranch are not feasible because, under current market conditions, the Ranch will not produce a net cash flow adequate to support a farm family. This numerical conclusion about the cash flow from Cullinan Ranch is valid, but the normative conclusion about a strict relationship between an ability to support a household and "financial feasiblity" is not applicable to this site. The concept of a "farm unit" as the minimum size unit that could be expected to support a single family may have been appropriate in the early years of this century and may still be appropriate where the farm is so remote from urban or other employment opportunities that off-farm employment would be impossible. This is not the case in Solano County.

The 1978 U. S. Census of Agriculture indicates that 34.6 percent of the Solano County farms with sales of $2,500 or more had operators who considered their principle occupation to be something other than farming. A total of 26.9 percent of these operators reported working off the farm 200 days or more, and 49.4 percent reported some off-farm employment. Clearly the use of a standard that the farm alone must support a household is not applicable in Solano County.

The more applicable consideration is whether an owner or lessee will operate Cullinan Ranch. Since the Ranch is currently under lease, (and has been for 30 years to the same farmer), it must be concluded that agricultural operations are currently economically feasible.

A second issue concerns the importance of a loss of the crops from Cullinan Ranch. This issue is a concern as indicated by the fact that the Board of Directors of the Marin County Farm Bureau have unanimously voted to oppose the proposed Cullinan Ranch development. The Farm Bureau expressed concern that "...the loss of this agircultural land which produces hay or silage for Marin and Sonoma County Dairy Industry will be devastating, especially for the smaller operators who depend on local sources for feed."

The feasibility study by Doyle Reed provides a quantitative analysis of the relative importance of the Cullinan Ranch production. The Ranch was estimated to produce a total of 1.6% of the hay used by dairies in Marin and Sonoma Counties and 6.7% of the hay grown in the two counties.

The absolute magnitude of these percentages does not fully illustrate the significance of the loss of the production at Cullinan Ranch. First, with regard to locally produced hay, a loss of 6.7% of local production, in and of itself, is not insignificant. Of greater importance is the cumulative loss of dairy hay production from all the hay lands in Marin and Sonoma Counties. The Marin and Sonoma County Planning Departments indicate that there are an additional 4,400 acres (+) of oat hay land that can reasonably be expected to

be the subject of subdivision/development proposals in the next five to ten years.[6] Oat hay areas in Sonoma County which are currently at risk of conversion are in the Old Adobe Road/Lakeville Highway area. These include about 2284 acres of 30-acre-lots and 800 ± acres of 60-acre-lots. In Marin County, about 1421 acres of oat hay land is at risk of conversion adjacent to Bel Marin Keys. This point is also discussed in a recent EIR for another project that would involve elimination of hay production.[7] The Frates Ranch EIR notes that the conversion of hay production is a regional issue. The link is established between the availability of a local supply of hay and the economic feasiblity of the dairy industry. The acreage associated with the dairy industry far exceeds the acreage of hay lands.

The complete substitution of hay from outside the region is not a satisfactory alternative for the dairy industry. A local supply of hay provides some protection against price increases by out-of-area suppliers. The importance of a local supply has also been documented in a study for the City of Petaluma.[8] This study indicates that a local supply may moderate the price charged for imported hay.

Mitigations - Soil and Agriculture

For Alternatives A, B and C, the loss of local hay production from Cullinan Ranch would only be mitigated if there were an increase in local production elsewhere in the region. Two alternatives could increase production:

a. utilizing low cost or no cost reclaimed waste water for irrigation which would permit double-cropping during the summer, and/or

b. placing additional land in oat hay production

The economics of waste water irrigation are discussed in a report to the City of Petaluma.[9] That report concluded that wastewater reclamation would produce a profitable oat hay operation and contribute to competitive supply of feed for north bay dairies.

However, these alternatives appear to be beyond the independent control of either the developer or the City of Vallejo, and the feasibility of actually implementing either of them is unlikely. Therefore, without an increase in local production, the loss of about 6.7 percent of the hay grown locally must be considered a significant unavoidable adverse impact due to the cumulative adverse effects on local dairies.

Footnotes

1 USDA Soil Conservation Service. Soil Survey of Solano County, California, May 1988.

2 Federal Register, Volume 43, No. 21, January 31, 1978, pages 4030-4033, Part 657 - Prime and Unique Farmlands.

3 Harvey & Stanley Associates. "Cullinan Ranch Wildlife Monitoring Program -Interim Report," February 1983, p. IV-13.

4 Bahme, Richard, "Technical and Economic Evaluation of the Cullinan Ranch Property for Agricultural Production," August 1982.

5 Telephone Conversations with Mark Riesenfeld, Marin County Planning Department and Carol Whitmore, Sonoma County Planning Department, 11 March 1983.

6 Wagstaff and Brady, Draft Environmental Impact Report Oil Adobe/Frates Ranch Project, City of Petaluma, April 1981.

7 Sedway Cooke and Angus McDonald Associates, Petaluma Wastewater Irrigation Study, June 1975.

8 Ibid.

E. GEOLOGY AND SEISMICITY

Setting - Regional Geology and Seismicity

The San Francisco Bay is in a depression between uplifted hills that bound the bay on the east and west sides. The hills which divide the Bay Area from the Great Valley are east of the site. The mountains to the west and north surround the upper portions of San Francisco Bay (San Pablo Bay).

Most of the North Bay lies within the northern coast range geomorphic province, a diverse assemblage of rocks of un-systematic structure loosely characterized as being in the "Franciscan Formation". This formation consists of sandstone, shale, conglomerate, altered mafic volcanic rocks, chert, limestone, and various metamorphosed rocks.

The eastern hills are part of the Cretaceous Great Valley Sequence of bedrocks. For the most part, these rocks consist of sandstone, mudstone, shale and conglomerate.

Several active and numerous inactive earthquake faults are located within the Greater Bay Area. Faults which have been mapped as being active during quaternary or recent times (within the last 2 million years) are the San Andreas, Hayward, Rodgers Creek, Calaveras, and Concord/Green Valley faults. The closest of these quaternary faults is the Rodgers Creek, approximately 4 miles to the northwest. Recent historical fault activity has been documented on the San Andreas, Hayward, Calaveras and Concord faults. These faults are twenty-five miles southwest, ten miles southwest, and twelve miles southeast of the site respectively.

The Richter magnitude for maximum probable earthquakes emanating from the Hayward and San Andreas faults (the largest fault systems in the area of the site) are 7 and 8-1/4 respectively. The recurrence interval for these earthquake magnitudes is estimated to be about 100 years.

Previous investigations indicate that the Franklin fault, if extrapolated from the northernmost known location of the fault trace (on the southside of the Carquinex Strait) could pass beneath the Cullinan Ranch. The City of Vallejo Seismic Safety Element states that the 1898 Mare Island earthquake was centered on the Franklin Fault trace. However, other reports indicate that this fault is inactive, and apparently does not extend north of the straits.[1,2,3]

Setting - Local Geology and Seismicity

The Cullinan Ranch area was once a tidal marshland on the edge of the San Pablo Bay, bisected by tidal sloughs and channels. It was reclaimed in the early 1990's for farming by constructing perimeter dikes around the periphery of the property. These dikes were supplemented with additional dike construction in the 1940's.[4,5] Little topographic relief is apparent throughout the entire ranch. Approximate elevations range from -2 to +3 feet mean sea level datum (MSL). In addition, interior drainage ditches collect surface runoff inside the diked area. Accumulated water is pumped into Dutchman slough.

The site soil and groundwater conditions have been established by test borings drilled on the site, in in-situ strength measurements, and laboratory samples removed from the test boring.[6,7] More than 30 test borings were made by the two firms studying the site. The deepest boring extended to about 100 feet below existing grades. The following discussion regarding the local geology and soil conditions is based upon a review of the results of the two site investigations and upon general data regarding the properties of Bay Mud.[8] The

Phase I Soil Investigation Report for Cullinan Ranch prepared by Harding Lawson Associates (November 1981) is included in Appendix A. It is noted that preliminary investigations were based on test borings made at an average spacing of about 1300 feet. This is a very small sampling of the total volume of soil throughout the project. Although this sample is considered adequate for the current evaluation of the site, more detail will be needed at a later stage, as recommended by Harding Lawson.

All of Cullinan Ranch is covered by a thick layer of geologically young silty clay and clayey silt, commonly found around the edge of San Francisco and San Pablo Bays, also known as "Bay Mud". Thin layers of silt and fine sand are interspersed throughout the Bay Mud layer. In addition, fibrous peat comprises much of the upper part of the Bay Mud. Judging from the 28 test borings made by Harding Lawson, about 22% of the top 15 feet of the site soil profile is peat. The surface is fairly stiff and somewhat dessicated.[9,10]

Bay mud has high compressibility, low shear strength and low permeability. The peat is also weak and very compressible.

The Harding Lawson Soil I investigation report indicates that below a depth of about 25 to 30 feet, the Cullinan Ranch Bay Mud layer (which is as thick as 90 feet) is overconsolidated. This soil engineering term implies that the lower portion Bay Mud layer has been subjected to different geologic history than the upper part, and that the lower part will be less compressible, stiffer and stronger than the upper part. The nature of this difference in geologic history is now known.

Test borings made on the Cullinan Ranch indicate that the Bay Mud is underlain by geologically older sands and clays. These findings are consistent with other investigations around San Francisco Bay. The underlying soils are consistently stronger and much less compressible than the Bay Mud.[11]

Judging from the Harding Lawson Associates investigation, the groundwater levels vary seasonally from the surface to near depths on the order of 5 feet.

Impacts - Settlement

The following discussion applies to Alternatives A, B and C.

Large ground settlements will occur in those areas of the project where existing grades will be raised with fills to provide for free-board above design flood stage. Plate 6 of the HLA indicates that 50 year settlements of 3 feet could occur in peat areas receiving 10 feet of fill. The settlements are a function of the compressibility of Bay Mud and peat layers and the required amount of fill.

Approximately 16 million cubic yards of fill will be required to raise site grades to acceptable levels above the 100-year flood plain elevation. Of this fill, about 3 million cubic yards will be derived from required lagoon excavations; the remaining 13 million cubic yards will be imported to the site. The source of this fill material has not been determined.

The excavated Bay Mud will have a high moisture content making it difficult to spread and compact with mechanical equipment. It is anticipated that Bay Mud fill will still consolidate and settle after construction is completed. The impact of this fill settlement is not anticipated to be as significant as that settlement which occurs in the underlying, undisturbed Bay Mud because the settlement of the underlying mud should be an order of magnitude greater than that which occurs in the fill.

Settlements of imported fill could also be an impact if the fill is derived from a dredged source. This will depend upon the characteristics of the dredgings. If the dredged soil is predominantly silty and clayey then the post-construction settlements could be similar to those which will occur in the Bay Mud fill. Dredgings composed primarily of sand would not be susceptible to post-construction settlement unless the sand fill has an extremely low density. In this case, the sand fill could settle if subjected to a sudden shock. Low density is only likely to occur if the sand fill is hydraulically placed and not subsequently mechanically compacted.

Excavated peat will also make a compressible fill. This should have little impact if the peat fill is not used in areas covered by structural improvements next to lagoons.

Uniform settlement would not have significant impact on the project area, i.e., if the site did not settle differentially from point to point. However, differential settlements can be expected from a variety of sources. The type and significance of each source is listed in the following table.

DIFFERENTIAL SETTLEMENT IMPACTS FOR
ALTERNATIVES A, B, AND C

Differential Settlement Source	Level of Impact
Variations in Bay Mud thickness	potentially significant
Presence and thickness of peat layers that remain after grading is completed	significant
Sloughs and drainage ditch backfills	significant
Fill thickness (finished) differences	probably not significant
Existing localized high ground	potentially significant
Differences in construction history (between phases)	potentially significant

Total settlement is important because it will control the height to which developed areas and dikes will have to be overbuilt to maintain an adequate free board and to prevent overtopping and inundation by tsunamis or high-tide flows.

Differential settlements will affect the design and performance of utilities, structural foundations and streets. Where differential settlements occur over short distances, the potential significant impacts include overstressed foundation and buried utilities, wracked building superstructures, reversed gradients in gravity flow pipelines and culverts, and the development of bumps and sags in streets. Potential impacts on buildings include foundation cracking and loss of supporting capacity; possible roof and wall leaks; breaks in house service connections, and other architectural and cosmetic damage.

Settlement occurring as a result of oxidation of the peat is not expected to have an impact. This is because the surface peat will either be removed during site grading, or will be covered with fill.

Total and differential settlement impacts will be similar for Alternatives A, B and C. The probability of problems occurring with building is greater for Alternative C simply

because of the greater dwelling unit density. No settlement impact is associated with Alternative D.

Mitigations - Settlement

For Alternatives A, B and C, total and differential settlement impacts can be mitigated somewhat by accounting for the estimated settlements during the design construction phase. To do this, the developer's geotechnical engineer should conduct a detailed investigation or investigations of the site soil conditions for each phase of the project. In this regard, the developer's proposed pilot fill and settlement monitoring program should be considered as part of the future investigation.

Suggested mitigation measures for identified adverse impacts due to settlement are given below and apply to Alternatives A, B and C. (All Developer Responsibility)

- o Design stiffened shallow foundations with inter-connected deep grade on grade or post-tensioned slabs.
- o Use flexible house (buried) service connections.
- o Avoid grade changes near building.
- o Surcharge existing sloughs, ditches and deep peat areas (developer proposed for multi-unit and commercial structures).
- o Use vertical drains to accelerate settlements before buildings are constructed.
- o Install means for releveling during construction or relevel after construction.
- o Remove surface peat and backfill with engineered fill.
- o Use deep foundations extending through Bay Mud, if necessary.
- o Increase gradients at construction stage to account for reversing differential settlements.
- o Use force mains.
- o Use flexible connections.
- o The design of street gutters and catch basins and other surface runoff collection and conveyance facilities should include an allowance for expected differential settlements.
- o Further investigation of the site should include detailed testing to confirm that the lower and greater portion of the younger Bay Mud layer is, in fact, overconsolidted and will not contribute significatnly to the overall total and differential settlements. Further investigation has been recommended by the developer's consultant.

(City Responsibility)

- o At the time that the source of fill is identified, the City should ensure that measures are taken to mitigate the impacts of transporting the fill.

Impacts - Slope Stability

The Cullinan Ranch development will involve construction of an extensive network of lagoons and finger peninsulas. The lagoons will be constructed by excavating from existing level areas, and the Bay Mud derived from the excavations will be placed as fill on the peninsulas to raise grades. This construction technique will have a significant impact upon the stability of the lagoon side slopes because of the weak strength of the foundation soil and fill, if the fill is made up of excavated Bay Mud or other clayey dredgings.

Structural support of excavated channel slopes may be required in high-density residential and commercial areas in order to maximize the space available for development. In their preliminary soil investigation report, Harding Lawson and Associates indicate that tied-back bulk-heads consisting of sheet piles driven to a top elevation of at least 30 feet below the dredge line would be required. However, this construction method was discarded in favor of using compacted fills due to cost.

A critical period for stability will be immediately after the lagoons have been constructed but before they have been filled with water. This is because the weight of the water in the lagoon provides for a counter-balancing and stabilizing force. The developer has stated that there will be no building construction or building occupancy until such time as excavation of the channels is completed and they are then filled with water. The stability of the lagoon banks will also be critical during a large intensity earthquake, despite the presence of the lagoon water.

On the basis of the strength data given in the Harding Lawson Associates Preliminary Soil report, the end-of-construction lagoon banks will be stable if the lagoon bottoms are cut to elevation -20, mean lower low water (MLLW) and the side slope inclinations are 5H:1V above MLLW and 4H:1V below. Present planning calls for small portions of the entire lagoon system to have bottom elevation of -30 (MLLW). It is anticipated that the stability of the lagoon banks in these areas will be marginal, particularly if the actual strength profiles of the mud and peat is lower than reported by Harding Lawson Associates. This could be possible if the Bay Mud that underlies the depth of 25 to 30 feet is not as overconsolidated as has been indicated in their reports.

High intensity ground shaking caused by a large earthquake would have a significant impact upon the stability of lagoon and perimeter dike slopes. It is probable that slopes would undergo severe lateral and vertical deformations if the ground accelerations are intense, and if the earthquake has a length duration.

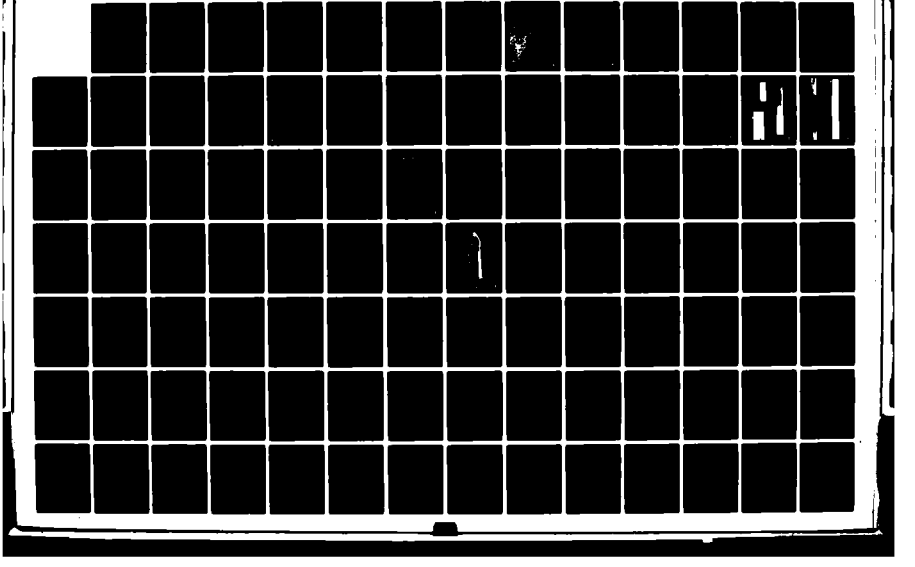
During the life of the project, periodic dredging of the lagoons will be required to remove accumulated sediment. This dredging could have an adverse impact upon the stability of the lagoon bank if the dredged bottom is accidentaly below design bottom elevations. The significance of the impact depends upon the water level in the lagoons shortly after the dredging is completed and on the depth of overexcavation.

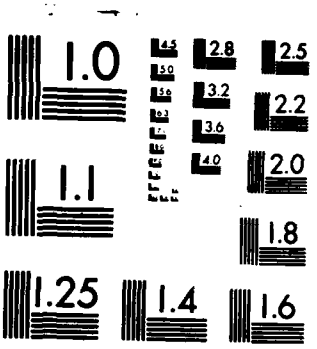
It is unlikely that deep construction trenches in the Bay Mud will be stable. Stability failures of trench sides would be a hazard for construction personnel and could be a source of localized differential (post construction) settlement.

Slope stability impacts are expected to be similar for Alternatives A, B and C because dikes and lagoons are part of each alternative plan. No impact is foreseen for Alternative D.

AD-A128 698 DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT CULLINAN RANCH SPECIFIC PLAN(U) TORREY AND TORREY INC SAN FRANCISCO CA MAY 83 2/3

UNCLASSIFIED F/G 13/2 NL





Mitigations - Slope Stability

The risk of problems with landslides occurring on lagoon slopes can only be eliminated by dispensing with the planned lagoon system. The risk is probably small; however, the acceptable risk should be determined by other parties (the design engineer, the developer, the political entities involved etc.). This cannot be answered by the limited soils investigations performed to date. One way the risk can be reduced is by raising the lagoon bottoms to a higher elevation than called for by current planning. Dikes will always be subject to some risk of instability. The following mitigations apply to Alternatives A, B and C including high density development areas. (All Developer Responsibility.)

- o Future sediment dredging operations should be rigidly controlled so that sediment removal does not result in a bottom elevation lower than design values. (Developer proposed.)

- o Establish building setbacks from the top of lagoon banks and dikes based upon a detailed study of lateral and vertical deformations of banks that would occur during large earthquakes. With proper setbacks, the impact of potential seismic deformations on the structural adequacy of the buildings can be mitigated to an acceptable level. (Developer proposed.)

- o Buttress the lagoon banks with compacted fills. Seismic deformations would thus be reduced, particularly if the fill material is generated from an offsite (non-dredged source.)

- o Reduce the grades of that portion of the project immediately adjacent to the tops of all the lagoons, to increase stability. This is because the potential for a landslide to occur largely is controlled by the difference in elevation between the bottom of the lagoon and the top of the lagoon slope (or dike). A slight increase of stability can also be achieved by flattening the slopes.

- o Shore construction trenches to mitigate the hazard associated with work in these trenches. (Developer proposed.) The stability of the trenches can be increased by flattening trench side slopes.

- o The strength characteristics of the Bay Mud on this site should be studied in more detail. This study should include strength testing to confirm the soil strength profile used for preliminary slope designs. Existing dikes that will be part of the project system should be individually evaluated and upgraded as necessary to achieve factors of safety consistent with the importance of the dike. It is anticipated that dikes will have to be improved and made similar to the lagoon banks.

Impacts - Erosion

For Alternatives A, B or C, unprotected lagoon banks would be subject to erosion by waves generated during windy and stormy periods and by movements of boats in the channels. The erosion would increase the turbidity and sedimentation in the lagoons.

Because Bay Mud is not a particularly erosion susceptible material, the quantity of erosion would not be great. As long as erosion resistent soil is used in the banks, the impact of erosion on the lagoon water quality would be adverse but not major.

The developer proposed to protect the lagoon and main channel banks with a mix of indigenous salt marsh plants, rip rap, and possibly, with commercially available plastic mats with attached filter cloth (ENKA drain). Those salt marsh plants that can withstand a salty environment would effectively control erosion in that zone of the protected banks on which the plants can take root. This is expected to be elevation +3 (MLLW). Below this elevation rip rap would also be effective for controlling erosion. It is important that the rip rap be placed upon either a graded soil filter or filters, or on a mat of protected filter fabric that has a record of longevity and resistance to environmental effects such as salt water immersion and ultra-violet light.

Mitigations - Erosion

The following mitigations apply to Alternatives A, B and C.

The potential for wave-created channel erosion will be effectively reduced to a level of insignificance by the developer's proposals for shore protection. Specific recommendations and a discussion of alternatives by Moffatt & Nichol, Engineers are in their report "Cullinan Ranch Shore Protection" (January 1982) contained in Appendix A. The following shore protection mechanisms discussed in their report and included in the Specification Plan should be implemented by the Developer to reduce impacts due to erosion (see Exhibit III-3).

On the southern side of the existing Dutchman Slough levee:

1. plant cord grass and pickleweed above +3.1 feet MLLW

2. place a 10-foot-wide, level, berm at +3.1 feet MLLW

3. place rip rap on areas highly susceptible to erosion

On the raised development portions adjacent to interior channels:

1. plant cord grass and pickleweed between +3.0 feet MLLW and about 12.0 feet MLLW

2. provide plastic mat with attached filter cloth (ENKA drain) between +3.0 feet MLLW and -3.0 feet MLLW

Alternative: Place rip rap between 3.5 feet MLLW and -3.0 feet MLLW (as an alternative to ENKA drain) with a graded soil filter and/or mat of protected filter fabric and a 3 foot berm at elevation -4.0 feet MLLW to prevent rip rap stones from rolling down the slope.

Impacts - Seismicity

There could be several important adverse effects related to earthquake vibration and earthquake fault movements.

Stability considerations are discussed above. Ground shaking would induce inertial forces in structures located on the site. Seismic waves generated from nearby faults and passing through the Cullinan Ranch soils could lead to lurching of the ground surface. This would damage the utilities and surface improvements. Lurching is considered to be a potential impact. Earthquake ground shaking could increase the pressure within the water found in

the pores of sandy soils (liquefaction). Liquefaction could lead to slope stability failures and settlement of developed areas. Finally, shearing along an active fault could severely damage structural improvements located on the fault trace.

Liquefaction should not impact this site. This is because the Bay Mud, either as fill or in a natural state, is not susceptible to liquefaction. The sandy seams found within or on the Bay Mud may liquefy. However, since they are not continuous nor extensive, the impact of liquefaction of these seams on surface settlements and stability would be minimal. Sandy soils located at or near the ground surface would not have an impact if removed or densified to above liquefiable levels during construction. Dynamic compaction and settlement are not believed to be a potential impact for the same reasons.

All reports indicate that no active fault crosses beneath the site. Therefore, the potential for shear displacements at the ground surface is nil. Furthermore, the presence of a deep layer of soft soil over the bedrock on the site would tend to prevent the displacement of bedrock from being manifested at the ground surface.

The specific effect that severe ground shaking would have on structures and other improvements on the site depends upon the nature of the structures and the stiffness and thickness of the peat, Bay Mud, and other soils above the bedrock. It is noted that the soft Bay Mud will attentuate high frequency ground motions and reduce the ground surface accelerations below the levels generated in the bedrock underlying and adjacent to Cullinan Ranch. It can be expected that the fundamental period of the soil deposit underlying the site would be quite long. If the structures on the site are five stories or less, the impact that the ground shaking would have would not be significant.

It it anticipated that lagoon bank and dike slopes would suffer deformation (outward movements) if the site is subjected to a long duration and high magnitude earthquake. This deformation is caused by inertial forces in the Bay Mud which momentarily exceed yield acceleration levels of the Bay Mud and capping fill.

It is anticipated that the seismicity impact is slightly greater for Alternative C than would be the case for A and B. This is because of the greater density of dwelling units, which increases the risk of problems occurring in Alternative C. Seismicity impacts on Alternative D are considered minimal.

Mitigations - Seismicity

Mitigaton of the impact that the earthquake vibrations will have on slope deformation and stability is discussed above. This impact can be mitigated by establishing building setbacks beyond the zone near slopes that will be affected by inertial deformations.

For Alternatives A, B and C, the impact that the vibrations will have on structural adequacy can be mitigated to an insignificant level. Utilizing proper engineering input, buildings can be designed to withstand strong earthquake shaking and to suffer only cosmetic and architectural damage and not structural collapse.

- o Evaluate the potential ground accelerations at the foundation level to determine if the shears and moments mandated by the Uniform Building Code are adequate for the site conditions. (Joint Developer and City Responsibility.)

- o Undertake additional borings within the project to verify that continuous sand layers do not exist. If necessary, analysis of the potential impact of liquefaction

induced in sand layers present within the Bay Mud should be part of these additional engineering studies. (Developer Responsibility.)

- o The potentially damaging effects of ground lurching can be mitigated to a great extent by ensuring that site fills are well compacted. This will increase the fill stiffness and resistance to lurching. (Developer Responsibility)

Impacts - Tsunami and Site Inundation

Harding Lawson and Associates indicate that the Highway 37 embankment is higher than the projected run-up of a tsunami with a 100-year return period. However, along Dutchman Slough, a tsunami could overtop some dikes and inundate all of the low lying area behind. Such a wave would not have a destructive force but would have the characteristics of a flood. The impact on Alternatives A, B and C would be negligible with the project ground elevations designed above 14.0' MLLW. Extensive flooding could occur with Alternative D but would not be considered a significant adverse impact given the existing drainage system on the site.

Mitigations - Tsunami and Site Inundation (Developer Responsibility)

- o Evaluation of the tsunami impact should include an estimate of future settlements of dikes (it is possible that the Highway 37 embankment is still settling). The evaluation should determine the dike and embankment minimum elevations that will be obtained after the future and present settlement of the Bay Mud has been completed. The impact should also be mitigated by including extra freeboard above the flood or tsunami elevation to act as a factor of safety. This would account for unknowns in engineering estimates of settlements and tsunami or flood elevations.

Impacts - Permanent Spoils Site

The placement of dredged spoil on unimproved low-lying areas will cause settlement of these areas. The weight of spoil would consolidate the underlying undisturbed natural Bay Mud in the same manner as in the project fill areas. The amount of settlement would probably be less than beneath project fills if the thickness of the spoils is less. However, the rate of settlement will be quite different because the placement of spoils will be periodic and not completed at one time.

Excavated peat could be placed in the spoils site. This would not have a large impact on the spoils areas except to increase both the total and differential settlement.

Mitigations - Permanent Spoils Site (Developer Responsibility)

- o Spoils should be placed with the thickest fill section at the center of the site. This will prevent ponding at the center. No other specific mitigation measures are recommended for spoil sites if no structural improvements are planned for these areas.

Footnotes

1 Harding Lawson Associates, "Preliminary (phase 1) Soil Investigation, Cullinan Ranch - Island No. 1, Vallejo - California," November 13, 1981.

2 Department of the Interior, U. S. Geological Survey, Basic Data Contribution 54, "Preliminary Geologic Map of Solano County and parts of Napa, Contra Costa, Marin and Yolo Counties, California", 1973.

3 California Division of Mines and Geology, Geologic Data Map No. 1, "Fault Map of *California* ", 1975.

4 Harding Lawson Associates, Op. Cit.

5 U. S. Department of the Interior, "Geological Survey", Basic Data Contribution 9, "Preliminary Map of Historic Margins" of Marshland, San Francisco Bay, *California*, 1971.

6 Harding Lawson Associates, Op. Cit.

7 Gribaldo, Jones and Associates, "Vainapies, Solano County, California, *Preliminary* Feasibility Study", (undated).

8 Rudolph Bonaparte and James K. Mitchell, Department of Civil Engineering, University of California, Berkeley, "The Properties of San Francisco Bay Mud at Hamilton Air Force Base, California, " April 1979.

9 Harding Lawson & *Associates, Op. Cit.*

10 Gribaldo, Jones and Associates, Op. Cit.

11 Harding Lawson & Associates, Op. Cit.

F. VEGETATION AND WILDLIFE

Setting - Vegetation and Wildlife

The entire Cullinan Ranch site is within the historic (1850s) marsh margin of San Francisco Bay as indicated on Exhibit III-3. The area was part of a large network of marshes and sloughs along the Napa River until levees were constructed in the late 1800's. Levee construction effectively eliminated tidal action on the site and permitted dry land farming and dairy ranching. The marsh habitat was eliminated except for the system of drainage ditches which collected surface runoff from the site. The installation of pumps to discharge collected runoff to Dutchman Slough permitted agricultural operations to continue even during years of heavy rainfall. Presently, there are only isolated pockets of marsh or wetland vegetation which occur in the drainage ditches, on uncultivated, low-lying portions of the property and on the levee facing Dutchman and South Sloughs.

The findings of a preliminary biological survey have been presented in a report titled "Cullinan Ranch Ecological Aspects" by Harvey & Stanley Associates (June 1982). That report (see Appendix D) indicates there are presenty seven major habitat types in the Cullinan Ranch area with values for wildlife use ranging from very high to low. Table III-1 indicates the identified habitats and associated value for wildlife use. The relative values for wildlife use were based on the variety and number of species and the presence (observed or inferred) of unique forms as listed in the report.

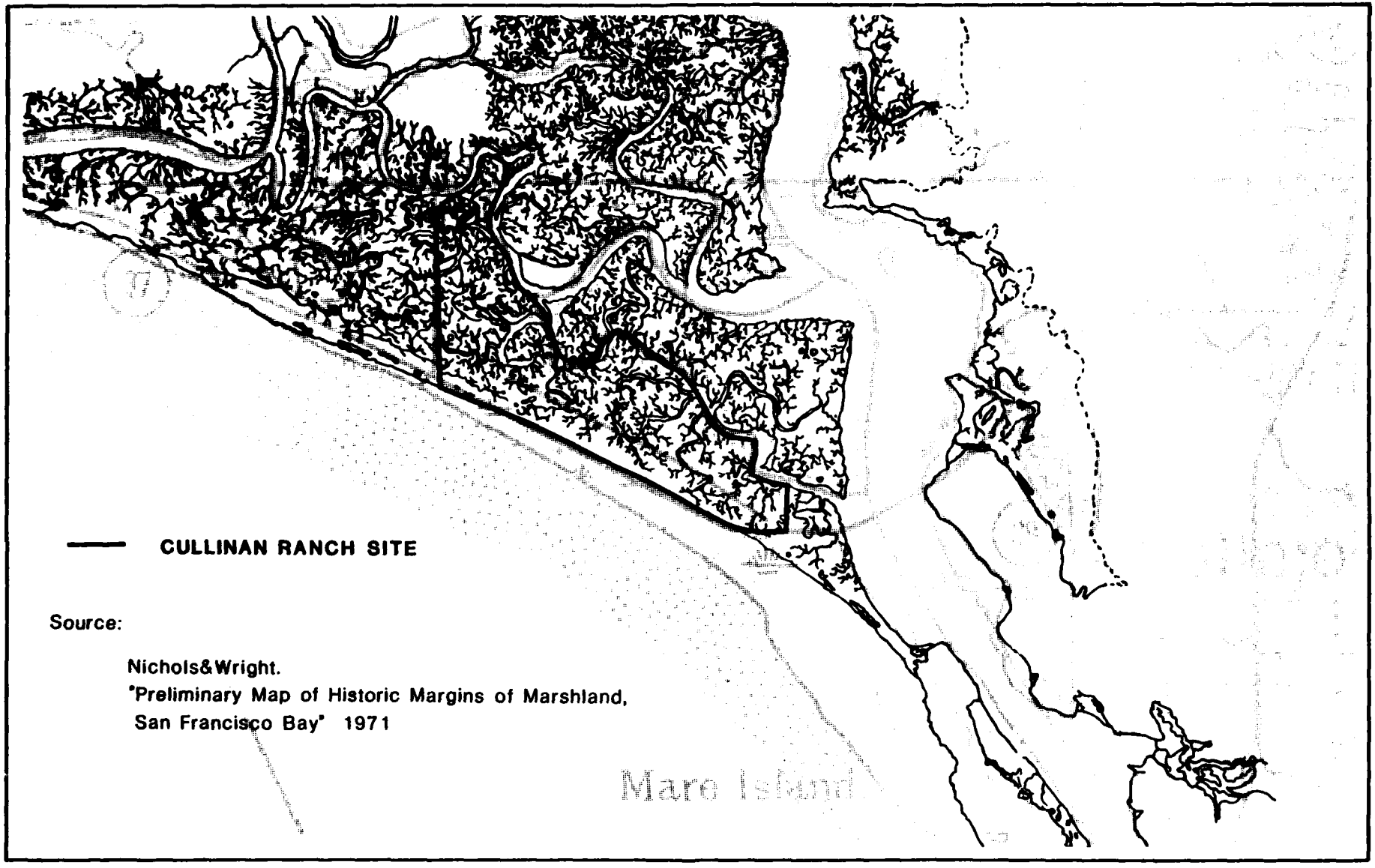
Table III-1

HABITATS IDENTIFIED IN THE AREA OF CULLINAN RANCH WITH RELATIVE WIDLIFE USE

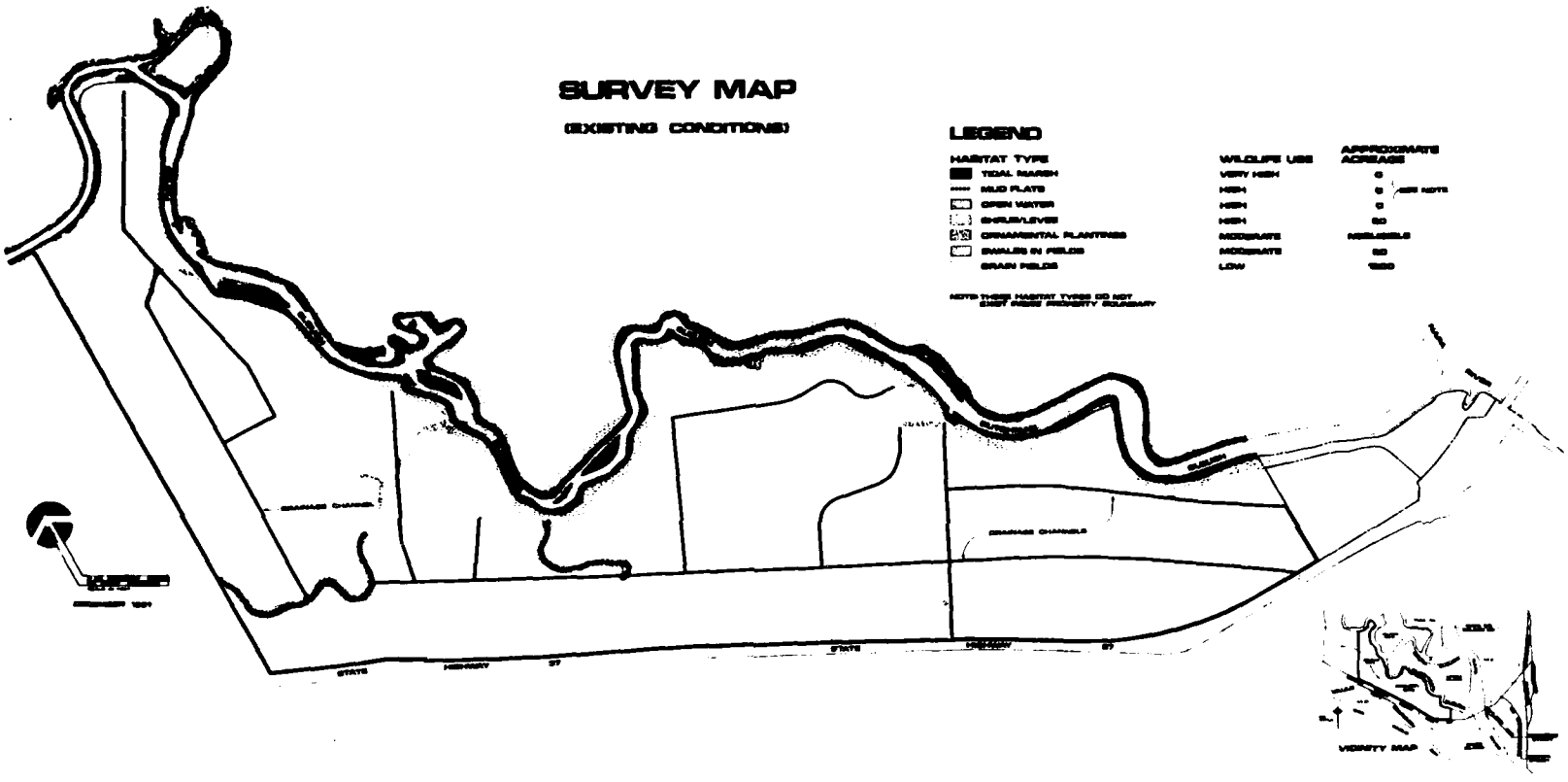
	Habitat Type	Widlife Use
1.	Tidal Marsh	Very High
2.	Mud Flats	High
3.	Open Water	High
4.	Shrub/Levee	High
5.	Ornamental Plantings	Moderate
6.	Swales in Field	Moderate
7.	Grain Fields	Low

Source: "Cullinan Ranch: Ecological Aspects" by Harvey & Stanley Associates (June 1982)

All of the seven habitats are identified on Exhibit III-4; however, only the shrub/levee, ornamental plantings, field swales and the grain fields are actually located on the site. Although the tidal marsh, mud flats, and open water habitats are on the periphery of the property, they are included as part of the environmental setting because of 1) the high and very high wildlife use, 2) the potential presence of endangered species, and 3) the high potential for off-site habitat disturbance due to any construction activities on the Cullinan Ranch property. The Harvey & Stanley report provides lists of vertebrates for each habitat and a plant list for the entire site. (See Appendix D.)



TORREY & TORREY INC. environmental/urban planning and design	Historic Marshes Near Vallejo	EXHIBIT III-3



Source: Harvey & Stanley Assoc. and Cullinan Ranch Specific Plan

TORREY & TORREY INC. 2T environmental/urban planning and design	Cullinan Ranch Biological Habitats	EXHIBIT III–4

A subsequent report (February 1983), "Cullinan Ranch Wildlife Monitoring Program", prepared by Harvey & Stanley Associates provides further information on wildlife utilization of the site and adjacent areas of San Pablo Bay and the Napa marshes. This document is an interim report to identify preliminary trends in wildlife utilization of the site and surroundings.

The wildlife monitoring data presented in the interim report is the result of six months of field sampling (August 1982 through January 1983). The field data was gathered through the use of ground avian transects, aerial waterfowl and shorebird surveys, marina monitoring within San Francisco Bay, and a survey of fishes in Dutchman Slough. The preliminary trends identified by this data include the following:

Ground Avian Transects

- The total number of birds observed in the grain field (14,917) is substantially greater than those observed along the slough (2,256). p. IV-2. However, the transects emphasized the agricultural grain fields (75-85 percent of the average in transects one and two are grain fields). In addition, the surveys were completed at various times of day and state of tide. The mudflat areas are exposed only at low tide; therefore, the shorebirds in the slough may be under represented. Even though 63% of the birds seen in the agricultural fields were flocking starlings, the large numbers of birds indicate a need for reevaluating wildlife value of the fields. p. IV-4.

- The wetlands areas on the site (approximately 2% of the entire ranch) are not used extensively by wildlife in the winter. p. IV-4.

Aerial Surveys

- Most birds (81%) flying over the transects flew at a height above 75 meters. p. IV-5.

- Most birds in flight were moving to and from areas immediately NNE and SSW of the property where the transects were run. p. IV-8.

- The highest numbers of waterfowl observed on the eight aerial surveys were in San Pablo Bay with very little activity by waterfowl and shorebirds at Cullinan Ranch. p. IV-13.

Alternate Marina Sites

- A survey of birds utilizing Redwood Shores and Bel Marin Keys lagoons is currently in progress to determine the impacts of existing marina activities on species present (American coot, mallard, goldeneye, ruddy duck, double-crested cormorant, pied-billed grebe, lesser scaup and canvasback).

Fish Population Monitoring

- The fish collected from Dutchman Slough include typical San Francisco Bay forms, anadromous, and typically freshwater forms which have a wide salinity tolerance (salinity ranged from 11 to less than 1 ppt).

The monitoring program is scheduled to continue through the summer of 1983 with a final report in August 1983. The final report will contain data from a full year of field

observations, density calculations for birds using the various habitats, data from ground transects, aerial surveys, fish sampling, and surveys of alternate marinas. Additional field surveys for candidate plant species and a trapping program for the endangered salt marsh harvest mouse are also planned for the spring of 1983.

The Solano County Mosquito Abatement district reports that the tidal marsh area south of Highway 37 (extending from Mare Island West to the Sonoma Creek Bridge) has a history of mosquito production throughout the year, the species complex changing after the winter months and remaining basically the same from late spring through the fall. Two species are produced in the winter months (Culiseta inornata and Aedes squamiger) that actively bite man. There is a complex of lateral ditches that connect with a main collection drain throughout the length of the marsh for the purpose of promoting as much drainage as possible. Unfortunately the combination of extremely high tides during the winter months (7.0+ MLLW) and rainwater results in too much water for the capacity of the drainage system. Consequently chemical control is required to suppress the larval populations that occur. With the arrival of the spring months and slightly warmer temperatures comes the production of the species capable of transmitting encephalitis to humans (Culex tarsalis). This mosquito is found in rainwater pools such as those found in the diked area south of Highway 37 adjacent to the western-most Mare Island fence line (Figueras Tract). It is also found in tidal water that accumulates as a result of the extremely high tides that occur from the late spring and throughout the fall. The combination of ditches and naturally occurring predators in addition to the mosquitofish that the District has introduced, provide fairly good control. It is still occasionally necessary to augment these with chemical treatment.

The area of proposed development is also subject to flights of salt marsh mosquitoes and gnats from surrounding areas outside the District's jurisdiction. A non-biting aquatic gnat called a midge can become extremely pestiferous due to their mass numbers. There is a resemblance between midges and mosquitoes which generates service requests during the late spring in the Vallejo area.

Agricultural grain fields on diked historic baylands generally have a higher habitat value during the winter when seasonal flooding occurs. Although these areas do not support characteristic wetland vegetation, they can be important as seasonal wetlands because of their short-term values as 1) substitute feeding habitat for waterfowl dependent upon true wetlands; 2) breeding grounds for amphibians; and 3) resting areas for shore birds when high tides cover adjacent mud flats. The brief period of time during which the seasonal wetlands have standing water coincides with periods of maximum concentration of waterfowl and shorebirds in the Bay Area. Many soil organisms and insects thrive in the surface water where they become an important food source for migrating and resident species. Seasonal wetlands have increased in importance due to the diminishing acreage of perennial wetlands around San Francisco Bay. Both the California Department of Fish and Game (DFG) and the U. S. Fish and Wildlife Service (FWS) consider diked agricultural fields, in general, to be seasonal wetlands and potentially significant habitat for wintering waterfowl.

The system of drainage ditches and the pumping operation on the Cullinan Ranch site currently prevents seasonal ponding. During 1982-83, the site remained free of standing water even though rainfall was excessive compared to other years. According to the Harvey & Stanley Associates report, waterfowl utilization of the agricultural fields was minimal, and most waterfowl were observed on San Pablo Bay.

The Resource Management section of the Department of Fish and Game reports that statewide populations of waterfowl (primarily ducks) have decreased by 35 percent between January 1982 and January 1983. The primary cause of these reductions is the decreasing population of pintail ducks. This species generally breeds on the Canadian prairies which are experiencing a severe drought. The resulting mortality of pintails has severely limited the number of birds returning to winter in California. Consequently, most waterfowl surveys indicate less wildlife utilization. This trend is expected to reverse with the easing of drought conditions on the Canadian prairies.

California Department of Fish and Game (DFG). The DFG has responsibility for managing the hunting and fishing easements along Dutchman Slough and South Slough adjacent to the project site. These areas are open to the public for recreational purposes. See Section IIIA. Land Use for further discussion of this easement as it pertains to the Sta' Lands Commission. The DFG also has jurisdiction over any activities involving stream b modification (breaching of levees) by authority of the Fish and Game Code Section 16 Fish and Game Code Section 5650a-f requires maintenance of optimum aquatic habit The DFG serves as a review agency for Army Corps of Engineers permit applications a also reviews projects to determine conformance with the Basic Wetlands Protect Policy of the California Resources Agency adopted in 1977 and the San Francisco F Management Guidelines (1979).

The Basic Wetlands Protection Policy states that the Resources Agency, its Departments, Boards and Commissions, will not authorize or approve projects that fill or otherwise harm or destroy coastal, estuarine, or inland wetlands.

Exceptions to this policy may be granted provided that all the following conditions are met.

1. The proposed project must be water-dependent or an essential transportation, water conveyance or utility project.

2. There must be no feasible, less environmentally damaging alternative location for the type of project being considered.

3. The public trust must not be adversely affected.

4. Adequate compensation for project-caused losses shall be a part of the project. Compensation, to be considered adequate, must meet the following criteria:

    a. The compensation measures must be in writing in the form of either conditions on a permit or an agreement signed by the applicant and the DFG.

    b. The combined long-term "wetlands habitat value" of the lands involved (including project and mitigation lands) must not be less after project completion than the combined "wetlands habitat value" that exists under pre-project conditions.

The following San Francisco Bay Management Guidelines assist the DFG in reviewing projects within the historic marsh margins of San Francisco Bay.

1. All areas of historical tidal marsh should be restored to productive fish and wildlife habitat wherever feasible.

2. Existing agricultural uses within the historical marsh margin and adjacent areas are compatible with habitat protection objectives and are encouraged to continue. Upon cessation of such uses, those areas should be restored or upgraded to the highest habitat value for the fish and wildlife of the Bay.

3. Ruderal and other undeveloped areas adjacent to existing wetlands should be preserved as open space for wildlife, with recreation uses encouraged, consistent with protection of wildlife habitat values.

4. Development in wetlands may be permitted if such development is dependent upon a waterfront site, provided that there are no other less environmentally damaging alternatives. Additionally, only those portions of projects which are actually water-dependent will be permitted.

5. The net volume and tidal surface of the Bay should not be reduced by permitted development. Any reduction in surface or volume should be offset by restoration of a comparable area in terms of size and value to fish and wildlife.

6. Permitted development on diked but unfilled historic marsh which results in permanent loss of an area having potential fish and wildlife habitat values must be offset by restoration of an area of comparable size and value.

The Basic Wetlands Protection Policy and the San Francisco Bay Management Guidelines were issued after the Boundary and Exchange Agreement (1974) authorized by the State Lands Commission for Cullinan Ranch. The DFG has indicated that the currently proposed project must be evaluated for consistency with the policy and guidelines. However, the project applicant contends that the state relinquished interest in the property as coastal, estuarine, or inland wetlands with the authorization of the Boundary and Exchange Agreement and the transfer of Coon's Island to the state. See discussion under Land Use; State Lands Commission. The issue of applicability of the Wetlands Policy and the San Francisco Bay Management Guidelines has not been resolved at this time. In order to identify all potential impacts of the proposed project and alternatives, this EIR/EIS assumes that this policy and the guidelines would be applied when the DFG evaluates the project and alternatives.

Generally, the DFG evaluates projects on an individual basis in an effort to identify significant habitat acreages. A policy of acre-for-acre compensation is usually applied to projects which eliminate significant habitats such as wetlands, seasonal wetlands or areas of diked historic baylands. Various combinations of on-site and off-site mitigation packages have been individually established by agreement between project developers and the DFG.

When evaluating development proposals, the DFG also cites State Senate Concurrent Resolution No. 28 (April 18, 1979) which advocates the protection, preservation, restoration, acquisition and management of wetlands. The legislature resolved that the DFG develop a plan which includes, among other subjects, a program for maintaining existing wetlands habitat, a program for optimizing wildlife value of existing wetlands habitat, and the identification of sufficient additional potential wetland habitat sites to increase the amount of wetlands in California by 50 percent. This resolution was adopted with the findings that over 90 percent of the historical natural wetlands in California have been lost by conversion to other land uses, and that loss of wetland habitat, particularly wintering waterfowl habitat, has had a severe adverse effect on the number of waterfowl on the Pacific Flyway. The Cullinan Ranch site may occupy a strategic location in the

Pacific Flyway for wintering and migrating waterfowl because of its position in the Napa Marsh between the salt ponds and the San Pablo Bay National Wildlife Refuge. The DFG is very concerned about maintaining an unobstructed flyway between the Napa Marsh and San Pablo Bay.

U. S. Fish and Wildlife Service. The U. S. Fish and Wildlife Service (FWS), Department of the Interior, is the Federal agency responsible for preserving, protecting and enhancing fish and wildlife resources. The FWS also serves as a review agency for Army Corps of Engineers permit applications under the authority, and in accordance with, the provisions of the Fish and Wildlife Coordination Act. The Congressional Acts and Executive Orders under which the FWS has been given its responsibility have been formed into the following policies which the Service uses to review all proposed projects.

1. The Service encourages all efforts to preserve, restore and improve the fish, wildlife, aquatic and wetland ecosystems and assists in the preservation of other environmental resources.

2. The Service actively discourages activities and developments in or affecting the nation's water and wetlands which would individually or cumulatively, with other developments on a water, unnecessarily destroy, damage or degrade fish, wildlife, aquatic and wetland ecosystems.

3. It is the Service's position that there exists a national recognition that wetland and shallow water habitats have such high ecological and social values as to consent to their destruction or degradation only where there is no question that the public interest demands it.

4. The Service discourages the occupation and destruction of biologically productive wetlands and shallows. The Service usually recommends that the site occupied by a project involve the least loss of area on the least valuable of the alternative sites; that avoidable loss or damage to such productive wetlands and shallows, their fish and wildlife, and their human uses be prevented; and that any damages or loss of such resources, proved unavoidable, be fully compensated.

5. The Service usually recommends against the issuance of U. S. Army Corps of Engineers permits for nonwater-dependent projects particularly where biologically productive wetlands are involved and alternative upland sites are available. Nonwater-dependent projects include homes, restautants, parking lost, and other activities not functionally dependent on a waterfront location. A water-dependent project requires a location in or next to a water body to function, for example marinas, port facilities and docks.

The FWS reports that the Cullinan Ranch is classified as a "palustrine farmed wetland" in the Classification of Wetlands and Deepwater Habitats of the United States, and is mapped as such in the U. S. Fish and Wildlife Service National Wetlands Inventory. The FWS has also identified the Napa Marsh as the number one priority for waterfowl wintering habitat preservation for the California coast, and the California coast is ranked sixth in national importance.

The FWS has used an analysis known as the Habitat Evaluation Procedure (HEP) to determine habitat values on existing sites and to predict the habitat value which would result from a proposed project. A HEP analysis normally includes input based upon the judgment of biologists and scientists experienced in resource management who represent

state, federal, local and private interests. A complete HEP results in the determination of whether a project will result in an overall ha 'tat value higher, lower or equal to an existing value. At this time, no HEP analysis has been completed for Cullinan Ranch.

Rare/Endangered Species. The primary species of concern that are predicted or known to occur in the Cullinan Ranch area are indicated on Table III-2. The Harvey & Stanley report (June 1982) indicates that these species were either predicted to occur on the site, observed on an adjacent site, or observed on-site (i.e., Cullinan Ranch). The FWS has identified three federally listed endangered species and two candidate species which may occur in the Cullinan Ranch area (letter dated 9 September 1982). Subsequently, the FWS published a complete list of vertebrate species that are considered candidates for federal listing (Federal Register, 30 December 1982). Several of the candidate bird species in the 30 December 1982 listing have been recorded as occurring in the Cullinan Ranch area. Candidate species do not receive protection under the Endangered Species Act. However, they are considered in the environmental planning process because they could be formally proposed and listed during the construction period of a project. Table III-2 indicates the present states of all these plant and animal species as well as where they have been observed or predicted to occur. The four plant species are considered rare and endangered by the California Native Plant Society based on their Inventory of Rare and Endangered Vascular Plants. According to observation reports from Harvey & Stanley Associates, two of these species (delta tule pea and soft bird's beak) have been tentatively identified on the levee at the northern boundary of the site. The other two species (Mason's lilaeopsis and caper-fruited tropidocarpum) have distribution records in the vicinity and may also be located on the levee.

The FWS is currently working on a recovery plan for the clapper rail and salt marsh harvest mouse which will probably involve Dutchman Slough and South Slough adjacent to the project site. The tidal marsh and mudflats located outboard of the levees along both sides of Dutchman Slough, from its westerly opening into South Slough to its confluence with the Napa River and South Slough from its confluence with Dutchman Slough to its confluence with Napa Slough have been proposed for designation as essential habitat for both of these species.

As part of the process under Section 7 of the Endangered Species Act, the Corps of Engineers is currently preparing a Biological Assessment to determine whether any federally listed species may be affected by the proposed development of Cullinan Ranch. The Biological Assessment will be completed following receipt of the trapping results for the salt marsh harvest mouse.

Impacts - Vegetation and Wildlife

All of the impacts on vegetation and wildlife for Alternatives A, B and C cannot be determined until a full year of field investigations are completed. However, at this time a number of impacts can be identified.

For Alternatives A, B and C, probably the longest range impact would be the loss of restoration potential to return the site to tidal salt marsh, assuming that the Basic Wetlands Protection Policy and the San Francisco Bay Management Guidelines would apply to the site. This is considered a significant adverse impact which cannot be avoided if the proposed project or either of the Alternatives B or C is implemented. Alternatives A, B, and C are not in conformance with the San Francisco Bay Management Guidelines which encourage continuation of existing agricultural uses within the historic marsh margin and which advocate restoring fish and wildlife habitat upon cessation of such uses.

Table III-2

RARE OR ENDANGERED SPECIES KNOWN FROM THE CULLINAN RANGE AREAS

	Birds	Scientific Name	Federal	State	Recorded Observation (1982)
1.	American peregrin falcon	Falco peregrinus anatum	Endangered	Endangered	Predicted
2.	Bald eagle	Haliaeetus Leucocephalus	Endangered	Endangered	Predicted
3.	California clapper rail	Railus longirostris obsoletus	Endangered	Endangered	Off-site
4.	California brown pelican	Pelecanus occidentalus californicus	Endangered	Endangered	Off-site
5.	California black rail	Laterallus jamaicensis coturniculus	Candidate[2]	Rare	Off-site
6.	Western snowy plover	Charadrius alexandrinus nivosus	Candidate[2]	--	Predicted
7.	Salt marsh yellow throat	Geothlypis trichas sinuosa	Candidate[2]	--	Off-site
8.	Long-billed curlew	Numenius americanus	Candidate[2]	--	On-site
	Mammals				
1.	Salt marsh harvest mouse	*Reithrodontomys raviventris*	*Endangered*	Endangered	Off-site
	Plants				
1.	Soft bird's beak	Cordylanthus mollis mollis	Candidate[2]	Rare	Off-site
2.	Delta tule pea	Lathrus jepsonii Jepsonii	Candidate[2]	--	Off-site
3.	Mason's lilaeopsis	Lilaeopsis Masonii	Candidate[3]	Rare	Off-site
4.	Caper-fruited tropidocarpus	Tripidocarpum capparideum	Candidate[1]	--	Off-site

[1] Sufficient biological data exists to propose this species for endangered or threatened status.

[2] Insufficient biological data to propose these species for endangered or threatened status.

[3] Species no longer being considered for listing as endangered or threatened (removed from candidate list).

Sources: "Cullinan Ranch: Ecological Aspects" by Harvey & Stanley Associates (June 1982)
U. S. Fish and Wildlife Service, letter to COE, September 9, 1982
Federal Register, December 15, 1980, Review of Plant Taxa for Listing as Endangered or Threatened Species (USFWS)
Federal Register, December 30, 1982, Review of Vertebrate Wildlife for Listing as Endangered or Threatened Species

The developer has proposed a restoration program for one side of the existing Dutchman Slough and South Slough levee. See Exhibit III-4A. This includes about 36 acres of inter-tidal area between elevations 3.0 feet MLLW and 6.2 feet MLLW which would be planted with pickleweed, cordgrass and other naturally occurring tidal marsh vegatation. The planting scheme would be designed using the natural elevation distribution of plants that presently grow along Dutchman Slough. An additional 50 acres of inter-tidal area (between 3.0 feet MLLW and -2.5 feet MLLW) would also be added at the base of the levee. Widening of the shrub/levee habitat along the northerly side of the project has been proposed to provide another 30 acres of wildlife habitat.

The FWS has expressed concern over the possibility that it may be very difficult to establish marsh vegetation on the levee due to waves generated by boat traffic. This is a potential adverse impact which could be reduced by enforcing a 5 mph limit for power boats within the development and by implementing alternative means for levee protection for areas that are particularly susceptible to wave erosion.

The FWS has also expressed concern that the responsibility for levee maintenance should be clearly defined. For Alternatives A and B, the breach in the levee places a limit on direct land access for maintenance purposes. At this time, it is assumed that the DFG would continue to maintain the outboard side of the levee. The developer has stated that the boating channels and the restored wetland areas south of the centerline of the levee would be dedicated to the City of Vallejo or other public jurisdiction which would be responsible for maintenance.

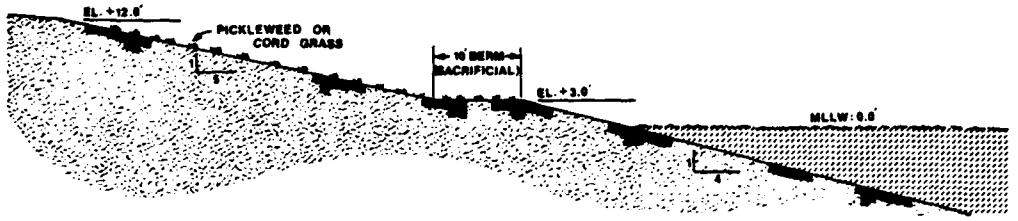
Alternatives A and B suggest that additional tidal marsh may be developed on conversion of the dredge material disposal area to a wildlife habitat. This area includes about 88 acres of historic marsh land which may be subjected to tidal action if it is planned to remain below 6.1 feet MLLW. However, maintenance dredging would not begin for 20 years and the need for a disposal site would continue indefinitely. Periodic removal of dried dredge materials from the site would provide a long-term location for depositing materials, but would preclude the establishment of salt marsh habitat. It therefore appears questionable whether this site could be restored to productive salt marsh unless an alternative location for dredge material disposal is identified.

Table III-3

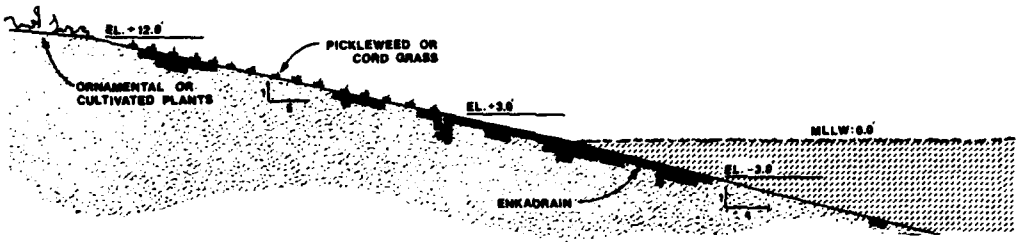
ACRES OF WILDLIFE HABITAT RESULTING FROM EACH ALTERNATIVE

Habitat Type	Alt. A	Alt. B	Alt. C	Alt. D
Grain Fields	--	--	--	1200
Swales, Drainage Ditches	--	--	--	20
Shrub/Levee	78	78	60	60
Ornamental Landscape	300	300	300	1
Tidal Marsh	30	204	--	--
Mud Flats	50	50	--	--
Open Channel/Waterways	366	366	229	--
Total Acres	824	998	589	1280

A comparison of the habitat acreages for the various alternatives indicates that the composition of habitat types would change considerably from the present conditions (No Project-Alternative D). These acreages are given in Table III-3. Alternative D (No



MAIN CHANNEL (SLOUGH SIDE)



INTERIOR AND MAIN CHANNEL (DEVELOPMENT SIDE)

Source: Cullinan Ranch Specific Plan

TORREY & TORREY INC. environmental/urban planning and design	Developer Proposed Shoreline Protection	EXHIBIT III-4a

Project) would provide the most acreage for wildlife use. However, Alternatives A and B would provide a greater number of habitat types (5) than the existing condition (3). In addition, wildlife density calculations (not yet available) may indicate that the additional habitats support a greater total number of individuals (even though the species composition would change since aquatic habitats would replace the terrestrial habitat.) When field data has been collected for a full year, density calculations should be made to help determine the relative value of each habitat type.

Regardless of the relative values of the various habitats, the loss of the existing grain fields, swales, and drainage ditches as wildlife habitat is considered an adverse impact. These features would be completely eliminated in Alternatives A, B and C. The initial rating of the grain fields as a habitat with low wildlife use needs revision based upon more recent data (Harvey & Stanley, February 1983). The grain fields are evidently used extensively by large numbers of flocking granivorous and insectivorous birds and shore birds feeding upland, though waterfowl have not been observed in significant numbers. To determine the full impact of eliminating this habitat requires additional data on year-round utilization. At this time, the loss of these habitats must be considered a potentially significant adverse impact due to the displacement and/or elimination of birds known to utilize the resources there. The species which would be affected by the developments proposed in Alternatives A, B, and C are indicated on Table III-3A.

Some of these species such as those associated with the existing ornamental vegetation, would adapt well to the proposed development. However, many of these birds are upland species which would not be able to utilize aquatic habitats; others would not be able to utilize ornamental plantings as suitable habitat due to specific habitat requirements. In addition, the long-billed curlew is a candidate for the federal endangered species list, and this species would be displaced or eliminated by the development.

Another impact resulting from Alternatives A, B and C is the loss of tidal marsh vegetation and habitat where the existing levee would be breached. For Alternatives A and B, the 300 to 400 foot wide opening of the levee would eliminate one of the most dense areas of marsh vegetation along Dutchman Slough and would also present movement by terrestrial wildlife species back and forth along the levee. This could be a significant adverse impact if this area is formally designated as essential or critical habitat for the salt marsh harvest mouse and clapper rail, or if populations of the mouse species are discovered in the trapping program planned for the spring of 1983.

There are several other potential impacts on vegetation and wildlife which will require additional data to determine significance. The location of the proposed development between the Napa Marsh and San Pablo Bay could obstruct the flyway for birds moving between these two habitats. The preliminary results of field observations indicate that most birds are at a high elevation (over 75 meters), and the proposed structures and landscaping would not exceed this height. However, birds in flight may be sensitive to the new land uses and/or activity on the ground, causing them to detour around the development or fly at higher elevations. This impact could be significant if the additional energy expended to avoid the development were to result in increased bird mortality. Some species may be able to tolerate the additional expenditure of energy and have the navigational skills to make this impact insignificant, while other species may be highly affected. Final evaluation of this potential impact should be completed when data based on a full year of over-flight observations is available, and when data has been collected on over-flight characteristics in other marina developments.

Table III-3A

PRELIMINARY LIST OF BIRD SPECIES WHICH WOULD BE AFFECTED BY ALTERNATIVES A, B, AND C

Flocking, Granivorous and Insectivorous Birds

Lesser goldfinch
Starling (most abundant species)
Savannah sparrow
Western meadowlark
Brewer's blackbird
Red-winged blackbird
Housefinch
Horned lark
Water pipet
Song sparrow
Rock dove
Barn swallow
Loggerhead shrike
Raven

Over-wintering Shorebirds

Long-billed curlew
Black-bellied plover
Killdeer
California gull

Upland Game Species

Ring-necked pheasant
Mourning dove

Raptors

Red-tailed hawk
Marsh hawk
White-tailed kite
American kestrel
Northern harrier

Species Associated with Ornamental Eucalyptus

Yellow-rumped warbler
Ruby-crowned kinglet
American robin
Barn owl
Great horned owl
Common flicker
Dark-eyed junco
Scrub jay
Mockingbird

Species Associated With Irrigation Ditches and Swales

Black phoebe
Common snipe
Greater yellow legs
Great blue heron
Great egret
Snowy egret
Mallard

The potential impacts on several of the identified rare and endangered species should be identified when additional data has been collected during 1983. Although several endangered bird species have been predicted to be on-site, only two federal candidate species (salt marsh yellow throat and long-billed curlew) have actually been observed to date on the site. The salt marsh yellow throat would probably not be significantly affected by Alternatives A, B or C because it depends upon the levee habitat which would be preserved. However, the long-billed curlew would be adversely affected by the loss of grain fields which it uses for resting and possibly foraging. The impacts upon the salt marsh harvest mouse are unknown since it is not known if this species is present on the site. Potential impacts will be determined following the trapping program planned for 1983. The only plant species which has official protection (State) and has been definitely observed on the site is the soft bird's beak. The distribution of this designated rare species (as well as any others) will be determined during the summer of 1983. However, rare and endangered plant species are expected to be confined to the levees along the slough. Preservation of these levees would, therefore, reduce the impact of the development on these species if public access were controlled.

Secondary impact of Alternatives A, B and C on the vegetation and wildlife of the Napa Marsh would primarily be due to increased boat traffic and increased human activity in areas which are now infrequently visited. The proposed trail system along the levee provides public access which can lead to wildlife disturbances on both sides of the slough. These impacts are considered significant as cumulative impacts since wildlife disturbances are presently occurring due to use of the area for hunting and fishing.

Another secondary impact would be the probable elimination of hunting along Dutchman Slough adjacent to the project. The DFG would probably have to restrict hunting as a safety measure. This could have the beneficial impact of increasing wildlife usage if the new human disturbances discussed previously were less than the present disturbances due to hunting.

Other secondary impacts of Alternatives A, B and C include the beneficial impact of increased aquatic habitat for estuarine fishes resulting in larger fish populations. This benefit is dependent upon the recommended mitigation measures suggested to reduce water quality impacts.

The proposed system of tide gates for Alternatives A, B and C would probably provide sufficient flushing of waterways to minimize mosquito production. Mosquitoes migrating into the developed areas from the surrounding marshes would result in additional service requests to the Solano County Mosquito Abatement District. This is a highly likely secondary impact of placing a residential development within a marsh area that already has a mosquito problem.

For Alternative D, the no project alternative, the agricultural use would probably continue until no longer economically feasible. At that time, the restoration of the site to tidal salt marsh would require acquisition of the site by a public agency. Following acquisition, a complete salt marsh restoration plan would have to be designed that would provide guidelines for breaching the levee, establishing drainage channels, recontouring the site (if necessary), protecting the Highway 37 embankment, removing existing structures, planting vegetation, and developing a phasing program to accomplish the necessary tasks. The California Waterfowl Association has indicated that it would endorse the restoration of the site to tidal salt marsh and would provide detailed information (at no cost to the City of Vallejo) into the mechanisms for restoration and management. However, unless a source of funding to purchase the site can be identified, salt marsh restoration appears to be economically infeasible at this time.

Mitigations - Vegetation and Wildlife

(Developer Responsibility)

- o For Alternatives A and B, the proposed entrance breach in the levee should be reduced slightly in width or moved further north to preserve more of the vegetation adjacent to Dutchman Slough. Any redesign of the levee opening should include input from a hydrologist to ensure that tidal flow would not be restricted and cause water quality problems.

- o For Alternatives A, B and C, the existing levee areas should be preserved intact due to the possibility that rare or endangered plant and animal species may be present. A complete survey should be conducted to determine distributions of these species prior to project approval.

- o For Alternatives A and B, investigations should be made into the design of islands near the inside of the levee to reduce wave action and increase habitat for aquatic plants. These islands might be constructed instead of increasing the width of the levee as proposed by the developer. A string of narrow islands parallel to the levee planted with native aquatic vegetation could also mitigate the impact of eliminated habitat due to breaching the levee for the channel entrance.

Mitigation Alternatives (Developer Responsibility)

- o For Alternatives A, B and C, the following alternatives are suggested to respond to the identified impacts of the eliminated potential to restore the site to productive salt marsh as stipulated in the San Francisco Bay Management Guidelines and the loss of agricultural grain field habitat. One (or possibly a combination) of these options would be implemented to 1) mitigate this impact to an insignificant level, or 2) provide adequate compensation for the impact.

a. A complete Habitat Evaluation Procedure (HEP) could be implemented using FWS guidelines to compare the existing value of the wildlife habitat with the projected habitat value of the project and with the projected habitat value of a restored tidal marsh. Depending upon the results of this analysis, the selected project alternative should be modified (if necessary) to reflect a wildlife habitat value equal to a restored tidal salt marsh.

b. An agreement could be negotiated between the developer and the DFG to acquire an off-site mitigation area which would be restored to productive salt marsh and deeded to the State of California. Details regarding off-site acreage, restoration and maintenance responsibilities, and adequacy of compensation should be worked out jointly with the DFG, FWS and NMFS. A precedent for establishment of off-site mitigation areas has already been set on a number of other projects.

c. The developer could contribute funds to a land trust administered by the State Lands Commission for the purposes of environmental mitigation pursuant to the regulations of the Kapiloff Land Bank (Public Resources Code, Section 8600) effective January 1983. By the summer of 1983, the State Lands Commission plans to have an option on specific parcels which may be used for mitigation.

Details regarding the total amount of the developer's contribution, the relationship to project phasing, and the actual trust administration, should be worked out with the DFG and the State Lands Commission.

G. AESTHETICS

Setting - Views *(See Exhibits III-5 through III-7)*

The project site is suitable in a low lying area between San Pablo Bay and the Napa River. The site's surrounding visual context includes a strong water orientation. Adjacent properties to the south (San Pablo Bay) and west are under water and a slough meanders along the project site's northern boundary. Development is scarce in the immediate vicinity. Vacant land which surrounds the site reinforces the existing rural character. Grassy marsh vegetation predominates and a few eucalyptus trees are scattered throughout the landscape.

The site's visual character is one of undeveloped agricultural acreage and marshland. Flat open terrain is interrupted occasionally by long straight levees, drainage swales and a few small eucalyptus groves. Other structural or visual elements are not present on the property. Although Sears Point Road (Highway 37) borders the site on one side, minimal access actually penetrates the property. Thus, large portions of the site have a secluded or tranquil character.

Short range views from the site are blocked by levees and the Highway 37 roadbed. Distant views encompass hillside silouettes, San Pablo Bay and the City of Vallejo. Views into the site are most prominent from Sears Point Road (Highway 37) which is designated as a potential scenic highway. A panoramic view across the site can be seen from this location because the roadbed is slightly elevated.

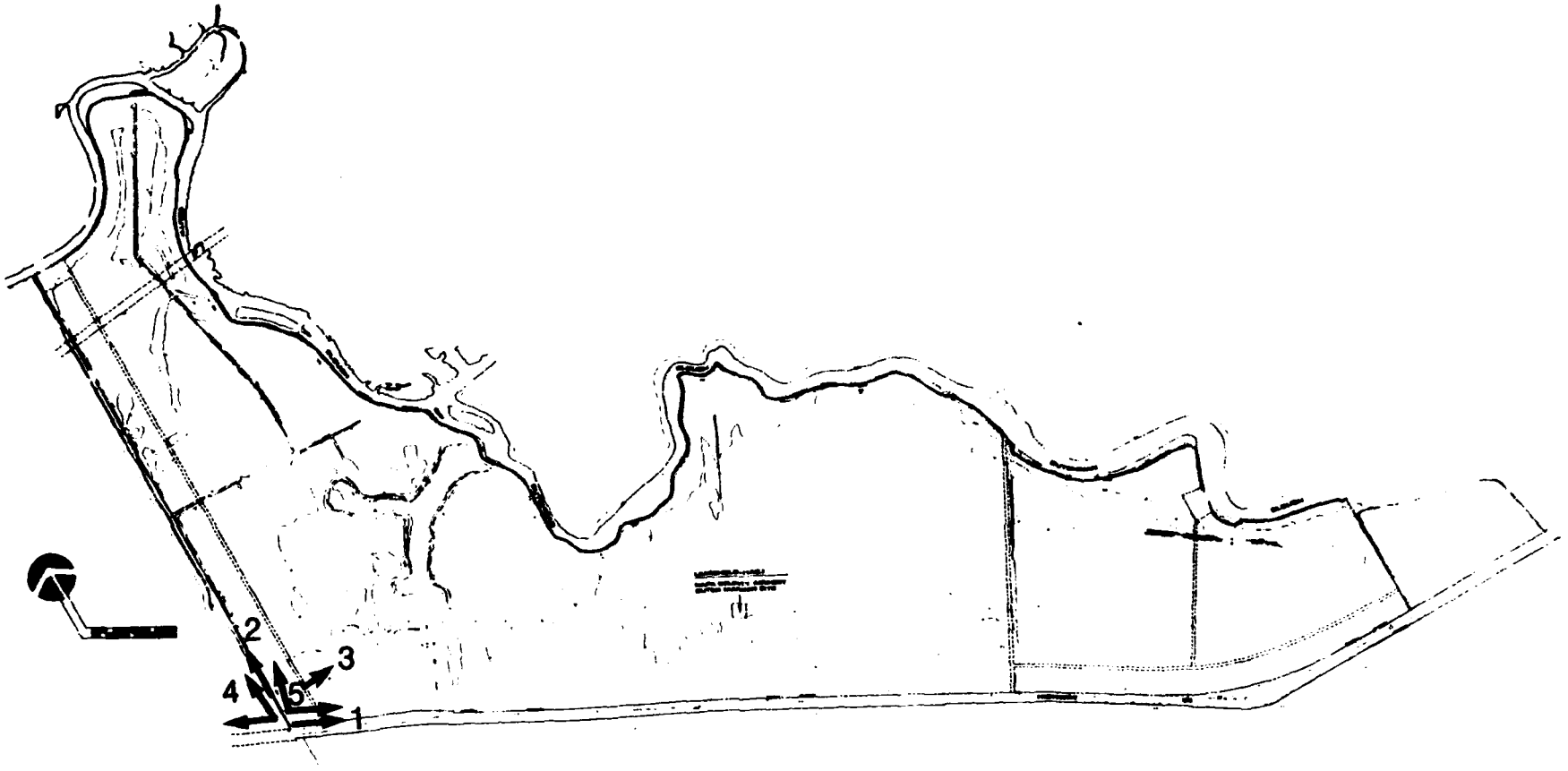
The Vallejo General Plan identifies several urban design goals and policies which pertain to development of the project site. A primary design goal is to "take advantage of the hills, waterfront, and other natural features in creating a unique identity". Recognizing Sears Point Road (Highway 37) as a potential scenic route, the General Plan recommends special design treatment such as limited access, screening and landscaping for subdivisions which border scenic routes and provision of bicycle paths in addition to effective coordination of new development along scenic corridors.

The General Plan recognizes that well planned mixed-use development can be a desirable alternative to monotonous uniform texture. A stated goal for the City's urban texture is "to have a planned variety of land uses within each neighborhood." Policies for achieving this goal include the use of Planned Unit development and effective buffers between uses in order to ensure compatibility.

Impacts - Views

Aesthetic impacts for Alternatives A through C would be similar; however, construction of Alternative B would alter a smaller land area and Alternative C would alter the appearance of a larger portion of the site. Alternative D, the no project alaternative, would be most consistent with the site's aesthetic surroundings.

Construction of the proposed development would dramatically alter the site's visual appearance; undeveloped agricultural and marsh land would be transformed into acres of residential development, marina and landscaped open space. Views from Highway 37 would be greatly altered. While crossing over the Mare Island Strait and traveling west for the next three miles on Route 37, the proposed development would be highly visible. Proposed residential units and commercial structures would appear most obtrusive in the



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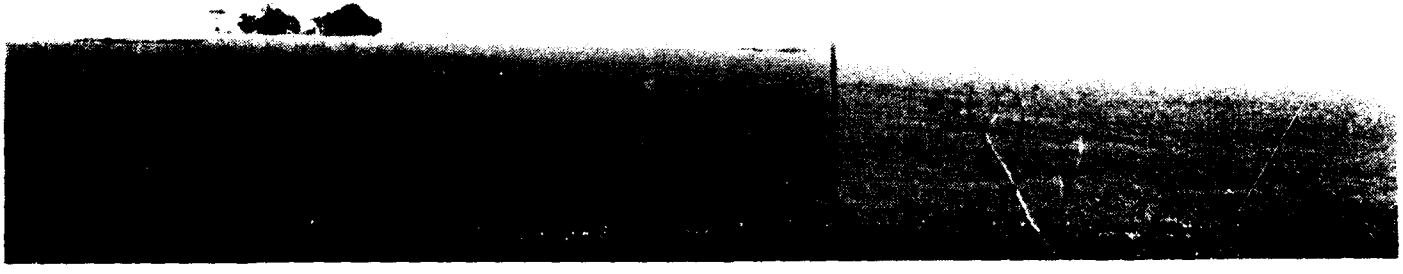
Location of Views

EXHIBIT III-5

1

2



3

TORREY & TORREY INC. 2T environmental/urban planning and design	Views at the Site	EXHIBIT III-6

4

5

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environmental/urban planning and design

Views at the Site

EXHIBIT III-7

landscape while numerous boat masts would also be visible. Project construction would render the site less visually compatible with its aesthetic surroundings which are described in the setting section. This would be an adverse impact.

Because the project would occupy a relatively large area (approximately 1200 acres), the project could result in a monotonous development image and pattern.

The two water tanks of the proposed development (Alternatives A-C) could be visually obtrusive. Their height may be out of scale with the visual surroundings.

A noise wall, approximately 13 feet high, has been recommended to reduce highway noise in the development. This wall would separate Highway 37 from the proposed development. The wall could also restrict views from the scenic highway to the north.

Internal views would generally be attractive, taking advantage of the site's water orientation. Single family residences would be closely oriented to the waterfront and medium density units would overlook the water, marinas and marsh area. The neighborhood commercial area would be flanked by residences on three sides which could result in unattractive residential views.

Mitigation Measures - Views

- Design of the noise wall should incorporate a combination of landscaped earth berms and masonry. If feasible, openings should be provided for water views from Highway 37.

- The water tanks should be painted a light blue grey or blue-green color to reflect water, sky or vegetation colors. Fast growing evergreen trees should be planted to screen them and earth berms should be constructed to provide a visual buffer.

- Visual access to water views should be provided for motorists on Highway 37. This could be achieved by creating controlled open "view corridors" within the development along Frontage Road.

- An attractive landscaped buffer which would effectively screen views from adjacent residences should be incorporated into the design of the neighborhood commercial area.

- Views of parking areas at commercial, marina and medium density residential areas should be screened by a combination of earth berms and landscaping. Mature canopy trees should be installed in parking areas.

- Landscaping and grading should be used to the greatest extent feasible for screening the development from Highway 37 views.

- All building and site design should be compatible with the Architectural Design and Landscape Guidelines which are outlined in the Cullinan Ranch Specific Plan Development Standards.

- Consideration should be given to employing several architectural firms for design of residential and other types of development. This could generate compatible design diversity which would minimize the potential for visual monotony.

Setting - On Site Functional Relationship

Alternative A

The configuration of the proposed plan's marinas, land areas and waterways is intended to separate development and human activity from sensitive natural areas. At the same time, provisions are made for residents and the general public to view the wetlands from residential, commercial and public water areas and along footpaths on the levee.

Channels and Boating Facilities

The main east-west boat channel serves both to provide marine access and to buffer areas of human activity from the levee, which serves as the beginning of the wetland area. The secondary channels leading from the main channel provide exposure to the water from residences, water view parks to be located on the residential peninsulas, and from pedestrian pathways and vehicular streets connecting the peninsulas with each other.

The large public marina is located at the eastern end of the site, next to the specialty commercial area, where it is accessible from land with the least intrusion on the residential areas. The secondary marina is more centrally situated on the main channel, while individual boat docks are located in the secondary channels, adjacent to the single family residences they serve.

Residential Areas

The single family units are divided into sub-communities located on the peninsulas delineated by the boating channels. Residents of interior streets and visitors would have views of the water from the pedestiran/bicycle system and from the view parks that provide openings between the single-family homes fronting on the boat channels.

Higher density areas are located closer to Highway 37 and the main frontage road paralleling the highway. These higher density areas are bounded by local collector streets and by adjoining schools and parks. They are separated from the lower density residential areas by a wide pedestrian/bicycle corridor.

Commerical Areas

There are three commercial areas in the plan. The large, specialty-commercial center, which would have restaurants and shops serving a regional as well as local market, is located adjacent to the primary marina and marina park, where regional clients would be able to gain access to all of these facilities directly from Highway 37 and the frontage road.

A smaller, community oriented shopping center is centrally located further west in the project, adjacent to the frontage road and the higher density residential areas. The secondary marina will also accommodate a limited number of commercial outlets for the users of the marina.

Circulation

Access to the site is from Highway 37. A combination of at-grade entries and exits connect the highway with the frontage road at three access points, two new and one

previously existing at the Walnut Avenue Interchange immediately west of the Napa River Bridge. Once on the frontage road, motorists would be able to reach directly any commercial, residential or marina facility through the system of local streets.

The pedestrian and bicycle system provides a non-vehicular movement network. The system connects all commercial and marina areas, parks, schools, and major groupings of residential areas. An extension of the pedestrian network is provided along the full length of the levee.

Boaters will have access to private residential docks and both marinas through the main channel and secondary channels. The main channel connects with the Napa River and San Pablo Bay via Dutchman Slough.

Recreation and Public Open Space

Both neighborhood and community recreational facilities are included in the plan. A marina park, extends from the main commercial area and primary marina. A community park is located adjacent to higher density residential areas, and smaller neighborhood parks adjoin the two elementary schools.

Private view parks on the residential peninsulas provide views of the water. All of these community and local facilities are connected to the pedestrian system, which also extends onto the levee.

Public Facilities

A junior high school and two elementary schools are indicated to serve the resident population. The school sites are located adjacent to community and neighborhood parks and within walking or bicycling distances of the residences.

Alternative B (Reduced Project Alternative, see Exhibit II-8)

This alternative is the same as Alternative A, except for two areas: the westerly part of the site would remain as open space/wetland, and the eastern part of the residential peninsulas facing the primary marina, would become a flat land area, to be developed for medium density housing. Thus the total amount of residential land area would be reduced, but the number of units would remain the same.

Alternative C (The General Plan Alternative, see Exhibit II-9)

This alternative basically differs from Alternative A by its higher number of residential units, and by the designation of industrial use on the Guadalcanal site. In order to provide for a larger number of units, the main boating channel is much smaller and is an enclosed lagoon, and the single family peninsulas are on the north side of the site, and are smaller than in Alternative A. High density residential areas are proposed near the center of the site, flanked by parks and public schools. The rest of the residential area is designated for medium density residential.

Two additional schools are proposed at the western end of the site, and near the single family area to the north. Specialty commercial is proposed around the marina at the eastern end of the site.

Impacts - On-Site Functional Relationship

Alternative A

The proposed (schematic) development plan provides a mix of uses which would generally take advantage of water access and views. Higher density residential development is proposed close to the frontage road access where it would have minimal traffic impact on single family residences. Open space which is designated for parks would be located adjacent to medium density housing and school sites. This proximity would be advantageous to the greatest number of park users and would provide additional open space amenities for medium density housing. The commercial marina is relatively isolated from residential development, thus minimizing marina traffic and noise impacts on the residential environment. Specialty commercial space is conveniently located near the commercial marina.

The development plan includes a pedestrian trail which follows along the commercial marina and out to the end of the levee, thus providing extensive waterfront access for pedestrians. The levee trail would be a loop, approximately 8 miles in length. Bicycle paths are also included in the development plan; however, bicycle circulation parallels the road alignment. With the exception of the marina areas, waterfront access would not be available to bicyclists. The levee area is suitable for a bicycle path as well as a pedestrian trail; particularly becuase the 8 mile round trip length is more appropriate for bicycles than pedestrians. The addition of a bicycle path on the levee would maximize the opportunity for waterfront public access at the development.

Because of safety considerations, placement of a school in the main approach to the Napa Airport is considered to be an adverse impact.

Mitigation for this impact has been recommended above.

Alternative B (The Reduced Project)

The main difference in this alternative is the preservation of 118 additional acres in open space/wetland. This acreage is on the west side of the site, the most remote part of the site. It results in a better transition between urban development and the adjacent salt ponds, and in a greater housing concentration in the portion of the site closest to existing development. For these reasons, the land use configuration of this alternative is considered to be a positive feature.

Alternative C (The General Plan Alternative)

This alternative results in a high proportion of urban development to water area. Although this density is not too high for flat land sites, it appears to be too high for this type of a waterfront residential development. The water area is likely to become congested and polluted (see Section C for discussion of these impacts).

The reduction in the number of peninsulas and thus in the opportunity for private boat docks, changes the character of the project and reduces its attractiveness. The character of the pedestrian/bicycle path on the northern edge, is also changed, giving it a much more urban context, with single family housing along its southern side. This is considered to be less desirable than the proposed path in Alternatives A and B.

Alternative D (No project)

If the project is not built, the Guadalcanal Village site would remain available for future industrial development. This is considered to be a positive feature of this alternative.

Mitigation Measures

Alternatives A and B

A paved bicycle path should be provided near the pedestrian path on the levee. The bicycle path design should incorporate measures to restrict motorcycle access.

The location of the school and the park in the main airport approach path should be changed, for safety reasons.

Alternative C (General Plan Alternative)

Mitigations which might be proposed to reduce the project density, would change this alternative to approximate Alternatives A or B.

Alternative D (No Project)

No mitigations are needed.

H. TRAFFIC

This traffic analysis considers the impacts that would be generated by the Cullinan Ranch project alternatives, as well as the cumulative impacts of the "South Parcel" which is owned by the City of Vallejo, and impacts of other traffic by the year 2005.

A traffic study was prepared for the developer by Basmaciyan-Darnell, Inc. in August 1982[1] and that report is hereby incorporated by reference. The report is included as Appendix C to this EIR/EIS. The results of this study have been used extensively in preparing the traffic section of the EIR/EIS, and referenced sections and tables are indicated with a (B-D). Although no new traffic data was gathered, a detailed evaluation of the Basmaciyan study was performed. In addition, the traffic analysis in the EIR/EIS includes a discussion of traffic impacts not fully evaluated by the above-referenced study, such as: impacts at selected off-site intersections and other transportation considerations including public and private mass transit, car pooling, etc., that can have a mitigating effect on the overall traffic circulation problem.

Setting

Existing Conditions

Exhibit III-8 shows the location of the proposed project in relation to the City of Vallejo, the Napa River and State Highway 37, as well as the existing street and highway system and the proposed Cullinan Ranch project. State Highway (S. R.) 37 or Sears Point Road is a major route from the City of Vallejo and the Mare Island Naval Shipyard to Sonoma and Marin Counties. West of the Napa River and along the Cullinan Ranch property, S. R. 37 is a three-lane road with two lanes westbound and one lane in an easterly direction. Further to the west, S. R. 37 has alternating two lanes westbound and two lanes eastbound to provide passing opportunities. Over the Napa River between Walnut Avenue and Wilson Avenue, S. R. 37 is built to freeway standards with grade separated interchanges at both of these streets. This section has four lanes of traffic with a median divider, and the four lanes and median continue easterly to Sacramento Street.

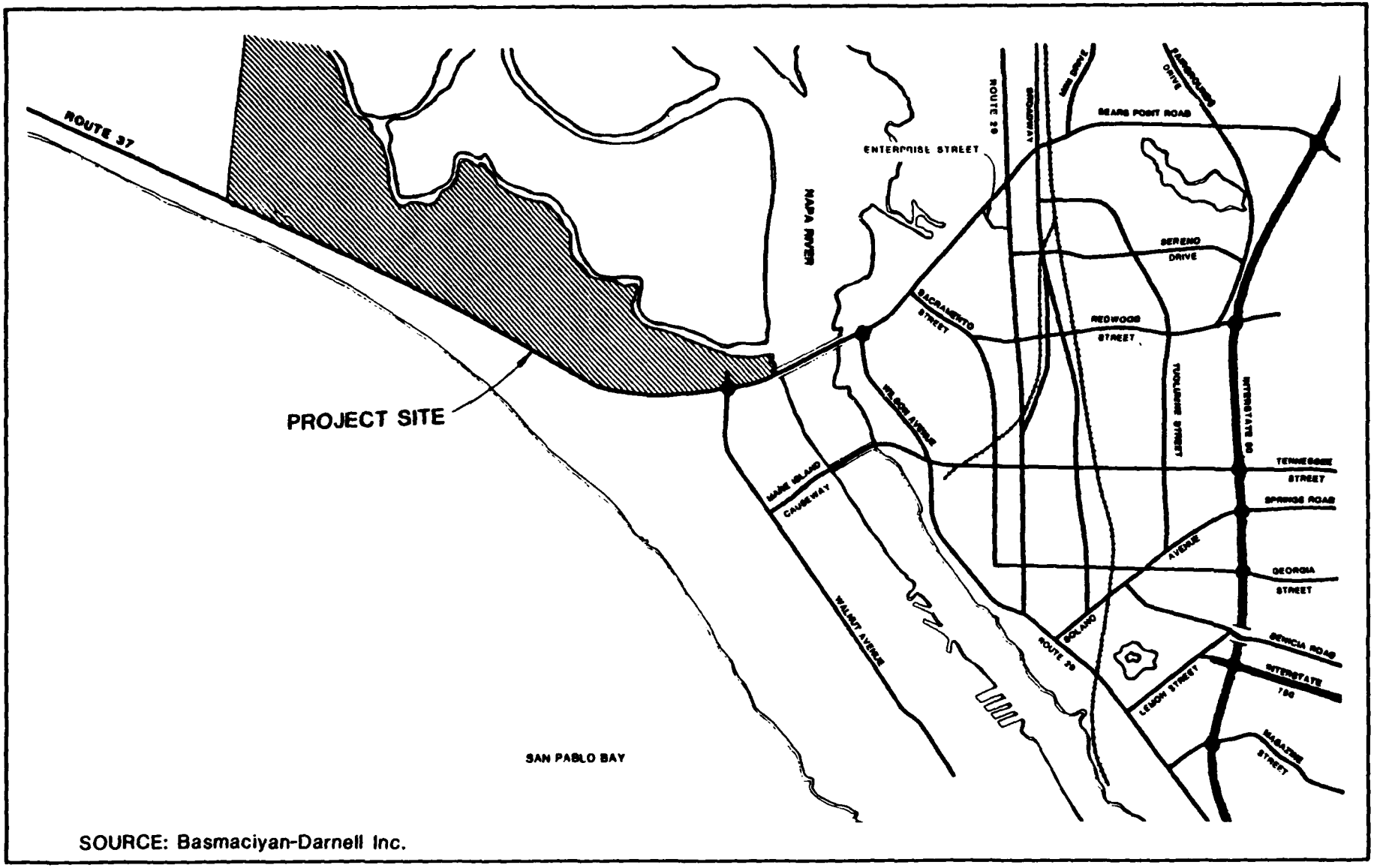
From Sacramento Street easterly to Enterprise Street, S. R. 37 has one lane of traffic in each direction and then the highway widens out to two lanes in each direction approaching S. R. 29, which is Sonoma Boulevard. Between S. R. 29 and Mini Drive there are two lanes in each direction plus a two-way left turn lane. From Mini Drive easterly to Fairgrounds Drive S. R. 37 is again reduced to one traffic lane in each direction. Between Fairgrounds Drive and I-80, S. R. 37 is improved to expressway standards.

A summary of existing cross sections on other streets is as follows:

1. S. R. 29 or Sonoma Boulevard has two through travel lanes in each direction plus left turn pockets along its entire length in the vicinity of S. R. 37.

2. Sacramento Street is a two-lane facility between S. R. 37 and Redwood Street.

3. Wilson Avenue between S. R. 37 and Tennessee Street is a two-lane facility with a curvilinear alignment. The six-legged intersection at Mare Island Causeway/Tennessee Street is a severely congested intersection during peak hour conditions.



SOURCE: Basmaciyan-Darnell Inc.

TORREY & TORREY INC. 2T environmental/urban planning and design	Existing Street Pattern	EXHIBIT III-8

4. Redwood Street has two travel lanes in each direction immediately east of Sacramento Street. In the vicinity of S. R. 29 and easterly to Tuolumne Street there are two lanes of traffic in each direction. Easterly of Tuolumne Street Redwood Street is one lane in each direction. After the bridge over I-80, it widens to two lanes in each direction with left turn pockets.

5. Mare Island Way has one lane of traffic in each direction between Tennessee Street and Kentucky Street. From Kentucky to Maryland Street there are two travel lanes in each direction with left turn pockets and a median divider.

Table II-1 (B-D) lists the existing traffic volumes on all of the state routes including freeways in the general Vallejo area. Table III-8 (B-D) shows existing traffic volumes on portions of Wilson Avenue, Sacramento Street and Redwood Street in the City of Vallejo. As pointed out in the B-D report there are existing traffic problem areas caused by today's traffic on the street system. A summary of these traffic problems is as follows:

1. S. R. 37

Peak traffic conditions caused primarily by the Mare Island Naval Shipyard result in some severe traffic congestion particularly in the two-lane segment of the route between Sacramento and Enterprise Street. During the afternoon the traffic has been observed to be backed up at the Sacramento Street signal westerly to the crest of the bridge over the Napa River, which is approximately three quarters of a mile long. The queue of traffic forms westerly of Sacramento Street. However, the problem is caused by the two-lane segment between Sacramento and Enterprise. During the morning peak hour period westbound motorists encounter similar congestion. The other two-lane segment between Mini Drive and Fairgrounds Drive also causes traffic congestion, but not to the level or extent experienced in the vicinity of Sacramento Street.

2. Tennessee Street/Mare Island Causeway

Traffic congestion on this street is at the six-legged intersection with Wilson Avenue discussed above.

3. Lemon Street

Lemons Street connects I-780 with S. R. 29 and then northerly to Mare Island Way. The continuity of streets here is poor requiring out of the way travel with relatively poor service to the municipal dock area.

4. Redwood Street

The two-lane section between Tuolumne Street and I-80 and the narrow bridge over the freeway result in congestion and backup of traffic during peak period conditions.

Planned Roadway Improvements

Several roadway improvements are now being considered by CalTrans and the City of Vallejo. Figure II-2 (B-D) shows the locations for which future improvements have been considered. A discussion of these locations is as follows:

1. S. R. 37

CalTrans has completed some planning work for improvement of this route to a four-lane conventional highway between Sacramento Street and Fairgrounds Drive. Existing congestion would seem to justify this improvement as a farily high priority item. However, there is no funding for it at present in the five year State Transportation Improvement Program (STIP). The portion of this route west of the Napa River is still technically in a (freeway) status. However, if a four-lane conventional facility is constructed east of the Napa River there would not seem to be much justification for building a freeway facility to the west. For this reason it is not anticipated that Highway 37 will be improved westerly into Sonoma and Marin counties and the existing three lane section will probably remain.

2. Redwood Street

The City of Vallejo is at the engineering state for improvement of this street between Tuolumne Street and I-80 which, also, would widen the Redwood Street Bridge over the freeway.

3. Route 141

This route is a future expressway type of facility that will provide a direct connection from I-780 to Route 29 and will facilitate the connection with an improvement of Wilson Avenue on northerly to Route 37. Recognizing the need for this facility, the City of Vallejo is nearing completion of that portion between the interstate ramp terminals and Solano Avenue. In addition, an engineering contract has been awarded for the design of the engineering improvements westerly along Maryland Street between Solano and S. R. 29. However, improvement of the rest of the route on northerly to Route 37 may require cooperation with the Navy and CalTrans and there appears to be no specific time-table for completion of this final section.

4. Sacramento Street

The City of Vallejo is planning to widen Sacramento Street between Route 37 and Redwood Street to four lanes. No funding is available at this time, but the City recognizes this as a needed and important street improvement.

Impacts and Mitigation

Impacts and mitigations are grouped together in this section, for easy evaluation of impacts. Mitigations are also summarized separately below.

Review of Data Base and Assumptions

A thorough review of the Basmaciyan-Darnell Traffic Study for the Cullinan Ranch project was conducted. The land use summary, trip generation rates, anticipated daily and peak hour trip ends, and the internal/exernal project trip distribution assumptions as shown in Tables III-2 through 5 of that report are considered to be valid for use in the EIR/EIS. The trip generation and distribution have been reviewed with CalTrans[2] and, also with the Vallejo Public Works Department.[3] In reviewing the report, CalTrans District 10 made reference to an in-house model in which a lower trip generation rate for residential uses was used than that which was employed by B-D. However, it was later determined by CalTrans that their lower trip generation rate may have included home generation trips only, and that visitor and/or delivery trips would have to be included. It

was therefore concluded by CalTrans as well, that the B-D trip generation would be valid for the EIR/EIS.

Parts of the B-D Report which have been revised in this EIR/EIS are the present capacity figures shown in their Table III-1. The source for these capacity figures is the Solano County Transportation Plan, a copy of which is enclosed in Page A-2 of the B-D Report. These capacity figures appear to be high when compared with level of service capacities normally utilized in transportation analyses. After conferring with the representatives from CalTrans, it has been concluded that lower capacity values would be more appropriate and this is discussed in greater detail below. Another area of concern about the B-D Report is the lack of detailed off-site analysis at potentially critical intersections such as: S. R. 37 and 29, S. R. 37 and Broadway, and S. R. 37 and Fairgrounds Drive. A peak hour analysis would be more sensitive to the need for traffic improvements. However, for this report, 24-hour volumes have been used to compare existing conditions with future conditions with and without the proposed project for the off-site analysis. The method of analysis is presented below.

Trip Generation

Table III-2 (B-D) has a breakdown of acreage and proposed development for phase one and phase two of Alternative A. The trip generation rates that are used for the proposed development are shown in Table III-3 (B-D). The rates used are ten trips per day for low density residential and eight trips daily for medium density residential. Neighborhood commercial is generated at 650 trips per acre, marinas at 21 per acre, community parks at 5 per acre and pubic schools at 30 per acre. These trip generation rates are based on research information available from the Institute of Transportation Engineers and CalTrans District 4.[5] The estimate of 250 trips per acre for the Guadalcanal Village specialty commercial area was based on research material mentioned above. Table III-4 (B-D) expands the trip generation rates to daily and peak hour trips. The trip estimate for the Alternative A is a grand total of 67,934 trips and 6,518 P.M. peak hour trips.

Of this amount, the Guadalcanal Village area (specialty commercial) would result in 15,840 daily trips and 1,300 P.M. peak hour trips. It is important to note that the B-D Report projected that 36% of all of these trips would remain internal to the proposed project and not contribute to the traffic on S. R. 37 and that the remaining 64% would be external traffic and use Route 37 which is the only access route to the proposed development. All of these assumptions are considered to be valid and have been used in this analysis.

Trip Distribution

As indicated above, 64% of the total trips generated would be external to the project. The distribution of these trips for Alternative A is shown in Figures III-1 and 2 of the B-D Report. These distribution percentages are considered reasonable and have therefore been used in this traffic analysis.

Traffic Analysis

The traffic analysis for this study includes separate analyses for the Cullinan Ranch project and for the increased impact that would be imposed by cumulative impacts to the year 2005. The traffic assignments for the Cullinan Ranch project have been discussed earlier in the report. The traffic analysis was based on existing 24-hour volumes on the street and highway system along with 24-hour and peak hour distributions from the proposed project.

The base analysis refers to "the project", or Alternative A. Differences in impacts for Alternatives B, C and D are discussed below.

By converting existing daily traffic to A.M. and P.M. peak hour volumes, a capacity analysis was conducted at critical intersections that would serve the project, including the Walnut Avenue interchange with Highway 37 and the easterly and westerly access points form the proposed project onto Highway 37.

At the Walnut Avenue interchange the phase one traffic impacts are shown in Table III-9 of the B-D Report and all of the ramp volumes are well within the Level of Service (LOS) A range. Table III-4 shows the impact on the Walnut Avenue interchange with full development of the project. In reviewing the year 2005 volumes on S. R. 37, as obtained from the Solano County Transportation Plan, the average annual growth rate was approximately 2%. The present traffic volumes were increased appropriately and the year 2005 volumes with Cullinan Ranch (Alternative A) are also included in the table. The total traffic is compared with typical capacity figures for ramp volumes as shown in Table III-4 and all of the ramps remain within LOS A.

Table III-4

VOLUME/CAPACITY SUMMARIES AT S. R. 37 AND WALNUT AVENUE INTERCHANGE

	Present Daily Traffic	Existing Traffic Plus Year 2005 And Cullinan/ Guadalcanal	LOS E Capacity	Level of Service
Eastbound Off	530	1,700	20,000	A
Westbound On	620	1,930	20,000	A
Eastbound On	3,770	10,800	20,000	A
Westbound On	3,770	10,700	20,000	A

The peak hour volumes shown in Figures IV-3 and 4 of the Bacmaciyan Report were checked and used to calculate A.M. and P.M. peak hour capacities. Table III-5 in this report reflects the results of this analysis. At the westerly access point it shows that existing plus Cullinan Ranch traffic and the year 2005 traffic would result in an LOS F at Route 37. This is considered to be a significant adverse impact. This can be mitigated to LOS E with a volume/capacity (v/c) ratio of 1.21 for the P.M. peak hour and LOS D with a ratio of 1.15 for the A.M. peak hour by providing a westbound right turn lane.

TABLE III-5

CAPACITY SUMMARIES FOR CULLINAN RANCH FRONTAGE WITH S. R. 37

Location	Time Period	Year 2005 Plus Project V/C	Year 2005 Plus Project LOS	Year 2005 Plus Project Mitigated V/C	Year 2005 Plus Project Mitigated LOS
Westerly Access	A.M. Peak	1.37	F	1.15	D
Westerly Access	P.M. Peak	1.60	F	1.21	E
Easterly Access	A.M. Peak	1.11	D	1.04	D
Easterly Access	P.M. Peak	1.37	F	1.13	D

At the easterly access point the P.M. volumes would result in a 1.37 v/c ratio LOS F and the A.M. peak would be 1.11 v/c, LOS D. A LOS of F is considered to be a significant adverse impact. If mitigated, these LOS' could be improved to D for both P.M. and A.M. traffic.

A dual left turn off Highway 37 for the westerly access would further mitigate that intersection to LOS D. In comparing the results of Table III-5 in this report, with Table IV-1 (B-D) the results very closely agree at the easterly access point but the westerly access point, if mitigated, is projected to be at LOS D and E instead of LOS C as shown in the earlier study. The primary difference is the lower capacity figure for the dual left turn lane, which has been used for this analysis.

Table III-6 shows a capacity summary on each of the critical streets using 24-hour traffic volume information. The first three columns compare existing traffic with existing capacity. The next series of columns adds the year 2005 traffic without any project traffic and compares capacity information. (This corresponds to Alternative D.) Next the year 2005 traffic is combined with the Cullinan Ranch traffic and capacity information is compared with projected traffic. The next series of columns in the table shows capacities and levels of service with the recommended mitigations for the year 2005 traffic with the project.

Finally the last column shows the type of mitigations that are needed. It should be emphasized that the LOS E capacity used in Table III-6 is considered to be realistic for a one hour peak hour flow and that the capacity figures utilized in the Bacmaciyan Report, with a higher level of service would only apply for an extended peak hour where perhaps one and a half or two hours is taken to clear out the afternoon peak hour traffic congestion.

In evaluating Table III-6, reference is made to Table III-7, which describes the six levels of service for urban and suburban arterial streets used in capacity analysis. Table III-7 relates the 24-hour volume information to the six levels of service with an explanation for each as used in capacity analysis. Generally speaking, Level of Service C is considered desirable for urban conditions although LOS D is accepted frequently by governmental jurisdictions.

TABLE III-6

STREET CAPACITY SUMMARY

FACILITY	LOCATION	EXISTING CONDITIONS			Alternative D YEAR 2005 (NO C. & G.)			Alternative A YEAR 2005 (WITH C.&G.)			Alternative A YEAR 2005 MITIGATED (WITH C. & G.)			MITIGATION TYPE OF IMPROVEMENT
		DAILY TRAFFIC	LOS E CAPACITY	LEVEL OF SERVICE	DAILY TRAFFIC	LOS E CAPACITY	LOS	DAILY TRAFFIC	LOS E CAPACITY	LOS	DAILY TRAFFIC	LOS E CAPACITY	LOS	
Route 37	Cullinan Ranch Frontage	15,300	20,000	C	20,000	20,000	E	28,100	20,000	F	28,100	33,000	D	4-L Div. Arterial
	Napa River Bridge	20,500	60,000	A	27,000	60,000	A	62,300	60,000	F	62,300	60,000	F	
	Bet. Wilson & Sacramento	19,000	30,000	B	29,000	30,000	E	49,500	30,000	F	49,500	45,000	F	6-L Arterial
	" Sacramento & Rt. 29	18,500	30,000	B	30,000	30,000	E	38,300	30,000	F	38,300	45,000	D	6-L Arterial
	" Rt. 29 & Broadway	16,500	30,000	A	45,000	30,000	F	50,500	30,000	F	50,500	45,000	F	6-L Arterial
	" Broadway & Mini Dr.	18,000	30,000	B	47,500	30,000	F	53,000	30,000	F	53,000	45,000	F	6-L Arterial
	" Mini & Fairgrounds	18,000	20,000	D	52,000	20,000	F	56,400	20,000	F	56,400	45,000	F	6-L Arterial
	" Fairgrounds & I-80	33,000	60,000	A	58,000	60,000	E	62,400	60,000	F	62,400	60,000	F	
Wilson	South of Route 37	5,100	15,000	A	6,000	15,000	A	20,800	15,000	F	20,800	30,000	B	4-L Arterial
Sacramento	Bet. Rt. 37 & Redwood	9,300	15,000	B	6,000	15,000	A	18,200	15,000	F	18,200	30,000	A	4-L Arterial
Route 29	North of Route 37	37,000	33,000	F	37,000	33,000	F	39,800	33,000	F	39,800	33,000	F	
	" " Redwood	16,000	33,000	A	16,000	33,000	A	16,900	33,000	A	16,900	33,000	A	
	" " Tennessee	27,000	33,000	D	27,000	33,000	D	29,800	33,000	D	29,800	33,000	D	
Redwood	East of Sacramento	---	15,000	-	6,000	15,000	A	13,500	15,000	D	13,500	15,000	D	
	West of Route 29	13,000	30,000	A	17,000	30,000	A	24,500	30,000	D	24,500	30,000	D	
	East of Route 29	15,000	30,000	A	8,000	30,000	A	11,000	30,000	A	11,000	30,000	A	
	West of I-80	---	15,000	-	25,000	15,000	F	27,400	15,000	F	27,400	30,000	E	4-L Arterial
I-80	North of Route 37	55,000	120,000	A	111,000	120,000	E	115,400	120,000	E	115,400	120,000	E	
	" " Redwood	64,000	120,000	A	82,000	120,000	B	82,000	120,000	B	82,000	120,000	B	
	" " Tennessee	70,000	120,000	A	118,000	120,000	E	120,200	120,000	E	120,200	120,000	E	
	South of Route 29	63,000	120,000	A	80,000	120,000	B	90,300	120,000	C	90,300	120,000	C	
I-780	East of I-80	23,000	80,000	A	58,000	80,000	C	64,500	80,000	C	64,500	80,000	C	

Source: TJKM 1/83

C. &G. : Cullinan & Guadalcanal Projects

TABLE III-7

LEVELS OF SERVICE FOR URBAN AND SUBURBAN ARTERIAL STREETS AND FREEWAYS

LEVEL OF SERVICE	DESCRIPTION	V/C RATIO	ARTERIAL STREET			FREEWAY		
			2 LANES	4 LANES	6 LANES	4 LANES	6 LANES	8 LANES
A	Free flow (relatively). If signalized, conditions are such that no approach phase is fully utilized by traffic and no vehicle waits through more than one red indication. Very slight or no delay.	0.00 - 0.75	9,000	20,000	27,000	48,000	72,000	96,000
B	Stable flow. If signalized, an occasional approach phase is fully utilized; vehicle platoons are formed. This level is suitable operation for rural design purposes. Slight delay.	0.76 - 0.90	10,500	23,100	31,500	56,000	84,000	112,000
C	Stable flow of operation. If signalized, drivers occasionally may have to wait through more than one red indication. This level is suitable operation for urban design purposes. Acceptable delay.	0.91 - 1.00	12,000	26,500	36,000	64,000	96,000	128,000
D	Approaching unstable flow or operation; queues develop, but are quickly cleared. Tolerable delay.	1.01 - 1.15	13,500	30,000	40,500	72,000	108,000	144,000
E	Unstable flow or operation; the intersection has reached ultimate capacity; this condition is not uncommon in peak hours. Congestion and intolerable delay.	1.16 - 1.25	15,000	33,000	45,000	80,000	120,000	160,000
F	Forced flow or operation. Intersection operates below capacity. Jammed.	1.25+	(Volumes are below capacity)					

Source: TJKM 1/83

In reviewing Table III-6 the existing level of service for all street sections, would be LOS D or better except for the section of Route 29 north of Route 37 which would be at LOS F. The year 2005 traffic was taken from the Basmaciyan Report as obtained from the Solano County Transportation Plan. When this traffic is evaluated without any project traffic a number of additional sections are at LOS F, including Route 37 between Route 29 and Fairgrounds Drive, Route 29 north of Route 37 and Redwood Street west of I-80. Except for the Napa River Bridge the rest of Route 37 would be at LOS E with parts of I-80 being at LOS E. These would be adverse future conditions, which would exist without the project. (Alternative D).

When traffic is congested further by adding project traffic (Alternative A), all of Route 37 would be at LOS F as well as Wilson Avenue and Sacramento Street. This would be considered a significant adverse impact. Sections of I-80 would remain at LOS E. This would be an adverse but not significant impact.

When mitigation is considered, the year 2005 traffic plus project traffic can be mitigated in some instances. However, a good share of Route 37 and a portion of Route 29 would remain at LOS F. This is considered to be a significant adverse impact which cannot be mitigated easily. In order for the proposed daily traffic on Route 37 to be within a reasonable range of the LOS E capacity it would be necessary to construct Route 37 as a four lane divided arterial along the Cullinan Ranch frontage and as a six lane arterial throughout the remainder of its length between the Napa River and Fairgrounds Drive. Wilson Avenue south of Route 37 would have to be constructed as a four lane arterial as would Sacramento Street between Route 37 and Redwood Street. Redwood Street west of I-80 would have to be a four lane cross section in order to have LOS E capacity.

The differences in Alternatives A, B, and C involve the number and type of residential units, and differences in commercial acreages and in the inclusion of industrial use in Alternative C.

Table III-8 shows the comparison of the daily trips for uses in Alternatives A, B, and C. Alternative B has a reduction of 2950 daily residential trips which amounts to an overall reduction of 4.4% from Alternative A. Alternative C has an increase of 37,000 residential trips for an overall increase of 54.5%. The differences in traffic generation due to variation in commercial acreage and due to the introduction of industrial use in Alternative C are also shown in Table III-8. These differences are not as significant as the differences in residential traffic generated by the alternatives.

TABLE III-8

TRIP GENERATION COMPARISON
CULLINAN RANCH ALTERNATIVES

Type of Use	ALTERNATIVE "A" Units Acres	Trip Rate	No. of Daily Trips	ALTERNATIVE "B" Units Acres	Trip Rate	No. of Daily Trips	ALTERNATIVE "A" Units Acres	Trip Rate	No. of Daily Trips
Residential									
Low Density	3,000	10	30,000	1,525	10	15,250	2,250	10	22,500
Medium Density	1,500	8	12,000	2,975	8	23,800	6,000	8	48,000
High Density	--	--	--	--	--	--	1,750	6	10,000
Light Industrial	--	--	--	--	--	--	53	60	3,180
Neighborhood Comm.	13.5	650	8,775	13.5	650	8,775	20	650	13,000
Specialty Comm.	56.5	258	14,577	56.5	258	14,577	20	258	5,160
Other			2,582			2,582			2,582
			67,934			64,984			104,922

Table III-9 shows the daily traffic for the year 2005 on the several routes involved for both Alternatives B and C. This table, also, indicates level of service both with and without mitigation. Alternative B is relatively close to Alternative A. However, Alternative C results in considerably more traffic congestion, especially on State Route 37. This, of course, would be expected due to a 54.5% increase in the generation of traffic. Since even the less intensely developed Alternatives A and B result in sections of Route 37 and 29 being at LOS F under mitigated conditions and, other sections of streets at LOS E, it is clear that Alternative C would result in much more congestion and difficulty in the movement of traffic. This alternative therefore results in significant adverse impacts which cannot be mitigated.

Traffic Signals

The following traffic signals are needed to mitigate project impacts under Alternatives A, B and C:

- o Install four signals at the westerly and easterly access points to State Route 37, at both the state highway and the frontage road.
- o At phase III of project development, install five additional signals on the frontage road and install one signal at the neighborhood commercial center.
- o Install a signal at the Walnut Avenue interchange and the frontage road.

The future total of signals is eleven and substantiates the number indicated in Figure IV-8 (B-D) except that the entrance into the Guadalcanal Village area would also need a traffic signal and this is not shown in that figure.

Analysis of the On-Site Circulation System

Setting

The Specific Plan calls for the frontage road to have an 80 foot right-of-way with sufficient street width to have four lanes of traffic, left turn lanes and bike lane facilities. Collector streets are proposed to be 40 feet wide curb to curb which can handle two lanes of traffic and vehicular parking or bike lane facilities. Local residential streets are proposed at 36 feet curb to curb which can handle one lane of traffic in each direction plus parking. Bicycles would operate on local streets mingling with existing vehicular traffic.

Impacts

The on-site circulation system proposed for Alternatives A and B has been reviewed and appears to be acceptable for carrying the movement of traffic. On-site circulation details for Alternative C have not been prepared. The only facility with traffic volumes sufficient to warrant a four lane facility is the frontage road paralleling State Highway 37.

The intersection configurations at the westerly and easterly access points between Route 37 and the frontage road are illustrated in Figure IV-5 and 6 (B-D). The proposed geometrics appear to be acceptable for handling anticipated traffic loads. Figure IV-7 (B-D) shows typical frontage road intersections designed to handle anticipated traffic volumes. Figure IV-9 (B-D) shows how off-street bikeway facilities are handled at

TABLE III-9

YEAR 2005 FULL DEVELOPMENT CAPACITY SUMMARY FOR ALTERNATIVES "B" AND "C"

FACILITY	LOCATION	LOS E CAPACITY (NO MITIGATION)	LOS E CAPACITY (MITIGATED)	ALTERNATIVE "B" DAILY TRAFFIC	ALTERNATIVE "B" LOS (NO MIT.)	ALTERNATIVE "B" LOS (MIT.)	ALTERNATIVE "C" DAILY TRAFFIC	ALTERNATIVE "C" LOS (NO MIT.)	ALTERNATIVE "C" LOS (MIT.)	IMPROVEMENT
Route 37	Cullinan Ranch Frontage	20,000	33,000	27,700	F	D	32,500	F	E	4-L Div. Arterial
	Napa River Bridge	60,000	60,000	60,700	F	F	81,500	F	F	
	Bet. Wilson & Sacramento	30,000	45,000	48,600	F	F	60,700	F	F	6-L Arterial
	" Sacramento & Rt. 29	30,000	45,000	37,900	F	D	42,800	F	E	6-L Arterial
	" Rt. 29 & Broadway	30,000	45,000	50,200	F	F	53,500	F	F	6-L Arterial
	" Broadway & Mini Dr.	30,000	45,000	52,700	F	F	56,000	F	F	6-L Arterial
	" Mini Dr. & Fairgrouds	20,000	45,000	56,200	F	F	58,800	F	F	6-L Arterial
	" Fairgrounds & I-80	60,000	60,000	62,200	F	F	66,800	F	F	
Wilson	South of Route 37	15,000	30,000	20,100	F	B	28,900	F	E	4-L Arterial
Sacramento	Bet. Route 37 & Redwood	15,000	30,000	17,600	F	A	24,900	F	C	4-L Arterial
Route 29	North of Route 37	33,000	33,000	39,700	F	F	41,300	F	F	
	" " Redwood	33,000	33,000	15,900	A	A	17,400	A	A	
	" " Tennessee	33,000	33,000	29,700	D	D	31,300	E	E	
Redwood	East of Sacramento	15,000	15,000	12,900	D	D	17,600	F	F	
	West of Route 29	30,000	30,000	23,400	D	D	28,600	E	E	
	East of Route 29	30,000	30,000	10,900	A	A	12,600	A	A	
	West of I-80	15,000	30,000	27,300	F	E	28,700	F	E	4-L Arterial
I-80	North of Route 37	120,000	120,000	115,200	E	E	117,800	E	E	
	" " Redwood	120,000	120,000	82,000	B	B	82,000	B	B	
	" " Tennessee	120,000	120,000	120,100	E	E	121,400	E	E	
	South of Route 29	120,000	120,000	89,800	C	C	95,900	C	C	
I-780	East of I-80	80,000	80,000	64,200	C	C	68,000	D	D	

intersections of vehicular traffic. The maximum use of off-site bikeway facilities will serve to encourage the usage of bicycles and reduce vehicular trips.

Mitigation

Although the streets have adequate capacity, because of the concern for safety with respect to the landing pattren for the Napa County Airport, the streets within the approach pattern should be curved to the exent possible. (See mitigation proposed in Section A. Land Use.)

Other Transportation Considerations

The mitigation measure and resultant capacity conditions shown in Table III-6 do not consider any benefits that could occur due to Transportation System Management (TSM) implementation. TSM measures possibly could lessen the impact on State Route 37 and other transportation facilities. TSM measures with their estimated ability to reduce traffic are presented here even though the responsibility for implementing these measures is beyond the capability of the developer and the City of Vallejo.

1. Ride Sharing

The objective of ride sharing is to reduce the average number of home to work commuting vehicular trips. Ride sharing may be accomplished through private car pools, company sponsored van pools, and charter buses. Incentives for ride sharing which may be provided by employers who include preferential parking.

2. Public Transportation

At the present time there is no bus service serving the Cullinan Ranch area since there is no development. In the future bus service to this area could contribute to reduce traffic volumes. Whether or when such increased service may become available is not predictable and no estimate of trip reductions can be made at this time.

3. Flex Time and/or Staggered Work Shifts

A flex time and/or a staggered work shift program could serve to reduce peak hour trips to and from Cullinan Ranch.

4. Bicycles

The use of bicycles would be encouraged in the Cullinan Ranch project due to the provision of bike lane facilities. On residential streets a Class Three System where bicycles mingle with street traffic would be appropriate. A Class Two System (a painted bicycle lane) would be appropriate for a collector and major arterial streets. If bicycle facilities in the Cullinan Ranch/Guadalcanal Village area can be combined with bike routes for Vallejo and Solano County this may also serve to reduce peak hour vehicular traffic.

It is difficult to estimate the impact that TSM could have on peak hour traffic, however, a reasonable goal for reduction in peak hour traffic through these measures would be from five to ten percent. A ten percent reduction in vehicular trips would be equivalent to a one step improvement in the level of service. This would mean that a roadway functioning at LOS E would be improved to LOS D with full TSM benefits.

Footnotes

1 Traffic Study for Cullinan Ranch and Guadalcanal Village, Basmaciyan-Darnell, Inc., August 1982.

2 CalTrans District 10 - Bob Biffel, and CalTrans District 4 - Ken Berner.

3 Vallejo Public Works Department - Larry Donovan, Traffic Engineer.

4 CalTrans District 10 - Bob Biffel, and CalTrans District 4 - Ken Berner.

5 CalTrans District 10 - Bob Biffel, and CalTrans District 4 - Ken Berner.

I. NOISE

Setting - Noise

The Cullinan Ranch site is exposed to noise from two sources: from traffic on Highway 37 and from aircraft flying overhead. Existing on-site noise levels due to these sources have been calculated. Exhibit III-9 shows the existing annual average 24-hour day/night noise exposure level (Ldn) on the site. The levels are shown in the form of equal noise contours in five decibel increments down to an Ldn of 58 dB. (Refer to Appendix G for a discussion of the fundamental concepts of environmental acoustics and a description of the terms used in this report.)

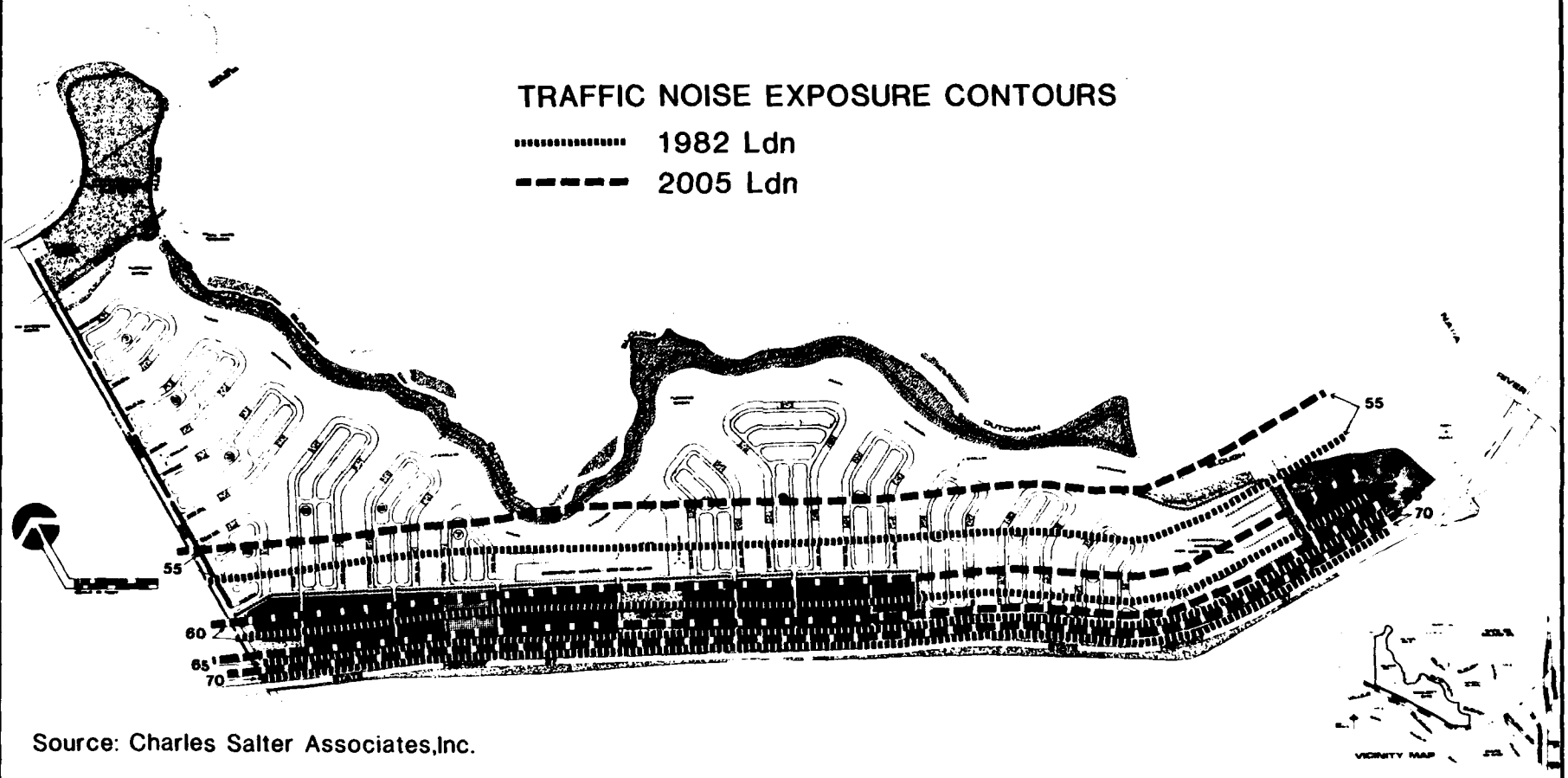
Only jet aircraft flights have an impact on on-site sound levels, because of the location of the jet aircraft approach in the middle of the project site. At present, jet aircraft on approach to and to take off from the Napa County Airport do not now contribute significantly to the on-site Ldn. The Director of the Napa County Airport estimates that there are presently only six to seven small business jet flights over the site during the day (7:00 am to 10:00 pm) and two to three flights at night. However, by 1990, he expects that there could be as many as 24 to 28 flights per day and 8 to 12 flights at night. Most of the jet aircraft will be small Falcon jets associated with the jet pilot training facility at the airport. The remainder would be other business jets. These aircraft pass the site at altitudes of between 1500 and 1800 feet. At this altitude, they emit maximum noise levels typically ranging from 70-80 dBA and occasionally up to 85 dBA. Based on the number of flights anticipated by the airport the number of flights expected by 1990 could cause an increase in the CNEL on the Cullinan Ranch property. Preliminary calculations indicate that an Ldn of up to 60 dB could be expected across the site due to aircraft flyovers.

Impacts - Noise

There are three areas of potential noise impact associated with a project of this type. They are: the compatibility of the proposed uses of the site with the noise environment; the impact of noise generated by traffic (vehicular and boat) along streets and waterways serving the project; and the potential for short-term impacts on adjacent land uses during the construction of the project.

Compatibility with Noise Environment. The compatibility of the proposed project with the noise environment is assessed using applicable state and local criteria. The City of Vallejo has adopted land use compatibility criteria as part of the Noise Element of the City's General Plan. The criteria are in terms of the noise level not to be exceeded more than 10 percent of the time during the noisiest hour of the day. For highway noise environments, the level exceeded 10 percent of the time during the noisiest hour of the day is typically three decibels higher than the Ldn at the same location. The City of Vallejo's land use criteria in terms of the Ldn are shown in Table III-9.

In addition to the City of Vallejo's criteria, the State of California in Title 25 of the California Administrative Code has adopted standards for the maximum amount of noise that is acceptable for new multi-family housing. This is a level of an Ldn of 45 dB indoors. The state has also adopted regulations prescribing the amount of noise acceptable in school classrooms. Section 215 of the Streets and Highways Code requires that noise levels in classrooms adjacent to state highways not exceed 50 dBA. This is the maximum level at any time and would typically be generated by diesel trucks.



Source: Charles Salter Associates,Inc.

TORREY & TORREY INC. environmental/urban planning and design	Noise Contours	EXHIBIT III-9

Table III-9

**Maximum Outdoor Day-Night Noise Levels (Ldn)
to be Used in Land-Use Consideration
(Adapted from the City of Vallejo's Noise Element)**

Land Use	Ldn
Single and multi-family residential	57 dB
Neighborhood commercial	67 dB

Exhibit III-9 shows anticipated year 2005 post-project traffic noise exposure contours on the Cullinan Ranch site. By 2005, the single-family residential portion of the site in Alternative A would be exposed to traffic noise levels of up to an Ldn of 70 dB. Additionally, the entire site would be exposed to maximum noise levels during jet aircraft flyovers ranging from 70-80 dBA and possibly to an Ldn of up to 60 dB. The resulting noise exposure would exceed the 57 dB recommended by the City of Vallejo for residential areas. If not mitigated, traffic noise would be high enough to interfere with conversations in the backyards of the homes nearest to State Highway 37 and to interfere with the sleep of people in the closest homes, with windows partially open. Homes farther from the highway would be partially shielded by intervening homes and would experience lower traffic noise levels. The amount of shielding would depend on the layout of the subdivision. Noise levels inside the homes with windows open would range from 55-65 dBA during aircraft flyovers. To protect against sleep disturbance and activity interference, the Office of Noise Control in the State Department of Health has suggested that noise levels should not exceed 50 dBA in sleeping areas or 55 dBA in other rooms.[2]

The City of Vallejo's Land Use Compatibility Guidelines do not contain noise criteria for schools. Calculations indicate that traffic noise levels inside the two elementary schools, even with the windows open, would not exceed 50 dBA regardless of where the buildings are placed on the proposed sites. Traffic noise levels inside the junior high school, depending upon where it was placed on the proposed site, could reach 60 dBA inside with the windows open. Noise levels in all three schools could exceed 50 dBA during aircraft overnight noise. The State does not require that the noise of aircraft be controlled to 50 dBA in classrooms. However, the predicted significant increase in volume of aircraft overflights increases the potential for speech interference in the classrooms. It is recommended that the schools should be designed so that maximum noise levels due to both aircraft and traffic not exceed 50 dBA.

The City of Vallejo's Land Use Compatiblity Guidelines do not contain noise criteria for parks. Park areas would be exposed to noise levels that could potentially interfere with conversation in a normal voice at distances greater than 10 feet. The mitigation measures suggested for reducing the noise exposure of the schools and the residential portion of the project would also be applicable to the park area.

The proposed neighborhood commercial development would be exposed to noise levels of up to an Ldn of 65 dB. The City of Vallejo's guidelines for land use compatibility indicate that the neighborhood commercial area would be compatible without special noise insulation requirements in an exterior noise environment of an Ldn of up to 67 dB. This portion of the project would therefore be compatible with the anticipated noise environment with no special design features.

Under Alternative B, the Reduced Project Alternative, the single-family homes fronting State Route 37 would be eliminated as would a few of the single-family homes along the western boundary of the project. The noise impacts under this alternative would be identical to those described for Alternative A except that the noise wall proposed to reduce the noise exposure of the residential school portions of the project would not have to be as long under Alternative B as under Alternative A.

Under Alternative C, the General Plan Alternative, the noise and land use compatibility impacts would be as described for Alternative A except that there would be an even greater noise level in the future along State Route 37 due to the significantly increased number of trips under the general plan alternative project. The resulting increase in traffic would increase noise levels 5 dBA over existing noise levels. Noise levels on other streets in the area would also increase but by less than 3 dBA.

Under Alternative D, the No-Project Alternative, noise levels along Highway 37 would increase by only 1 dBA due to general growth in the areas. Existing uses of agriculture on vacant land would be compatible with the existing and future noise environment both in terms of highway traffic noise and aircraft noise.

Mitigation Measures

The following mitigation measures apply to Alternatives A, B, and C. No mitigation measures are necessary for Alternative D.

- o (Developer Responsibility) To mitigate traffic noise levels on the Cullinan Ranch site, construct a noise barrier (earth berm, solid wall or combination) along the frontage with State Highway 37. Due to the significant diesel truck percentage along this highway, the barrier should be high enough to screen truck exhaust stacks from view of the site. This would probably require an 11 to 12 foot high barrier and noise levels would be reduced by about 10 dB. The actual height and length of the barrier would be determined during design development. The ground level of the entire project would then be compatible with traffic noise as suggested by the City of Vallejo's General Plan. Upper stories, however, would receive more noise depending upon their location in relation to the highway and the barrier. Thus in addition to the barrier, the upper stories of some of the multi-family housing area might still require treatment to meet an indoor level of 45 dB. This may mean the incorporation of mechanical ventilation and possibly sound-isolating windows. The entire project would remain exposed to jet aircraft noise.

Mitigation Alternatives

- o (Developer Responsibility) To reduce the potential impact of jet aircraft flyover noise on the project, the homes could be designed to allow the windows to remain closed (at least in bedrooms; i.e., the windows could be operable but the owner would have the choice of keeping windows closed and ventilating his home through an alternate method). Treatment of the roofs, walls, etc., would also be required to reduce aircraft noise intrusion. Similar treatment would be appropriate for the schools.

  The following steps over and above standard construction techniques would be needed to reduce maximum noise levels during aircraft flyovers to a level not in excess of 55 dBA:[3]

- Windows must be tightly closed and all treated rooms must be served with a forced air circulation system.

- In wood frame constructions, all exterior stud walls must have interior and exterior surfaces of density of not less than 2 lbs. per square foot and the intervening space must contain fibrous thermal insulation at least three inches thick.

- Air ducts between any treated room and the outside must contain an interior sound-absorbing lining five feet in length prior to the room outlet vent.

In addition, the following steps would be necessary to control noise levels in bedrooms such that maximum levels do not exceed 50 dBA.

- Ceiling and exhaust ducts to the outside must be provided with a bend in the ducts such that there is no direct line-of-sight through the duct from the venting cross section to the opening cross section.

- The duct must be lined with a sound-absorbing material at least five feet in length prior to any opening.

- All windows must be close fitting or weather stripping must be installed. Sound-rated glass may be required. There must be no exterior cracks or openings.

- (Developer Responsibility) In order to avoid noise impacts due to traffic on the schools, the developer may move the school away from Route 37, provide interior ventilation, or stipulate that the schools should be only one story high (the barrier would still be needed along Route 37). To mitigate overhead noise, the same mitigations recommended for the residential uses should be employed.

- Because of the potentially significant impact of aircraft noise on the site and also due to the uncertain future activities at Napa County Airport, it is recommended that a detailed study, including on-site noise measurements, be undertaken prior to construction, to determine what impacts the aircraft associated with the airport may have on the Cullinan Ranch project.

Noise Impacts Generated by Project. Implementation of Alternative A could be expected to increase noise levels in surrounding areas in two ways: increased boat traffic and increased highway traffic. Using the traffic volume estimates discussed in Section H. Traffic, the largest increase in noise levels would occur along Highway 37 in front of the project site. Noise level increases of up to 3 dBA could be expected in this area. The resulting noise exposure would be as shown in Exhibit III-9. Noise levels along other streets in the area would increase by a lesser amount. An increase of 3 dBA or less in traffic noise levels would not be expected to generate adverse community response. The increase in boat traffic could be noticeable along the Napa River; however, it is doubtful that the number of power boats associated with the new development would significantly alter noise levels along the Napa River. Therefore, the mitigations recommended for impacts related to compatibility of the project with the noise environment would be sufficient to mitigate noise generated by the project.

Construction Noise. Due to the relative remoteness of the site and the lack of sensitive receptors in the vicinity, construction noise impacts are expected to be minimal. Construction noise during later phases of the development (Exhibit II-7) would have minimal impact on residents occupying homes built during the initial phases because of the buffering effect of the waterways surrounding the low density residential areas. Medium density residential areas may experience short-term noise impacts which are not expected to be significant. Therefore, no mitigations are necessary for construction noise.

Footnotes

1 Bill Partain, Director, Napa County Airport.

2 Jack W. Swing, Editorial in Noise Control Engineering; November-December 1978.

3 Bolt, Beranek & Newman, Inc., A Study--Insulating Homes from Aircraft Noise, Los Angeles, CA, for HUD, November 1966.

J. AIR QUALITY

Setting

Climate, Topography. The project site is located at the extreme southern end of the Napa Valley on flat terrain. The site is exposed to breezes off San Pablo Bay, with the result that temperatures are very moderate. The prevailing wind direction in Vallejo is southwest, reflecting flow through the Golden Gate. A secondary frequency maxima occurs for east winds, reflecting flow eastway through the Carquinez Straits during the winter months.[1] The average annual windspeed is 5.5 mph, and calm conditions occur about 10% of the time.

Air Pollutants, Standards and Regulations. The Clean Air Act of 1967 as amended established air quality standards for several pollutants. These standards are divided into primary standards, designed to protect the public health, and secondary standards, intended to protect the public welfare from effects such as visibility reduction, soiling, nuisance and other forms of damage. Additionally, the State of California has adopted its own standards.

The standards are durations for specific contaminant levels that are designed to avoid adverse effects with a margin of safety. Table III-10 describes these standards.

Because the federal standards for ozone, carbon monoxide and total suspended particulates are exceeded in the Bay Area, the Bay Area has become designated as a Non-attainment Area for these pollutants. This required the preparation of a Non-attainment Plan containing a strategy for eventual attainment of the federal standards. The original 1979 Bay Area Air Quality Plan[2] has recently been revised and updated in the 1982 Bay Area Air Quality Plan.[3]

The 1982 Plan includes stationary source controls, transportation control measures and mobile source controls to meet the federal standards throughout the Bay Area by 1987.

Air Pollutant Emissions. Emission sources in the Bay Area include stationary sources (factories, power plants), motor vehicles and area sources (fuel combustion, solvents, etc.). Total Bay Area emissions are shown in Table III-11.

The existing project site is an intermittent source of particulate matter in the form of dust raised by agricultural activities.[4] Based on available emission factors, dust from agricultural activities on site are estimated at 75 tons/year, equivalent to 0.20 tons/day.

Existing Air Quality. Air quality is monitored in Vallejo by the Bay Area Air Quality Management District. A summary of air quality data for Vallejo is shown in Table III-12.

Table III-10

Federal and California Air Quality Standards

Pollutant	Averaging Time	Federal Standards		California Standards
		Primary	Secondary	
Suspended particulates	Annual geometric mean	75 ug/m^3	60 ug/m^3	60 ug/m^3
	24 hours*	260 ug/m^3	150 ug/m^3	100 ug/m^3
Carbon monoxide	8-hour*	10 mg/m^3	10 mg/m^3	9.7 mg/m^3
	1-hour*	40 mg/m^3	40 mg/m^3	22.8 mg/m^3
Ozone	1-hour*	240 ug/m^3	240 ug/m^3	200 ug/m^3
Nitrogen dioxide	1-hour	--- ---	470 ug/m^3	
	Annual average	100 ug/m^3	100 ug/m	100 ug/m^3
Non-methane hydrocarbons	3-hour* (6-9 a.m.)	160 ug/m^3	160 ug/m^3	---
Sulfur dioxide	24 hour*	565 ug/m^3	--- 131	ug /m^3

*Not to be exceeded more than once per year.

ug/m^3 = micrograms per cubic meter

mg/m^3 = milligrams per cubic meter

Table III-11

1979 Bay Area Emission Inventory Summary
in tons/day

Source Type	Carbon Monoxide	Hydro-Carbons	Nitrogen Oxides	Sulfur Dioxide	Particulate Matter
Stationary	264	359	321	177	205
Motor Vehicles	2870	310	310	17	34
Other	80	63	12	1	240
Total	3220	732	643	195	479

Source: Bay Area Air Quality Management District, Base Year 1979. Emissions Inventory: Source Category Methodologies, August 26, 1981.

Table III-12 shows that violations of the state or federal standards for ozone, carbon monoxide and total suspended particulates have occurred. Because of seasonal variations, attainment of the federal ozone standard is based on a 3-year running average of violations called the Expected Annual Exceedance (EAE). The EAE for Vallejo from 1979 to 1981 is 0.3 days/year, well below the allowable 1.0 days per year.

The federal 8-hour carbon monoxide standard was violated in 1979 and 1980. Vallejo has been identified as one of four locations in the Bay Area that had not attained the federal standard by 1979. The 1982 Bay Area Air Quality Plan contains an analysis of past and future carbon monoxide levels in Vallejo.

The federal total suspended particulate standard is currently met in Vallejo. The state standard is occasionally exceeded, however.

Impacts - Air Quality

Indirect Emissions. Indirect emissions are those associated with auto and boat traffic generated or attracted to the project site. Motor vehicle and boat emissions generated by each alternative are shown in Table III-13. The methodology and assumptions used in deriving these figures are described in Appendix H.

Boat emissions under Alternatives A and B have been based upon a total of 1700 berths. Under Alternative C, it is assumed that boats would be mostly small sailboats, and that use of power boats would be negligible.

Of the pollutants shown in Table III-13, hydrocarbons and oxides of nitrogen (ozone precursors) are the most significant due to the persistent ozone problem in the Bay Area. Due to travel patterns and regional wind patterns, project emissions would mainly affect the Napa Valley. The emissions from Alternatives A, B and C would contribute to the cumulative degradation of air quality in the Napa Valley and Vallejo area. Alternative D would have no effect on regional air quality.

Ozone levels at Napa and Vallejo have met the federal standard during 1979-1981.[5] Ozone forecasts indicate continued improvement in ozone air quality in Vallejo through 1987, despite population growth.[6] The regional degradation of air quality due to project emissions would not, therefore, interfere with continued attainment of the ozone standard. The relationship of the project growth and assumed growth in the 1982 Bay Area Air Quality Plan is discussed further below under "Consistency with Nonattainment Plan/State Implementation Plan".

Local Air Quality Effects. The most significant pollutant on the local scale is carbon monoxide, an odorless, colorless, poisonous gas that is mainly emitted by automobiles. Concentrations of carbon monoxide under worst-case traffic and meteorology assumptions have been predicted for six road segments impacted by project traffic. The Caline-3 air quality model was used to predict peak 1-hour and peak 8-hour concentrations with existing traffic conditions and for several future scenarios. The assumptions and methodology used in deriving these predictions are explained in Appendix H.

Table III-12

Summary of Air Quality Data for Vallejo, 1979-1981, Maximum Concentration and Days Exceeding Standard[1]

Pollutant	Standard	1979 Max.	1979 Days	1980 Max.	1980 Days	1981 Max.	1981 Days
Ozone	Federal 1-hour (0.12 ppm)	0.10	0	0.14	1	0.10	0
Carbon monoxide	Federal 8-hour (9.3 ppm)	8.6	0	13.0	3	9.2	1
Nitrogen dioxide	State 1-hour (0.25 ppm)	0.08	0	0.09	0	0.10	0
Sulfur dioxide	State 24-hour (0.05 ppm)	0.004	0	0.008	0	0.010	0
Total suspended particulates	State Annual[2] (Ann. Geom. mean of 60 micrograms per cubic meter)	45	-	52	-	46	-
	State 24-hour ($100\ ug/m^3$)[3]	-	1	-	6	-	5

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1 California Air Resources Board, California Air Quality Data, Annual Summary, 1980-1982.

2 Data shown is Annual Geometric Mean.

3 Total suspended particulates are samples for a 24-hour period every sixth day. The data shown is the number of samples exceeding the state standard.

Table III-13

Project Emissions and Regional Emissions in tons/day

	Pollutant				
	Carbon monoxide	Non-methane hydrocarbons	Nitrogen oxides	Sulfur oxides	Particulates
Year 2000 Emissions[1]	2250	569	610	233	649
Alternative A	7.5	0.75[2]	1.25	0.21	1.65[3]
(% increase)	(0.3%)	(0.1%)	(0.2%)	(0.08%)	(0.3%)
Alternative B	7.2	0.72[2]	1.2	0.20	1.58[3]
(% increase)	(0.3%)	(0.1%)	(0.2%)	(0.08%)	(0.2%)
Alternative C	10.9	0.97	1.9	0.32	2.7[3]
(% increase)	(0.5%)	(0.2%)	(0.3%)	(0.1%)	(0.4%)
Alternative D	0	0	0	0	0
(% increase)	(0%)	(0%)	(0%)	(0%)	(0%)

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1 Association of Bay Area Governments, 1982 Bay Area Air Quality Plan, December 1982. This emissions data applies to the entire Bay Area District.

2 Includes 4 pounds per day generated by gasoline distribution to boats.

3 Includes effect of 0.20 tons/day for discontinuation of agricultural activities on site.

Tables III-14 and III-15 show predicted worst-case 1-hour and 8-hour carbon monoxide concentrations, respectively. The federal 1-hour standard is 35 ppm, the state standard is 20 ppm. The federal 8-hour standard is 9.3 ppm, the state standard is 9.0 ppm. The values shown are the sum of a local contribution generated by the local street traffic and a background concentration. The derivation of the background concentration is shown in Appendix H.

No violations of the standards are indicated for existing or future conditions. Levels under Alternative A or B would be somewhat below existing levels, reflecting the effect of anticipated improved emission controls on vehicles. Concentrations with Alternative C are higher, but still below projected 1987 levels. With Alternative C in 2000, carbon monoxide levels would be slightly higher than existing levels. With Alternative D, carbon monoxide levels would decrease to about 75% of existing levels by 2000.

Because the highest carbon monoxide levels are often found near intersections, carbon monoxide modeling was conducted for 3 intersections along S. R. 37 for worst-case traffic and meteorology. Estimated concentrations are for a receptor 25' from both roadways. Because intersection levels of service were not available, traffic was assumed to have an average travel speed of 10 mph (congested conditions) for all alternatives and analysis years. The results of this analysis are shown in Table III-16.

Carbon monoxide concentrations near intersections do not approach the federal or state 1- or 8-hour standards. Alternatives A and B would increase carbon monoxide levels by as much as 1.3 parts per million (ppm) in 1987 and as much as 5.6 parts per million in 2000. Alternative C would have a greater effect, increasing concentrations by up to 2.1 ppm in 1987 and up to 8.7 ppm in 2000. Increased levels of carbon monoxide near intersections along S. R. 37 are considered to be a cumulative adverse impact. With Alternative D, carbon monoxide levels would decline at the intersections analyzed through the year 2000, reaching levels equivalent to 75% of current levels.

Consistency with Non-attainment Plan/State Implementation Plan. The 1982 Bay Area Quality Plan is the Non-attainment Plan (NAP) for the Bay Area for ozone and carbon monoxide. This Plan, together with an earlier plan for control of total suspended particulates, is to be incorporated into the State Implementation Plan (SIP), the federally-mandated strategy for attaining the federal air quality standards statewide.

The 1982 Bay Area Air Quality Plan contains forecasts of future air quality in the Vallejo area. These forecasts were based on projections of future land use and population changes. The consistency of the project with the NAP is largely a question of consistency with the growth assumptions in the NAP.

The project site falls within the "sphere of influence" of Vallejo.[14] Within this area, a toal of 14,500 new dwelling units were assumed to be constructed between 1980 and 2000.

Alternatives A and B would involve 4,500 new dwelling units, which would be consistent with assumed growth. Alternative C would involve 10,00 new dwelling units, representing about 70% of the assumed growth in the Vallejo area. While not inconsistent with assumed growth in the NAP and the Vallejo General Plan, such a level of development within a single project would result in a total growth in dwelling units in the Vallejo area exceeding the assumed 14,500 within the 1980-2000 period.

Alternative D assumes no population increase on the site. While technically inconsistent with the assumptions of the NAP, this alternative would result in lower levels of emissions and improved air quality, and is threfore consistent with the goals of the NAP.

Table III-14

Estimated Worst-Case Peak 1-Hour Carbon Monoxide Concentrations near Selected Roadway Segments in parts per million

Roadway Segment	1987					2000			
	Existing	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D
S. R. 37 west of Napa River bridge	7.8	6.6	6.6	6.8	6.3	6.8	6.8	10.0	5.2
S. R. 37 between Sacramento and Enterprise	8.0	6.7	6.7	6.7	6.6	6.8	10.9	8.4	6.2
S. R. 37 west of I-80	9.2	7.7	7.7	6.4	7.7	9.1	9.1	11.9	8.8
I-80 north of S. R. 37	9.7	8.2	8.2	8.3	8.2	8.2	8.2	10.1	8.0
Wilson south of S. R. 37	6.9	5.7	5.7	5.9	5.5	5.6	5.6	7.7	4.6
S. R. 29 south of S. R. 37	10.6	8.3	8.3	8.4	7.7	6.6	6.6	8.0	6.4

Table III-15

Estimated Worst-Case Peak 8-Hour Carbon Monoxide Concentrations near Selected Roadway Segments in parts per million

Roadway Segment	1987					2000			
	Existing	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D
S. R. 37 west of Napa River bridge	4.9	4.2	4.2	4.4	4.0	4.4	4.1	6.7	3.3
S. R. 37 between Sacramento and Enterprise	5.1	4.3	4.3	4.3	4.2	4.4	4.4	5.6	4.0
S. R. 37 west of I-80	5.9	5.0	5.0	5.5	5.0	6.1	6.1	8.0	5.9
I-80 north of S. R. 37	6.3	5.4	5.4	5.4	5.4	5.4	5.4	6.8	5.3
Wilson south of S. R. 37	4.3	3.6	3.6	3.7	3.5	3.6	3.6	5.1	2.9
S. R. 29 south of S. R. 37	6.8	5.4	5.4	5.5	4.0	3.7	4.3	5.3	4.2

Table III-16

Estimated Worst-Case Peak 1-Hour and 8-Hour Carbon Monoxide Concentrations near Selected Intersections in parts per million

Segment	1987					2000			
	Existing	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D
S. R. 37 at S. R. 29									
1-hour	16.5	13.9	13.8	14.1	13.8	12.6	13.4	13.8	12.6
8-hour	7.5	6.3	6.2	6.3	6.2	5.9	5.8	6.0	5.6
S. R. 37 at Sacramento									
1-hour	12.4	10.5	10.9	11.4	10.1	10.4	11.7	13.7	8.4
8-hour	6.0	5.1	5.2	5.4	4.9	4.8	5.3	6.0	4.1
S. R. 37 at Wilson									
1-hour	12.1	11.1	11.1	11.9	9.8	13.7	12.3	16.7	8.1
8-hour	5.9	5.2	5.3	5.5	4.8	6.0	5.5	7.0	4.0

The control strategies in the NAP consist of stationary source controls, transportation control measures, and mobile source controls. A review of these measures reveals no inconsistency between any of the Alternatives and these control measures.

Mitigations - Indirect Emissions (Joint City and Developer Responsibility)

- Require that phase development coincide with planned and recommended capacity improvements along S. R. 37 and other streets. Because carbon monoxide emissions are greatly increased by congestion, capacity improvements that increase average vehicle speeds reduce carbon monoxide impacts. This measure is applicable to Alternatives A, B and C.

- Develop a program of Transportation System Management (TSM) measures. Such a program would be a joint effort by the developer, county, city and regional agencies. Such a program might include:

  - ridesharing
  - extending public transit to site
  - carpool/vanpools
  - bicycle incentives for local travel

  This measure would be applicable to Alternatives A, B and C. An aggressive TSM program could reduce indirect emissions from the project by 5 to 10%.

Construction. Construction air quality impacts would be due to dust generated by equipment and vehicles. Fugitive dust is emitted both during construction activity (e.g., clearing, earthmoving, grading) and as a result of wind erosion over exposed earth surfaces. Clearing and earthmoving activities comprise the major source of construction dust emissions, but traffic and general disturbance of the soil also generate significant dust emissions,[7] but traffic and general disturbance of the soil also generate significant dust emissions. Dust generation is dependent on soil type and soil moisture. The effects of construction activities would be increased dustfall and locally elevated levels of total suspended particulates.

Alternatives A and B would involve movement of up to 16.2 million cubic yards of fill, including 3.0 million cubic yards of bay mud and 13.2 million cubic yards of imported material. Also, larger quantities of peat would be moved to be used as fill on site. The potential for dust generation would be high during earthmoving activities. On-site soils have a large silt content, which, when dried, would easily be carried by the wind. Although dust generation would be significant during construction, there are no sensitive land uses immediately downwind of the site.

Dust impacts of Alternative B would be less than those of Alternatives A and C, due to the smaller need for fill material and smaller excavaton of bay mud for creation of waterways.

These construction impacts for Alternatives A-C are considered to be significant adverse impacts.

There would be no construction air quality impacts associated with Alternative D.

Mitigations - Construction

- o Require all construction contracts to include dust control clauses. The developer should require all contractors to control dust by watering exposed earth surfaces, covering trucks transporting fill to the site, and daily removing earth or mud carried onto S. R. 37. This measure would apply to Alternatives A, B and C. A concerted effort to reduce dust generation could be as much as 50% effective.

On-Site Emission. The proposed land uses in Alternatives A and B and the residential and commercial uses in Alternative C would not be a large direct source of air pollutants. Air pollutants associated with residential/commercial uses are limited to space and water-heater exhausts, fumes from paints and household solvents, exhaust from lawn mowers, fireplaces and barbeques.

The magnitude of these sources would be proportional to the population increase associated with each alternative. Such emissions would not represent a significant increase in regional emissions, and would be far less than indirect emissions.

Alternative C would include 53 acres of industrial land uses, which may include stationary sources of pollutants. Impacts from such sources must be discussed in general terms because the number and nature of specific industrial uses and resulting air emissions are not now known. As industrial uses are proposed, each would be subject to federal, state and local rules and regulations.

The Bay Area Air Quality Management District is the primary regulator of industrial sources within the project area. The District requires permits for all stationary pollutant sources. To obtain a permit from the District, all industrial applicants must submit information of the proposed facility, the processes and operations planned, operating schedules and design capacities. All emission points and the concentration and amount of all emissions must be identified.

The District would evaluate the application to determine that the National Ambient Air Quality Standards and State Standards are not violated. It also must be determined that all emission limitations would be met. These emissions limitations are of five general types:

- o opacity limitations
- o exhaust concentration limitations
- o mass limitations
- o nuisance limitations
- o emission limitations for specific industrial processes

Additionally, new sources emitting more than

- o 50 tons/year (or 1000 lbs./day) of particulates
- o 1000 lbs./day of carbon monoxide
- o 250 lbs./day of any other pollutant for which there is a standard, must be constructed using Best Available Control Technology (BACT). An offset equal to 120% of the emission would also be required if modeling shows that the new source causes or contributes to the violation of an air quality standard.

Although the specific amounts and types of pollutants generated by any future industrial uses are currently unknown, such uses would come under close scrutiny at the time of application for a permit from the Bay Area Air Quality Management District. Under

current regulations, industrial development would not have a significant impact on local or regional air quality. The enforcement of emission limitations, BACT requirements and offset requirements would insure that future industrial develoment would not interfere with the achievement and maintenance of the air quality standards.

Footnotes

1 Bay Area Air Quality Management District, unpublished computer analyses of Vallejo Station wind data.

2 Association of Bay Area Governments, 1979 Bay Area Air Quality Plan, January 1979.

3 Association of Bay Area Governments, 1982 Bay Area Air Quality Plan, December 1982.

4 Bay Area Air Quality Management District, Base Year 1979 Emissions Inventory: Source Category Methodologies, August 16, 1981.

5 California Air Resources Board, California Air Quality Data. Annual Summary, 1980-1982.

6 Association of Bay Area Governments, 1982 Bay Area Air Quality Plan, December 1982.

7 U. S. Environmental Protection Agency, Guidelines for Development of Control Strategies in Areas with Fugitive Dust Problems, OAQPS 1.2-071, October 1977.

K. UTILITIES AND SERVICES

Setting - Sanitary Sewer

The Cullinan Ranch site is within the sphere of influence of the Vallejo Sanitation and Flood Control District (VSFCD), a self governing special district. The district's adopted Master Planning Study was prepared by James Montgomery Engineers, Inc. and Lowry & Associates. The subject site would have to be annexed in the VSFCD.[1]

The VSFCD's sewage treatment plant currently has the capacity to process 12.5 million gallons of sewage per day, and is expandable to 16.0 mgd. The plant is capable of handling peak loads at a rate of up to 60 mgd. The plant is currently processing approximately 10 mgd.[2]

Alternatives A and B require sewage collection from 4500 residential units; and assorted commercial uses. Alternative C requires sewage collection from 10,000 residential units, commercial uses, and light industrial use. Alternative D would not require sewage collection.

Impact - Sanitary Sewer

Construction of Alternatives A, B, and C would involve the collection of sewage within the proposed development by means of a gravity flow system, and transportation through a series of pump stations and force mains across the Napa River, connecting to the VSFCD 24-inch sanitary sewer interceptor in Wilson Street.

The developer has identified a lack of capacity in the 24-inch interceptor to handle the anticipated flows generated by the construction of Alternatives A, B, and C, and proposes to increase the capacity of that line.

While no engineering problem exists with installing the required sewer lines for Alternatives A, B, and C across the Napa River, from an administrative point of view, the California Department of Transportation staff has indicated a reluctance to installing the pipe on the Napa River Bridge, however, the VSFCD has no reservations about installing the pipe underground.

The developer has also identified site soils as containing peat and unconsolidated bay muds. Ground settlement, a characteristic of these types of soils, would adversely affect the gravity flow of sanitary sewers proposed in Alternatives A, B, and C.

The sewer pump stations that would be necessary for the construction of Alternatives A, B, and C would create both visual and maintenance problems for the VSFCD. Additionally, such pump stations would have standing sewage, providing a possible environment for the breeding of mosquito larvae. Since the operation of such stations would be power dependent, sewage back-up may occur during times of power outage. Since no practical alternative to pump stations exists, these are adverse impacts which require mitigation.

According to Sol Friedman, Engineer-Manger of VSFCD, sewer plant capacity over and above prior commitments, including Glen Cove and the Northeast Quadrant, is anticipated to be sufficient for construction of Alternatives A and B. The plant will not have sufficient capacity to serve the needs of Alternative C. No increase in the cost of sewage service to either the Mare Island Naval Shipyard or City of Vallejo residents is expected as the result of the Construction of Alternatives A, B, and C, as any costs to the VSFCD resulting from the project, now or in the future, will be borne by the developer.

With respect to sanitary sewer, no adverse impacts are associated with Alternative D.

Mitigations - Sanitary Sewer

The following mitigation measures apply to Alternatives A, B, and C unless otherwise noted.

Joint VSFCD and Developer Responsibility

- o Upgrade and renovate the Sanitary Sewer interceptor on Wilson Avenue from Tennessee Street to Sears Point Road, to mitigate overload problems. The cost of the new sewer would be shared by the VSFCD and the Developer, based on the expected use of its capacity.

Developer Responsibility

- o Construct sanitary sewers with flexible piping to avoid breakage, and have steeper slopes to offset possible slope flattening due to anticipated differential earth settlements.

- o Sanitary sewers should conform to VSFCD guidelines as outlined in a recent VSFCD letter to the City of Vallejo Planning Department.

- o Pump stations should have both wet wells and dry wells, to facilitate maintenance. Developer maintenance of pump stations may be considered as an alternate measure.

- o Consider aesthetic treatment of pump stations considered, either by landscaping or architectural detail, per VSFCD requirements.

- o Equip pump stations with auxiliary generators to avoid sewage back-up during power outages.

- o Pump stations should be adequately sealed to prevent mosquito entry and breeding.

- o Construction under Alternative C will require expansion of treatment plant facilities.

- o No mitigation measures are necessary for Alternative D, no project.

Setting - Water Supply

The water source for the Cullinan Ranch project would be an existing 20-inch water main located approximately 2400 feet east of the Napa River at the intersection of Sacramento Street and Sears Point Road. Alternatives A and B require water service to 4500 residential units and assorted commercial uses. Alternative C requires service for 10,000 residential units, commercial uses, and light industrial use.

An 18-inch main is proposed to cross the Napa River and run along the frontage road to the project. The main line near the westerly boundary of Cullinan Ranch would be a 16-inch line. All other in-tract lines would be 12, 8 and 6-inch sizes. Two elevated tanks, of approximately 2.0 million gallons each and estimated to be at least 75 to 85 feet high, located as shown in the Cullinan Ranch Specification Plan, would also be included.

Depending upon the available flow and pressures from the existing main, one or more booster stations may also be required. The tanks would be included to provide necessary domestic and fire flows in the event that the project site's water supply from across the Napa River is ever cut off. All facilities should be designed in accordance with City Standards.

Impacts - Water Supply

According to Erwin Folland, Water Superintendent for the City of Vallejo Water Division, water supply from the City's Delta and Lake Berryessa sources over and above prior commitments, including Glen Cove and the Northeast Quadrant, is adequate to meet the estimated 2.44 million gallon per day (mgd) requirement of Alternatives A and B. Existing supplies, however, are not sufficient to meet the estimated 6.1 mgd requirement of Alternative C. Additionally the Water Division will require, for all Alternatives, that a specific evaluation to determine whether residual pressure in the existing trunk system (transmission mains and pumping plants) is sufficient to meet the needs of the project, without detrimental effect to existing service.[4]

While no engineering problem exists with installing the required water supply lines from Alternatives A, B, and C across the Napa River, from an administrative point of view the California Department of Transportation staff has indicated a reluctance to installing the pipe on the Napa River Bridge,[5] and the City has reservations about installing the pipe underground for maintenance reasons.[6] If such is the case, the City would require that a maintenance district be formed, to deal with maintenance and repairs. A determination would be made once a specific plan for service is developed jointly by the developer and City.

Installation of the water storage tanks required for Alternatives A, B, and C are planned for construction in phases C and F respectively. Should the project be interrupted in earlier phases, service to previously constructed phases could be affected. This would be an adverse impact. Larger tanks may be required for Alternative C. The construction of booster stations required for Alternatives A, B, and C will create a noise nuisance for nearby residences. This is considered to be an adverse impact.

The additional water usage required by the construction of Alternatives A, B, and C reduces the amount of water supply available for other uses, both within the City of Vallejo and other users of Delta and Lake Berryessa reserves. Increased pumping requirements may affect the City's ability to transport sufficient quantities of water into the City from the Cordelia and American Canyon pumping plants. For this reason, the City may require the developer to conduct a study to determine if additional delivery capacity is necessary. If it is found that additional capacity is required, the City would review the Water Facilities Tax on new connections and make appropriate adjustments. Additionally, increasing pumping requirements would marginally increase energy consumption for utility operations. In general, revenues acquired from service rates and fees cover the costs of operation and maintenance of a water distribution system. The construction of Alternatives A, B, and C will require capital improvement expenditures (i.e. tanks, transmission mains and booster stations) that are normally covered by service charges.

Significant ground settlement due to site soils warrants special design treatment for the water distribution lines, tanks, etc. For this reason the City may require a complete dielectric on all components.

No adverse impacts are associated with Alternative D.

Mitigations - Water Supply

The following mitigation measures apply to Alternatives A, B, and C unless otherwise noted.

Joint City of Vallejo Water Division and Developer Responsibility

- The existing trunk system would have to be upgraded. Costs would be shared based on expected usage.

Developer Responsibility

- The developer should bear any additional costs related to maintenance of water supply lines, should they be placed under the Napa River, and alternative mitigation measures would be the formation of a maintenance district.

- Install water storage tanks prior to occupancy of any unit dependent on that tank for service.

- Booster stations should be insulated to eliminate noise problems. Booster stations could be placed underground to achieve the same effect; however, this solution is not acceptable to the Water Division.

- To mitigate water supply demands, water conservation measures should be incorporated into the design. These include, but are not limited to, the use of water conserving fixtures in residential units, and low-water use landscaping.

- Energy demands could be mitigated by maximizing pumping during off-peak electrical demand periods.

- The cost of major capital improvements including water tanks, transmission mains and booster stations, should be borne by the developer, per City of Vallejo Water Division policy. Under these conditions, there would be no fiscal impact to either the City or existing customers.

- Larger water storage tanks may be required for Alternative C.

- No mitigation measures are required for Alernative D, no project.

Setting - Public Schools

The Cullinan Ranch site is located within the Vallejo School District. The nearest schools are Vallejo Senior High School, Solano Junior High School and Mare Island Elementary School. Bus transportation is provided by the school district. The average number of students per household in Vallejo is .34 elementary school age children and .13 students for both junior high and high school levels. According to Mr. Dale Welsh, Assistant Superintendent, all the schools nearest the Cullinan Ranch site are at or above capacity. Federal Terrace Elementary School, which is also near the site, is also at capacity. The current plans for expansion of these schools do not include enrollment projections for Cullinan Ranch.

Impacts - Public Schools

Alternatives A, B, and C would all result in a significant increase in the number of school age children. A survey of school age populations in similar developments around San Francisco Bay was prepared by Haworth & Anderson (June 1982). See Appendix Document. Their findings indicate that the average school age population per household (occupied dwelling unit) for similar developments is .31 elementary students, .15 junior high students and .14 high school students. Using these figures, the following projection of school age children for each alternative can be made.

Table III-18

PROJECTED SCHOOL AGE CHILDREN AT FULL BUILDOUT

	# Households	# Elementary	# Junior High	# High School
Alternative A	4,500	1,395	675	630
Alternative B	4,500	1,395	675	630
Alternative C	10,000	3,100	1,500	1,400

The developer has proposed new school sites to meet the need for the additional student populations. Two elementary school sites of 8 and 9 acres are proposed at opposite ends of the medium density residential areas for Alternatives A and B. A 15 acre junior high school site is proposed near the middle of the medium density area. These locations were chosen to minimize travel distance, to take advantage of the pedestrian/bicycle trail system, and to avoid heavily traveled streets. Funding for construction has not yet been identified. See Economic/Fiscal section of this report. For Alternative C, four school sites are proposed including three elementary sites and one junior high site. Funding for construction has not yet been identified. See Economic/Fiscal section of this report.

The phasing program proposed for Alternative A indicates that 770 low density residential units would be constructed during phases A and B, which would be four to six years prior to improvement of the nearest elementary school site. Using the projection figures above, this would result in the following numbers of school age children when these units are occupied: 238 elementary school students, 115 junior high school students, and 107 high school students. The Vallejo School District has stated that there is no capacity at the existing schools for any additional students. Provisions must be made, therefore, to either provide additional capacity at existing schools or revise the construction phasing to provide new schools by the time residential dwellings are occupied.

As discussed under Land Use and Parks, one elementary school site is proposed in the flight path of the Napa Airport, thereby creating an unsafe condition. The developer has stated that the school site would be relocated away from the flight path.

Mitigations

The developer has proposed school sites for Alternatives A, B and C. Relocation of the elementary school site away from the flight path of the Napa Airport has already been recommended under Land Use.

Mitigation Alternatives (Joint School District and Developer Responsibility)

The following two mitigation alternatives are suggested as possible ways to reduce the short-term impact of insufficient capacity at existing schools.

A. Additional capacity would be provided at existing schools, e.g., double or year-round sessions and/or additional portable classrooms.

B. Construction phasing could be revised to provide the new school by the time residential dwellings are occupied.

Setting - Parks

The proposed site is currently within the Greater Vallejo Recreation District (GVRD), which has responsibility for providing recreational opportunities within Vallejo. The site presently provides only limited recreational use of the levee areas for hunting and fishing primarily because of reduced access and no parking. However, a public easement is provided in the State of California Boundary Exchange Agreement. See discussion under Land Use. The GVRD standard for parks provides 4.25 acres of park per 1,000 population.

Impacts - Parks

Alternatives A, B and C would all result in a considerable increase in the demand for recreational facilities in the vicinity of the site. Application of the GVRD park standard to each alternative results in a minimum required acreage of park land of 48.5 acres for Alternatives A and B and 106.3 acres for Alternative C.

The developer has proposed the following park areas for Alternatives A and B: 1) two neighborhood parks totaling 13.0 acres located adjacent to the elementary schools, 2) one community park of 20.0 acres located adjacent to the junior high, 3) a 10.0 acre marina park located on the finger of land that will separate Dutchman Slough from the harbor, 4) a system of bicycle and pedestrian trails, 5) about 185 acres of open space along the levee between Dutchman and South Sloughs, 6) 15.5 acres of view parks ranging from .3 to .5 acres each and located between waterfront properties on the residential peninsulas.

The view parks would most likely be owned and maintained by a homeowners' or improvement association. The 37 acres of bicycle and pedestrian corridors may be dedicated to the City. The levee and wetlands area might be offered to the State for public use and maintenance or become the responsibility of a port authority, which would be established at a later date. The remaining 43 acres of developed park lands would probably be dedicated to and maintained by the GVRD. The impacts of costs for developing these park facilities have been discussed in the Economics/Fiscal section and also in the Alfred Gobar "Preliminary Fiscal Impact Evaluation - Cullinan Ranch Development (September 1982)". See Appendix Document.

The GVRD has expressed concern that the parks have been proposed in areas with the highest noise levels, i.e., Highway 37, and also the park/school site is located within the main flight path of the Napa Airport, which may create a safety hazard.

Alternative C proposes 461 acres of open space, of which about 110 acres would be landscaped parks and buffer, 251 acres would be open water, and 100 acres would be natural landscpae. About 68 acres of community parks and about 40 acres of neighborhood parks have been designated for Alternative C.

Mitigations (Developer Responsibility)

- o For Alternatives A and B, the proposed site for the elementary school/park should be relocated away from the flight path of the Napa Airport (discussed under Land Use section).

- o Landscape buffers should be provided in all parks where automobile traffic creates excessive noise (developer proposed).

Setting - Gas and Electricity

Pacific Gas and Electric Company (PGandE) has three electric lines on the Cullinan Ranch site. Two of these lines are parallel transmission lines and are contained within a 120 foot easement on the northwest corner of the property. See Exhibit III-1. These lines, 115 KV and 230 KV, were constructed under rights of way acquired in 1912 and 1967 respectively. The construction of any building, or other structure, or the drilling of any well within the rights of way and easements is prohibited.

In addition to the transmission lines, there is a 12 KV distribution pole line within the proposed project. This line presently serves the existing agricultural operation within the project boundary.

There are no distribution or transmission gas lines within the project boundary.

Impacts - Gas and Electricity

PGandE estimates that Alternatives A or B would create an electrical demand that could vary from a low of 12 megawatts to a high of 25 megawatts during peak loads. Alternative C would result in an electrical demand between 25 and 50 megawatts during peak loads. These electrical demands would require the development of an area substation with related transmission lines tying into one of the existing transmission lines crossing the northerly boundary of the project. About 2 to 3 acres would be required to develop a new substation to serve the project, depending on landscaping and setback requirements established by the City of Vallejo.

A new substation could be constructed at the existing Highway Substation located on Highway 29 in the American Canyon area. From this facility two 21 KV feeder lines could be extended to the project area. This would require a crossing of the Napa River either by submarine cable or by attaching the facilities to the bridge crossing the River. It is not certain at this time if all the necessary land rights or permits can be obtained or if an off-site substation is technically or economically feasible.

The Navy has requested PGandE to investigate the possibility of providing an alternate source of transmission voltage to the northerly portion of Mare Island. This alternative would tie into either of the existing transmission lines that cross the northerly portion of the proposed project and require the development of a substation on the south side of Highway 37 in the vicinity of Guadacanal Village and the construction of a new transmission line to it, most probably through the proposed project.

Since there are no gas distribution or transmission facilities in the vicinity, it will be necessary to extend gas lines across the Napa River to the proposed project site for Alternatives A, B and C. A preliminary investigation by PGandE gas engineers indicates that there are two possibilities for supplying gas to the site.

One possibility would be to extend a supply line over the causeway to Mare Island through Mare Island to the development. At the drawbridge, the line would be placed underwater within a dredged trench approximatley 100 feet in length. This possibility is dependent upon PGandE obtaining adequate rights and/or permits from the Department of the Navy for that portion of the gas line located on government property.

The second possibility would be to install approximatley 10,000 feet of 6 inch gas line along Wilson Avenue from its intersection with Tolo Avenue to the development. The gas line would cross under the Napa River at a point northerly of the State Highway Bridge. A crossing at this point would require the dredging of a trench approximately 2,250 feet in length.

Both possibilities would require the installation of a gas regulator station at some point in or near the development. A regulator station would require approximately 1/4 of an acre.

Alternative D would have no impacts on gas and electric service requirements.

Mitigations (Joint PGandE and Developer Responsibility)

The following mitigations apply to Alternatives A, B and C.

- Electrical transmission should be extended to service the site and a new substation should be constructed.

- Gas lines should be extended to the site and a gas regulator station should be constructed. Details regarding routing gas and electric lines should be coordinated by PGandE, the developer and possibly the Navy at Mare Island.

Setting - Police Services

The City of Vallejo Police Department provides police protection for areas within the City of Vallejo. The department currently does not have a patrol boat nor does it have responsibility for enforcing the Harbor and Navigation Code. The Napa County Sheriff, Solano County Sheriff and the U. S. Coast Guard have joint responsibility for patrolling all waterways and enforcing boating regulations.

Impacts - Police Services

Alternatives A, B and C would all generate a need for additional police services. The Police Department estimates that at least one patrol unit, 24 hours per day, would be required to provide adequate service. The costs of this additional service are discussed in the Gobar analysis, "Preliminary Fiscal Impact Evaluation" (see Appendix Document) and in the Economic/Fiscal section of this report.

The developer has suggested that a combined police and fire facility be designated within the project to provide the additional services. Provisions for police services within the boating channels will be developed in consultation with the City of Vallejo.

Mitigations (Joint Police/Fire Department and Developer Responsibility)

As suggested by the developer, a combined police and fire facility should be designated within the project, if necessary.

Setting - Fire Services

The City of Vallejo Fire Department provides fire suppression services 24 hours per day. The nearest fire station to the site is Station #3 located at 900 Redwood Street about 1.5 to 3.5 miles from the site. This station would provide the first response for fire suppression services. Second and third responses would come from Station #5 at 595 Mini Drive and Station #1 at 1220 Marin Street, respectively. A total of nine personnel (three from each station) would normally respond to a structural fire. The current response standard is within a radius of 1.5 miles from a station and is generally a five minute response time. The fire department currently has no fire boats for fire suppression.

Impacts - Fire Services

The proposed projects in Alternatives A, B and C are all outside the Fire Department's response time standard. The developer has stated that a site will be designated within the project boundary for a fire station or a combined police and fire facility. Financing for the fire station has not been determined. See Economics/Fiscal section. The Vallejo Fire Chief estimates that fire service costs would range from $700,000-800,000 per year beginning at the end of phase 2 or beginning of phase 3.

Mitigations (Joint City of Vallejo Fire Department and Developer Responsibility)

The following mitigations apply to Alternatives A, B and C.

- o A specific site should be designated for a fire station (or combined police and fire facility) on the project site. (Developer proposed mitigation.) A financing package should be established to pay for construction of the new fire station

- o The developer also proposes the following mitigations to assure adequate fire protection: water supply sufficient to deliver required fire flow and pressure to the site, hydrants, water mains, hydrant markers, paved access for emergency vehicles, clearly marked street names, adequate building identification by number and fire and drought resistant plant materials.

Footnotes

1 Letter from Vallejo Sanitation & Flood Control District to Planning Department of City of Vallejo, dated Sacramento 7, 1982.

2 Interview with Sol Friedman, Engineer-Manager of Vallejo Sanitation & Flood Control District, January 14 and February 18, 1983.

3 Interview with Ron Matheson of Vallejo Sanitation & Flood Control District, January 18, 1983.

4 Interview with Erwin J. Folland, Water Superintendent, City of Vallejo Water Department, Janaury 14 and February 18, 1983.

5 Interview with Bill Sieji of CalTrans Maintenance, Fairfield, January 14, 1983.

6 Letter from Erwin J. Folland, Water Superintendent for the City of Vallejo, to City of Vallejo Planning Department, dated August 8, 1982.

L. ECONOMIC/FISCAL

Setting - Economic/Fiscal

The Public Services Plan for Cullinan Ranch assumes that all of the project area within unincorporated Solano County will be annexed to the City of Vallejo. The City would provide the majority of municipal services. The Greater Vallejo Recreation District would provide recreation services. The project area is within the Vallejo City Unified School District, which would be responsible for elementary and secondary education.

Alternative A (the proposed project) has been the subject of an economic/fiscal analysis by Alfred Gobar Associates, Inc. completed in September 1982 and December 1982. (These previous studies are occasionally referred to as the "Gobar Analysis" and are contained in the Appendix Document.) Since Alternative B differs from Alternative A only in terms of product mix, it was assumed that the economic/fiscal impacts of these two alternatives would be comparable. Alternative C differs substantially from Alternatives A and B both in product mix and product type. An analysis of the differences between the three Alternatives is contained within this EIR/EIS.

Impacts - Economic/Fiscal

The present analysis incorporates the previous economic/fiscal impact analysis of the proposed project and includes revisions due to changed circumstances or alternative technical assumptions. The basic conclusions from the previous study are summarized in Table III-17 (Exhibit II of the Gobar Analysis of December, 1982). The following analysis describes revisions in that exhibit.

Fiscal Impact of Alternative A. The revised procedures for estimating revenues are summarized in Table III-18. Revenues other than those discussed in Table III-18 remain the same.

A particularly important issue concerns assumptions in the Gobar Analysis about taxable value. The assumed market values in the Gobar Analysis are considerably higher than current Vallejo experience, as confirmed by discussions with the County Assessor's office. Table III-19 shows the unit values that were used in the Gobar Analysis but also shows values that would be more typical of current market values in Vallejo. These latter numbers are analyzed to indicate the fiscal impact on Vallejo if the ultimate Cullinan Ranch development is not able to capture values considerably in excess of typical values in Vallejo at the present time.

The line item "Unsecured Marina Property" was eliminated in the "Current Vallejo Values" alternative. Discussions with the Office of the County Assessor indicated that the only unsecured property at a marina would be the boats themselves.

Table III-19 also shows the taxable market value ten years after each improvement first comes onto the tax roles. Taxable value will not keep up with inflation (assuming an inflation rate in excess of two percent per year) unless the property changed ownership each year. The taxable value estimate for year 10 is based on a simulation of the limitations of the Jarvis-Gann property tax initiative.

TABLE III-17

CUMULATIVE FISCAL IMPACT ON THE CITY OF VALLEJO THROUGH EACH DEVELOPMENT PHASE

CULLINAN RANCH PROJECT

	Cumulative Thru: Phase A	Phase B	Phase C	Phase D	Phase E	Phase F	Phase G
Revenues:							
Property Tax	$ 247,015	$ 609,155	$ 1,264,325	$ 1,660,228	$ 2,242,490	$ 2,733,822	$ 3,210,624
Sales Tax*	-	-	304,920	609,840	914,760	1,029,105	1,067,220
Utility Users Tax	33,431	84,400	182,501	236,210	333,324	421,450	493,245
Business License Tax	-	-	18,968	37,936	56,904	64,017	66,308
Franchise Tax	4,175	10,541	22,794	29,502	41,631	52,638	61,605
Property Transfer Tax	14,314	36,130	78,435	101,802	139,264	173,142	204,468
Per Capita Revenues	9,052- 18,523	22,854- 46,764	47,000- 96,173	59,169- 121,074	80,624- 164,974	101,400- 207,487	120,840- 247,266
Total Revenue	$307,987-317,458	$763,088-786,998	$1,918,943-1,968,118	$2,734,687-2,796,592	$3,808,997-3,893,347	$4,575,574-4,681,661	$5,224,390-5,350-816
Costs:							
Police Protection**	$22,474- 62,640	$ 56,737-158,143	$116,684-325,234	$146,895- 409,440	$200,158- 557,900	$251,737- 701,666	$300,000- 836,190
Fire Protection**	11,719- 45,160	29,586-114,009	60,847-234,470	76,600- 295,176	104,375- 402,209	131,272- 505,850	156,439- 602,851
Public Works	5,855- 21,564	8,782- 46,335	15,892- 80,794	23,001- 99,989	30,110- 123,156	33,805- 148,718	41,123- 198,628
Library	4,748	11,987	24,683	31,036	42,289	53,187	63,304
Overhead Costs	11,450- 34,279	27,373- 84,469	55,740-170,013	70,937- 213,590	96,344- 287,691	120,132- 360,248	143,378- 434,789
Total Costs	$56,246-168,391	$134,465-414,943	$273,816-835,164	$348,469-1,049,231	$473,276-1,413,241	$590,133-1,769,669	$704,324-2,135,842
Range of Net Revenues	$139,596-261,212	$348,145-652,533	$1,083,779-1,694,300	$1,685,456-2,448,123	$2,395,756-3,420,071	$2,805,905-4,091,528	$3,088,548-4,646,492
Range of Benefit:Cost Ratios	1.82-5.64:1	1.84-5.85:1	2.29-7.19:1	2.61-8.03:1	2.70-8.22:1	2.59-7.93:1	2.45-7.60:1

*Does not allow for increased spending by residents in development off the property during early years of development.
**Cost estimates made by agencies for total project (low estimates) were allocated by phase according to population growth. While these are only an approximation and costs will occur in step functions, the high estimates are also shown which are based on the current per capita costs.

Source: Alfred Gobar Associates, Inc.

Table III-18

REVISIONS TO REVENUE ESTIMATES
CULLINAN RANCH DEVELOPMENT

REVENUE

Property Tax

Reason for Revision

1) The property tax transfer amount under the Solano County Master property tax transfer agreement and the resulting tax apportionment factors in Cullinan Ranch Tax Rate Area (TRA) are now known.

2) The limits of Proposition 13 prevent the property tax base from keeping pace with price inflation.

Revised Estimating Procedure

The effective tax rate resulting from the City of Vallejo/Solano County property tax transfer agreement was applied to the taxable value estimated previously from the Gobar analysis. The Proposition 13 limit on increase in taxable value in constant dollars was simulated, assuming an average residential property turnover rate of 10% and price inflation at 6%. The estimate of taxable value was for the 10th year after buildout.

Sales Tax

Reason for Revision

1) The estimate of sales tax should include only retail sales that generate sales tax revenues to the local jurisdiction and the State. Transient occupancy taxes are not sales taxes and are therefore estimated separately.

Table III-18

REVISIONS TO REVENUE ESTIMATES
CULLINAN RANCH DEVELOPMENT
(continued)

REVENUE

2) The sales tax revenue estimated previously from the Gobar analysis is viewed as unrealistic in the absence of a detailed commercial plan with anchor tenants and a better indication of the services and products to be provided in the 65 acres of commercial area.

Revised Estimating Procedure

A more realistic estimate of sales tax revenue to be generated by the project is based on $140 total sales--only half of which would be taxable--per commercial square foot. This assertion is based on the likelihood of utilizing some of the 65 acre commercial area for light industrial/office or warehouse functions.

Per Capita Revenues

Reason for Revision

1) The range of per capita estimates from the Gobar analysis was quite broad.

2) The relationship between street maintenance costs and Road Fund revenues was not clear.

Revised Estimating Procedure

Fines and Forfeitures: The city's 1981/82 per capita experience and percent distribution to the General Fund and Road Fund were applied to the project population.

Motor Vehicle In-Lieu Fee: $18.26 per capita for City, $13.96 per capita for County, with no offset for State "reverse bailout". (see text).

Table III-18

REVISIONS TO REVENUE ESTIMATES
CULLINAN RANCH DEVELOPMENT
(continued)

REVENUE	
	Cigarette Taxes: Simulation of state allocation formula, using population and taxable retail sales estimates from from the Gobar analysis and revised estimates.
	Motor Fuel Taxes: Simulation of State allocation formulae, using population as a surrogate for vehicle registration and taxable value from from the Gobar analysis.
	Other Per Capita Revenues: Per capita, based on 1981/82 City budget.

Source: McDonald & Associates

Table III-19

TAXABLE VALUES FOR ALTERNATIVE A
CULLINAN RANCH DEVELOPMENT

LAND USE	No. of Units	As Proposed			Current Vallejo Values		
		Unit Value	Original Total Market Value	Taxable Value: Year 10	Unit Value	Original Total Market Value	Taxable Value: Year 10
Single Family Residential	3000	$214,500	643,500,000	519,047,000	$ 170,000	510,000,000	411,366,000
Multi-Family Residential	1500	144,000	216,000,000	174,226,000	90,000	135,000,000	108,891,000
Hotel	200	75,000	15,000,000	10,210,000	75,000	15,000,000	10,210,000
Commercial	65 ac	923,000	60,000,000	40,842,000	923,000	60,000,000	40,842,000
Landscaped Area/Open Space	766.5 ac	0	0	0	0	0	0
Marina	700	12,000	8,400,000	5,718,000	6,000	4,200,000	2,859,000
Boats	1700	90,000	153,000,000	153,000,000	15,000	25,500,000	25,500,000
Unsecured Marina Property			48,993,000	24,497,000		0	0
TOTAL	--	--	1,144,893,000	927,540,000	--	749,700,000	599,668,000

Source: McDonald & Associates and Alfred Gobar Associates

The Gobar Analysis presented two estimates of the public services cost for city-provided services. The first estimate was developed in conjunction with responsible City department heads. In each case, this estimate was lower than the existing citywide per capita average. A second estimate, based on Vallejo's current per capita experience, was then presented in the Gobar Analysis for illustrative purposes.

The present analysis uses only the revised cost estimates prepared by responsible department heads. It was confirmed that these estimates were carefully considered and reflect the actual intention of the service providers. A comparison of the Gobar Analysis (Table III-17) and the vertical analysis shown in Table III-20 indicate the following major differences: a change in the firehouse financing of 10% over 15 years, a clarification of the term "three-person engine company" to reflect round-the-clock staffing by three people, and a revised public service plan for libraries.

The fund balance, considering the revised revenue estimates and the revised cost estimates for Alternative A, is presented as a phase-by-phase analysis. This analysis indicates a negative fiscal impact for the early phases. This negative impact is associated with the costs of providing police and fire protection services prior to full-scale commercial and residential development. With the continued development in later phases, a positive (both annual and cumulative) fiscal impact is realized.

The City of Vallejo currently contributes $345,810 to the County Library and contributes $145,800 to the Redevelopment Agency for the library facility lease payment. The cost to Vallejo would increase by $45,400--the amount required to finance the library capital costs.

The significant reduction in estimated property tax revenues, even when the taxable values from the Gobar Analysis are used, is caused by the lower tax apportionment factor applicable to the Cullinan Ranch. The applicable factor for the Cullinan Ranch Tax Rate Area was estimated by the Office of the Solano County Auditor Controller to be 13.642%. (An alternate and approximate calculation of the City of Vallejo's share of the property tax, after annexation, was used in the Gobar Analysis.)

The revised fiscal estimate of the impact of the proposed project on Solano County are summarized in Table III-21. This table shows separate estimates for the direct costs and for the costs that were estimated in the original study on a per capita basis.

Solano County provides library service to the Greater Vallejo Division population of 87,131 (Vallejo and adjacent unincorporated pockets) through the Kennedy Library and branch libraries. A new library facility would be required to serve the project residents, oriented toward high impact and high use of popular materials. One 1600 square foot portable structure would be placed on-site. The structure would include 32 seats, 4 study tables, bookshelves and carousels. The capital cost for the building, installation, freight, site plan and foundation landscaping would total $265,000. Additionally, 14,000 paperback volumes (including processing) would cost $80,000. These capital costs could be financed with Mello-Roos Community Facilities District bonds. For illustrative purposes, bonds were assumed to be amortized over a 15 year period at 10%, for an annual cost of $45,400. Annual ongoing costs for a Senior Library Assistant and a Library Assistant would total an additional $60,000.

The primary sources of revenue to the Library Fund are property taxes (and Special District Augmentation Funds), a portion of County Revenue Sharing, and contributions from the City of Vallejo. Property tax revenue to the Library Fund is estimated at $157,900 to $244,300. Revenue Sharing, if continued, would yield $13,700. Contributions

Table III-20

SUMMARY OF COSTS AND REVENUES--BY PHASE--Alternative A
CITY OF VALLEJO
CULLINAN RANCH DEVELOPMENT

Figures are expressed in terms of constant 1981/1982 DOLLARS

	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5	PHASE 6	PHASE 7
COSTS							
Police Protection	$ 150,000	$ 150,000	$ 300,000	$ 300,000	$ 400,000	$ 400,000	$ 400,000
Fire Protection	$ 50,300	$ 127,000	$ 800,000	$ 800,000	$ 800,000	$ 800,000	$ 800,000
Public Works--Street	$ 22,300	$ 48,800	$ 87,500	$ 106,800	$ 131,200	$ 157,400	$ 198,600
Library	$ 3,600	$ 9,200	$ 18,800	$ 45,400	$ 45,400	$ 45,400	$ 45,400
Overhead Costs @ 15%	$ 33,900	$ 50,300	$ 180,900	$ 187,800	$ 206,500	$ 210,400	$ 216,600
TOTAL OF ALL COSTS	$ 260,100	$ 385,300	$ 1,387,200	$ 1,440,000	$ 1,583,100	$ 1,613,200	$ 1,660,600
REVENUES							
Prop. Tax @ 13.642%	$ 37,200	$ 128,300	$ 304,800	$ 430,600	$ 651,600	$ 748,500	$ 859,800
Sales Tax	$ 35,000	$ 75,000	$ 225,000	$ 300,000	$ 350,000	$ 425,000	$ 500,000
Utility Users' Tax	$ 36,900	$ 93,300	$ 191,800	$ 241,500	$ 329,000	$ 413,800	$ 493,200
Transient Occupancy	$ 0	$ 0	$ 0	$ 0	$ 105,100	$ 105,100	$ 105,100
Property Transfer Tx	$ 15,500	$ 23,200	$ 30,100	$ 14,800	$ 15,200	$ 21,800	$ 21,700
Business License Tax	$ 5,000	$ 12,500	$ 25,800	$ 32,500	$ 44,300	$ 55,700	$ 66,400
Franchise Fees	$ 4,600	$ 11,600	$ 23,900	$ 30,100	$ 41,100	$ 51,700	$ 61,600
Vehicle In-Lieu Fee	$ 15,500	$ 39,400	$ 81,000	$ 101,900	$ 138,900	$ 174,700	$ 208,200
Cigarette Tax	$ 5,000	$ 10,600	$ 21,200	$ 23,000	$ 23,200	$ 24,200	$ 24,100
Fines, Forf. & Penal	$ 1,700	$ 4,300	$ 8,900	$ 11,200	$ 15,200	$ 19,100	$ 22,800
Highway Users' Tax	$ 9,200	$ 20,100	$ 33,100	$ 33,400	$ 33,900	$ 34,100	$ 32,600
Misc. Per Capita Rev	$ 3,600	$ 9,200	$ 18,800	$ 23,700	$ 32,300	$ 40,700	$ 48,500
TOTAL REVENUES	$ 169,200	$ 427,500	$ 964,400	$ 1,242,700	$ 1,779,800	$ 2,114,400	$ 2,444,000
ANNUAL BALANCE	$ -90,900	$ 42,200	$ -422,800	$ -197,300	$ 196,700	$ 501,200	$ 783,400
CUMULATIVE BALANCE	$ -90,900	$ -48,700	$ -471,500	$ -668,800	$ -472,100	$ 29,100	$ 812,500

Source: McDonald & Associates, and City of Vallejo

Table III-21

Summary of Costs and Revenues--Year 20--Alternative A
COUNTY OF SOLANO
CULLINAN RANCH DEVELOPMENT

	ORIGINAL ANALYSIS (GOBAR)	REVISED ANALYSIS FOR EIR/EIS
COSTS		
Direct Costs @ $48.61/capita	$ 554,100	$ 554,100
Health Net Cost	0	11,400
Welfare Net Cost	0	48,500
Overhead Costs @ 15.46%	85,700	94,900
TOTAL GENERAL FUND COSTS	$ 639,800	$ 708,900
Library Services		$ 105,400
TOTAL ALL COSTS	$ 639,800	$ 768,900
REVENUES		
Property Tax @ 31.287%	$ 3,583,500	$ 1,971,800
Vehicle In Lieu Fee	--	159,100
Property Transfer Tax	--	21,700
TOTAL GENERAL FUND	$ 3,583,500	$ 2,152,600
Library Fund Property Tax	--	$ 258,400
Contribution from Vallejo		45,400
Revenue Sharing @ $1.20/capita		13,700
TOTAL LIBRARY FUND		$ 317,500
TOTAL ALL FUNDS	$ 3,583,500	$ 2,470,100
BALANCE	$ 2,943,700	$ 1,701,200

Source: McDonald & Associates and Alfred Gobar Associates

from Vallejo are estimated for the initial years at the per capita average of $4.25; following the construction of a new library facility, Vallejo would pay the capital costs of the facility, estimated at $45,400 annually. Total revenue to the Library Fund is thus estimated at $219,100 to $305,500. On balance, the Library Fund revenues exceed the costs of providing library service.

To summarize, the revised analysis presents numeric conclusions different from the original analysis. The indicated fiscal balance is lower than that indicated in the original analysis, and the initial phases would generate a negative fiscal impact. Overall, the revised analysis does indicate that the project as proposed would produce a cumulative positive fiscal impact for the public agencies providing services.

Fiscal Impacts of Alternative B. Since Alternative B differs from the proposed project (Alternative A) only in the mix of units, it is possible to adjust the fiscal analysis to reflect:

- a total taxable market value that is lower than Alternative A because of the greater proportion of multi-family units,
- A total population that is lower because the average household size for multi-family units is lower.

The assumed taxable values are summarized in Table III-22.

The revenue estimates were revised to reflect the change in taxable values and the change in population. The cost estimates for the City were left unchanged since they reflected a public service delivery plan that would still be realistic given the new mix of land uses. It is doubtful that any economies could be achieved because of the reduced population.

The results of the analysis for the City are summarized in Table III-23. It can be seen that Alternative B also produces a positive fiscal balance. The analysis of impacts on Solano County is shown in Table III-24.

Fiscal Impact of Alternative C. Alternative C differs from the proposed project (Alternative A) in both the type of units, number of units, and mix of units. The fiscal analysis for Alternative C reflects:

- A total market value that is higher than Alternative A because of the greater number of units.
- A total population that is substantially higher because of the greater number of units.

The assumed taxable values are summarized in Table III-25.

The revenue estimates were revised to reflect the change in taxable values, taxable sales, and the change in population.

The cost estimates for the City were revised where appropriate. A doubling in the miles of roads to be maintained doubles the public works costs. The City's contribution to the Library doubles to finance the doubled library facility capital costs. Both fire and police costs would be the same as for Alternative A. The results of the analysis for the City are summarized in Table III-26.

Table III-22

TAXABLE VALUES FOR ALTERNATIVE B
CULLINAN RANCH DEVELOPMENT

LAND USE	No. of Units	As Proposed			Current Vallejo Values		
		Unit Value	Original Total Market Value	Taxable Value: Year 10	Unit Value	Original Total Market Value	Taxable Value: Year 10
Single Family Residential	1525	$214,500	327,112,000	263,849,000	$ 170,000	259,250,000	209,111,000
Multi-Family Residential	2975	144,000	428,400,000	345,547,000	90,000	267,750,000	215,967,000
Hotel	200	75,000	15,000,000	10,210,000	75,000	15,000,000	10,210,000
Commercial	65 ac	923,000	60,000,000	40,842,000	923,000	60,000,000	40,842,000
Landscaped Area/Open Space	766.5 ac	0	0	0	0	0	0
Marina	700	12,000	8,400,000	5,718,000	6,000	4,200,000	2,859,000
Boats	1700	90,000	153,000,000	153,000,000	15,000	25,500,000	25,500,000
Unsecured Marina Property			48,993,000	24,497,000		0	0
TOTAL	--	--	1,040,905,000	843,663,000	--	631,700,000	504,489,000

Source: McDonald & Associates and Alfred Gobar Associates

Table III-23

Summary of Costs and Revenues--Year 20--Alternative B
CITY OF VALLEJO
CULLINAN RANCH DEVELOPMENT

	REVISED ANALYSIS FOR EIR/EIS
COSTS	
Police Protection	$ 400,000
Fire Protection	800,000
Public Works -- Streets	198,600
Library	45,400
Overhead Costs	216,600
TOTAL	$ 1,660,600
REVENUES	
Property Tax @ 13.642%	$ 688,100
Sales Tax	500,000
Utility Users Tax	493,200
Transient Occupancy Tax	105,100
Property Transfer Tax	20,300
Business License Tax	66,400
Franchise Fees	61,600
Vehicle In Lieu Fee	186,600
Cigarette Tax	22,600
Fines, Forfeitures, Penalties	20,400
Highway Users' Tax	29,100
Misc. Per Capita Revenues	43,400
TOTAL	$ 2,236,800
BALANCE	$ 576,200

Source: McDonald & Associates

Table III-24

Summary of Costs and Revenues at Year 20--Alternative B
SOLANO COUNTY
CULLINAN RANCH DEVELOPMENT

	REVISED ANALYSIS FOR EIR/EIS
COSTS	
Direct Costs @ $48.61/capita	$ 496,800
Health Net Cost @ $1.00/capita	10,200
Welfare Net Cost @ $4.25/capita	43,400
Overhead Costs @ 15.46%	85,100
TOTAL GENERAL FUND	$ 635,500
Library Services	105,400
TOTAL ALL FUNDS	740,900
REVENUES	
Property Tax @ 31.287%	$ 1,578,400
Vehicle In Lieu Fee @ $13.96/cap	142,700
Property Transfer Tax	20,300
TOTAL GENERAL FUND	$ 1,741,400
Library Property Tax @ 4.100%	$ 222,100
Contributions from Vallejo	45,400
Revenue Sharing @ $1.20/capita	12,300
TOTAL LIBRARY FUND	$ 277,000
TOTAL ALL FUNDS	$ 2,018,400
BALANCE	$ 1,277,500

Source: McDonald & Associates

Table III-25

TAXABLE VALUES FOR ALTERNATIVE C
CULLINAN RANCH DEVELOPMENT

LAND USE	Number of Units	Current Vallejo Values		
		Unit Value	Original Total Market Value	Taxable Value Year 10
Single Family Residential	2,250	$ 170,000	$ 382,500,000	$ 308,525,800
Multi-Family Residential	6,000	$ 90,000	$ 540,000,000	$ 435,564,000
High Density Residential	1,750	$ 60,000	$ 105,000,000	$ 84,693,000
Commercial	40 ac	$ 923,000	$ 37,200,000	$ 25,376,000
Light Industrial	53 ac	$ 435,000	$ 23,[illegible]7,000	$ 15,715,000
Other Land Uses	587 ac	-0-	-0-	-0-
TOTAL	--	--	$ 1,087,867,000	$ 869,873,000

Source: McDonald & Associates and Alfred Gobar Associates

Table III-26

Summary of Costs and Revenues--Year 20--Alternative C
CITY OF VALLEJO
CULLINAN RANCH DEVELOPMENT

	ANALYSIS FOR EIR/EIS
COSTS	
Police Protection	$ 400,000
Fire Protection	$ 800,000
Public Works -- Streets	412,900
Library Contribution	90,800
Overhead Costs @ 15%	216,600
TOTAL	$ 1,706,000
REVENUES	
Property Tax @ 13.642%	$ 1,186,800
Sales Tax	$ 391,400
Utility Users Tax	$ 1,096,100
Property Transfer Tax	$ 31,000
Business License Tax	$ 66,400
Franchise Fees	$ 136,900
Vehicle In Lieu Fee	$ 398,100
Cigarette Tax	$ 35,400
Fines, Forfeitures, Penalties	$ 43,600
Highway Users' Tax	$ 64,100
Misc. Per Capita Revenues	$ 92,600
TOTAL	$ 3,542,400
BALANCE	$ 1,836,400

Source: McDonald & Associates

Similarly, the cost and revenue estimate for the County were revised. Alternative C would require a larger on-site library facility consisting of two linked portable structures. The capital costs would be double that for Alternatives A and B. Amortizing a $690,000 bond issue at 10% over 15 years yields an annual payment of $90,800. Annual ongong costs including a full-time librarian would total $100,000. The results of the analysis for the County are summarized on Table III-27.

Wastewater Treatment. The Gobar Analysis identified several unresolved issues. The treatment process at the Sanitation District treatment plant is currently being upgraded to correct existing problems but this upgrade will not provide capacity for any of the proposed alternatives at Cullinan Ranch. The required expansion can be financed through the use of connection fees and user charges or through the use of revenue bonds to be repaid by these charges.

Park Financing. The demand for parks that will be generated by all of the alternatives can be financed in one (or both) of two ways. Both financing procedures can be implemented before development actually occurs.

The first alternative is for the developer to provide a negotiated number of parks, located and built to a negotiated standard, on a turnkey basis. The parks would thus be financed in the same way as other developer-financed infrastructure.

The second alternative is to levy development fees in lieu of park dedications.

The two approaches can be used in combination particularly if some desirable park sites that would be used by project residents are not located physically on Cullinan Ranch.

School Finance. The previous fiscal analysis identifies two unresolved questions about schools:

- How should the proposed elementary and junior-high schools be financed?
- Will a community with the income level implied by the price of the housing mix actually generate enough pupils to occupy the school facilities?

The statewide school bond issue which was passed in the November, 1982 election could conceivably provide funds that will be available to the school district, but the competition for the proceeds of this fund issue will be intense. It must be anticipated that districts with existing facility requirements will fare better in the competition for funds, compared to districts whose facility requirements are produced by a planning decision not yet made. If funds from the bond issue are not available, the recently-enacted Mello-Roos Community Facilities Act of 1982 provides an effective mechanism to finance school construction. A levy can be imposed on the entire planning area to pay for the required school construction. The financing procedure should be negotiated with the school district during the review period for the area's Specific Plan.

With regard to the question of pupil generation, it may be possible to mitigate the uncertainty of actual attendance by designing school facilities with the utmost flexibility and consideration for phase by phase expansion.

Fire Protection. The question of financing the proposed firehouse is unresolved at present. The Gobar Analysis notes that the firehouse might be financed from development fees that would be generated at the site (a total amount estimated to be approximately $2,500,000). If these funds are unavailable or insufficient, a Mello-Roos

Table III-27

Summary of Costs and Revenues--Year 20--Alternative C
SOLANO COUNTY
CULLINAN RANCH DEVELOPMENT

	ANALYSIS FOR EIR/EIS
COSTS	
Direct Costs @ $48.61/capita	$ 1,059,700
Health Net Cost @ $1.00/capita	$ 21,800
Welfare Net Cost @ $4.25/capita	$ 92,600
Overhead Costs @ 15.46%	$ 181,500
TOTAL GENERAL FUND	$ 1,355,600
Library Services	$ 198,800
TOTAL ALL FUNDS	$ 1,554,400
REVENUES	
Property Tax @ 31.287%	$ 2,721,600
Vehicle In Lieu Fee	$ 304,300
Property Transfer Tax	$ 31,900
TOTAL GENERAL FUND	$ 3,057,800
Library Property Tax @ 4.100%	$ 356,600
Contributions from Vallejo	$ 90,800
Revenue Sharing @ $1.20/capita	$ 26,200
TOTAL LIBRARY FUND	$ 473,600
TOTAL ALL FUNDS	$ 3,531,400
BALANCE	$ 1,997,000

Source: McDonald & Associates

Community Facilities District can be used to finance the firehouse. (A Community Facilities District can also be used to finance the ongoing costs of police and fire protection.)

Library Capital Costs. The capital costs of a new library facility could also be financed from development fees or from a Mello-Roos Community Facilities District.

Street Lighting and Waterway Maintenance. The previous study notes that a special assessment could be used to finance the costs of street lighting. It is not clear whether the doctrine of "special benefit", which is necessary to justify a benefit assessment under current California law, could be interpreted to include the maintenance of waterways within a benefit assessment district. If benefit-assessment fees are not available for this purpose, it may be possible to negotiate an agreement whereby a homeowners' association assumes responsibility for the maintenance costs of the waterways.

Motor Vehicle In-Lieu Fee. There is unavoidable uncertainty about the State of California's ability to continue providing subventions to local governments. During the last two years, the State reduced the share of motor vehicle in-lieu fees given to cities and to counties, in response to its own budget problems.

The current debate about the State's 1982/83 estimated budget shortfall frequently involves discussions of additional cutbacks for cities.

Motor vehicle in-lieu fees are allocated to cities and counties in proportion to population. The cutbacks for 1981/82 and 1982/83 were calculated as a fixed dollar amount for each city and for each county, as a function of the State "bailout" or property tax transfer that had been received by each city and by each county. Since the cutback was a fixed dollar sum and since motor vehicle in-lieu revenue is distributed in proportion to city population, each additional city resident produces the full per-capita amount. This assumption was used in the revenue estimates presented herein.

If the assumption proves to be invalid, the fiscal-impact conclusion would be modified. As a "worst case," the estimated general revenues would be reduced by $108,200, assuming a complete elimination of the motor vehicle in-lieu fee. This change would not be enough to change the conclusion about fiscal balance for the project.

M. ENERGY

Setting

As part of its energy conservation program, the City of Vallejo has established solar access guidelines for new residential construction.* The City requires participation in the PG&E Premium Energy Conservation Program. Maximum solar orientation of units through use of the Planned Unit Development approach is also encouraged.

The project site has relatively flat terrain without substantial tree cover. Consequently, the property is not shaded by either topography or vegetation and opportunities exist for solar generated energy. Public transit is not currently available along Highway 37 near the project site.

Impacts

Impacts would be similar for Alternatives A through C; energy demands would be highest for Alternative B. There would not be any impacts associated with Alternative D, the no project alternative.

Construction of the proposed development would establish an energy demand for residential, commercial, marina and institutional (school) uses on the site. Alternative C would also create energy demands associated with light industrial uses. Residences would require energy for heating and cooling, lighting and appliances. Commercial space would also require heating, cooling, lighting and energy for any office equipment. The proximity of schools, jobs and shopping would allow walking or bicycling from residences.

The primary energy demand associated with the proposed development would be fuel for transportation. Transportation to and from the site would be heavily auto dependent unless public transit is made available.

Estimated fuel consumption can be projected using an average trip length of 14.7 miles (see Appendix C for explanation of Vehicle Miles Traveled), and an average fuel efficiency of 17.5 miles per gallon. Table III-28 shows projected transportation energy use for the year 1987 and year 2000.

Mitigation Measures (Developer Responsibility)

- The proposed street pattern in single family residential clusters should be reoriented slightly, in order to increase solar access for Alternatives A, B, and C.
- Building design and orientation of proposed structures should maximize solar access and allow for installation of solar access facilities.
- Bicycle parking racks should be provided at all commercial, recreational and institutional facilities on the site.
- Planting design for the proposed development should include plant material for summer shading and winter solar access. Trees should be planted to shade large areas of pavement in parking areas.

*City of Vallejo, "Solar Access Measures for Residential Units."

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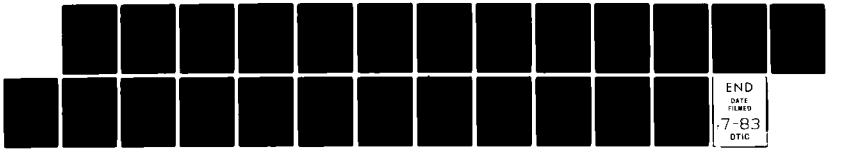

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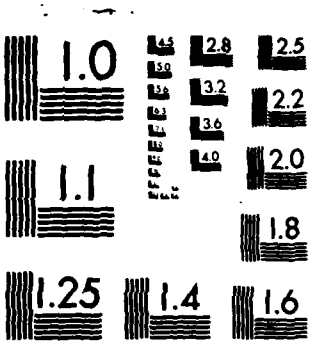

Table III-28

TRANSPORTATION ENERGY USE

	Year 1987	Year 2000
ALTERNATIVE A		
Daily Vehicle Miles Traveled	58,600	637,300
Daily Fuel Consumption (gallons of gasoline)	3,348	36,417
Annual Fuel Consumption (gallons of gasoline)	1,178,496	12,818,784
ALTERNATIVE B		
Daily Vehicle Miles Traveled	56,100	609,900
Daily Fuel Consumption (gallons of gasoline)	3,206	34,851
Annual Fuel Consumption (gallons of gasoline)	1,128,512	12,267,552
ALTERNATIVE C		
Daily Vehicle Miles Traveled	92,300	1,003,100
Daily Fuel Consumption (gallons of gasoline)	5,274	57,320
Annual Fuel Consumption (gallons of gasoline)	1,856,448	20,176,640

- To the greatest extent feasible, the City of Vallejo's residential energy measures should be incorporated into the development plan.

- Serious consideration should be given to extending public transit service along Highway 37, near the proposed development and to providing park and ride lots near the interchanges.

N. ARCHAEOLOGY

Archaeology - Setting

The California Archaeological Inventory of Sonoma State University conducted an archaeological records search in January 1983 to determine if known archaeological sites are located within the Cullinan Ranch property. Their findings indicate that no previously recorded archaeological sites, or California Historical Landmarks are situated within or immediately adjacent to the project boundaries. Ethnographic information and the locations of nearby archaeological sites suggest that archaeological sites are more likely to be situated on higher land than that contained within the Cullinan Ranch. According to historic maps, the project area was entirely within the salt marsh and was probably subject to tidal inundation. Archaeological surveys previously conducted within environmental settings similar to that of the project area have not resulted in the discovery of any archaeological resources.

Archaeology - Impacts

In consideration of the literature search, the project area for Alternatives A, B, C and D having low archaeological sensitivity and further archaeological study is not recommended at this time. However, the possibility remains that there are subsurface prehistoric or historic materials. Prehistoric materials include such items as obsidian or chert flakes and artifacts, mortars and pestles, bones, human burials, and concentrations of shell. Historic materials include stone foundations and walls, structural remains with square nails, ceramics, sun-tinted glass, and refuse deposits.

Archaeology - Mitigation (Developer Responsibility)

The following mitigation applies to Alternatives A, B, and C. If archaeological materials are found during construction, work in the immediate vicinity should be temporarily halted, and a qualified archaeologist should be consulted to evaluate the materials in order to provide recommendations for the protection of significant archaeological resources.

IV. ANY SIGNIFICANT ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Significant environmental effects which can be reduced to a level of insignificance through mitigations have been discussed in each section of this report.

The proposed project (Alternative A) and Alternatives B and C would have some unavoidable significant adverse impacts which cannot be mitigated to a level of insignificance. These impacts are summarized as follows:

Soils and Agriculture

- Alternatives A, B anc C would result in the loss of about 1268 farmable acres currently in oat hay production. The yield from this acreage which would be lost is about 6.7 percent of the total oat hay produced in the area. This loss is significant primarily as a cumulative adverse impact due to the total projected loss of acreage for hay production and the resulting impacts on the Marin and Sonoma County dairy industries.

Air Quality

- Alternatives A, B and C would result in a regional and local reduction in air quality, due primarily to automobile emissions, that would be significant as a cumulative impact.

Vegetation and Wildlife

- Alternatives A, B and C would eliminate the agricultural field habitat on the site and would eliminate the potential for tidal salt marsh restoration.

- From the standpoint of marsh preservation, Alternatives A, B and C would contribute to the cumulative adverse impacts of increased visitor use of the Napa Marsh.

Energy

- Alternatives A, B and C would add to the cumulative demand for energy to meet heating, cooling, lighting, transportation and other energy needs.

Traffic

- Alternatives A, B and C would result in Level of Service Ratings of "F" along State Route 37 given the presently proposed roadway system.

V. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Land Use

- For Alternatives A, B and C, the construction of residential units on the flight path of the Napa Airport would place constraints on flight operations because of public concerns regarding safety and noise. The possibilities for increasing flight operations would decrease. Alternative D would not affect future flight operations.

Air Quality

- Alternatives A, B and C would contribute to cumulative long-term air quality impacts due to increased motor vehicle emissions.

Soils and Agirculture

- Alternatives A, B and C would result in an annual decrease in oat hay production of about 6.7% of the total produced in the area. This loss of long-term productivity is an unavoidable cumulative adverse impact.

Vegetation and Wildlife

- Alternatives A, B and C would eliminate the restoration potential of 1493 acres of diked agricultural land within the historic marsh margin of San Francisco Bay due to the construction of lagoons and developed areas.

Energy

- Alternatives A, B and C would have long-term commitments of energy resources to provide for the local population increase.

Traffic

- Alternatives A, B and C would contribute to the long-term cumulative impacts of increased traffic and congestion especially along State Route 37.

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

The following irreversible and irretrievable commitments of resources would be involved in implementing Alternatives A, B or C as indicated.

- o Elimination of currently farmed agricultural land in favor of residential and recreational use (Alternatives A, B and C)
- o Use of building materials, fill materials, and energy during project construction and maintenance (Alternatives A, B and C)
- o Consumption of energy, water and services during project operation (Alternatives A, B and C)
- o Elimination of the potential for salt marsh restoration on about 1240 acres (Alternative A), 1123 acres (Alternative B) or 1393 acres (Alternative C)

VII. GROWTH INDUCING IMPACTS

Project alternatives A, B and C, in and of themselves are growth inducing. The addition of 4500 dwelling units to the City of Vallejo with the accompanying population increase would contribute to the need for goods and services in the area. Alternatives A through C would stimulate growth of additional (off-site) commercial centers to provide for the population increase, require expansion of public services and utilities, and require construction and improvement of roadways. Increased capacities may then be considered growth inducing. Development of the project would also result in increase in revenues to the City and Solano County. For a detailed discussion of revenue distribution please see Section III L. Economic/Fiscal. In addition, implementation of any of the Alternatives A through C would continue the precedent already set elsewhere permitting residential development on diked agricultural land within the historic marsh margin of San Francisco Bay. This could contribute to further development demand for surrounding diked lands.

The availability of housing could help to generate some additional employment opportunities in the City of Vallejo and in nearby communities. Housing availability would therefore contribute to economic growth in the subregion.

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U. S. Environmental Protection Agency. Storet Data Base, Region IX, San Francisco.

U. S. Environmental Protection Agency, Guidelines for Development of Control Strategies in Areas with Fugitive Dust Problems, OAQPS 1.2-071, October 1977.

Vallejo Sanitation and Flood Control District. "Rainfall Intensity and Duration Graph." May 1979.

2. Organizations and Persons Contacted

CalTrans District 10

Bob Biffel
Ken Berner

California Coastal Commission

Eric Metz

California Department of Fish and Game

James Swanson, Wildlife Biologist
Bob LeDonne, State Waterfowl Coordinator

California State Lands Commission

Don Reese, Land Agent
Mike Balentine, Staff Counsel

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Christy Huddle, Assistant Planning Director
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Al da Silva, Development Coordinator
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Larry Donovan, Traffic Engineer

Federal Aviation Administration

Technical Support Division
Scott Merrill, Assistant Manager

Napa County Airport

William Partain, Director

Napa County Planning Department

James Hickey, Director
James O'Laughlin, Senior Planner

San Francisco Bay Conservation and Development Commission

Michael Wilmar, Executive Director
Nancy Wakeman

Solano County Planning Department

David Hubble, Planner III

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Project Evaluation

Roger Golden

U. S. Coast Guard

Ken Johnson

U. S. Department of Navy

E. J. Scheyder

U. S. Fish and Wildlife Service

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Vallejo Sanitation and Flood Control District

Ron Matheson

Lessee of Cullinan Ranch

William Kiser

IX. LIST OF PREPARERS

Name	Professional Discipline	Years Exper.	Role in Preparing EIR/EIS
A. U. S. ARMY CORPS OF ENGINEERS			
Roger Golden	Social Science/ Environmental Planning	4	EIS Coordinator and Federal Review
Robert R. Mooney	Civil Engineer Environmental Planning	8	Federal Review
B. CITY OF VALLEJO PLANNING DEPARTMENT			
Christine Huddle	Urban Planning	9	Contract Administration EIR Development and Coordination
C. TORREY & TORREY INC.			
I.P. Torrey	Urban Planning	20	Contract Administration Project Supervision
Gerald Edelbrock	Environmental Planning Biology	6	Project Manager
Marsha Gale	Environmental Planning Landscape Architecture Graphics	9	Environmental Analysis
Gil Kelley	Environmental Planning	5	Environmental Analysis
Lorraine Lancaster	Report Preparation	6	Word Processing
D. TETRA TECH, INC.			
Donald B. Porcella, Ph.D.	Enviornmental Systems Engineering	20	Hydrology
George Bowie, Ph.D.	Environmental Systems Engineering	5	Sedimentation
William Mills	Environmental Systems Engineering	8	Water Quality
E. SANTINA & THOMPSON			
Michael Middleton	Civil Engineering	8	Marina Design and Utilities
Eugene St. Onge	Civil Engineering	10	Marina Design and Utilities

	Name	Professional Discipline	Years Exper.	Role in Preparing EIR/EIS
F.	HALLENBECK-McKAY ASSOCIATES			
	Curt Jensen	Geotechnical Engineering	13	Soils, Geology, Seismicity
G.	DONALD BALLANTI			
	Donald Ballanti	Meteorology	9	Air Quality
H.	TJKM			
	Arnold A. Johnson	Traffic Engineering	15	Traffic Analysis
I.	CHARLES SALTER ASSOCIATES			
	Richard Illingworth	Acoustical Engineering	7	Noise
J.	ANGUS McDONALD & ASSOCIATES			
	Angus McDonald	Economics	12	Fiscal and Soils and Agriculture
	Walter F. Kieser	Economics	6	Fiscal and Soils and Agriculture
	Scot Mende	Economics	6	Fiscal Analysis

X. PUBLIC INVOLVEMENT

Public involvement in the review of the Cullinan Ranch project has been (or will be) solicited by the Corps of Engineers and the City of Vallejo through the actions described below. In combination, they provide notices to ag ncies, organizations, and concerned individuals to participate in the review process through national, state and local means of notification.

	Notice of Preparation of a Draft EIR was issued by the City of Vallejo inviting participation in the scoping process.
September 2, 1982	Public Notive No. 14775E57 issued by the Corps for the Cullinan Ranch permit application.
November 2, 1982	Notice of intent to prepare a Draft EIS on the permit application to develop the Cullinan Ranch was published in the Federal Register by the Corps to invite participation in the scoping process.
November 29, 1982	Joint Corps of Engineers/City of Vallejo public scoping meeting was held in Vallejo. 1 p.m. and 7:15 p.m.
December 10, 1982	Site visit for Federal, State and Local Agencies
	Draft EIR/EIS filed with Environmental Protection Agency for publication of the Notice of Availability in the Federal Register.
	The City of Vallejo will issues a Notice of completion which will be acknowledged in the California EIR Monitor.
	Draft EIR/EIS circulated to public. See Chapter XI for distribution list.
	The City of Vallejo will schedule a public hearing(s) on the EIR/EIS. The heating will be notice in local newspapers.

DISTRIBUTION OF DRAFT EIR/EIS

Federal

Soil Conservation Service
National Marine Fisheries Service
Department of Energy
Department of Health and Human Services
Department of Housing and Urban Development
Fish and Wildlife Service
Department of Interior, Geological Survey
Department of Interior, Heritage, Conservation and Recreation
Department of Interior, Office of Environmental Project Review
Twelfth Coast Guard District
Department of Transportation
Environmental Protection Agency
Environmental Protection Agency, Office of Federal Activities
Department of Commerce, Office of Ecology and Conservation
Mare Island Naval Shipyard

State

State Clearinghouse, for
Office of Planning and Research
Resources Agency
Department of Fish and Game
CalTrans
Water Resources Control Board
Air Resources Board
Department of Boating and Waterways
State Lands Commission
Department of Health Services
Office of Historic Preservation

Regional and County

Water Quality Control Board
Association of Bay Area Governments
Bay Area Air Quality Maintenance District
Bay Conservation Development Commission
Local Agency Formation Commission
Napa County Planning Director
Napa Planning Director
Solano County Planning Director
Benicia Planning Director
Solano County Mosquito Abatement District
Solano County Health Department
Napa County Airport
Napa County Mosquito District
Metropolitan Transportation Commission
Napa Register

Local

Planning Commission
City Council
Beautification Advisory Commission
Economic Development Commission
Greater Vallejo Recreation District
Vallejo Sanitation and Flood Control District
Pacific Telephone, Napa Office
P G & E, San Rafael Office
Solano Community College, Library
Solano Community College, Biology Department
Solano Community College, Science Department

Groups

Wetlands Coalition
Save the Bay Association
Marin Audubon Society
California Waterfowl Association
Madrone Audubon Society
Bay Planning Coalition
Napa-Solano Audubon Society
Ohlone Audubon Society
Marine Conservation League
Marin County Farm Bureau
Sierra Club - San Francisco Chapter
Sierra Club - Marin Group
Sierra Club - Vallejo
League of Women Voters
Hill Neighborhood Association
Vallejo Heights Improvement Association
Sierra Club - Redwood Chapter
Sierra Club - Mother Lode Chapter
California Institute of Man in Nature
California Tomorrow
California Wildlife Federation
Ecology Center
Environmental Defense Fund
ENVIRPYEST
Friends of the Earth
Institute for the Human Environment
Natural Resource Defense Council
Nature Conservancy
Golden Gate Audubon Society
Associated Sportsmen of California
Sierra Club (Bush St., San Francisco)
California Trout
Trout Unlimited

Private Parties

Doris Sloan
T. Brett Roberts
Kristen Barrene
Martin Cohen
Salem Rice
George S. Nolte & Assoc.
Lowell Bunn
Jimmy Genn
Lew Allen
Robin Leong
David Ruegg
Walter Cook
Deborah Mogel
Christine Samario
Bill Henriquis
Leslie Salt
W. R. Williams, Inc. (applicant)

Also made available at the following Places

Solano County, J. F. K. Public Library (Vallejo)
Marin County, Civic Center Library
Alameda County, Berkeley Library
Napa County, Napa Library
Army Corps of Engineers Library
Planning Department Office, City Hall, Vallejo

XI. "APPENDIX (SEPARATE VOLUME)"

A. SOILS, GEOLOGY, SEISMICITY AND EROSION

Harding Lawson Associates. "Preliminary (Phase I) Soil Investigation: Cullinan Ranch - Island No. 1; Vallejo, California." November 13, 1982.

Moffat & Nichol, Engineers. "Cullinan Ranch Shoreline Protection Study." January 1982.

B. HYDROLOGY, WATER QUALITY AND SEDIMENTATION

R. B. Krone & Associates/Resource Management Associates. "Water Circulation, Sedimenation and Algae Growth in the Cullinan Ranch Development Project." February 1982.

C. TRAFFIC AND CIRCULATION

Basmaciyan-Darnell, Inc. "Traffic Study for Cullinan Ranch and Guadalcanal Village." August 1982.

Moffat & Nichol, Engineers. "Cullinan Ranch Boat Traffic Study." December 1981.

TJKM Associates. Capacity Indices.

D. VEGETATION AND WILDLIFE

Harvey & Stanley Associates, Inc. "Cullinan Ranch: Ecological Aspects." June 1982.

Harvey & Stanley Associates, Inc. "Cullinan Ranch Wildlife Monitoring Program Interim Report." February 1983.

E. AGRICULTURE

Richard B. Bahme, AgriDevelopment Company. "Technical and Economic Evolution of the Cullinan Ranch Property for Agricultural Production." August 1982.

A. Doyle Reed, Agricultural Economist. "Economic Feasibility of the Cullinan Ranch for Agricultural Production." October 1982.

F. ECONOMIC/FISCAL

Alfred Gobar Associates, Inc. "Preliminary Fiscal Impact Evaluation -Cullinan Ranch Development; Vallejo, California." September 1982.

G. NOISE

Charles Salter Associates. "Fundamental Concepts of Environmental Acoustics."

H. AIR QUALITY

Donald Ballanti, "Methodology and Assumptions for Air Quality Analysis."

I. INITIAL STUDY

XII. INDEX

Subject & Pages

ACKNOLWEDGEMENTS

This report was prepared by Torrey & Torrey Inc., Environmental Planning and Design, One Sutter Street, Suite 707, San Francisco 94104. I. P. Torrey AICP, President, was Principal-in-Charge, and Gerald Edelbrock, M.A., Associate, was Project Director. Marsha Gale, ASLA, Associate, and Gil Kelley, Environmental Planner, participated in the preparation of the report. ASAP was responsible for word processing. The following subconsultants were responsible for portions of the EIR: Tetra Tech, Inc., hydrology, water quality and sedimentation; Santina & Thompson, marina design and utilities; McDonald & Associates, fiscal analysis, soils and agricultural; Charles Salter Associates, noise; Donald Ballanti, air quality; TJKM, traffic; Hallenbeck McKay, geology and seismicity.

Special thanks are due to Mr. Hal Boex, Planning Director, City of Vallejo and Ms. Christine Huddle, Assistant Planning Director, and to Mr. Roger Golden of the U. S. Army Corps of Engineers for providing background information and technical review of the document.